A TAXONOMIC STUDY OF THE APHIDS OF OKLAHOMA (HOMOPTERA: APHIDIDAE)

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PREFACE

The aphids or plant lice constitute an important group of phytophagous parasites. Due to their small size, specific determinations often are not attempted by the average economic entomologist. With the growing need for a more detailed understanding of the various species on which to evaluate damage, plant disease transmission, various types of control recommendations, etc., the necessity of a taxonomic study of the family became obvious.

The purpose of this study is to present in one paper, keys to the identification, descriptions, distribution and recorded host plants of the various species of aphids found in Oklahoma.

It is with deep appreciation, I wish to acknowledge the kind interest, valuable advice and guidance offered by Dr. D. E. Howell, graduate chairman, throughout the period of this study. Special appreciation is extended to Dr. W. A. Drew for valuable advice, encouragement, and assistance in collecting specimens; Drs. H. L. Chada, R. R. Walton, and U. T. Waterfall for assistance and advice in the preparation of this manuscript.

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TABLE OF CONTENTS

Chapter Page

IV. FAMILY APHIDIDAE (continued)

Chapter Page

IV. FAMILY APHIDIDAE (continued)

Chapter Page

LIST OF ILLUSTRATIONS

CHAPTER I

INTRODUCTION

The aphids or plant lice compose one of the more important plant infesting insect families. Due to their comparatively small size, they are often overlooked or shunned by applied workers. The crop losses resulting from the feeding activity of several of the species have brought to focus the importance of specific identification within this family as it relates to control recommendations. The expanding number of cases incriminating aphids as vectors of plant diseases has further emphasized the need for adequate references to aid applied entomologists in the identification of these insects.

The author became acutely aware of the lack of adequate references for Oklahoma while serving as the Survey Entomologist for the Oklahoma Cooperative Economic Insect Survey from September 1958 to September 1961. During this period of time, samples were collected from all counties in the State, as time would permit. These collections, along with those submitted by Oklahoma State Department of Agriculture Inspectors; USDA, Plant Pest Control Division personnel; Extension Entomologists; staff and graduate students of the Department of Entomology, Oklahoma State University, served as a basis for this study. Approximately 1500 collections were examined and slides were prepared of representative specimens for microscopic examination.

It is hoped that this preliminary study will encourage other entomologists to undertake the important task of expanding the understanding of this family of insects in Oklahoma.

CHAPTER II

REVIEW OF LITERATURE

The entire family Aphididae has never been covered in a single publication for all of the United States. Several regional publications have appeared over the years which are very valuable to workers in those regions but are of limited usefulness in Oklahoma. Of these regional or state studies, Palmer's (1952) "Aphids of the Rocky Mountain Region," Sanborn's (1904) "Kansas Aphididae," Kring's (1952) "Aphids or Plant Lice (Aphididae, Hemiptera) in Kansas," and Medler and Ghosh's (1968) "Species of Aphids Trapped During NC-67 Project on Aphid Migration" have been the most valuable in the study of the aphids of Oklahoma. In addition to these studies, the check lists of the aphids from Missouri by Kring (1955) and Leonard (1959) plus the list of Texas aphids by Leonard and Tissot (1965) have served as valuable supplements. An unpublished key to the Louisiana aphids by H. B. Boudreaux dated 1946 has served as a valuable reference for specimens collected in southeastern Oklahoma.

Very little work had actually been undertaken on the aphid fauna of Oklahoma prior to this study. Professor C. E. Sanborn, a recognized aphidologist, served in the Department of Entomology at Oklahoma State University for a number of years but he did not publish any taxonomic studies of aphids during this period of his career. Professor Sanborn's main aphid collection apparently has been lost over the years (only a limited number of slides mainly from Kansas and Texas, identified to

the generic level, are still available at Oklahoma State University) but some record of his Oklahoma collecting can still be found. In the records of the Entomology Department Insect Museum at Oklahoma State University, eight species of aphids are listed from the State bearing Sanborn's name as collector (and presumably identified by him) along with other pertinent collection data.

During 1958 and 1959, Dr. R. G. Price, then a graduate student at Oklahoma State University, surveyed the arthropod pests in Oklahoma greenhouses. In his thesis (1959), he reported five species of aphids attacking a variety of plants under greenhouse conditions in Oklahoma.

In 1968, Medler and Ghosh circulated their unpublished manuscript covering the results of a regional research project (NC-67) on aphid migration. This study listed twelve additional species of aphids which had not been found in the State during the period of this study. Their broad study was of invaluable assistance in the completion of this manuscript and that aid is gladly acknowledged.

Several revisionary studies involving particular genera have been published during the last thirty years which have some bearing on the study of Oklahoma aphids. These studies are reviewed within the body of this manuscript under the appropriate taxa.

The important changes in the synonymy of all genera and species are taken from literature as an aid to future students of this family. The appropriate literature citations are included with the synonymy under each taxon and, therefore, are not included in the section on literature cited.

Scientific names of the host plants are following Waterfall (1962), Gould (1962), or Bailey (1966).

CHAPTER III

METHODS AND MATERIALS

Collections were made using a camel's hair brush dipped in alcohol, and the specimens were stored in 1 dram vials containing 70 per cent ethyl alcohol. Collection data was placed on a label and enclosed in the vial with the specimens.

The mounting technique found to be most satisfactory was essentially the technique developed by Hille Ris Lambers (1950). The technique actually used during this study was as follows:

1. Place preserved specimens in a watch glass containing 70 per cent alcohol.
2. Decant most of the 70 per cent alcohol and replace with 40 per cent alcohol.
3. Allow specimens to sit a few minutes, then decant most of the 40 per cent alcohol and add 20 per cent alcohol.
4. Allow specimens to sit for approximately 10 minutes, then decant the 20 per cent alcohol and add 10 per cent KOH.
5. Heat specimens on an electrical hot plate to a level just below the boiling point. Heating time varies depending upon the size and coloration of the specimens. Usually from 1 to 5 minutes is sufficient.

6. Allow the KOH to cool, then decant and process the specimens through 20 per cent, 40 per cent, 70 per cent, and 85 per cent alcohol baths as described above.
7. Decant the 85 per cent alcohol and replace with chloralphenol (phenolic acid supersaturated with chloralhydrate).
8. Heat specimens in chloralphenol on an electrical hot plate to a level just below the boiling point and continue to heat the specimens until they are sufficiently cleared to observe the appendage through the opposite body wall.
9. Allow the chloralphenol to cool completely, then mount specimen in Hoyer's mounting medium on standard microscope glass slides.
10. Place prepared slides in a warming oven at 50°C and leave until the mounting medium has dried around the edge of the coverslip. Remove excess mounting medium from around the edge of the coverslip and ring the coverslip with "ZUT"[1] ringing compound.

Although the technique was not completely without faults, it was much more satisfactory than any of the others tried. The small percentage of slides which failed to seal properly and required remounting after a few years required very little effort and the time saved in preparing the original slide offset this disadvantage in the view of this author.

[1]ZUT, Slide Ring Compound. Bennett's, 65 West First South Street, Salt Lake City, Utah 84110.

CHAPTER IV

FAMILY APHIDIDAE

Description.

Alate Vivipara.

This is the most important morphological form of an aphid from a taxonomic standpoint. It is common to all aphids and exhibits a wide variety of morphological characteristics which can serve to develop functional keys to their specific identification. The keys found in this study are based upon the alate vivipara.

General Characteristics. HEAD. The antennae are typically 6-segmented and consist of two subequal basal segments, a long third segment, the fourth and fifth segments subequal and of moderate length, the sixth segment consisting of a short basal portion and a short figure-like to long thread-like terminal portion called the unguis. One primary sensoria is situated near the apex of antennal segment V while another is located at the junction of the base of segment VI and the unguis. A cluster of usually 4 to 6 marginal sensoria are arranged in a semicircle around the primary sensoria on antennal segment VI. A variable number of secondary sensoria are found on antennal segments III; often on segments IV and V but only occasionally on VI. The antennae arise from the anterior dorsal margins of the head which may be extended into what is referred to as frontal tubercles. These

frontal tubercles are more highly developed in specimens with elongate antennae. Three ocelli are present, with the middle ocellus situated on the vertex and the two remaining ocelli located on the dorsal surface usually in front and between the compound eyes. The compound eyes are usually well developed and each bears an ocular tubercle on the posterior margin. The rostrum is 5-segmented but typically segment V is reduced and often fused with segment IV. THORAX. The typical wing venation of the family is illustrated in Figure 1. Although most aphids have the media vein of the fore wing twice-branched, a number of genera are characterized by having the media once-branched or simple (not branched). The fore wing is always larger than the hind wing and the venation of the hind wing is reduced as compared to that of the fore wing. The legs are typical of insects in general but the tarsi are two segmented with the second segment being the larger of the two. ABDOMEN. The abdomen exhibits 8 distinguishable segments. On the dorsal surface at the junction of the fifth and sixth segments is located a pair of cornicles. The cornicles vary in size and shape (rarely absent). At the caudal end of the abdomen is a terminal process termed the cauda which is variable in size and shape. Ventrad to the cauda is the anal plate which is usually rounded or slightly to deeply indented.

Apterous Vivipara.

This form is more commonly found than the alate vivipara but is of less value taxonomically.

General Characteristics. This form is similar to the alate vivipara but lacks wings and has few if any secondary sensoria on the

antennal segments. Otherwise, this form exhibits the same general morphological characteristics as described in the alate form.

Alatoid Nymph.

This form is the immature individual which will develop into an alate adult. It is recognized by the presence of two pairs of wing pads on the thorax but does not exhibit the adult configuration of the cauda. It is of little taxonomic value in identifying specimens from throughout the family but in certain genera it is of great taxonomic value in identification at the species level.

Arrangement of Taxa.

The concept of the family, subfamilies, and tribes follows Palmer (1952). The more generalized tribes are placed first within each subfamily with the more specialized tribes listed later. At the generic and specific levels within the tribes, groups are arranged in alphabetical order for the sake of convenience and no phylogenetic relationship is implied.

Abbreviated synonymies to the genera and species are taken from literature as an aid to the reader.

Note. All measurements given are in millimeters.

Key to the Subfamilies of Aphididae in Oklahoma

Secondary sensoria on antennae of alate vivipara
circular to oval (Fig. 2).....Aphidinae.
Secondary sensoria on antennae of alate vivipara
transverse or annular (Fig. 3).....Eriosomatinae.

Subfamily Aphidinae

General Characteristics. Antennae usually 6-segmented; longer than the head and thorax combined, often longer than the body. Secondary sensoria on antennal segments circular to oval in outline. Compound eyes well developed, typically with ocular tubercles present. Media of fore wing once or twice branched. Cornicles present but of varying sizes and shapes. Cauda varying from short and broadly rounded to medium length and knobbed or spoon-shaped, to elongated with or without a basal constriction. Anal plate broadly rounded or indented. Wax glands rarely present, but if present, not abundant.

Note. The subfamily as considered here follows the concept of Palmer (1952).

Key to the Tribes of the Subfamily Aphidinae in Oklahoma

1. Cornicle mere rim, usually on broad shallow cone (mammiform) (Figs. 10 and 11).....2.
   Cornicle truncate to more or less elongate, not reduced to a mere rim.....4.

2. Radial sector of fore wing straight or nearly so.....Lachnini (in part).
   Radial sector of fore wing obviously curved.....3.

3. Media of fore wing once-branched.....Lachnini (in part).
   Media of fore wing twice-branched.....Callaphidini (in part).

4. Cauda and anal plate broadly rounded (both of the same general configuration) (Fig. 4)....Callaphidini (in part).

Cauda knobbed, elongate or a broadly tapering cone but not of the same general configuration as the anal plate.....5.

5. Cauda knobbed and anal plate bilobed or slightly indented (Fig. 5).....Callaphidini (in part).

Cauda a broad tapering cone, spoon-shaped or elongated, anal plate broadly rounded but not indented.....Aphidini.

Tribe Lachnini

General Characteristics. Body and appendages of most members with numerous moderate to long hairs. Frontal tubercles lacking. Antennae usually 6-segmented (5-segmented in Essigella Del Guercio); not longer than the body and usually only one-half the length of the body or less; unguis of terminal segment shorter than the base. Stigma usually somewhat elongated to greatly elongated (short and broad in Anoecia Koch) with radial sector straight (curved in Anoecia Koch). Cornicles never elongate, instead varying from mere pores or rims to broad cones. Cauda broadly rounded, wider than long. Anal plate broadly rounded.

Key to the Genera of the Tribe Lachnini in Oklahoma

1. First segment of hind tarsi triangular in outline when viewed in lateral aspect (hardly longer than wide) (Fig. 6).....*Anoecia*.
   First segment of hind tarsi trapezoidal in outline when viewed in lateral aspect (longer than wide) (Fig. 7).....2.

2. Rostrum lance-like, segment V well developed and distinctly lanceolate (Fig. 8).....*Cinara*.
   Rostrum obtuse, segment V vestigial or may appear coalesced with IV (Fig. 9).....3.

3. Antennae five-segmented.....*Essigella*.
   Antennae six-segmented.....4.

4. Cornicles mere rings or pores; hind tarsal segment I with dorsal hairs.....*Eulachnus*.
   Cornicles cone-like; hind tarsal segment I without dorsal hair.....5.

5. Cornicles small cones with very few or no hairs (Fig. 10).....*Schizolachnus*.
   Cornicles large, low cones with numerous hairs (Fig. 11).....6.

6. Stigma elongated to the apex of the wing (Fig. 12)...Longistigma.

Stigma not greatly elongated, does not reach the apex of the wing nor touch the apex of the radial sector.....Lachnus.

Genus Anoecia Koch

Anoecia Koch, 1856. Die Pflanzenlause:275.

Genotype: Aphis corni Fabricius, 1775 (monotypical).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Anoecia querci (Fitch)

The White-banded Dogwood Aphid

Eriosoma querci Fitch, 1859. New York Agri. Soc. Trans., 18:804.

Eriosoma cornicola Walsh, 1862. Proc. Entomol. Soc. Philadelphia, I:304.

Anoecia querci, Baker, 1916. Entomol. News, 27:359.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.755-2.340. Head, antennae, and rostrum brown. Rostrum reaching coxae III. Antennae with numerous hairs. Thorax and legs brown. Wings hyaline with short, broad stigma pale to medium brown. Abdomen light amber with narrow, transverse dusky to brown bands on dorsum of segments I and II, bands fusing into a rather large irregular spot covering dorsum of III, IV, and V extending to the sides far enough to enclose the cornicles, returning to narrow transverse bands on the

remaining caudal segments. Cornicle low cone with few fine hairs on base. Cauda and anal plate broadly rounded.

Measurements. Antennal segments as follows: I .071, II .071-.077, III .275-.321, IV .102-.112, V .097-.112, VI .092-.122 + .036-.041. Sensoria oval but varying in size, confined to an irregular line on the posterior of each segment. Sensoria numbering as follows: III 6-8, IV 2, V 2, VI 1 with marginal sensoria present. Leg segments as follows: femora I .388-.418, II .326-.367, III .428-.510; tibiae I .551-.571, II .561-.592, III .836-.918; first tarsal segments I .031-.036, II .031-.036, III .031-.036; second tarsal segments I .122-.133, II .122-.133, III .133-.153. Length of fore wing 2.520-2.813, hind wing 1.688-1.935.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.643-1.958. Body color varying from uniform pale amber to amber with transverse dusky crossbands. Antennae, rostrum and legs varying from pale amber to light brown with antennae V and VI, rostrum III, IV, and V and apex of tibia and tarsi darker.

Measurements. Antennal segments as follows: I .061-.077, II .071, III .158-.214, IV .071-.087, V .082-.092, VI .082-.097 + .041-.046. One sensorium present on terminal portion of IV, V, and VI with marginal sensoria on VI. Leg segments as follows: femora I .235-.296, II .235-.301, III .306-.403; tibiae I .301-.377, II .332-.418, III .479-.627; first tarsal segments I .031-.036, II .031-.036, III .036-.041; second tarsal segments I .112-.122, II .117-.128, III .128-.143.

Alatoid Nymph.

General Characteristics. Coloration as in apterous vivipara with wing pads pale amber to medium brown.

Collection Data.

Apterous vivipara. From roots of little bluestem (Andropogon scoparious Michx.): Goldsby, McClain Co., Oklahoma, Dec. 9, 1958, H. W. Van Cleave; Alex, Grady Co., Oklahoma, Nov. 16, 1959, H. W. Van Cleave; Nebo, Murray Co., Oklahoma, Nov. 17, 1959, H. W. Van Cleave; Kingston, Marshall Co., Oklahoma, Nov. 18, 1959, H. W. Van Cleave; Binger, Canadian Co., Oklahoma, Nov. 19, 1959, H. W. Van Cleave; Stroud, Lincoln Co., Oklahoma, Nov. 14, 1960, H. W. Van Cleave. From roots of purpletop (Triodia sp.): Ripley, Payne Co., Oklahoma, Nov. 19, 1959. From roots of unknown grass: Chimney Rock, Woodward Co., Oklahoma, Oct. 25, 1960.

Alate Vivipara. In air: Roman Nose State Park, Blaine Co., Oklahoma, Sept. 27, 1960, H. W. Van Cleave; Stillwater, Payne Co., Oklahoma, Oct. 7, 1960, H. W. Van Cleave. On Dogwood (Cornus sp.): Boiling Springs State Park, Woodward Co., Oklahoma, Oct. 25, 1960, H. W. Van Cleave and W. O. Washum. Casual on oats: Hennessey, Kingfisher Co., Oklahoma, Nov. 9, 1960, H. W. Van Cleave.

Mixed forms. On roots of little bluestem (Andropogon scoparious Michx.): Alex, Grady Co., Oklahoma, Nov. 16, 1960; Boynton, Muskogee Co., Oklahoma, Nov. 18, 1959; Stroud, Lincoln Co., Oklahoma, Nov. 14, 1960, H. W. Van Cleave; Pawnee, Pawnee Co., Oklahoma, Nov. 15, 1960, H. W. Van Cleave.

Genus Cinara Curtis

Cinara Curtis, 1935. Brit. Entomol., 12, sec. 576.

Lachniella Del Guercio, 1909. Redia, 5:286.

Wilsonia Baker, 1919. Can. Entomol., 51:212.

Dilachnus Baker, 1919. Can. Entomol., 51:253.

Lachnus Burmeister, (misidentification) Baker. 1920, U.S. Dept. Agri. Bull., 826:16.

Panimerus Laing, 1926. Entomol., 59:322.

Neochmosis Theobald, 1929. The plant lice or Aphididae of Great Britain. London, 3:129.

Genotype: Aphis pini Linnaeus, 1758. (Fixed by Curtis, 1835).

General Characteristics. Medium to large, hairy aphids with color reddish, grayish or blackish brown or green. Head divided dorsally by median longitudinal suture. Compound eyes well developed with ocular tubercle present. Antennae shorter than body, six segmented, with unguis shorter than base. Rostrum medium to long reaching coxa III or well beyond, segment V distinct and lanceolate. First tarsal segment distinctly traperzoidal in lateral spect. Cornicle with broad cone-like base, beset with setae. Cauda and anal plate broadly rounded. Fore wing with stigma somewhat elongate, radial sector straight, media once or twice branched (usually twice). Hind wing with media and cubitus present. Found living on bark of coniferae.

Note. Samples of each species listed under this genus were identified by A. N. Tissot, whose assistance is gratefully acknowledged. Generic and specific synonymy is taken from Palmer (1952) and Tissot (1938).

Key to the Species of the Genus *Cinara* in Oklahoma

1. Femora pale of nearly uniform color.....*braggii*.
   Femora with contrasting light and dark coloration or light basally shading to dark apically.....2.
2. Unguis shorter than or subequal to the diameter of the primary sensoria on antennal segment VI.....3.
   Unguis distinctly longer than the diameter of the primary sensoria on antennal segment VI.....4.
3. Antennal segment III of alate vivipara with 1-3 secondary sensoria, IV of apterous vivipara without sensoria.....*louisianensis*.
   Antennal segment III of alate vivipara with 4-6 secondary sensoria, IV of apterous vivipara with 1-2 sensoria.....*tujafilina*.
4. Setae on cornicles moderate in number and of subequal length and thickness, tibia I with prominent wide yellowish area bordered by dark areas at base and apex.....*pinivora*.
   Setae on cornicles very numerous; with few heavy long setae on lower base, with many shorter, finer setae over entire surface, tibia I dark throughout the entire length.....*watsoni*.

Cinara braggii (Gillette)

Lachnus braggii Gillette, 1917. Ann. Entomol. Soc. Amer., 10:138.

Cinara braggii, Palmer, 1952. Thomas Say Found., Vol. V:24.

This species was reported collected from Oklahoma by Medler and Ghosh (1968). Material was not available for this study so the following description of forms is taken from Palmer (1952).

> Apterous Summer Vivipara. Nymph. Body pale yellow to brownish with two longitudinal rows of pale greenish spots; lightly covered with pulverulence. Cornicle, tarsi, and genital plate black. Adult. Body yellow-brown to dark brown; dorsum mostly covered with heavy powder leaving a naked dark band on abdominal V and only spots and dashes on other segments; venter lightly pulverulent; legs pale except mere tips of tibiae and of antenna. Rostrum, entire tarsi, cauda, cornicle, anal, and genital plates black.
>
> Body length 3-4; hind tibia 1.3-1.7; antenna 1.10-1.17; cornicle in life covered with powder to diameter of .14; rostrum attaining 3d coxae to abdominal II. Hairs rather fine; on hind tibia 1.5 times as long as diameter of tibia.
>
> Alate Vivipara. Same as aptera in color and measurements. Hairs on hind tibia 2-3 times as long as diameter of tibia.
>
> Ovipara. Apterous. Head and thorax dark; abdomen pale yellow with dark band on abdominal V and dashes and spots on other segments; covered except on dark areas with pulverulence as in vivipara and also with entire body posterior to cornicles heavily pulverulent; cornicle black; entire hind tibia dusky. Measurements same as apterous vivipara. Hind tibia considerably swollen on distal half and thickly covered with sensoria along entire length.
>
> Male. Alate. Body blackish brown; more or less powdery. Body length 2.20; antenna 1.34; hind tibia 1.46. Otherwise as in alate vivipara.
>
> Egg. Black; naked. Size 1.25 by .55.

Cinara louisianensis Boudreaux

Cinara louisianensis Boudreaux, 1948. Florida Entomol., 31:95.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.06-2.44. Head and abdomen pale, thorax brownish. Antennal segments I and II, apical portions of two terminal segments darker. Rostrum extending past coxae III. Femora pale shading to dusky towards the apex, tibiae pale with apex dusky, tarsi dusky. Media of fore wings once or twice branched (even on same specimen).

Measurements. Antennal segments as follows: I .071-.082, II .066-.082, III .219-.247, IV .107-.138, V .117-.138, VI .117-.128 + .015-.020. Sensoria numbering as follows: III 1-3, IV 1, V 1-2, VI 1 with 4-6 marginal sensoria present. Leg segments as follows: femora I .541-.622, II .428-.479, III .704-.796; tibiae I .765-.877, II .714-.806, III 1.122-1.316; first tarsal segments I .061-.071, II .061-.071, III .061-.077; second tarsal segments I .194-.214, II .199-.204, III .214-.235. Length of fore wing 2.78-3.11, hind wing 1.67-1.89.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.94-2.28. Body color pale amber throughout with only the apical portion of antennal segments V and VI, terminal segment of rostrum, apex of tibiae and tarsi appearing dusky. Rostrum extending past coxae III.

Measurements. Antennal segments as follows: I .077-.087, II .066-.077, III .158-.194, IV .102-.112, V .102-.112, VI .097-.112 + .015-.026. Sensoria numbering as follows: V 1-2, VI 1 plus 4-6 marginal sensoria. Leg segments as follows: femora I .428-.479, II .408-.449, III .505-.581; tibiae I .612-.689, II .602-.683, III .857-.947; first tarsal segments I .061-.066, II .061-.066, III .061-.071; second tarsal segments I .168-.194, II .184-.199, III .194-.219.

Alatoid Nymph.

General Characteristics. Overall length from vertex to tip of cauda 2.00-2.44. Coloration as in alate vivipara with wing pads coloration same as thorax.

Collection Data. From arborvitae (Thuja orientalis L.): Stillwater, Payne Co., Oklahoma, May 7, 1960, W. A. Drew; Stillwater, Payne Co., Oklahoma, March 10, 1961, H. W. Van Cleave and W. A. Drew; Stillwater, Payne Co., Oklahoma, March 24, 1961, H. W. Van Cleave; Madill, Marshall Co., Oklahoma, March 29, 1961, H. W. Van Cleave and F. Vinson.

Comments. This species can be separated from C. tujafilina, also found on arborvitae, by its greenish body color and only a small amount of mealy waxy secretion present in the natural state. When cleared and mounted the winged forms can be distinguished by the presence of 1-3 sensoria on antennal segment III and the wingless females have sensoria present on segment V and VI only. In both species, the length of the unguis is subequal to the diameter of the primary sensoria on VI. This species is probably somewhat more common than indicated by the number of collections recorded but is difficult to detect due to its coloration. Colonies were found on the same plant with C. tujafilina.

Cinara pinivora (Wilson)

Lachniella pinivora Wilson, 1919. Can. Entomol. 51:44.

Dilachnus pinivora, Wilson, 1923. Conn. State Geol. and Natur. Hist. Survey Bull., 34:267.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.06-3.89. Coloration as follows: head and abdomen brownish amber; thorax brown; antennal segments I, II, and VI apical half of segments III, IV, and V brown; coxae brown; trochanters amber; basal half of femorae amber shading to dusky or brown; base and apex of tibiae brown with broad yellowish amber area in between covering one-half to two-thirds of length; tarsi dusky to brown; cauda and anal plate dusky to brown. Cornicles large, dusky to light brown in color with comparatively limited number of moderately heavy setae of subequal length present. Rostrum extending past coxae III. Wings dusky with stigma brown. Media of fore wings twice branched.

Measurements. Antennal segments as follows: I .112-.133, II .122-.127, III .602-.648, IV .204-.235, V .275-.296, VI .117-.122 + .041. Sensoria number as follows: III 3-6, VI 1-2 plus 1 primary, VI 1 primary sensoria plus marginal sensoria. Leg segments as follows: femora I 1.111-1.222, II .945-1.000, III 1.611-1.722; tibiae I 1.667-1.778, II 1.722-1.833, III 2.945-3.111; first tarsal segments I .122-.143, II .128-.143, III .128-.138; second tarsal segments I .240-.265, II .235-.260, III .260-.286. Fore wing 4.78-5.00, hind wing 2.67-3.11.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.67-3.72. Coloration as in alate vivipara except that thorax is concolorous with head and abdomen.

Measurements. Antennal segments as follows: I .117, II .117-.122, III .602-.612, IV .204-.214, V .260, VI .117 + .046. Sensoria number as follows: III 1, IV 1, V 1 plus 1 primary sensoria, VI 1 primary sensoria plus marginals. Leg segments as follows: femora I 1.111-1.222, II 1.000-1.056, III 1.556-1.722; tibiae I 1.556-1.611, II 1.667, III 2.834-3.000; first tarsal segments I .120, II .128-.148, III .138-.143; second tarsal segments I .235-.240, II .245-.255, III .265-.270.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 3.44. Coloration as in alate vivipara with thorax and wing pads concolorous.

Collection Data. From pine (Pinus sp.): Madill, Marshall Co., Oklahoma, April 20, 1960, H. W. Van Cleave, F. Vinson, and J. C. Pennington; Rattan, Pushmataha Co., Oklahoma, May 5, 1960, J. M. Goin; Broken Bow, McCurtain Co., Oklahoma, May 12, 1960, H. W. Van Cleave. From short leaf pine (Pinus echinata Mill.): Flint, Delaware Co., Oklahoma, May 4, 1960, H. W. Van Cleave and T. Ritter.

Comments. This species can be distinguished by the lanceolate rostrum of Cinara; the front tibiae having a light colored area as in the middle and hind tibiae; and the cornicles being rather large and prominent. The setae on the cornicles are of subequal length and texture.

Cinara tujafilina (Del Guercio)

Lachniella tujafilina Del Guercio, 1908. Redia, V:287.

Lachnus juniperi, Essig, 1911. Pom. J. Entomol., Vol. 3:541.

Lachnus tujafilinus, Swain, 1919. Univ. Calif. Publ., III:50.

Cinara tujafilina, Tissot, 1939. Florida Entomol., XXII:42.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.72-3.89. Body reddish brown with whitish, mealy, waxy covering present over much of the dorsal surface. Antennal segment I and II, apex of segments III, IV, V, and most of VI, thorax, apical two-thirds of femora, apex of tibiae, tarsi, and cornicles darker brown. Antennae, legs, head, and abdomen with numerous medium to long setae. Rostrum long, reaching well past coxae III. Wings pale dusky brown, media of fore wings twice branched.

Measurements. Antennal segments as follows: I .092-.107, II .082-.092, III .388-.428, IV .163-.184, V .168-.184, VI .153-.163 + .015-.020. Sensoria numbering as follows: III 4-6, IV 1-2, V 1-2, VI 1 with 5-6 marginal sensoria present. Leg segments as follows: femora I .833-1.000, II .667-.778, III 1.111-1.333; tibiae I 1.111-1.389, II 1.111-1.333, III 1.778-2.167; first tarsal segments I .077-.087, II .082, III .077-.087; second tarsal segments I .230-.265, II .230-.281, III .265-.296. Length of fore wing 4.11-4.56, hind wing 2.72-3.11.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.83-3.67. Body color reddish brown with whitish mealy, waxy covering present in characteristic pattern on dorsum of living specimens. Due to the absence of the waxy secretion, two dark longitudinal lines show, beginning just behind the head, and diverge as they progress to the cornicles where they meet with a dark transverse line extending between the cornicles. In mounted specimens body color is reddish brown with several rows of small transverse and circular darker spots or dorsum of abdomen. Rostrum extending past coxa III. Antennal segment I, apex of V and apical two-thirds of VI dark. Apex of tibiae and tarsi dark. Cornicles dark. Body, antennae, and legs covered with numerous medium to long setae.

Measurements. Antennal segments as follows: I .071-.102, II .071-.092, III .286-.357, IV .133-.163, V .122-.168, VI .122-.148 + .015-.026. Sensoria present as follows: IV 1-2, V 0-1 small followed by 1 large at apex, VI 1 large at apex preceded by 5-6 marginal sensoria of varying but smaller size. Leg segments as follows: femora I .643-.704, II .581-.653, III .816-.928; tibiae I .816-.928, II .816-.928, III 1.306-1.387; first tarsal segments I .071-.087, II .071-.082, III .071-.082; second tarsal segments I .204-.214, II .204-.235, III .224-.255.

Alatoid Nymph.

General Characteristics. Coloration as in apterous vivipara except that thorax and wing pads slightly darker than remainder of body. Overall length from vertex to tip of cauda 2.44-3.28.

Collection Data. From arborvitae (Thuja orientalis L.): Elk City, Beckham Co., Oklahoma, October 30, 1959, R. Burk; Elk City, Beckham Co., Oklahoma, February 2, 1960, H. W. Van Cleave; Stillwater, Payne Co., Oklahoma, February 22, 1960, C. F. Stiles; Oklahoma City, Oklahoma Co., Oklahoma, March, H. H. Latham; Randlett, Cotton Co., Oklahoma, March 5, 1960, A. C. Hatfield; Pocasset, Grady Co., Oklahoma, March 16, 1960, H. W. Van Cleave; Duncan, Stephens Co., Oklahoma, March 16, 1960, H. W. Van Cleave; Lawton, Comanche Co., Oklahoma, March 16, 1960, H. W. Van Cleave; Henton, Caddo Co., Oklahoma, March 17, 1960, H. W. Van Cleave; Noble, Cleveland Co., Oklahoma, March 22, 1960, H. W. Van Cleave; Pauls Valley, Garvin Co., Oklahoma, March 22, 1960, H. W. Van Cleave; Wewoka, Seminole Co., Oklahoma, March 23, 1960, H. W. Van Cleave; Millcreek, Johnston Co., Oklahoma, March 26, 1960, F. Vinson; Coalgate, Coal Co., Oklahoma, March 28, 1960, F. Vinson: Pawnee, Pawnee Co., Oklahoma, March 31, 1960, H. W. Van Cleave; Yukon, Canadian Co., Oklahoma, April 1960, T. Ritter; Stigler, Haskell Co., Oklahoma, April 5, 1960, H. W. Van Cleave; Sprio, Le Flore Co., April 5, 1960, H. W. Van Cleave; Checotah, McIntosh Co., Oklahoma, April 6, 1960, H. W. Van Cleave; Warner, Muskogee Co., Oklahoma, April 14, 1960, W. O. Washum; Kingfisher, Kingfisher Co., Oklahoma, January 31, 1961, H. W. Van Cleave; Marshall Co., Oklahoma, March 20, 1961, F. Vinson; Madill, Marshall Co., Oklahoma, March 29, 1961, H. W. Van Cleave; Talequah, Cherokee Co., Oklahoma, April 4, 1961, H. W. Van Cleave; Ponca City, Osage Co., Oklahoma, April 15, 1961, R. L. Owens; Briston, Creek Co., Oklahoma, April 18, 1961, C. F. Stiles.

Comments. This species can be separated in the field from the other species found on arborvitae by its reddish brown color and the presence of the whitish, waxy, mealy secretion in the characteristic pattern described above. When cleared and mounted on slides, the fact that the unguis is subequal in length to the diameter of the primary sensoria on VI and the presence of 4-6 sensoria on III in the alate forms will serve to separate it from the other members of Cinara.

Note. Synonymy of this species is adapted from Tissot (1939).

Cinara watsoni Tissot

Cinara watsoni Tissot, 1939. Florida Entomol., 22:43.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.00-2.67. Coloration as follows: head and abdomen brownish amber, thorax brown; apex of rostrum segment II, all of III, IV, and V, brown to dark brown, legs blackish brown with narrow yellowish band at base of femora I and II, femora III with slightly wider yellowish band, tibiae II and III with blackish brown band at base followed by yellowish area one-third of length with remainder blackish brown; cornicles light brown; abdomen with scattered brown circular spots and transverse patches. Setae on cornicles of irregular length with few longer, heavier setae generally confined to basal half. Numerous fine setae present over total surface. Rostrum extending well past coxae III. Media of fore wing twice branched.

Measurements. Antennal segments as follows: I .122-.148, II .117-.122, III .510-.530, IV .250-.286, V .265-.306,

VI .189-.199 + .051-.056. Sensoria numbers as follows: III 7-9, IV 2-4, V 0-1 plus 1 primary sensoria, VI 1 primary sensoria plus 3-5 margin sensoria. Leg segments as follows: femora I 1.056-1.167, II .833-.945, III 1.278-1.500; tibiae I 1.389-1.556, II 1.389-1.611, III 2.111-2.445; first tarsal segments I .158-.173, II .158-.179, III .168-.179; second tarsal segments I .265-.296, II .281-.296, III .296-.311. Fore wing 4.00-4.56, hind wing 2.33-2.78.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.67-4.78. Coloration as above except that thorax is concolorous with head and abdomen. Setae on cornicles as above.

Measurements. Antennal segments as follows: I .122-.133, II .107-.122, III .571-.607, IV .286-.316, V .270-.306, VI .173-.204 + .051-.056. Sensoria number as follows: III 0-4, IV 0-3, V 0-2, VI 1 plus 4-6 marginal sensoria. Leg segments as follows: femora I 1.167-1.278, II 1.111-1.222, III 1.445-1.556; tibiae I 1.500-1.611, II 1.500-1.611, III 2.278-2.445; first tarsal segments I .163-.189, II .158-.194, III .168-.199; second tarsal segments I .281-.306, II .275-.301, III .286-.321.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 3.00-3.56. Coloration as in alate vivipara with thorax and wing pads concolorous.

Collection Data. From pine (Pinus sp.): Madill, Marshall Co., Oklahoma, April 20, 1960, H. W. Van Cleave, F. Vinson and J. C. Pennington; Broken Bow, McCurtain Co., Oklahoma, May 12, 1960, H. W. Van Cleave; Madill, Marshall Co., Oklahoma, March 20, 1961, F. Vinson; Madill, Marshall Co., Oklahoma, March 29, 1961, H. W. Van Cleave and F. Vinson; Rattan, Pushmataha Co., Oklahoma, October 7, 1961, D. C. Arnold. From Slash pine (Pinus caribaea, Morelet.): Ardmore, Carter Co., Oklahoma, May 2, 1961, H. W. Van Cleave, F. Vinson and J. L. Meharg.

Comments. This large grayish brown aphid was found feeding on limbs and twigs of pine. It can be recognized by the long rostrum having the terminal segment lanceolate and the front tibiae blackish brown throughout their length. It can be distinguished from C. pinivora in that this species has normal sized cornicle with setae of varying length and texture.

Genus Essigella Del Guercio

Essigella Del Guercio, 1909. Redia, 5:329.

Genotype: Lachnus californicus Essig, 1909 (monotypical).

General Characteristics. Body elongate and narrow. Head much broader than long, compound eyes without ocular tubercles. Antenna five segmented (resulting from the coalescing of segments III and IV) and bearing only a few minute setae; unguis bearing the primary sensoria. Rostrum broad, segment V reduced to mere tip. Fore wing hyaline with media once-branched or unbranched, and faint. Cornicle reduced to mere ring. Cauda broadly round to pointed with a distinct nipple at the apex. Anal plate broadly rounded.

Note. Students of this group should refer to Hottes (1957).

Key to the Species of the Genus *Essigella* in Oklahoma

Tibial hairs subequal in length to the diameter of the tibia.....*pini*.

Tibial hairs 1.5-2 times as long as diameter of the tibia.....*fusca*.

Essigella fusca Gillette and Palmer

The Brown and Green Pine Needle Aphid

Essigella fusca Gillette and Palmer, 1924. Ann. Entomol. Soc. Amer., 17:6.

This species was reported from Oklahoma by Medler and Ghosh (1968) captured in a suction trap. Material was not available for this study so the following description of forms is taken from Palmer (1952).

> Apterous Summer Vivipara. Head and often pronotum dusky yellowish brown; thorax dusky brown; abdomen pale to medium greenish or glaucous green, with dorsum marked with dusky spots often coalesced into crossbands or one solid patch fading out on head and pronotum; legs mostly dusky to blackish; antenna pale yellowish, dusky distal to middle of III. Body length 2-2.2, width .5-.8 parallel-sided; hind tibia .80-1.15; antenna .45-.55, unguis cylindrical, blunt bearing primary sensorium. Hairs slightly capitate; on hind tibia at angle of 45-60 degrees, 1.5 times as long as diameter of tibia.
>
> Alate Vivipara. Head and thorax brown; abdomen medium green with dusky dots coalesced into broken crossbands; antenna dusky brown; all tibiae and tarsi black. Body 1.7 by .75; hind tibia 1.05-1.3; antenna .57. Otherwise, same as apterous vivipara except hairs on hind tibia about twice as long as diameter of tibia. Fore wing with media usually once branched, rarely simple. Rostrum attaining the 3d coxa or abdomen.

Ovipara. Apterous. Yellowish dusky green becoming yellowish brown on head and prothorax and with numerous small fuscous spots at base of hairs; tibiae, tarsi, and tip of antenna blackish. Body 1.7 by .50; antenna as in apterous vivipara; hind tibia .72-.80, hardly swollen but bearing large sensoria along posterior border.

Male. Apterous. Dusky or olive-green posteriorly, shading to light rusty brown on thorax and head; appendages rusty brown to dusky.

Egg. Shining black a few days after being laid; placed lengthwise on upperside of needle.

Essigella pini Wilson

The Speckled Pine Aphid

Essigella pini Wilson, 1919. Entomol. News, 30:2.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.09-2.17. Body color generally amber. Head with a few coarse usually capitate setae along front margin. Rostrum attaining coxa III or slightly beyond, terminal segment broadly obtuse. Antennae short with few hairs; segments I, II, and basal half of III very pale, remainer pale brown. Thorax brown. Wings long and narrow; fore wing with media usually simple, occasionally once-branched. Legs set with numerous short usually capitate setae, setae on hind tibia with length approximately equal to diameter of hind tibia. Distal portion of tarsal segment II of each leg somewhat darker than remainder of leg. Abdomen with numerous longitudinal rows of small brown spots. Single transverse row of minute capitate setae on dorsum of each segment, more numerous on ventral surface. Cornicle merely low rims around the opening. Cauda a broad cone with a nipple-like projection at the tip, anal plate broadly rounded, both immargined with moderately long setae.

Measurements. Antennal segments as follows: I and II subequal .061, III .173, IV .092, V .102-.117 + .010. Primary sensoria on IV and V; marginal sensorial on base of V preceding primary sensoria; 2-4 secondary sensoria on III. Fore wings 2.168-2.295 in length, hind wing 1.428-1.581. Leg segments: femora I .362-.377, II .286-.296, III .541-.602; tibiae I .439-.459, II .500-.505, III .831-.842; first tarsal segments I .060, II .066, III .087; second tarsal segments I .122, II .122, III .148.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.785-2.142. Body color uniformly amber with only slightly darker areas in the antennae on distal half of III, IV, and V. Abdomen with four longitudinal rows of brown spots; 1 row on each side surrounding and in front of the spiracular openings, 1 row on the ventral surface of each side slightly mesael to the spiracular spots. Without brown spots on dorsal surface of abdomen. Rostrum, cornicles, cauda, and anal plate as above.

Measurements. Antennal segments as follows: I and II subequal .056, III .128-.184, IV .071-.117, V .092-.102 + .010. Primary sensoria on distal portion of IV and V, marginal sensoria on base of V. Leg segments: femora I .275-.316, II .235-.265, III .398-.459; tibiae I .306-.347, II .377-.428, III .571-.663; first tarsal segments I .056, II .056-.061, III .071-.077; second tarsal segments I .107-.122, II .102-.122, III .133-.143.

Alatoid Nymph.

General Characteristics. Coloration as in alate vivipara except that thorax is amber as the remainder of the body. Wing pads are but slightly darker than thorax. Dorsal abdominal spots prominent.

Nymph.

General Characteristics. Coloration as in alatoid nymph but without wing pads.

Collection Data. From short leaf pine (Pinus echinata Mill.): Robber's Cave State Park, Latimer Co., Oklahoma, September 17, 1959, H. W. Van Cleave; Broken Bow, McCurtain Co., Oklahoma, September 13, 1960, H. W. Van Cleave and J. M. Goin. From pinon pine (Pinus edulis Engelm.): Kenton, Cimarron Co., Oklahoma, May 16, 1961, H. W. Van Cleave. From western yellow pine (Pinus ponderosa Dough, var. scopulorum Engelm.) (ornamental planting): Woodward, Woodward Co., Oklahoma, July 21, 1959, H. W. Van Cleave and J. C. Pennington. From pine (Pinus sp.): Sequoyah State Park, Cherokee Co., Oklahoma, May 5, 1960, H. W. Van Cleave and T. Ritter; Jefferson Co., Oklahoma, February 17, 1961, F. Vinson.

Comments. This species can be separated in the field from the other pine aphids by the presence of only five segments in the antennae. The antennae is short, approximately one fourth the length of the body and with very few hairs. It is further distinguished in the laboratory by the dorsal setae of the hind tibia being equal in length to the diameter of the hind tibia. This a slim bodied aphid which is very agile. Found feeding on the needles of various pine species.

Genus Eulachnus Del Guercio

Eulachnus Del Guercio, 1909. Redia, 5:327.

Genotype: Lachnus agilis Kaltenbach, 1873 (fixed by Wilson, 1911).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Eulachnus rileyi (Williams)

Lachnus rileyi Williams, 1910. The Aphididae of Nebraska. Univ. Studies, 10:108.

Eulachnus rileyi, Davis, 1914. Can. Entomol., 46:169.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.45. Coloration as follows: head and abdomen amber; thorax dusky brown; antennal segments I, II, apices III, IV, V, and VI dusky; femora pale at base shading to dusky brown at apex; tibiae I and II pale with tinge of dusky coloration at base and apex, tibiae III marked as I and II except dusky areas more pronounced; tarsi concolorous with apex of tibiae. Cornicles mere ring. Cauda broadly conical, anal plate broadly rounded or semi-lunar. Head, antennae, legs beset with heavy, blunt to slightly capitate setae; abdomen, cauda, and anal plate beset with pointed setae. Rostrum nearly reaching coxae III, segment V distinct but short and blunt, media of fore wing faint at base, once branched.

Measurements: Antennal segments as follows: I and II subequal .092, III .459, IV .265, V .286, VI .173 + .031. A primary sensoria on the apex of both V and VI with a single secondary sensoria on IV and

4-5 marginal sensoria on VI just preceding the primary sensoria. Leg segments measure as follows: femora I .510, II .408, III 1.066; tibiae I .867, I .857, III 1.765; first tarsal segments I .097, II .097, III .122; second tarsal segments I .153, II .153, III .209. Fore wing 2.278, hind wing 1.445. (Measurements taken from a single specimen).

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.945-2.667. Body coloration as above except thorax concolorous with head and abdomen, dusky areas with not as much contrast to pale areas as above. Rostrum reaching nearly to coxae II.

Measurements. Antennal segments as follows: I and II subequal .867-.969, III .342-.459, IV .204-.301, V .224-.306, VI .163-.204 + .031-.041. Primary sensoria at apex of V and VI, one secondary sensoria at apex of IV, 2-4 marginal sensoria preceding primary sensoria on VI. Leg segments as follows: femora I .408-.520, II .367-.469, III .744-1.112; tibiae I .663-.898, II .658-.918, III 1.214-1.775; first tarsal segments I .087-.112, II .092-.102, III .107-.133; second tarsal segments I .153-.173, II .163-.184, III .199-.250.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.833-2.056. Coloration as in apterous vivipara with wing pads concolorous with thorax.

Collection Data. From needles of Austrian pine (Pinus nigra L.): Cherokee, Alfalfa Co., Oklahoma, July 22, 1959, H. W. Van Cleave, J. C. Pennington, and R. L. Owens

Genus Lachnus Burmeister

Lachnus Burmeister, 1835. Handbuch der Entomol. Zweiter Band. Berlin:91.

Pterochlorus Rondani, 1848. Nuove Ann. Sci. Natur.:35.

Genotype: Aphis roboris Linnaeus, 1758 (syn. Lachnus fasciatus Burmeister, 1835) which is the type set by Westwood (1840) or Lachnus punctatus Burmeister, 1835, which is the type set by Wilson (1910 and 1911). The question is before the International Commission of Nomenclature.

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Lachnus salignus (Gmelin)

The Giant Willow Aphid

Aphis salicis Sulzer, 1776. Abgekurzte Geschichte Der Insecten. 4. Teile, 1:105. (Preoccupied).

Aphis saligna Gmelin, 1790. XXX Lin. Syst. Natur. T. I., Pars., iii:2209.

Lachnus punctatus Burmeister, 1835. Handbuch der Entomol.: 93.

Aphis viminalis Boyer de Fonscolombe, 1841. Ann. Soc. Entomol. France, 10:184.

Lachnus dentatus LeBaron, 1872. Third Ann. Rept. Nox. Ins. State Ill.: 183.

Lachnus viminalis, Cockerell, 1904. Can. Entomol., 36:263.

Tuberolachnus viminalis, Knowlton, 1930. Can. Entomol., 62:159.

Lachnus salignus, Gillette and Palmer, 1931. Ann. Entomol. Soc. Amer., 24:878.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 4.223-4.445. Head and thorax medium brown, abdomen amber. Antennae and rostral segments III, IV, and V brownish amber. Rostrum reaching between coxae II and III. Apices of femora, tibiae, and tarsis brown. Wings hyaline; fore wing with stigma elongate, radial sector slightly curved. Single prominent dorsal tubercle on abdominal segment V between cornicles. Cornicles and dorsal tubercle dusky brown in color. Cornicle low, broad cone. Cauda and anal plate broadly rounded. Body covered with numerous moderately fine setae.

Measurements. Antennal segments as follows: I .122, II .122-.133, III .714, IV .255-.270, V .275-.281, VI .173-.199 + .046-.061. Secondary sensoria strongly convex, circular to oval and numbering as follows: III 14-17, IV 2-4, V 0-1; primary sensoria at apex of V and junction of base of VI and unguis with approximately 6 marginal sensoria near primary on VI. Leg segments as follows: femora I 1.168-1.278, II 1.000-1.056, III 2.056-2.167,; tibiae I 1.611-1.722, II 1.778-1.889, III .133-.138; second tarsal segments I .326, II .316-.326, III .357-.377. Length of fore wing 6.556-6.889, hind wing 3.556.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 3.945-4.167. Coloration as in alate vivipara except that head, thorax, and abdomen concolorous amber. Wing pads dusky brown. Body covered with numerous moderately fine setae.

Collection Data. From willow (*Salix* sp.): Willis, Marshall Co., Oklahoma, May 8, 1965, K. F. Schaefer.

Comments. This species can be recognized by its size and the prominent tubercle present on the dorsum between the cornicles.

Note. The placement of this species and the synonymy is following Palmer (1952).

Genus *Longistigma* Wilson

Longistigma Wilson, 1909. Can. Entomol., 41:385.

Davisia Del Guercio, 1909. Redia, 5:185.

Genotype: *Aphis caryae* Harris, 1841 (monotypical).

Note. Only one species of this genus is known; therefore, the description is of that species.

Longistigma caryae (Harris)

The Giant Bark Aphid

Aphis caryae Harris, 1941. Insects Inj. Veg., 190.

Lachnus caryae, Fitch, 1856. Trans. N.Y. State Agri. Soc., Vol. XVI:443.

Lachnus longistigma Monell, 1878. Valley Natur.

Lachnus platanicola Riley, 1883. Amer. Natur., 17:198.

Longistigma caryae, Wilson, 1909. Can. Entomol., 41:385.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 5.556-7.778. Head and abdomen medium brown, thorax dark brown. Body, legs, and antennae covered with fine, moderately long setae. Antennae brown with segments III (except for extreme base) and IV darker than remainder. Rostrum extending just past coxae III, segments IV and V obtuse. Apices of femora and tibiae dark brown to blackish, most of femora and tars, medium brown. Wings brownish with anterior margin of fore and hind wing darker brown. Stigma of fore wing elongate and reaching tip of radial sector at apex of wing. Radial sector straight to slightly curved. Cubitus and 1st anal heavy and with dusky borders. Dorsum of abdomen with two small black spots on each side of median line on each segment forming four longitudinal rows. Cornicles broad low cones and darker colored. Cauda and anal plate rounded.

Measurements. Antennal segments as follows: I .163-.194, II .194-.224, III 1.081-1.377, IV .469-.612, V .497-.694, VI .204-.235 + .105-.133. Secondary sensoria present on apical half of III numbering 4-10 and on IV numbering 2-5. Primary sensoria present at apex of V and at junction of base of VI and unguis with 6 marginal sensoria near primary sensoria on VI. Leg segments as follows: femora I 2.000-2.500, II 1.778-2.278, III 2.889-3.667; tibiae I 3.445-4.000, II 3.556-4.167, III 5.667-6.778; first tarsal segments I .153-.204, II .153-.209, III .153-.209; second tarsal segments I .296-.357, II .296-.408, III .306-.408. Length of fore wing 5.778-8.000, hind wing 3.222-4.445.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 6.334-6.778. Body color reddish brown without the pronounced contrasting darker areas on legs and antennae as in the alate vivipara. Small dark spots present on dorsum. Rostrum reaching coxae III. Body and appendages covered with fine, moderately long setae.

Measurements. Antennal segments as follows: I .163-.173, II .194-.204, III .765-.867, IV .316-.367, V .439-.459, VI .173-.204 + .102-.128. Leg segments as follows: femora I 1.556-2.000, II 1.667-2.111, III 2.222-2.334; tibiae I 2.500-2.556, II 2.834-2.889, III 4.000-4.278; first tarsal segments I .158-.168, II .158-.179, III .158-.173; second tarsal segments I .306-.316, II .316-.332, III .337-362.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 4.167-5.884. Coloration as in alate vivipara with thorax and wing pads concolorous.

Collection Data. On twigs and limbs of elm (Ulmus sp.): Vinita, Craig Co., Oklahoma, May 6, 1956, S. Coppock; Perry, Noble Co., Oklahoma, May 6, 1963, D. C. Arnold. On oak (Quercus sp.): Perry, Noble Co., Oklahoma, July 20, 1959, G. A. Bieberdorf. On limbs of pecans (Carya illinoensis (Wang.) K. Kock): Durant, Bryan Co., Oklahoma, April 18, 1963, F. Vinson; On limbs of sycamore (Platanus occidentalis L.): Stillwater, Payne Co., Oklahoma, November 8, 1962, H. W. Van Cleave. Single winged form: Nashoba, Pushmataha Co., Oklahoma, April 20, 1963, K. F. Schaefer.

Comments. This species can be recognized by its large size and distinctive wing veination involving the elongate stigma of the fore wing. All forms are covered with grayish-white waxy secretion obscuring most of the coloration of the integument.

Genus Schizolachnus Mordvilko

Schizolachnus Mordvilko, 1908. Ann. Mus. Zool. Acad. Imp. Sci. At. Petersbourg, 13:375.

Genotype: Aphis tomentosa De Geer, 1773 (Fixed by Mordvilko, 1908).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Schizolachnus lanosus Hottes

Schizolachnus lanosus Hottes, 1959. Proc. Biol. Soc. Wash., 72:13-14.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.99-2.09. Vertex and lateral margins of head, brown. Ocular tubercles weak to inconspicuous. Rostrum reaching nearly to coxae II; segments I, III, IV, and V brown; II light amber. Antennal segments I, II, apical one-third of V and VI brownish; remainder pale. Antennae with fine hairs of varying lengths. Thorax brown. Wings hyaline, media of fore wing simple. Legs brown with narrow pale amber areas on proximal portions of femora I and II and proximal two-thirds of femur III; tibia mainly pale amber with only apical portion brown. Long fine hairs present on legs, measuring approximately 5 times the

width of tibia on tibia III. Abdomen pale amber with single row of fine hairs on each segment dorsally, much more numerous on venter but shorter and more scattered. Cornicle low cone with few fine hairs on base. Cauda broad cone, twice as wide as long with few long hairs limited to margins. Anal plate similar to cauda in shape but with numerous fine hairs scattered over lower surface as well as margin.

Measurements. Antennal segments as follows: I .06, II .085-.092, III .268-.336, IV .134-.183, V .153-.171, VI .122-.128 + .024-.031. Primary sensoria on V and VI, marginal sensoria on ventral margin of primary sensoria of segment VI, secondary sensoria in irregular rows on posterior margin as follows: III 5-9, IV 2-4. Width of segment III .031-.036 and length of segment III setae up to .123. Fore wing 2.30-2.73 in length, hind wing 1.32-1.58. Leg segments as follows: femora I .406-.480, II .295-.418, III .701-.800; tibiae I .480-.603, II .541-.652, III .996-1.205; first tarsal segments I .049-.074, II .049-.074, III .068-.086; second tarsal segments I .185-.221, II .185-.221, III .246-.295. Width of tibia III .037-.049. Length of tibia III setae .185-.234. Abdominal dorsal setae up to .101. Caudal width .122-.214, length .073-.085. Anal plate subequal.

Apterous Summer Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.79-1.94. Coloration of head, antennae, rostrum, legs, abdomen, and cornicles similar to above. Thorax pale amber. Ocular tubercles inconspicuous. Rostrum attaining coxae III. Abdominal and cornicle

setation as above. Cauda broad cone with few long hairs on margin. Anal plate broadly rounded with numerous fine hairs of varying lengths on ventral surface as well as margin.

Measurements. Antennal segments as follows: I .051-.071, II .077-.087, III .245-.286, IV .112-.163, V .122-.158, VI .112-.122 + .031-.041. Primary sensoria on V and VI, marginal sensoria present on ventral margin of primary sensoria VI, unguis finely imbricated. Width of segment III .031, length of setae on segment III up to .153. Leg segments as follows: femora I .381-.431, II .369-.418, III .640-.738; tibiae I .443-.529, II .504-.590, III .923-1.070; first tarsal segments I .062-.068, II .062-.068, III .074-.086; second tarsal segments I .185-.209, II .185-.221, III .246-.295. Width of tibia III .041-.061, length of setae on tibia III up to .204. Dorsal abdominal setae up to .122. Ventral abdominal setae somewhat finer, shorter, and much more numerous.

Alatoid Nymph.

Coloration as above but contrast between light and dark areas on appendages less evident. Wing pads brown.

Collection Data. From shortleaf pine (Pinus echinata Mill.): Nashoba, Pushmataha Co., Oklahoma, September 16, 1959, W. A. Drew; Robber's Cave State Park, Latimer Co., Oklahoma, September 17, 1959, H. W. Van Cleave; Broken Bow, McCurtain Co., Oklahoma, September 13, 1960, H. W. Van Cleave and J. M. Goin. From loblolly pine (Pinus taeda L.): Broken Bow, McCurtain Co., Oklahoma, September 13, 1960, H. W. Van Cleave and J. M. Goin. From slash pine (Pinus caribaea, Morelet): Broken Bow,

McCurtain Co., Oklahoma, September 13, 1960, H. W. Van Cleave and J. M. Goin. From pine (Pinus sp.): Broken Bow, McCurtain Co., Oklahoma, May 12, 1960, H. W. Van Cleave; Broken Bow, McCurtain Co., Oklahoma, September 13, 1960, H. W. Van Cleave and J. M. Goin.

Comments. This species can be separated in the field from the others presently found on pine in Oklahoma by the greyish-white waxy secretion covering the specimens. This aphid is found feeding on the pine needles.

Tribe Callaphidini

General Characteristics. Antennae moderate to long, generally 6-segmented (5-segmented in the genus Sipha) usually with few to moderate number of secondary sensoria in the alate forms. Wing venation normal in fore wing but radial sector occasionally weak to hardly evident, hind wing normally with both transverse veins present, occasionally reduced to one. Cornicles usually short, truncate or reduced to mere rings; not greatly elongated. Cauda knobbed or broadly rounded, anal plate indented or broadly rounded.

Note. The tribe as considered here is in the broad sense following Baker (1920) and Palmer (1952). The name has been adjusted following Richards (1965) but used here in a broader sense than Richards' concept.

Key to the Genera of the Tribe Callaphidini in Oklahoma

1. Antennae 5-segmented.....*Sipha*.
   Antennae 6-segmented.....2.
2. Dorsum of abdomen with conspicuous finger-like tubercles (Figs. 16 and 17).....3.
   Dorsum of abdomen with or without tubercles; if present, never elongated and finger-like.....4.
3. Cornicles swollen on basal two-thirds, usually more than twice as long as broad.....*Drepanaphis*.
   Cornicles truncate, never twice as long as broad.....*Tinocallis*.
4. Cornicles reduced to mere pores on low cones or flush with the body surface.....5.
   Cornicles conspicuous (truncate to moderately elongate), never reduced as above.....7.
5. Cauda of alate forms broadly rounded.....*Stegophylla*.
   Cauda of alate forms knobbed.....6.
6. Spinal setae of embryo set further apart on abdominal segments V and VII than those on other abdominal segments.....*Monellipsis*.
   Only spinal setae on abdominal segment VII of embryo set further apart than those on other abdominal segments.....*Monellia*.
7. Unguis shorter than the base of antennal segment VI.....8.
   Unguis equal to or longer than the base of antennal segment VI.....9.

8. Lateral abdominal setae single.....*Therioaphis*.
   Lateral abdominal setae multiple.....*Hoplochaitophorus*.
9. Body hairs flabellate (Fig. 13).....*Iziphya*.
   Body hairs pointed or capitate, not flabellate
   (except in dimorphs of *Periphyllus*).....10.
10. Cornicles reticulated at least on apical
   portion (Fig. 14).....11.
   Cornicles without reticulations.....12.
11. Hind tibia with distinct spinules on distal
   one-fifth or less.....*Periphyllus*.
   Hind tibia without spinules or with very few
   at the tip.....*Chaitophorus*.
12. Cauda knobbed.....*Myzocallis*.
   Cauda broadly rounded.....*Pterocomma*.

Genus *Chaitophorus* Koch

Chaitophorus Koch, 1854. Die Pflanzenlause. Nurnberg: 1.

Genotype: *Chaitophorus leucomelas* Koch, 1854 (fixed by Van der Goot, 1931 - pending ruling by the International Committee on Zoological Nomenclature).

General Characteristics. Frontal tubercles not developed. Antennae 6-segmented with conspicuous setae; unguis longer than base of segment VI. Body spinous particularly in apterous forms. Fore wings with media twice-branched. Cornicles truncate, hardly longer than wide, with reticulation distally. Cauda knobbed or broadly rounded; anal plate indented or broadly rounded.

Note. Hille Ris Lambers (1960) has made a rather extensive study of this genus for North America, and it should be consulted when additional species of this group are found in Oklahoma.

Key to the Species of the Genus

Chaitophorus in Oklahoma

Cauda knobbed; wing veins without dusky borders.....nigrae.

Cauda without constriction, rounded or a broad cone; wing veins with prominent dusky borders.....populicola.

Chaitophorus nigrae Oestlund

Chaitophorus nigrae Oestlund, 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:40.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.889-2.556. Head and thorax brownish black, abdomen amber. Antennal segments I, II, V, VI, apices of III and IV dark brown, remainder amber. Rostrum reaching beyond coxae II. Femora II and III, bases and apices of tibiae and all of tarsi dusky to medium brown. Wings hyaline, venation normal without color pattern. Reticulation present on mesonotum between thoracic lobes. Transverse dusky to dark band dorsally on each of abdominal segments I-VIII, lateral dusky patch on each side of segments I-VI. Cornicles pale, truncate with reticulations. Cauda knobbed, anal plate slightly indented to rounded. Abdomen with numerous long setae which are longer than the cornicles.

Measurements. Antennal segments as follows: I .082-.092, II .061-.071, III .388-.439, IV .214-.265, V .164-.214, VI .102-.107 + .418-.449. Secondary sensoria on III numbering 8-9. Primary sensoria at apex of V and junction of base of VI and unguis with marginal sensoria near primary sensorium on VI. Rostral segments IV and V .133-.143. Leg segments: femora I .342-.408, II .347-.408, III .418-.551; tibiae I .541-.643, II .622-.658, III .724-.898; first tarsal segments I, II, and III subequal .041; second tarsal segments I .107-.128, II .122-.138, III .133-.138. Length of fore wing 2.333-2.556, hind wing 1.556-1.667.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.667-2.000. Body brownish amber to medium brown. Antennal segments and legs colored as above. Rostrum attaining coxae III. Abdomen without dark transverse bands and lateral spots of alate vivipara. Cornicles pale, truncate and reticulated. Cauda knobbed, anal plate slightly indented to rounded. Body with long hairs as in alate vivipara.

Measurements. Antennal segments: I .071-.092, II .051-.061, III .155-.367, IV .148-.205, V .148-.184, VI .092-.102 + .372-.418. Rostral segments IV and V .122-.133. Leg segments: femora I .275-.357, II .285-.357, III .337-.418; tibiae I .398-.479, II .469-.520, III .571-.638; first tarsal segments I and II subequal .041, III .041-.051; second tarsal segments I .112-.117, II .112-.128, III .117-.133. Length of cornicle .056-.082.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 2.167-2.445. Coloration as in apterous vivipara with wing pads slightly darker than body.

Collection Data. On willow (Salix sp.): Stillwater, Payne Co., Oklahoma, November 14, 1922, C. E. Sanborn; Roman Nose State Park, Blaine Co., Oklahoma, September 27, 1960, H. W. Van Cleave and J. C. Pennington; Guymon, Texas Co., Oklahoma, May 17, 1961, H. W. Van Cleave; Red Rock Canyon State Park, Caddo Co., Oklahoma, May 23, 1961, H. W. Van Cleave; Carter, Beckham Co., Oklahoma, May 24, 1961, H. W. Van Cleave; Pawnee, Pawnee Co., Oklahoma, July 5, 1961, H. W. Van Cleave; Stillwell, Adair Co., Oklahoma, August 22, 1961, H. W. Van Cleave.

Comments. In this species the unguis is approximately four times the length of base of VI and rostral segments IV and V are equal in length to the second segment of the hind tarsus.

Chaitophorus populicola Thomas

The Cloudy-winged Cottonwood Leaf Aphid

Chaitophorus populicola Thomas, 1877. Ill. State Lab. Natur. Hist. Bull., 2:10.

Periphyllus populicola, Gillette and Palmer, 1931. Ann Entomol. Soc. Amer., 24:924.

Periphyllus populicolus, Palmer, 1952. The Thomas Say Found., Vol. V:99.

Chaitophorus populicola, Hille Ris Lambers, 1960. Tijdschr. Voor Entomol., 103:16.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.334-2.834. Head and abdomen medium brown, thorax dark brown. Antennal segments I, II, V, and base of VI concolorous with head, remainder amber. Rostrum attaining coxae II. Fore legs brownish amber, middle and hind legs brown. Venation of wings normal; stigma dark, veins of fore wing with wide dusky to dark borders, hind wings with narrower borders along media and cubitus. Abdomen with transverse dusky patches on each segment dorsally, lateral dusky patches present on segments I-VII. Cornicles pale, truncate without flange and reticulated on apical half. Cauda broad cone to rounded, anal plate broadly rounded to slightly indented.

Measurements. Antennal segments: I .092, II .082, III .377-.398, IV .224-.230, V .153-.173, VI .117-.122 + .219-.224. Secondary sensoria as follows: III 16-21, IV 1-5, V 0-3. Primary sensoria present at apex of V and at junction of base of VI and unguis with approximately 4 marginal sensoria near primary on VI. Leg segments: femora I .408-.439, II .388-,418, III .520-.561; tibiae I .530-.592, II .632-.694, III .877-.979; first tarsal segments I .046-.051, II .051, III .051; second tarsal segments I .148-.153, II .153-.158, III .163. Length of fore wing 2.667-3.111, hind wing 1.778-2.111. Length of cornicle .097-.102.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.556. Body medium brown. Antennal segments and legs as in alate vivipara.

Cornicles pale, short, truncate, without flange and with reticulation. Cauda rounded, anal plate slightly indented.

Measurements. Antennal segments as follows: I .087, II .082, III .377, IV .204, V .168, VI .122 + .214. Leg segments: femora I .418, II .434, III .561; tibiae I .581, II .704, III .979; first tarsal segments I, II, and III subequal .051; second tarsal segments I .153, II .158, III .163. Length of cornicle .102.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 2.500. Coloration as in apterous vivipara with wing pads concolorous with body.

Collection Data. On cottonwood (Populus deltoides Marsh.): Fort Gibson Reservoir, Wagner Co., Oklahoma, June 30, 1959, H. W. Van Cleave and F. Vinson; Lebanon, Marshall Co., Oklahoma, September 25, 1959, F. Vinson; Stillwater, Payne Co., Oklahoma, August 22, 1960, H. W. Van Cleave and F. Vinson; Stillwater, Payne Co., Oklahoma, August 31, 1960, C. Breedlove; Stillwater, Payne Co., Oklahoma, September 14, 1960, R. G. Price; Marshall Co., Oklahoma, September 20, 1960, F. Vinson; Boiling Springs State Park, Woodward Co., Oklahoma, October 25, 1960, H. W. Van Cleave and W. O. Washum; Cleo Springs, Major Co., Oklahoma, October 26, 1960, H. W. Van Cleave and W. O. Washum; Hollis, Harmon Co., Oklahoma, July 11, 1961, H. W. Van Cleave.

Genus *Drepanaphis* Del Guercio

Drepanaphis Del Guercio, 1909. Riv. Pathol. Veg., 4:49.

Phymatosiphum Davis, 1909. Ann. Entomol. Soc. Amer., 2:196.

Genotype: *Siphonophora acerifoliae* Thomas, 1878 (fixed by original designation).

General Characteristics. Frontal and ocular tubercles developed. Antennae 6-segmented, unguis 5 or more times longer than the base of segment VI, secondary sensoria present on segment III (of alate vivipara) oval to circular in shapes and ciliated. Venation of fore wing normal with radial sector strongly curved, media twice-branched, membrane hyaline. Conspicuous paired dorsal tubercles present on abdominal segments I-IV of alate vivipara. Cornicle swollen at base, more than twice as long as wide, apices flanged. Cauda knobbed, anal plate indented.

Note. Smith and Dillery (1968) have published an extensive study of this genus which is invaluable to students of this group.

Key to the Species of the Genus *Drepanaphis* in Oklahoma

Paired dorsal abdominal tubercles on segments I-IV with those on segments I and III being larger than those on II and IV (Fig. 16).....*acerifoliae*.

Paired dorsal abdominal tubercles on segments I-IV with those on segment I inconspicuous and those in III being fused at the base and 3-4 times larger than those on II and IV (Fig. 17).....*kanzensis*.

Drepanaphis acerifoliae (Thomas)

The Painted Maple Aphid

Siphonophora acerifoliae Thomas, 1878. Ill. State Lab. Natur. Hist. Bull., 2:4.

Drepanosiphum acerifoliae, Clarke, 1903. Can. Entomol., 35:249.

Drepanaphis acerifoliae, Del Guercio, 1909. Riv. Pat. Veg. Pavia: 3.

Phymatosyphum acerifoliae, Davis, 1909. Ann. Entomol. Soc. Amer.:2.

Drepanaphis allegheneyensis Miller, 1936. Can. Entomol., 68:81.

Alate Vivipara.

General Characteristics. Length from vertex 1.778-2.222. Head and thorax brown, abdomen amber. First antennal segment concolorous with head. Apices III, IV, V, and junction of base of VI and unguis dusky. Wings hyaline with dusky borders around veins. Paired dorsal abdominal tubercles prominent on segments I-IV with those on segments I and III being larger than those on II and IV. Minute tubercles on V. Dorsal tubercles on segments I-V dusky to brown, a single brownish spot on each side of segments I-V between median and lateral tubercles. Lateral tubercles on IV and V dusky. Cornicles dusky to brown. Cauda knobbed, anal plate bilobed.

Measurements. Antennal segments as follows: I .102-.112, II .061-.071, III .806-.928, IV .602-.714, V .612-.745, VI .143-.163 + 1.122-1.510. Secondary sensoria on III numbering 8-12. Leg segments as follows: femora I .612-.694, II .388-.428, III .520-.612; tibiae I .826-.969, II .806-.949, III 1.122-1.357; first tarsal segments I .031-.041, II .031-.036, III .031-.036; second

tarsal segment I .112-.117, II .102-.112, III .107-.112. Length of fore wing 2.500-2.778, hind wing 1.445-1.611. Length of median abdominal tubercles as follows: I .112-.184, II .046-.112, III .128-.184, IV .026-.092. Cornicle length .214-.245, width .077-.102.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.667-2.000. Body color amber with apices of antennal segments III, IV, and V, all of VI, tibiae and second tarsal segments dusky. Abdominal segments I-VII each with four low, dorsal tubercles and single lateral tubercles. Each tubercle armed with single capitate seta.

Collection Data. On leaves of silver maple (Acer saccharinum L.): Hugo, Choctaw Co., Oklahoma, September 14, 1960, H. W. Van Cleave and J. M. Goin; Joy, Delaware Co., Oklahoma, July 19, 1961, H. W. Van Cleave.

Comments. This species can be recognized by the extensive dusky pattern in the wings and the four pairs of well developed finger-like dorsal tubercles on the abdomen with the first and third pairs being the largest.

Drepanaphis kanzensis Smith

Drepanaphis kanzensis Smith, 1941. Elish Mitchell Sci. Soc., 57:232.

Alate Male.

General Characteristics. Length from vertex to tip of cauda 1.667-1.889. Head and thorax brownish amber, abdomen amber. Antennal segment I brownish amber, apices of III, IV, V, and junction of base of

VI and unguis dusky. Legs pale amber. Wings hyaline with dusky spots in fore wing at base and apex of stigma, base of radial sector and first anal and at apices of each vein. Abdominal segments II-VII with transverse median dusky bands, dusky spots on lateral margins of abdominal segments III-V. Abdominal segments I with inconspicuous median pair of dorsal tubercles, segments II, III, and IV with paired pigmented tubercles with tubercles on III being 3-4 times larger than the others and fused at least one half their length from the base. Median dorsal tubercles each armed with single pointed seta. Cornicles light to medium brown. Cauda and anal plate amber with cauda knobbed and anal plate bilobed.

Measurements. Antennal segments as follows: .112-.133, II .061-.071, III .944-.969, IV .612-.663, V .571-.622, VI .153 + .796. Leg segments: femora I .663-.704, II .459-.485, III .632-.663; tibiae I 1.020-1.071, II .959-1.040, III 1.234-1.255; first tarsal segments I and II subequal .031, III .041; second tarsal segments I, II, and III subequal .112. Length of fore wing 2.889-3.000, hind wing 1.667-1.778. Length of cornicle .245, width .082.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.167. Coloration as in alate male except as follows: abdomen amber with the only darker coloration present being on lateral margins of segments IV and V, on paired median dorsal tubercles on segments II, III, and IV and a single spot on either side between median tubercles and lateral margins of segments I-V, and cornicles. Median tubercles as above with III being by far the largest and fused from the base to at least one half their lengths.

Measurements. Antennal segments as follows: I .112, II .082, III .898, IV .643, V .673, VI .153 + 1.428. Antennal segment III with 11-14 secondary sensoria present. Leg segments as follows: femora I .632, II .413, III .571; tibiae I .901, II .898, III 1.244; first tarsal segments I, II, and III subequal .031; second tarsal segments I, II, and III subequal .102. Length of fore wing 2.667, hind wing 1.445. Length of cornicle .214, width .082.

Apterous Ovipara.

General Characteristics. Length from vertex to tip of extended ovipositor 2.389-2.556. Body color amber except for apices of antennal segments III, IV, V, and junction of base of VI and unguis which are dusky. Each abdominal segment armed dorsally with four low tubercles forming into four longitudinal rows. Lateral tubercles present on each abdominal segment.

Measurements. Antennal segments as follows: I .112-.122, II .061, III .581-.785, IV .388-.541, V .428-.571, VI .153-.163 + .437-.683. Leg segments as follows: femora I .530-.622, II .439-.500, III .551-.622; tibiae I .744-.898, II .765-.938, III .469-1.224; first tarsal segments I .031-.036, II .036-.041, III .041. Hind tibiae with numerous sensoria. Length of cornicle .173-.204, width .082-.092.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 2.000. Body and appendages amber with apices of antennal segments III, IV, V, and junction of base of VI and unguis dusky. Tubercles on abdomen as in apterous ovipara.

Collection Data. From sugar maple (Acer saccharum Marsh): Miami, Ottawa Co., Oklahoma, October 5, 1960, H. W. Van Cleave, C. F. Stiles, and H. C. Campbell; Talequah, Cherokee Co., Oklahoma, November 1, 1960, H. W. Van Cleave, Savage, and W. O. Washum; Stillwater, Payne Co., Oklahoma, April 24, 1964, W. A. Drew.

Comments. This species can be recognized by having clear wings except at base and tips of veins and the prominent paired dorsal tubercles on abdominal segment III. Smaller pigmented tubercles are present on segments II and IV and a pair of unpigmented inconspicuous tubercles on segment I.

Genus Hoplochaitophorus Granovsky

Hoplochaitophorus Granovsky, 1933. Proc. Entomol. Soc. Wash., 35:29.

Genotype: Chaitophorus quercicola Monell, 1879 (monotypical).

Note. Only one species of the genus was found in Oklahoma; therefore, the description is of that species.

Hoplochaitophorus quercicola (Monell)

Chaitophorus quercicola Monell, 1879. Bull. U.S. Geol. Surv., 5:32.

Chaitophorus spinosus Oestlund, 1886. Fourteenth Rep. Minn. Geol. Natur. Hist. Surv., 17:49.

Callipterus quercifolii Thomas, 1879. Eight Rep. State Entomol.: 112.

Hoplochaitophorus quercicola, Granovsky, 1933. Proc. Entomol. Soc. Wash., 35:32.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.028-2.808. Head and abdomen medium brown, thorax dark brown. Antennal segments I and II, apices of III, IV, V, and apical portion of base of VI brown, remainder amber. Fore femora amber with apex dusky middle and hind femora medium brown except for base; fore tibiae amber with base and apex dusky, middle tibiae medium brown at basal half with apex amber, hind tibiae medium brown over basal 3/4 with apex amber; fore and middle tarsi and second segment of hind tarsi dusky. Veins of fore and hind wings with dusky borders. Paired median and lateral tubercles of abdominal segments I-VIII dusky and armed with numerous setae. Cornicles pale, smooth and with distinct flange. Cauda knobbed, anal plate bilobed.

Measurements. Antennal segments as follows: I .082-.097, II .082-.092, III .459-.581, IV .337-.418, V .306-.337, VI .143-.153 + .097-.122. Secondary sensoria numbering 6-9 on segment III. Leg segments as follows: femora I .520-.592, II .500-.541, III .689-.801; tibiae I .826-.949, II .949-1.040, III 1.459-1.581; first tarsal segments I .041-.051, II .046-.051, III .051; second tarsal segments I .133-.138, II .138-.143, III .143-.148. Length of fore wing 2.340-3.120, hind wing 1.456-2.028. Length of cornicle .102-.128.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.548-2.808. Body brownish amber. Antennal segments I, II, apices of III, IV, V, and basal portion of VI brown, remainder amber. Legs as in

alate vivipara but without the marked differences in coloration. Dorsal plate on head and all thoracic and abdominal segments brown and armed with heavy spines. Lateral plates on thoracic and abdominal segments also brown and heavy armed with spines. Cornicles pale. Cauda knobbed, anal plate bilobed.

Measurements. Antennal segments as follows: I .082-.097, II .077-.082, III .459-.510, IV .245-.306, V .255-.286, VI .133-.143 + .097-.102. Leg segments as follows: femora I .469-.525, II .510-.551, III .663-.734; tibiae I .745-.826, II .877-.949, III 1.285-1.408; first tarsal segments I .051, II .046-.051, III .051; second tarsal segments I .133-.148, II .143-.148, III .143-.163. Length of cornicle .122-.153.

Collection Data. On Burr oak (Quercus macrocarpa Michx.): Stillwater, Payne Co., Oklahoma, April 30, 1960, H. W. Van Cleave and W. A. Drew. On oak (Quercus sp.): Red Rock Canyon State Park, Caddo Co., Oklahoma, May 23, 1961, H. W. Van Cleave.

Genus Iziphya Nevsky

Iziphya Nevsky, 1929. Vzbekistan Exp. Sta. for Plant Protection, 16:314.

Genotype: Iziphya maculata Nevsky, 1929 (monotypical).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Iziphya flabella (Sanborn)

Chaitophorus flabellus Sanborn, 1904. Kansas Univ. Sci. Bull., Vol. III, No. I:37.

Callipterus flabellus, Gillette, 1909. Entomol. News, 20:120.

Iziphya flabella, Gillette and Palmer, 1931. Ann. Entomol. Soc. Amer., 24:908.

Alate Vivipara (single specimen).

General Characteristics. Length from vertex to tip of cauda 1.278. Head brownish amber with brown margins, thorax brown, abdomen amber. Antennal brown except for basal half of segment III. Segments III-VI heavily imbricated. Femora, bases of tibiae and second tarsal segments brown, remainder amber. Fore wing normal, veins with dusky borders expanding to dusky areas at apices of veins; hind wing without cubitus, veins marked with dusky borders and apices as in fore wing. Lateral tubercles on abdominal segments I-V and cornicles dusky to brown. Cornicles heavily imbricated, truncate and arising from broad low cone. Cauda and anal plate heavily imbricated and dusky in color; cauda knobbed, anal plate bilobed. Dorsal and lateral areas of abdomen, cone areas around bases of cornicles with flabellate hairs.

Measurements. Antennal segments as follows: I .107, II .071, III .510-.530, IV .280, V .250, VI .153-.235. Secondary sensoria on III numbering 17-18, primary near apex of V and at junction of base of VI and unguis. Legs: femora I .306, II .275, III .321; tibiae I .510, II .459, III .622; first tarsal segment I .031, II .031, III .041; second tarsal segment I .107, II .092, III .122. Length of fore wing 2.111, hind wing 1.222.

Collection Data. Taken in yellow pan trap: Stillwater, Payne Co., Oklahoma, April 29, 1964. Material courtesy of J. T. Medler and A. K. Ghosh, Department of Entomology, University of Wisconsin.

Note. Sanborn (1904) collected his material by sweeping and the host was not noted. (This type material reported by Palmer (1952) to be in the Oklahoma Experimental Station Collection could not be located and is apparently lost). Gillette (1909), and Gillette and Palmer (1931) reported this species to be common in Colorado on Carex sp.

Genus Monellia Oestlund

Monellia Oestlund, 1887. Geol. Natur. Hist. Surv. Minn. Bull., 4:45.

Genotype: Aphis caryella Fitch, 1854 (monotypical).

General Characteristics. Antennae six segmented. Rostrum short, barely extending past coxae I. Frontal tubercles not well developed, ocular tubercles developed and easily noticed. Wings and wing venation normal but with the radial sector being weak. Coxas I enlarged with lateral margins extending past lateral margins of the prothorax when viewed from the dorsal aspect. Lateral abdominal tubercles well developed at least on segments I-V and each armed with single setae (more prominent on alatoid nymphs but not as conspicuous on alate viviparae). Dorsal tubercles armed with single setae prominent on alatoid nymphs but only slightly developed on alate viviparae. Cornicles reduced to mere rims, with single lateral seta of segment VI appended to the posterior base of each cornicle. Cauda knobbed and anal plate indented on alate viviparae; cauda and anal plate rounded on alatoid nymphs. Apterous viviparae do not occur in this genus.

Note. The genus Monelliopsis resembles Monellia very closely and can be separated only on the basis of the dorsal chaetotaxy of the embryo. In the case of Monellia, only the spinal setae of abdominal segment VII are set wider apart than those of the other abdominal segments. In the case of Monelliopsis, the spinal setae on both abdominal segments V and VII are set wider apart than those on the remaining segments.

Key to the Species of the Genus *Monellia* in Oklahoma

1. Costal margins of fore wings with dark pigmented border; alatoid nymphs with only two setae on dorsum of abdominal segments I-VII, each seta situated on a well developed tubercle.....*costalis*.

   Costal margins of fore wings without pigmented border; alatoid nymphs with four setae situated on well developed tubercles or numerous small setae on dorsum of abdominal segments I-V.....2.

2. Dorsum of abdominal segments I-V bearing four setae per segment; setae on alatoid nymphs situated on well developed tubercles.....*caryella*.

   Dorsum of abdominal segments I-V bearing a varying number of setae but usually more than four per segment; setae on alatoid nymphs not situated on tubercles.....*microsetosa*.

Monellia caryella (Fitch)

Aphis caryella Fitch, 1854. Trans. N.Y. Agr. Soc., 14:867.

Callipterus caryella, Fitch, 1856. Trans. N.Y. Agr. Soc., 16:448.

Monellia caryella, Oestlund, 1887. Bull. Geol. Natur. Hist. Surv. Minn., 4:45.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.000-2.167. Color yellow with dusky marking on lateral margins of prothorax, on tubercles on dorsum of abdomen, at apices of antennal segments I, II, III, IV, V, and at junction of base of VI and unguis. Dark pigmentation spot on the underside of apex of hind femur. Dorsum of abdominal segments I-V with four low pigmented tubercles, each armed with a single setae and forming longitudinal rows; segment VI, VII, and VIII with only two setae per segment, setae on VII set wider apart than on VI or VIII. Lateral tubercles of each segment each armed with single setae. Wings hyaline. Cornicles poriform. Cauda knobbed, anal plate deeply indented.

Measurements. Antennal segments as follows: I .051-.061, II .056-.061, III .332-.388, IV .194-.235, V .199-.245, VI .143-.173 + .117-.122. Secondary sensoria at base of III numbering 5-6. Primary sensoria at apices of V and VI with 3-5 marginal sensoria near primary on VI. Leg segments as follows: femora I .240-.275, II .204-.235, III .383-.408; tibiae I .398-.485, II .428-.485, III .648-.745; first tarsal segments I .031, II .031, III .026-.031; second tarsal segments I .071-.077, II .031, III .026-.031; second tarsal segments I .071-.077, II .077, III .082. Length of fore wing I .945-2.000, hind wing 1.333-1.389.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.333 (limited number involved). Color yellow with dusky pigmentation on apices of antennal segments III, IV, V, and at junction of base of VI and unguis. Tubercles on dorsum of abdomen arranged as in alate vivipara but with tubercles and setae large, setae capitate.

Collection Data. On hickory (Carya sp.): Nashoba, Pushmataha Co., Oklahoma, September 12, 1960, H. W. Van Cleave; Broken Bow, McCurtain Co., Oklahoma, September 13, 1960, H. W. Van Cleave and J. M. Goin.

Monellia costalis (Fitch)

The Black-margined Aphid

Aphis caryella var. costalis Fitch, 1854. Trans. N.Y. Agr. Soc., 14:869.

Aphis marginella Fitch, 1854. Ibid.: 870.

Monellia costalis, Baker, 1917. J. Econ. Entomol., 10:434.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.056-2.222. Body color yellow with dark brown to black pigmentation on margins of head, lateral margins of thorax and first three abdominal segments. Antennal segments I and II, base and apex of III, apex of IV and V, junction of base of VI and unguis, anterior margins of fore and hind wings (but much paler on hind wings). Radial sector of fore wing faint, remaining veins distinct. Dorsum of abdomen with a double line of small setae along median line and small single setae present on lateral margins of each segment. Cornicles mere pores. Cauda knobbed, anal plate deeply indented.

Measurements. Antennal segments as follows: I and II subequal .066-.071, III .367-.449, IV .260-.301, V .255-.316, VI .179-.204 + .173-.204. Secondary sensoria confined to swollen pigmented basal area of III, 4-6 in number. Primary sensoria at apex of V and junctions of base of VI and unguis, marginal sensoria approximately 3-4 in number and proximad to primary sensoria on VI. Leg segments: femora I .255-.286, II .199-.219, III .337-.388; tibiae I .418-.479, II .428-.474, III .592-.643; first tarsal segments I .026, II .031, III .031; second tarsal segments I .082, II .082-.087, III .092. Length of fore wing 1.889-2.056, hind wing 1.222-1.278.

Alatoid Nymph.

General Characteristics. Overall length from vertex to tip of cauda 1.556-1.722. Yellow with brownish-black pigmentation at apices of antennal segments III, IV, V, and at the junction of the base of VI and unguis. Dorsum of abdomen with two longitudinal rows of tubercles armed with capitate setae along median line and lateral tubercles also armed with capitate setae.

Collection Data. On pecan (Carya illinoensis (Wang.) K. Koch): Comanche, Stephens Co., Oklahoma, August 26, 1959, H. W. Van Cleave and T. Ritter; Dickson, Carter Co., Oklahoma, September 21, 1959, F. Vinson; Jefferson Co., Oklahoma, August 3, 1960, F. Vinson; Love Co., Oklahoma, August 26, 1960, F. Vinson; Frederick, Tillman Co., Oklahoma, September 9, 1960, A. C. Hatfield; Wetunka, Hughes Co., Oklahoma, September 15, 1960, H. W. Van Cleave; Temple, Cotton Co., Oklahoma, September 21, 1960, H. W. Van Cleave.

Monellia microsetosa Richards

Monellia microsetosa Richards, 1960. Can. Entomol., 92:228.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.167. Body color yellow with dusky pigmentation around base of compound eyes extending around base of ocular tubercles, lateral margins of thorax and first three abdominal segments, antennal segments I, II, base and apex of III, apices of IV, V, and junction of base of VI and unguis. Pigmentation spots present in fore wing at base and apex of stigma, bases of cubitus and anal I veins. Dorsum of abdomen with double row of small setae along median line with one to five smaller setae between each pair on most of the anterior segments; single setae on lateral tubercles of each segment. Cornicles poriform. Cauda knobbed, anal plate deeply indented.

Measurements. Antennal segments as follows: I and II subequal .061, III .337, IV .265, V .281, VI .184 + .194. Secondary sensoria on III confined to swollen pigmented area at base, 5-6 in number (Richards (1960) reports 3-8). Primary sensoria at apex of V and junction of base of VI and unguis. Marginal sensoria near primary on VI. Leg segments: femora I .270, II .204, III .275; tibiae I .434, II .413, III .566; first tarsal segments I .026, II .031, III .031; second tarsal segments I .077, II .082, III .082. Length of fore wing 1.945, hind wing 1.389.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.117-1.778. Yellow with dusky pigmentation at apices of antennal segments III, IV, V, and junction of base of VI and unguis. Dorsum of abdomen with two median setae per segment forming longitudinal rows and smaller setae of irregular number in between as in alate vivipara. Lateral tubercles of each segment armed with single heavier setae.

Collection Data. On hickory (Carya sp.): Nashoba, Pushmataha Co., Oklahoma, September 12, 1960, H. W. Van Cleave.

Genus Monelliopsis Richards

Monelliopsis Richards, 1965. Mem. Entomol. Soc. Can., 44:89.

Genotype: Callipterus caryae Monell, 1879 (fixed by Richard, 1965).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Monelliopsis caryae (Monell)

The American Walnut Aphid

Callipterus caryae Monell, 1879. Bull. U.S. Geol. Surv., 5:31.

Monellia caryae, Gillette, 1910. Econ. Entomol., 3:367.

Monelliopsis caryae, Richards, 1965. Mem. Entomol. Soc. Can., 44:90.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.445-1.667. Body and appendages light amber to yellowish. Eyes reddish. Apices of antennal segments III, IV, V and junction of base

of VI and unguis dusky to brownish black. Dusky around antennal sockets and on lateral margins of pronotum, fading posteriorally. Median paired tubercles on dorsum of segments I-VII and lateral tubercles on segments I, IV, and V dusky to brown. Median tubercles on segments V and VII set wider apart than on remaining segments. Paired median tubercles near anterior and posterior margins of prothorax, on meso- and metathorax concolorous with thorax. All lateral and median tubercles armed with a single seta. Blackish-brown pigmentation present dorsally and ventrally on apices of femora III. Dusky spot present near base of stigma on fore wing and first anal of fore wing bordered by dusky pigmentation. Cornicles poriform. Cauda knobbed and anal plate deeply bilobed.

Measurements. Antennal segments as follows: I and II subequal .051-.061, III .255-.408, IV .194-.245, V .173-.219, VI .112-.173 + .112-.138. Secondary sensoria present on basal half of III and numbering 5-8. Primary sensoria present at apex of V and at junction of base of VI and unguis. Marginal sensoria surrounding primary sensoria on VI. Leg segments as follows: femora I .219-.296, II .168-.224, III .311-.500; tibiae I .403-.500, II .413-.479, III .571-.724; first tarsal segments I, II, and III subequal .026-.031; second tarsal segment I and II subequal .071-.082, III .071-.092. Length of fore wing 1.389-1.778, hind wing .945-1.222.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.056-1.445. Body light amber to yellow with dusky tubercles on dorsum and lateral marginal thorax and abdomen. Antennal segments marked as

above. Lateral tubercles present on pro-, meso-, and metathorax. Remainder of tubercles arranged as in alate vivipara but more prominent and armed with single heavy capitate setae.

Collection Data. On walnut leaves (Juglans sp.): Boiling Springs State Park, Woodward Co., Oklahoma, July 20, 1959, H. W. Van Cleave and J. C. Pennington. On persimmon (Diospyros virginiana L.): may be casuals but alate viviparae and alatoid nymphs were both present: Boiling Springs State Park, Woodward Co., Oklahoma, July 20, 1959, H. W. Van Cleave and J. C. Pennington.

Genus Myzocallis Passerini

Myzocallis Passerini, 1860. Parma.: 28.

Nippocallis Matsumura, 1917. J. Coll. Agric. Tohodu Imp. Univ., 7:365.

Dryomyzus Hille Ris Lambers, 1948. Trans. R. Entomol. Soc. Lond., 99:285.

Genotype: Aphis coryli Goeze, 1778 (fixed by Passerini, 1860).

General Characteristics. Frontal tubercles not developed. Compound eyes with ocular tubercles developed. Antennae 6-segmented with secondary sensoria present on segment III only (alate viviparae), unguis longer than base of VI. Anterior lateral prothoracic setae absent, posterior lateral, lateral prothoracic setae number 1 to 2 (rarely 3). Wings normal, radial sector weak to well defined, media twice-branched. Membrane hyaline or with pigmented pattern. Spinal setae of abdomen usually in clusters but occasionally single; pleural setae usually absent in alate viviparae but usually present in alatoid

nymphs. Cornicles short, truncate and more or less widened at the base, with or without spicules. Cauda knobbed and anal plate deeply indented in alate vivipara.

Note. Apterous viviparae are unknown in the species found in Oklahoma. Boudreaux and Tissot (1962) studies the "blackbordered species of Myzocallis of oaks" and this publication is an invaluable reference for the species covered. Richards (1965) in his publication "The Callaphidini of Canada (Homoptera: Aphididae)" also covers most of the species found in Oklahoma but neither study alone will be sufficient for a student of Oklahoma aphids. However, with the publication of Richards' 1966 study, a key for all North American species of Myzocallis became available in one paper and with Richards' (1968) "A synopsis of the world fauna of Myzocallis (Homoptera: Aphididae)" the student finds a single reference to meet his needs for this group which includes both a key to the species and description of the various forms of each.

Key to the Species of the Genus Myzocallis in Oklahoma

1. Cornicles spiculose (Fig. 18).....2.
   Cornicles without spicules (Fig. 19).....3.
2. Cornicles dusky to brown in color.....discolor.
   Cornicles pale.....punctata.

3. All tibiae about equally dark in pigmentation in alate viviparae; alatoid nymphs bearing a single seta on each of the lateral hind lobes of the prothorax.....frisoni.

Fore tibiae usually contrasting with and darker than the middle and hind tibiae in alate viviparae, apices of middle and hind tibiae darker than tarsal portion; alatoid nymphs bearing two setae on each of the lateral hind lobes of the prothorax.....bella.

Myzocallis bella (Walsh)

Aphis bella Walsh, 1862. Proc. Entomol. Soc. Philadelphia, 1:299.

Callipterus bella, Monell, 1879. U.S. Geol. and Geogr. Surv. Bull., 5:29.

Myzocallis bella, Thomas, 1879. Eight Rep. State Entomol. 106.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.811-2.423. Body amber. Lateral margins of head, pro-, and mesothorax brown to brownish black; antennal segments I and II pale dusky, apices of III, IV, V and base of VI dusky. Costal margin of fore and hind wings to apices with broad dark border. Femora (except bases), tibiae and tarsi brownish to brownish black. Cornicle smooth, cauda knobbed, anal plate indented.

Measurements. Antennal segments as follows: I .061-.077, II .061-.066, III .332-.449, IV .235-.291, V .194-.224, VI .122 + .337-.347. Secondary sensoria numbering 3-6 on antennal segment III,

length of rostral segments IV and V .102-.112, width at base of IV .061-.066. Leg segments as follows: femora I .377-.454, II .326-.377, III .439-.510; tibiae I .602-.734, II .612-.719, III .826-.979; first tarsal segments I, II, and III subequal .036-.041; second tarsal segments I .107-.112, II .112-.117, III .117-.122. Length of fore wing 2.295-2.678, hind wing 1.530-1.785. Length of cornicle .041-.061.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.530. Body color amber. Apices of base of VI and unguis dusky. Tarsi dusky. Dorsal surface and lateral tubercles of throax and abdomen armed with prominent pointed to capitate setae.

Collection Data. On leaves of pin oak (Quercus palustris Muench.): Stillwater, Payne Co., Oklahoma, April 28, 1960, R. G. Price.

Myzocallis discolor (Monell)

The Eastern Dusky-winged Oak Aphid

Callipterus discolor Monell, 1879. Bull. U.S. Geol. Surv., 5:30.

Myzocallis discolor, Baker, 1917. J. Econ. Entomol. 10:424.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.716-2.444. Head and thorax medium brown, abdomen pale amber. Antennal segment I, apices of IV, V, and apex of base of VI, dusky, remainder pale amber. Legs pale amber except for tarsi which are dusky. Fore wing with extensive pigmented pattern between veins, radial cell free of pigmentation. Abdominal segments I-VII with low, paired median

tubercles and lateral tubercles brown, brown pattern on dorsal and ventral surfaces of segments IV and V extensive. Abdominal tubercles armed with numerous setae. Cornicle dusky to brown and spiculose. Cauda knobbed, anal plate deeply indented. Both cauda and anal plate pale.

Measurements. Antennal segments as follows: I .061-.071, II .051-.061, III .367-.510, IV .275-.351, V .275-.316, VI .122-.133 + .204-.300. Secondary sensoria numbering 3-6 on segment III. Rostral segments IV and V .087-.107. Leg segments as follows: femora I .321-.398, II .255-.316, III .332-.428; tibiae I .571-.734, II .541-.694, III .724-1.040; first tarsal segments I .031-.041, II .031-.041, III .036-.046; second tarsal segments I .097-.102, II .097-.102, III .097-.112. Length of fore wing 1.872-2.548, hind wing 1.300-1.665. Length of cornicle .061-.082.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.716-1.820. Body amber. Apices of antennal segments III, IV, V, and apex of base of VI dusky, remainder amber. Legs amber, tarsi dusky. Body heavily armed with capitate setae. Abdominal segments with paired median tubercles on dorsum and lateral tubercles, each armed with 3-4 setae. Each side of each segment having a row of setae between median and lateral tubercles. Tubercles not distinctly pigmented but rather concolorous with abdomen.

Collection Data. On burr oak (Quercus macrocarpa Michx.): Stillwater, Payne Co., Oklahoma, July 18, 1959, D. E. Howell; Stillwater, Payne Co., Oklahoma, August 1, 1959, H. W. Van Cleave; Stillwater,

Payne Co., Oklahoma, September 30, 1960, H. W. Van Cleave and W. A. Drew. On oak (Quercus sp.): Stillwater, Payne Co., Oklahoma, April 30, 1960, H. W. Van Cleave and W. A. Drew; Lake Wister, Le Flore Co., Oklahoma, November 2, 1960, H. W. Van Cleave and H. Savage.

Comments. Specimens considered here to be this species agree with most of the diagnostic characteristics listed by other authors with the exception of the number of sensoria on the third antennal segment. Specimens examined exhibited 3-6 secondary sensoria which agrees with descriptions by Davidson (1920) and Palmer (1952) for Myzocallis alhambra (Davidson). The unguis varies from slightly less than twice to somewhat more than twice the length of the base of antennal segment VI. In all other regards the specimens exhibit characteristics attributed to M. discolor. A specimen determined as this species by J. T. Medler exhibit these same discrepancies. Palmer (1952) commented that further study might prove that M. alhambra (Davidson) is the same species as M. discolor. This may well explain the discrepancies listed here, but the problem is considered beyond the scope of this study. Extensive collections of this species from Oklahoma and surrounding areas might aid future workers in the study of this problem.

Myzocallis frisoni Boudreaux and Tissot

Myzocallis frisoni Boudreaux and Tissot, 1962. Misc. Pub. Entomol. Soc. Amer., Vol. 3(4):129.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.664-2.184. Body amber. Antennal dark except for segments I, II, and

base of III. Prothorax with single seta on each posterior lateral margin. Pro- and mesothorax dusky on lateral margins. Femora amber, tibae dark at bases shading to pale dusky at apices, tarsi dusky. Fore and hind wings with dark brown band along costal margins becoming broken past the stigma on the fore wing. Cornicles, cauda and anal plate amber. Cauda knobbed, anal plate deeply indented.

Measurements. Antennal segments as follows: I .071-.082, II .061-.071, III .428-.571, IV .306-.367, V .306-.326, VI .163-.184 + .490-.581. Secondary sensoria numbering 7-10 on antennal segment III. Length of rostral segments IV and V .077-.082, width .061-.071. Leg segments: femora I .326-.377, II .286-.316, III .377-.418; tibiae I .515-.605, II .592-.612, III .775-.877; first tarsal segments I, II, and III subequal .031-.036; second tarsal segments I, II, and III subequal .097-.102. Length of fore wing 1.508-2.340, hind wing .884-1.508. Length of cornicle .071.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.768-2.028. Body amber. Antennal dark except for segments I, II, and base of III. Legs pale except for tarsi which are dusky. Paired median dorsal patches on segments II-VII dusky and armed with 3-4 moderately long capitate setae. Lateral abdominal tubercles concolorous with abdomen and usually armed with three moderately long capitate setae. Cornicles concolorous with abdomen.

Collection Data. On pin oak (Quercus palustris Muench.): Miami, Ottawa Co., Oklahoma, August 23, 1961, H. W. Van Cleave.

Comments. The paired large wax-like globules located internally at the bases of the cornicles mentioned as distinctive for this species by Boudreaux and Tissot in the original description were evident in the specimens collected. Brachypterous forms of the alate viviparae were collected and measurements were included in the description of the alate vivipara.

Myzocallis punctata (Monell)

Callipterus punctata Monell, 1879. Bull. U.S. Geol. Surv., 5:30.

Myzocallis punctatus, Baker, 1917. J. Econ. Entomol., 10:424.

Myzocallis alhambra Davidson, 1920. Can. Entomol., 52:176.

Myzocallis discolor, Knowlton, 1929. Pan-Pacif. Entomol., 6:39.

Myzocallis punctata, Hottes and Frison, 1931. Bull. Natur. Hist. Surv., 19:259.

Myzocallis discolor var. coloradensis Gillette and Palmer, 1931. Ann. Entomol. Soc. Amer., 24:890.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.643-1.980. Body amber. Apices of antennal segments III, IV, V, base of VI and all of unguis dusky, remainder amber. Posterior lateral margins of prothorax with two setae. Legs amber with tarsi dusky. Bases and apices of veins in fore and hind wings dusky. Setae on dorsal and lateral margins of abdomen weakly capitate. Cornicles spiculose, concolorous with body. Cauda knobbed, anal plate deeply indented.

Measurements. Antennal segments as follows: I .056-.061, II .051-.061, III .388-.408, IV .245-.286, V .214-.245, VI .112-.122 + .153-.173. Secondary sensoria on segment III numbering 3-5. Length of rostral segments IV and V .097-.102, width .061-.071. Leg segments: femora I .306-.347, II .235-.275, III .316-.367; tibiae I .551-.612, II .525-.571, III .745-.816; first tarsal segments I, II, III equal .036; second tarsal segments I .092-.097, II .092-.102, III .097-.107. Length of fore wing 1.755-2.070, hind wing 1.283-1.463. Length of cornicle .041-.056.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.215-1.530. Body amber without dusky markings. Apices of antennal segments III, IV, V, and base of VI dusky. Setae on body moderately long and capitate. Setae arising from distinct areas on dorsum and lateral margin, at base on abdomen.

Collection Data. From oak (Quercus sp.): Stillwater, Payne Co., Oklahoma, April 29, 1960, H. W. Van Cleave; Stillwater, Payne Co., Oklahoma, April 30, 1960, H. W. Van Cleave; Oklahoma City, Oklahoma Co., Oklahoma, May 10, 1961, J. C. Pennington.

Comments. Richards (1965) describes melanistic forms of this species which were collected later in the season in which the wings are infuscated between the veins and have dusky to fuscous markings on the abdomen in the alate vivipara and have pigments of areas around the bases of the setae in the alatoid nymphs. These melanistic forms were not collected in this study and, therefore, were not included in the description of the two forms described above.

Genus Periphyllus van der Hoeven

Phillophorus Thornton, 1852 (never published). (See Essig. and Abernathy, 1952, 1).

Phyllophora Fernice, 1852 (name preoccupied). Naturalist (Morris) III:265.

Chaitophorus (in part) Koch, 1854. Die Pflanzenlause.

Chelymorpha Clark, 1858 (name preoccupied). Objects Microscope, ed. I.

Periphyllus van der Hoeven, 1863. Tijdschr. Entomol. Nederland. Entomol. Ver., 6:7.

Chaitophorinella van der Goot, 1913. Eine Morph. System. Studie. Tijdschr. v. Entomol., 56:112.

Chaithophorinella van der Goot, 1915. Beitrage zur Kenntnis der Hollanischen Blattlause: 369.

Chaithorinella van der Goot, 1915 (error in spelling; should be Chaitophorinella - see Essig and Abernathy, 1952, 1): Ibid.

Chaitophorinus Borner, 1930. Arch. fur klass. u. physiol. Entomol., 1(2):127.

Genotype: Periphyllus testudo van der Hoeven, 1863 (monotypical).

(This species is considered to be a synonym of Phyllophora testudinacea Fernie, 1852).

General Characteristics. Frontal tubercles absent. Ocular tubercle present. Antenna six-segmented (except in dimorph); with circular to oval sensoria; unguis not shorter than base of VI. Body and usually antenna with prominent spinelike hairs. Cornicle short, truncate, usually imbricated or reticulate. Cauda and anal plate rounded. Fore wing with media twice-branched. Male alate or apterous. Ovipara and fundatrix apterous.

Note. Due to a lack of material for study, except in one species, the above description is taken from Palmer (1952).

Key to the Species of the Genus

Periphyllus in Oklahoma

(adapted from Palmer, 1952)

Unguis shorter than three times as long as the base of VI.....negundinis.

Unguis at least four times as long as the base of VI.....lyropictus.

Periphyllus lyropictus (Kessler)

The Norway Maple Aphid

Chaitophorus lyropictus Kessler, 1886. Nova Acta der Kon. Acad. Leop. Carol, 2:171.

Chaitophorus aceris, Gillette, 1909. J. Econ. Entomol., 2:387 (misidentification).

Periphyllus lyropictus, Hottes and Frison, 1931. Bull. Natur. Hist. Surv., 19:170.

This species was recorded by C. E. Sanborn from Oklahoma in the records of the Insect Museum, Department of Entomology, Oklahoma State University. No specimens remain from this collection and the species was not taken in this study. The following description, along with the above synonymy, is taken from Palmer (1952) as an aid for future students of aphids in the State.

> Apterous Summer Vivipara. (Mounted in balsam), body pale; cornicle, tarsi, tip of tibiae and of antennal IV and V and entire VI dark. Body length 2.70; hind tibiae .95-1.20; hind tarsal II .15; antenna 2.23; rostral IV + V .12, attaining 2d coxa. Hairs spinelike on vertex; on body of two kinds, some fine and .10 long and others heavy, spinelike, .20-.28 long. Cauda semilunar; cornicle nearly cylindrical and reticulated on distal half.

Alate Vivipara. Same as apterous vivipara except as shown in figure. Wings hyaline.

Ovipara. Apterous (Mounted in balsam), body, pale; tarsi, tips of tibiae and of antennal IV and V and entire VI dark. Body length 2.3-2.8; antenna about 2.13, III .60-.66, IV .35-.39, V .30-.31, VI .11 + .50-.55; cornicle .18; hind tibia 1-1.15 long, moderately swollen for nearly entire length and bearing numerous tuberculate sensoria; otherwise as in apterous vivipara.

Male. Alate. Same as alate vivipara except as follows: Length of body 1.7 and presence of numerous sensoria on III, IV, and V.

Collection Data. Boxelder (Acer negundo L.): Stillwater, Payne Co., Oklahoma, June 20, 1925, C. E. Sanborn.

Periphyllus negundinis (Thomas)

The Boxelder Aphid

Chaitophorus negundinis Thomas, 1878. Ill. State Lab. Natur. Hist. Bull. (2) Art., 1:10.

Thomasia negundinis, Swain, 1919. Univ. Calif. Pub. Entomol., 3:36.

Periphyllus negundinis, Webster, 1922. U.S. Bur. Entomol. Insect Pest Surv. Bull., 144.

Alate Vivipara (Single specimen).

General Characteristics. Length from vertex to tip of cauda 1.889. Head and thorax brownish amber, abdomen amber. Antennae pale except dusky areas at apices of segments III, IV, V, base of VI and unguis. Rostrum reaching coxae II. Legs pale. Wings hyaline without dusky markings, veination normal. Cornicles trunicate with reticulation on distal half to two-thirds and slight flange at apices. Cauda and anal plate rounded.

Measurements. Antennal segments as follows: I .102, II .071, III .388, IV .260, V .235, VI .112 + .337. Segment III with 7-8 secondary sensoria present, primary and marginal sensoria in normal positions. Leg segments as follows: femora I .428, II .367, III .561; tibiae I .608, II .632, III .898; first tarsal segments I and II subequal .041, III .051; second tarsal segments I and II subequal .143, III .153. Length of fore wing 2.500, hind wing 1.556. Cornicle .112.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.722-2.222. Body and appendages amber to brownish amber with dusky pigmentation at apices of antennal segments V, base of VI and unguis and apical half of second tarsal segments. Body and appendages armed with numerous medium to moderately long setae. Rostrum attaining coxae II. Cornicles truncate with flange but without reticulations. Cauda and anal plate rounded.

Measurements. Antennal segments: I .092-.102, II .071-.087, III .245-.388, IV .189-.250, V .173-.209, VI .102-.122 + .250-.332. Leg segments: femora I .337-.418, II .326-.423, III .408-.520; tibiae I .490-.612, II .541-.673, III .694-.842; first tarsal segments I and II subequal .046-.051, III .051-.061; second tarsal segments I .143-.153, II .148-.153, III .153-.163. Length of cornicle .092-.102.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.778-2.334. Coloration and setae as in apterous vivipara. Wing pads concolorous with remainder of body.

Dimorph.

General Characteristics. Length .643-.704. Body and appendages amber. Antennae four-segmented with segment I produced forward and armed with two lamellae. Anterior margin of head set with four lamellae. Lamellae present on lateral margins of meso- and metathorax and each of the abdominal segments as well as fore and middle tibiae (Fig. 15).

Collection Data. On leaves of boxelder (Acer negundo L.): Red Rock Canyon State Park, Caddo Co., Oklahoma, May 23, 1961, H. W. Van Cleave.

Genus Pterocomma Buckton

Cladobius Koch, 1857. Die Pflanzenlause Aphiden: 251 (rejected under the provisions of Article 23(b), 1961, International Code of Zoological Nomenclature).

Aphiodes Passerini, 1860. Gli Afid: 28 (Name used previously).

Pterocomma Buckton, 1879. Monogr. Brit. Aphides, Vo. 2:142.

Clavigerus Szepligete, 1883. Rovart. Lap., 1:1-5, 17-20 (not seen).

Melanozanthus Oestlund, 1887. Minn. Geol. Natur. Hist. Surv., 4:36.

Aristaphis Kirkaldy, 1905. Can. Entomol., 37:416.

Genotype: Pterocomma pilosa Buckton, 1879 (monotypical).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of this species.

Richards (1967) studied this genus and his publication should afford future students of this group a valuable reference. The synonymy on the preceding page follows Richards (1967).

Pterocomma smithiae (Monell)

Willow Grove Aphid or Black Willow Aphid

Chaitophorus smithiae Monell, 1879. Bull. U.S. Geol. Surv., 5:32.

Cladobius saliciti, Essig, 1912. Pomona Coll. J. Entomol., 4:786.

Pterocomma smithiae, Wilson, 1915. Ann. Entomol. Soc. Am., 8:355.

Pterocomma media Baker, 1917. J. Econ. Entomol., 10:431.

Melanoxantherium smithiae, Oestlund, 1922. 19th Rept. State Entomol. Minn.: 122.

Clavigerus smithiae, Hottes and Frison, 1931. Bull. Ill. Natur. Hist. Surv., 19:166.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.445-4.111. Body reddish brown, apices of tibiae darker with tibia III showing the greatest amount of dark pigmentation. Rostrum reaching coxae II. Wing venation normal without color pattern. Cornicles lighter than body. Cornicles slightly longer than twice their greatest width. Cauda and anal plate broad cones to rounded. Body with numerous fine hairs.

Measurements. Antennal segments as follows: I .122-.133, II .092, III .510-.561, IV .270-.326, V .270-.326, V .270-.286, VI .153-.168 + .173-.183. Secondary sensoria on III numbering 15-18.

Leg segments: femora I .722-1.000, II .667-.833, III 1.056-1.222; tibiae I 1.167, II 1.278-1.667, III 1.889-2.222; first trasal segments I .051, II .051, III .051-.061; second tarsal segments I .184, II .179-.189, III .179-.194. Length of fore wing 4.111-4.445, hind wing 2.222-2.778. Length of cornicle .265-.301, width .122-.133.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.334-3.834. Coloration as in alate vivipara.

Measurements. Antennal segments: I .112-.122, II .102-.107, III .418-.469, IV .214-.275, V .214-.255, VI .122-.148 + .138-.179. Leg segments: femora I .667-.722, II .667-.722, III 1.000-1.056; tibiae I .945-1.056, II 1.111-1.278, III 1.611-1.833; first tarsal segments I and II .051-.061, III .056-.061; second tarsal segments I .158-.173, II .158-.163, III .168-.179. Length of cornicle .224-.265, width .122-.153.

Collection Data. On willow (Salix sp.): Stillwater, Payne Co., Oklahoma, June 8, 1960, H. W. Van Cleave and K. F. Schaefer. On weeping willow (Salix babylonica L.): Miami, Ottawa Co., Oklahoma, July 18, 1961, H. W. Van Cleave.

Comments. This species can be separated from other aphids found on willow by its size, the relative length of the cornicles to their width, the presence of a flange on the cornicles and the lack of a dorsal abdominal tubercle.

Genus Sipha Passerini

Sipha Passerini, 1860. Parma.: 29.

Genotype: Aphis glyceriae Kaltenbach, 1843 (fixed by Passerini, 1860).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Sipha flava (Forbes)

Yellow Sugarcane Aphid

Chaitophorus flavus Forbes, 1884. Thirteenth Rep. St. Entomol., Ill.: 42.

Sipha flava, Davis, 1909. USDA Bur. of Entomol. Tech. Ser. No. 12, pt. III:156.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.556-1.833. Head and abdomen amber, thorax light to medium brown. Dorsum of body with numerous small to moderate sized setae, venter of abdomen with transverse rows of fine setae. Antennae light amber with segments I, II, apices of III, IV and junction of base of V and unguis light dusky. Rostrum extending past coxae I but not to coxae II. Legs concolorous with head and abdomen. Wing veination normal and heavy except for cubitus of hind wing which is faint, apices of veins in fore wings slightly dusky. Cornicles truncate and light brown in color. Cauda knobbed, anal plate slightly indented to rounded.

Measurements. Antennal segments as follows: I and II subequal .061-.066, III .255-.306, IV .143-.189, V .112-.138 + .194-.214. Secondary sensoria on III numbering 3-5, primary sensoria on apex of

IV and at junction of base of V and unguis, marginal sensoria around primary sensoria on V. Leg segments: femora I .245-.301, II .224-.245, III .296-.337; tibiae I .398-.485, II .418-.500, III .541-.668; first tarsal segments I, II, and III subequal .031; second tarsal segments I .107-.117, II .107-.122, III .112-.122. Length of fore wing 2.000-2.111, hind wing 1.222-1.333.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.556-1.778. Body and appendages amber, with apex of IV, junction of base of V and unguis and apex of unguis dusky. Dorsum of body armed with numerous setae varying in length from .020-.082 in length. Cornicles truncate and concolorous with abdomen. Cauda knobbed, anal plate slightly indented to rounded.

Measurements. Antennal segments as follows: I .061-.071, II .051-.061, III .204-.219, IV .102-.148, V .097-.117 + .133-.194. Primary sensoria at apex of IV and junction of base of V and unguis, six marginal sensoria around primary sensoria on V. Leg segments: femora I .245-.281, II .224-.265, III .270-.337; tibiae I .326-.418, II .367-.459, III .469-.592; first tarsal segments I, II, and III subequal .031; second tarsal segment I .102-.117, II .102-.122, III .117-.128.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.389-1.611. Coloration as in apterous vivipara with wing pads concolorous with remainder of body. Dorsum of body armed with setae as in apterous vivipara.

Nymph.

General Characteristics. Coloration and setae as in alate vivipara. Early instars with only four segments in antennae, later instars with five segments.

Collection Data. On barley (Hordeum vulgare L.): Hennessey, Kingfisher Co., Oklahoma, November 9, 1960, H. W. Van Cleave; Inola, Rogers Co., Oklahoma, November 10, 1960, H. W. Van Cleave; Lebanon, Marshall Co., March 29, 1961, H. W. Van Cleave and F. Vinson. On broomcorn (Sorghum vulgare var. technicum (Koern.) Jar.): Pauls Valley, Garvin Co., Oklahoma, May 4, 1961, H. W. Van Cleave. On Johnsongrass (Sorghum halepense (L.) Pres.): Newkirk, Kay Co., Oklahoma, October 3, 1960, H. W. Van Cleave and C. F. Stiles; Bartlesville, Washington Co., Oklahoma, October 4, 1960, H. W. Van Cleave and C. F. Stiles; Davidson, Tillman Co., Oklahoma, April 18, 1961, H. W. Van Cleave and A. C. Hatfield; Texas Co., Oklahoma, May 16, 1961; Slapout, Beaver Co., Oklahoma, May 18, 1961, H. W. Van Cleave; Sayre, Beckham Co., Oklahoma, May 23, 1961, H. W. Van Cleave. On sorghum (Sorghum vulgare Pers.): Perkins, Payne Co., Oklahoma, November 5, 1960, H. W. Van Cleave. On wheat (Triticum aestivum L.): Commerce, Ottawa Co., Oklahoma, May 14, 1959, H. W. Van Cleave; Perkins, Payne Co., Oklahoma, January 13, 1960, H. W. Van Cleave; Chouteau, Mayer Co., Oklahoma, November 10, 1960, H. W. Van Cleave; Kingfisher, Kingfisher Co., Oklahoma, November 28, 1960, H. W. Van Cleave; Granite, Greer Co., Oklahoma, February 15, 1961, H. W. Van Cleave; Harper Co., Oklahoma, October 3, 1961, S. E. Kunz.

Comments. This species can be recognized by its five segmented antennae, spiny body, short cornicles, knobbed cauda and slightly indented to rounded anal plate. The unguis is longer than base and the integument of the body is smooth which help distinguish it from other members of the genus Sipha reported from nearby states.

Genus Stegophylla Oestlund

Stegophylla Oestlund, 1922. Nineteenth Rep. State Entomol. Minn.: 146.

Genotype: Phyllaphis quercicola Baker, 1916 (monotypical).

Note. Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Stegophylla sp.

Alate Male.

General Characteristics. Length from vertex to tip of genial plate 1.333-1.500. Head and thorax brown. Abdomen pale amber with transverse dusky line anterior to cauda and lateral dusky patches on segments IV, V, and VI (dusky areas on abdomen contain what appear to be wax glands). Antennae and legs dusky to light brown throughout. Rostrum not reaching coxae II. Cornicles mere rims. Cauda and anal plate very broadly rounded.

Measurements. Antennal segments as follows: I .051-.061, II .061-.071, III .112-.133, IV .105-.122, V .133-.148, VI .168-.173 + .051-.026. Sensoria numbering as follows: III 5-7, IV 8-14, V 10-14, VI 8-10 plus 2-3 marginals at junction of base of VI and unguis. Leg segments as follows: femorae I .224-.281, II .184-.224,

III .260-.281; tibiae I .311-.326, II .281-.316, III .398-.423; first tarsal segments I, II, and III subequal .031-.036; second tarsal segments I .112, II .112-.122, III .117-.133. Trochanter and femur fused on each leg but fusion line discernable. Rostral segments IV and V .087-.102. Length of fore wing 1.667-1.833, hind wing 1.111-1.222. Media of fore wing once branched, hind wing with both media and cubitus present. All veins in both pairs of wings with dusky borders.

Apterous Ovipara.

General Characteristics. Length from vertex to tip of cauda 2.000-2.111. Head dusky; thorax and abdomen pale with three longitudinal rows of dusky spots on each side of the median line on the dorsal aspect, a large lateral dusky patch on the ventral surface below each cornicle. Antennae and legs dusky. Trochanter and femur fused in each leg. Hind tibiae distinctly swollen with numerous sensoria on basal two-thirds. Rostrum not reaching coxae II. Cornicles mere rims. Cauda and anal plate very broadly rounded.

Measurements. Antennal segments as follows: I .051, II .077-.082, III .071-.082, IV .056-.071, V .077-.092, VI .128 + .015-.020. Antennal occasionally only five segmented. A primary sensoria on apex of V and at junction of base of VI and unguis. Two to three marginal sensoria near primary on VI. Leg segments as follows: trochanter + femur I .214-.224, II .245-.260, III .255-.306; tibiae I .260, II .286-.296, III .408-.418; first tarsal segments I .031-.036, II .031, III .036; second tarsal segment I .092, II .092-.097, III .102-.107. Rostral segments IV + V .092-.102.

Alatoid Nymph.

General Characteristics. Overall length from vertex to tip of cauda 1.111-1.389. Coloration pale amber with slightly dusky antennal and legs.

Collection Data. From leaves of oak (Quercus sp.): Stillwater, Payne Co., Oklahoma, October 11, 1960, D. E. Howell; Guthrie, Logan Co., Oklahoma, November 8, 1960, H. W. Van Cleave.

Genus Therioaphis Walker

Therioaphis Walker, 1870. Zool., 5:1999.

Genotype: Aphis ononidis Kaltenback, 1846 (monotypical).

General Characteristics. Antennae six segmented, secondary sensoria present on segment III of alate viviparae, unguis subequal to or slightly shorter than the base of VI. Ocular tubercles present. Radial sector of fore wing distinct to faint, media twice-branched, veins with dusky borders to only slight pigmentation around the tips of the veins along the wing margin. Low pigmented tubercles on dorsal and lateral surfaces of the abdomen. Cornicles short, truncate and without flanged apices. Cauda knobbed and anal plate bilobed.

Key to the Species of the Genus Therioaphis in Oklahoma

Dorsum of abdomen with only spinal rows of setae present (Fig. 20).....riehmi.

Dorsum of abdomen with both spinal and pleural rows of setae present (Fig. 21).....trifolii.

Therioaphis riehmi (Borner)

The Sweetclover Aphid

Myzocallidium riehmi Borner, 1952. Mitt. Thuring. Bot. Ges. Bieh., 3:63.

Therioaphis riehmi, Richards, 1965. Mem. Entomol. Soc. Can., 44:94.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.612-2.028. Body color light amber, antennal segments I, II, and base of III amber, remainder dusky. Veins of wings brownish. Abdomen with paired, low median tubercles on segments I-VIII and lateral tubercles on segments I-VII brownish. Cornicle dusky, without flange. Cauda knobbed, anal plate deeply indented, both amber.

Measurements. Antennal segments as follows: I .082-.092, II .071-.077, III .632-.724, IV .357-.428, V .326-.418, VI .163-.194 + .143-.214. Secondary sensoria on segment III numbering 9-14 located on basal half of segment. Leg segments: femora I .408-.459, II .342-.398, III .474-.581; tibiae I .755-.847, II .704-.836, III .908-1.081; first tarsal segment I .036-.041, II .031-.041, III .041; second tarsal segment I .117-.122, II .122-.133, III .122-.133. Length of fore wing 2.340-2.548, hind wing 1.560-1.820. Length of cornicle .041-.051.

Alatoid Nymph.

General Characteristics. Length from vertex to tip fo cauda 1.196-1.716. Body color light amber, apices of antennal segments III, IV, V, and all of VI dusky. Paired, median dorsal tubercles and

lateral tubercles on abdominal segments I-VI each armed with single capitate seta and showing dusky pigmentation around bases of setae.

Collection Data. On sweetclover (Melilotus sp.): Carter Co., Oklahoma, June 30, 1961, F. Vinson.

Therioaphis trifolii (Monell)

Callipterus trifollii Monell, 1882. Can. Entomol., 14:14.

Chaitophorus maculatus Buckton, 1899. Indian Mus. Notes, 4:277.

Myzocallis ononodis Hottes and Frison, 1931. Bull. Natur. Hist. Surv., 19:258.

Myzocallis trifolii, Gilette and Palmer, 1931. Ann. Entomol. Soc. Amer., 24:892.

Ptercallidium maculatum, Borner, 1952. Mit. Thuring. bot. Ges. Bieh, 3:63.

Therioaphis maculata, Dickson, 1959. Ann. Entomol. Soc. Amer., 52:63.

Therioaphis trifolii, Hille Ris Lambers and van den Bosch, 1964. Zool. Ver.: 68.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.945-2.334. Head amber with transverse brownish band connecting compound eyes ventrally, thorax brownish amber, abdomen amber. Antennal segments I, II, V, VI, and apex of IV dusky amber, remainder amber. Rostrum extending past coxae I. Legs amber with apices of tibiae and tarsi slightly dusky. Wings venation normal with base of radial sector faint. Fore wing dusky along costal margin, margins of stigma, at base of media, cubitus and first anal and at apices of all veins, hind wing dusky at apical tip of wing and apices of media and cubitus. Abdominal

segments I-VIII each with numerous irregular low dusky tubercles forming transverse rows on dorsum, lateral tubercles dusky, setae arising from tubercles capitate. Cornicles truncate, slightly dusky. Cauda knobbed, anal plate bilobed.

Measurements. Antennal segments as follows: I .087-.092, II .061-.071, III .056-.678, IV .398-.434, V .337-.388, VI .163-.204 + .179-.194. Secondary sensoria on segment III numbering 8-11, primary and marginal sensoria in normal positions. Rostral segments IV + V .082-.087. Leg segments: femora I .398-.439, II .326-.362, III .459-.520; tibiae I .755-.847, II .704-.791, III .898-1.020; first tarsal segments I, II, and III subequal .036-.041; second tarsal segments I and II subequal .112-.117, III .117-.122. Length of fore wing 2.222-2.556, hind wing 1.445-1.833. Length of cornicle .056-.082.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.167-2.222. Body amber. Head without dark transverse connecting compound eyes ventrally. Antennae, legs and cornicles colored as above. Dusky dorsal tubercles present on thoracic segments as well as abdominal segments. Setae arising from tubercles capitate. Cornicles truncate. Cauda knobbed, anal plate bilobed.

Measurements. Antennal segments: I .087-.097, II .061-.066, III .597-.638, IV .367-.393, V .321-.342, VI .179-.194 + .179-.189. Secondary sensoria on segment III numbering 5-7. Length of rostral segments IV + V .082-.087. Leg segments: femora I .377-.402, II .342-.357, III .439-.459; tibiae I .644-.734, II .683-.724,

III .836-.867; first tarsal segments I .036-.041, II .041, III .041; second tarsal segments I .112-.122, II .112-.117, III .122. Length of cornicle .061-.071.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.778-2.111. Coloration and arrangement of tubercles as in apterous vivipara.

Comments. Two forms of this species are recognized, i.e., form trifolii (the yellow clover aphid) and form maculata (the spotted alfalfa aphid). Form maculata is described above and is common wherever alfalfa (Medicago sativa L.) is grown throughout the state. Consequently, specific collection data is not included here. It reaches its highest numbers during periods of hot, dry weather. Form trifolii has been reported from Texas (Leonard and Tissot, 1965) and from the North Central States (Medler and Ghosh, 1968) and should occur in Oklahoma. These two forms can be separated from each other based on the following key by Dickson (1959):

Sensoria on segment III of the antenna confined to the basal half. Venter of the abdomen with dark dashes or bars.....form maculata.

Sensoria on segment III of antenna extending up to 2/3 of the segment. Venter of the abdomen without dark dashes or bars.....form trifolii.

Genus Tinocallis Matsumura

Tinocallis Matsumura, 1919. Tras. Sapporo Natur. Hist. Soc., 7:100.

Melanocallis Oestlund, 1922. Mineteenth Rep. State Entomol. Minn., 136.

Genotype: Tinocallis ulmiparvifoliae Matsumura, 1919 (monotypical).

General Characteristics. Frontal tubercles not developed, ocular tubercles distinct. Antennae six segmented, secondary sensoria present on segment III only (alate viviparae), unguis shorter than base of segment VI. Wings and venation normal, membrane hyaline or with large pigmented areas. Dorsum of thorax and abdomen with spinal rows of setae present, often on well developed tubercles. Spinal setae on abdominal segments III, V, and VII set wider apart than those on the remaining abdominal segments. Cornicles short with lateral setae of abdominal segment VI appended to their bases. Cauda knobbed, anal plate deeply indented.

Note. Only alate viviparae and alatoid nymphs were noted in this genus.

Key to the Species of the Genus Tinocallis in Oklahoma

1. With well developed dorsal and lateral tubercles on abdomen.....2.

   With only dorsal tubercles well developed on abdomen.....ulmifolii.

2. With well developed dorsal tubercles on the mesonotum of alate forms.....caryaefoliae.

Without dorsal tubercles on the mesonotum of alate forms.....kahawaluokalani.

Tinocallis caryaefoliae (Davis)

Black Pecan Aphid

Callipterus caryaefoliae Davis, 1910. Entomol. News, 21:198.

Myzocallis fumipennella Baker, 1917. Econ. Entomol., 10:422.

Melanocallis caryaefoliae, Oestlund, 1922. Nineteenth Rep. State Entomol. Minn., 136.

Melanocallis fumipennella, Hottes and Frison, 1931. Bull. Natur. Hist. Surv., 19:250.

Tinocallis fumipennella, Quednau, 1954. Mitt. Biol. Zeut-Anst. Berl., 78:28.

Tinocallis caryaefoliae, Borner and Heinze, 1957. Handb. PfKrankh., 5:85.

Myzocallis (Tinocallis) caryaefoliae, Richards, 1960. Can. Entomol., 92:224.

Tinocallis (Melanocallis) caryaefoliae, Richards, 1965. Mem. Entomol. Soc. Can., 44:102.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.722-2.278. Head and thorax brown to brownish-black, abdomen light brown with darker brown paired median tubercles and lateral tubercles. Antennal segments I, II, apices of III, IV, V, and most of VI medium brown with remainder light brown to amber. Paired median tubercles present on dorsum as follows: small inconspicuous pair at base of head, small pair on anterior of prothorax with larger pair near posterior

margin, large pair on mesothorax, small inconspicuous pair on metathorax, prominent pairs on abdominal segments I, II, III, and IV with those on II being the largest, those on III and IV being set further apart than on I and II, small, inconspicuous tubercles on V, VI, VII, and VIII, with V being the widest separated of any on the abdomen, those on VI and VIII being set fairly close together, prominent dark lateral tubercles present on prothorax and abdominal segments I-IV. Cornicles dark brown with pigmented area surround their bases. Cauda knobbed and anal plate deeply indented. Dusky spots present along the anterior margin of fore wing out to apex of stigma and present at base of cubitus and first anal.

Measurements. Antennal segments as follows: I .061, II .056, III .449-.510, IV .265-.281, V .230-.265, VI .138-.148 + .097-.107. Antennal segment III with 6-9 secondary sensoria. Primary sensoria at apices of V and junction of base of VI and unguis. Approximately four marginal sensoria surround primary on VI. Leg segments as follows: femora I .270-.316, II .224-.265, III .326-.398; tibiae I .449-.520, II .444-.520, III .602-.719; first tarsal segment I .026-.031, II .031-.036, III .031-.036; second tarsal segment I .082, II .082-.087, III .082-.092. Length of fore wing 1.833-2.167, hind wing 1.222-1.500.

Alatoid Nymph.

General Characteristics. Overall length from vertex to tip of cauda 1.445-1.833. Body coloration amber to light brown with antenna and legs marked as in alate vivipara. Tubercles medium to dark brown

and arranged as in alate vivipara but being of nearly uniform size and armed with a single prominent, capitate seta. Wing pads and cornicles medium to dark brown.

Collection Data. From pecan (Carya illinoensis (Wang.) K. Koch): Wetumka, Hughes Co., Oklahoma, September 15, 1960, H. W. Van Cleave.

Tinocallis kahawaluokalani (Kirkaldy)

Crapemyrtle Aphid

Myzocallis kahawaluokalani Kirkaldy, 1907. Proc. Hawaii. Entomol. Soc., 1:101.

Monellia lagerstroemia Takahashi, 1920. Zool. Mag. Tokyo, 378:118.

Callipterus kahawaluokalani, Takahashi, 1921. Agr. Exp. Sta. Formosa: 74.

Tinocallis kahawaluokalani, Borner and Heinze, 1957. Hand. PflKrankh., Vol. 5:85.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.333-1.667. Head amber with extensive dusky areas along lateral margins and median line, thorax dusky, abdomen amber with median and lateral tubercles dusky plus dusky spots on segments I-III between median and lateral tubercles. Antennal segments I, II, apices of III, IV, V, and junction of VI and unguis dusky. Middle half of femora II, apex of femora III and base of tibiae III dusky. Wings with extensive dusky patterns; fore wing dusky across base and along anterior margin to apex of stigma, radial sector very indistinct with dusky spot at apex, media dusky at base, media 1 and media 2 surrounded by dusky area back to their junction, media 3 + 4 dusky at bases and apices; hind wing

dusky along anterior margin, media and cubitus dusky at bases and apices. Lateral tubercles on abdominal segments I-IV well developed; paired median tubercles on segments I and II large, with those on II much the largest and fused more than half of their length, paired median tubercles on segments III-VIII small, with those on segments III, V, and VII set much wider apart than on any of the other abdominal segments. Cornicles truncate and dusky in color. Cauda knobbed and anal plate deeply bilobed.

Measurements. Antennal segments as follows: I and II subequal .051-.061, III .275-.306, IV .184-.235, V .173-.204, VI .122-.133 + .102-.112. Secondary sensoria on III numbering 5-8; primary sensoria at apex of V and at junction of base of VI and unguis; approximately three marginal sensoria near primary sensoria on VI. Leg segments as follows: femora I .224-.255, II .179-.199, III .286-.326; tibiae I .388-.449, II .357-.413, III .510-.561; first tarsal segments I, II, and III subequal .026-.031; second tarsal segments I, II, and III subequal .071-.082. Length of fore wing 1.445-1.722, hind wing 1.000-1.668.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.389-1.722. Body color light amber to yellowish with pale dusky pigmentation on dorsal and lateral tubercles. Apices of antennal segments III, IV, V and at junction of base of VI and unguis dusky. Dorsum armed with tubercles as follows: two near antennal sockets near anterior on each side of head and two pairs along posterior margin, one pair along anterior margin and one pair near posterior margin of

prothorax, one pair on each of meso- and metathorax, abdominal segments I-VIII each with a median pair, with those on segments III, V, and VI being set wider apart than the remainder. Lateral tubercles present on each of the thoracic segments and abdominal segments I-IV. Each dorsal and lateral tubercle armed with a single, heavy, capitate seta.

Collection Data. From leaves of crapemyrtle (Lagerstronemia indica L.): Lawton, Comanche Co., Oklahoma, August 14, 1959, A. C. Hatfield; Tulsa, Tulsa Co., Oklahoma, August 28, 1959, C. F. Stiles; Woodward, Woodward Co., Oklahoma, September 2, 1959, H. W. Van Cleave and R. L. Owens; Stillwater, Payne Co., Oklahoma, September 17, 1960, H. W. Van Cleave; Kingfisher, Kingfisher Co., Oklahoma, September 26, 1960, H. W. Van Cleave and J. C. Pennington; Stillwater, Payne Co., Oklahoma, August 17, 1961, D. E. Howell; Miami, Ottawa Co., Oklahoma, August 23, 1961, H. W. Van Cleave; Vinita, Craig Co., Oklahoma, August 23, 1961, H. W. Van Cleave and H. C. Campbell; Tahlequah, Cherokee Co., Oklahoma, August 30, 1961, H. W. Van Cleave.

Tinocallis ulmifolii (Monell)

The Elm Leaf Aphid

Callipterus ulmifolii, Monell, 1879. Bull. U.S. Geol. Surv., 5:29.

Myzocallis ulmifolii, Gillette, 1910. J. Econ. Entomol., 3:369.

Tuberculatus ulmifolii, Hottes and Frison, 1931. Bull. Natur. Hist. Surv., 19:272.

Tinocallis ulmifolii, Borner and Heinze, 1957. Handb. PflKrankh., 5:85.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.500-2.167. Body and appendages light amber to yellowish with apices of antennal segments I-V, junction of base of VI and unguis, and tip of median and lateral tubercles on abdomen dusky. Dusky spots present at base and apex of stigma and at base of radial sector, media, cubitus and first anal veins in fore wing. Paired median tubercles on dorsum of abdominal segments I and II finger-like and longer than those on posterior segments. Median dorsal tubercles on abdominal segments III, V, and VII set wider apart than those on I, II, IV, VI, and VIII. Cornicles obliquely truncate without flange. Cauda knobbed, anal plate deeply bilobed.

Measurements. Antennal segments as follows: I .056-.082, II .051-.071, III .408-.587, IV .260-.347, V .219-.306, VI .133-.173 + .107-.148. Secondary sensoria on III number 5-10, primary sensoria on apex of V and at junction of base of VI and unguis. Leg segments as follows: femora I .281-.377, II .449-.648, III .653-.949; first tarsal segments I .026-.036, II and III subequal .031-.036; second tarsal segments I, II, and III subequal .082-.102. Length of fore wing 1.556-2.278, hind wing 1.111-1.667.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.111-1.833. Coloration as in alate vivipara. Head with four pairs of dorsal tubercles, first two pairs toward anterior area of head, hind two pairs near posterior margin and forming nearly a transverse row. Prothorax with a pair of median tubercles near the anterior margin and

a second pair near the posterior margin. Single median pairs of tubercles of subequal size on dorsum of meso- and metathorax and abdominal segments I-VIII. Lateral tubercles present on each thoracic segment and abdominal segments I-V. Dorsal abdominal tubercles arranged as on alate vivipara. Dorsal and lateral tubercles each armed with single capitate seta. Cornicles short, truncate.

Collection Data. From leaves of American elm (Ulmus americana L.): Red Rock Canyon, Caddo Co., Oklahoma, July 13, 1959, H. W. Van Cleave and W. O. Washum; Boiling Spring State Park, Woodward Co., Oklahoma, July 20, 1959, H. W. Van Cleave and J. C. Pennington; Waurika, Jefferson Co., Oklahoma, April 19, 1960, H. W. Van Cleave and J. C. Pennington; Fairview, Major Co., Oklahoma, August 23, 1960, H. W. Van Cleave and F. Vinson; Mooreland, Woodward Co., Oklahoma, August 23, 1960, H. W. Van Cleave and F. Vinson; Stillwater, Payne Co., Oklahoma, August 25, 1961, H. W. Van Cleave. From elm leaves (Ulmus sp.): Waurika, Jefferson Co., Oklahoma, August 26, 1959, H. W. Van Cleave and T. Ritter; Olustee, Jackson Co., Oklahoma, September 20, 1960, H. W. Van Cleave and A. C. Hatfield; Sallisaw, Sequoyah Co., Oklahoma, August 29, 1961, H. W. Van Cleave.

Tribe Aphidini

General Characteristics. Frontal tubercles poorly developed (not exceeding the vertex) to distinct and well developed. Antennae normally six-segmented (rarely five-segmented), longer than half the length of the body, unguis filamentous. Ocular tubercles present. Rostrum with four distinct segments resulting from the fusion of segments IV and V. Wing membranes hyaline; radial sector distinct and curved; media of fore wing usually twice-branched (once-branched in Schizaphis); hind wing typically with both oblique veins (media and cubitus) present (reduced to only one oblique vein in Hysteroneura). First tarsal segments triangular in lateral outline. Cornicles usually well developed of various shapes; rarely reduced in size. Cauda short to elongate, of various shapes but not semi-lunar (broadly rounded). Anal plate entire and generally broadly rounded.

Note. The tribe is considered here in the broad sense following Palmer (1952).

Key to the Genera of the Tribe Aphidini in Oklahoma

1. Head without prominent frontal tubercles, rarely exceeding vertex (Fig. 22); cornicle never longer than four times the length of the hind tarsus, never reticulated.....2.

   Head usually with prominent frontal tubercles, exceeding the vertex (Fig. 23); cornicle usually longer than four times the length of the hind tarsus, often reticulated.....10.

2. Cornicles swollen or at least attentuated just proximad of the flange not subcylindrical or tapering (Fig. 24).....3.

Cornicles subcylindrical or tapering, not swollen nor abruptly attentuated proximad of the flange (Fig. 25).....6.

3. Cornicles distinctly longer than cauda.....4.

Cornicles subequal to or shorter than cauda.....5.

4. With lateral abdominal tubercles.....Rhopalosiphum.

Without lateral abdominal tubercles.....Hyadaphis.

5. Cauda elongate, distinctly longer than the width at the base.....Hyalopterus.

Cauda a broad tapering cone, not distinctly longer than the width at the base.....Brevicoryne.

6. Hind wing with only one oblique vein.....Hysteroneura.

Hind wing with two oblique veins present.....7.

7. Fore wing with media once-branched.....Schizaphis.

Fore wing with media twice-branched.....8.

8. Cornicles short, with fine denticulate imbrications (Fig. 26).....Neoceruraphis.

Cornicles short or long, with imbrication but without denticulation.....9.

9. Cauda basal width equal to median length; a rounded cone.....Anuraphis.

Cauda longer than width at base, spoon-shaped.....Aphis.

10. Cornicles with distinct reticulations apically (Fig. 27).....11.

Cornicles without reticulations apically.....13.

11. Reticulations covering 1/2 to 2/3 the length of the cornicle, on the distal portion.....Macrosiphoniella.

Reticulations covering 1/3 or less of the length of the cornicle.....12.

12. First segment of each tarsus bearing three setae.....Macrosiphum.

First segment of each tarsus usually bearing five setae, occasionally less.....Dactynotus.

13. Setae on dorsum of head or abdomen slightly to conspicuously capitate or fan-shaped (Fig. 28).....14.

Setae on dorsum of head or abdomen not capitate or fan-shaped.....16.

14. First segment of each tarsus with five setae; ultimate segment of rostrum not stiletto-shaped.....Chaetosiphon.

First segment of each tarsus with two or three setae; ultimate segment of rostrum stiletto-shaped.....15.

15. Secondary sensoria usually present on antennal segment III only; ultimate segment of rostrum with two basal setae much longer than other setae on this segment.....Pleotrichophorus.

Secondary sensoria present on antennal segments III, IV, and occasionally V; ultimate rostral segment without enlarged basal setae.....Capitophorus.

16. Frontal tubercles smooth to scabrous, and diverging (Fig. 23).....Acyrthosiphon.

Frontal tubercles strongly gibbose, parallel sided or converging anteriorly (Fig. 29).....Myzus.

Genus Acyrthosiphon Mordvilko

Aphis Linnaeus (in part), 1758. Systema Naturae, Ed. X:451.

Siphonophora Koch (preoccupied), 1855. Die Pflanzenlause Aphiden: 150.

Macrosiphum Passerini (in part), 1860. Gli Afidi: 27.

Nectarophora Oestlund (in part), 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:78.

Illinoia Wilson, 1910. Ann. Entomol. Soc. Amer., 3:318 (not considered valid - see Palmer, 1952).

Acyrthosiphon Mordvilko, 1914. Faune d.l. Russie, Ins. Hemipt., Vol. I:75.

Macchiatiella Del Guercio, 1917. Redia, Vol. CII:210.

Aulacorthum, Borner (in part), 1933. Kl. Mitt. uber Blattl.

Mirotarsus Borner, 1939. Arb. Phys. u Angew. Entomol., Vol. VI:83.

Genotype: Aphis pini: Kaltenbach (fixed by Mordvilko, 1914).

Note. The above synonymy is adapted from Baker (1920), Hille Ris Lambers (1947), and Palmer (1952). Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Hille Ris Lambers (1947) studied the European species and Richards (1963) included a key to the nine species found in Canada. Although these two papers do not necessarily cover all of the species that might be found in the United States, they would be very helpful to any student interested in this genus.

Acyrthosiphon pisum (Harris)

The Pea Aphid

Aphis pisum Harris, 1782. Exposit. English Insects, Lond.: 66.

Aphis onobrychis Boyer de Fonscolombe, 1841. Ann. Soc. Entomol. France, 10:169.

Aphis pisi Kaltenbach, 1843. Monogr. de Familien der Pflanzelause. Aachen: 23.

Macrosiphum pisi, Davis, 1915. U.S. Dept. Agr. Bull. 276.

Acyrthosiphon pisum, Hille Ris Lambers, 1947. Tijdschr. voor Entomol., 88:247.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.328-3.848. Head amber, thorax medium brown, and abdomen amber. Head with conspicuous frontal tubercles. Antenna amber except apices of segments III, IV, V, and all of VI. Apices of rostral segments IV + V dusky. Membrane of wings hyaline, venation normal. Apices of femur and tibia dusky, tarsus dusky. Cornicles long and slender, without reticulations, amber throughout most of their length becoming dusky at apices. Cauda and anal plate amber. Cauda elongate, basal lateral hairs pointed becoming shorter and blunt to slightly capitate at apex of cauda.

Measurements. Antennal segments as follows: I .184, II .133-.143, III .989-1.112, IV .867-1.040, V .796-.857, VI .326-.337 + 1.224-1.275. Secondary sensoria numbering 11-19 on antennal segment III. Primary sensoria present in normal position on V and VI. Rostrum nearly attaining coxae II. Length of fore wing 4.160-4.316, hind wing 2.340-2.392. Leg segments as follows: femora I 1.122-1.224, II 1.020-1.183, III 1.357-1.530; tibiae I 1.938-2.193, II 1.907-2.122, III 2.642-3.009; first tarsal segments I, II, and III equal .051; second tarsal segments I .173-.184, II .173-.184, III .184. Length of cornicle .847-.938. Length .530-.551.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 3.224-3.276. Coloration as in alate vivipara except that thorax is amber and concolorous with head and abdomen and the femora are amber throughout, lacking the dusky pigmentation noted at the apices on the alate forms.

Measurements. Antennal segments as follows: I .133-.173, II .112-.122, III .734-.898, IV .541-.581, V .510-.571, VI .245-.265 + .765. Secondary sensoria numbering 1-2 near base of antennal segment III. Rostral segments IV + V .117. Leg segments: femora I .836-.908, II .796-.867, III 1.091-1.163; tibiae I 1.346-1.448, II 1.367-1.408, III 1.979-2.091; first tarsal segments I, II, and III equal .051; second tarsal segments I .138-.153, II .153-.163. Length of cornicle .714-.806. Length of cauda .449-.541.

Collection Data. Common on alfalfa (Medicago sativa L.) throughout the state during the cooler months of the year. On vetch (Vicia sp.): Weber Falls, Muskogee Co., Oklahoma, April 16, 1960, H. W. Van Cleave. On sweetpea (Lathyrus odoratus L.): Ardmore, Carter Co., Oklahoma, May 2, 1961, H. W. Van Cleave and F. Vinson.

Note. The synonymy is adapted from Palmer (1952).

Genus Anuraphis Del Guercio

Anuraphis Del Guercio, 1907. Redia, Vol. 4:190.

Brachycaudus van der Goot, 1913. Tijdschr. voor Entomol., Vol. 56:97.

Dentatus van der Goot, 1913. Ibid.: 98.

Semiaphis van der Goot, 1913. Ibid.: 105.

Yezabura Matsumura, 1917. J. Coll. Agr. Tohoku Univ., Vol. 7, pt. 6:392.

Sappaphis Matsumura, 1918. Trans. Sapporo Natur. Hist. Soc., Vo. 7, pt. 1:18.

Genotype: Aphis pyri Koch (fixed by Del Guercio, 1907).

Note. The synonymy above is adapted from Baker (1920). Only one species of this genus was found in Oklahoma; therefore, the description is of that species.

Anuraphis helichrysi (Kaltenbach)

The Leaf-curl Plum Aphid

Aphis helichrysi Kaltenbach, 1843. Monogr. der Familien der Pflanzenlause. Aachen: 102.

Brachycaudus helichrysi, van der Goot, 1913. Tijdschr. Entomol., 56:97.

Anuraphis helichrysi, Smith, 1921. J. Econ. Entomol., 14:422.

Anuraphis padi (Linnaeus), Theobald, 1927. The plant lice or Aphididae of Great Britain. London, 2:403 (disputed synonymy).

Aphis marutae, Palmer, 1936. Ann. Entomol. Soc. Amer., 29:747 (det. of sexuales erroneous).

This species has been collected in Oklahoma but this author was only able to examine one nymph identified by L. M. Russell, consequently, the following description is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma.

Fundatrix. Body length 2.30; antenna .53, five-segmented; hind tibia .50-.65.

Apterous Summer Vivipara. (On plum). Pale green to lemon-yellow; shining; all appendendages pale. Body length 1.1-1.3; hind tibia .50-.70; antenna .60-.80. Dorsal surface of body granular. Lateral tubercles minute. Rostrum surpassing 2d coxa. Cauda elongate-rounded to bluntly tapering, bearing 2-3 pairs of lateral hairs and one preapical one.

Alate Vivipara. Spring Migrant. Head and thorax black; abdomen green with dusky to glossy black dorsal patch on abdominal III or IV to tip of abdomen and dusky to black lateral areas of abdominal II, III, and IV; cornicle pale to black; antenna blackish; tibiae brownish; cauda and anal plate pale. Body length 1.10-1.30; hind tibia .73-.96; antenna 1.15. Rostrum attaining 2d coxa.

Ovipara. Apterous. Body length .90; antenna .40, III and IV coalesced; hind tibia .30, conspicuously swollen and bearing numerous sensoria.

Male. Alate. Body length 1; antenna 1.10.

Collection Data. Cineraria sp. in greenhouse: Muskogee, Muskogee Co., Oklahoma, December 2, 1958, C. Campbell (Det. L. M. Russell, 1959).

Genus Aphis Linnaeus

Aphis Linnaeus, 1758. Systema Naturae, Ed. X:451.

Loxerates Rafinesque, 1817. Amer. Mo. Mag. & Crit. Review, I:361.

Uraphis Del Guercio, 1907. Redia, Vol. 4:192.

Microsiphon Del Guercio, 1907. Ibid.: 192.

Myzaphis van der Goot, 1913. Tijdschr. voor Entomol., Vol. 56:96.

Stenaphis Del Guercio, 1913. Redia, Vol. 9:185.

Longiunguis van der Goot, 1916. Zur. Kennt. d Blattlause Java's: 112.

Melanaphis van der Goot, 1916. Ibid.: 61.

Abura Matsumura, 1917. J. Coll. Agr. Tohoku Univ., Vol. 7, pt. 6:407.

Arimakia Matsumura, 1917. Ibid.: 405.

Genotype: Aphis sambuci Linnaeus (by suspension of rules; set by Latrielle, 1802) from Palmer (1952).

General Characteristics. Frontal tubercles reduced, not exceeding the vertex. Antennae six-segmented, unguis filamentous, secondary sensoria circular to subcircular. Wing venation typical of the tribe Aphidini. Cornicles cylindrical to slightly tapering, of moderate length, not greatly elongate, usually with imbrications but not denticulated. Cauda typically narrowed at the base producing a spoon-shaped outline, occasionally without constriction resulting in a rounded cylindrical outline; with imbrication. Cauda rounded.

Note. The genus is considered here in a narrower sense than in Palmer's study (1952). Synonymy of this genus is adapted from Baker (1920).

Key to the Species of the Genus *Aphis* in Oklahoma

1. Abdomen pale with a large black spot at the base of each cornicle (Fig. 30).....*nerii*.
   Abdomen pale or dusky but without a single large black spot at the base of each cornicle.....2.
2. Cauda bearing two to four pairs of lateral hairs.....3.
   Cauda bearing five or more pairs of lateral hairs.....5.
3. Overall color of abdomen reddish amber to reddish brown.....sp. (prob. *illinoisensis*).
   Overall color of abdomen amber with or without dusky bands or spots.....4.
4. Unguis nearly twice the length of the cornicle.....*craccivora*.
   Unguis between one to one and one-half times the length of the cornicle.....*gossypii*.
5. Antennal segment III longer than unguis; cauda short and stubby, about as broad as long.....*rumicis*.
   Antennal segment III and unguis subequal in length; cauda longer than broad.....*pomi*.

Aphis craccivora Koch

The Cowpea Aphid

Aphis craccivora Koch, 1854. Die Pflanzelause Aphiden, Nurberg: 124.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.938-2.193. Head and thorax medium brown, abdomen amber with small lateral and transverse dorsal dusky spots on each segment. Antennal segments I, II, apical portion of V, and all of VI dusky to brown, remainder of antenna amber. Rostrum amber and reaching nearly to coxae II. Wing membranes hyaline and venation normal. Trachanters, femora (except at basal fourth), apices of tibiae and all of tarsi dusky to brown, remainder of legs amber. Cornicles, cauda and anal plate dusky to brown. Cornicles imbricated. Cauda with three pairs of lateral setae. Abdominal segments I and VII with small, but distinct, lateral tubercles.

Measurements. Antennal segments as follows: I .061-.071, II .051-.061, III .270-.286, IV .224-255, V .204-.224, VI .112-.117 + .168-.204. Secondary sensoria on segment III numbering 4-6. Rostral segments IV + V .112-.122 in length. Length of fore wing 2.882-3.060, hind wing 1.734-1.785. Leg segments as follows: femora I .408-.418, II .337-.347, III .479-.510; tibiae I .694-.704, II .704-.724, III .938-.979; first tarsal segments I .031-.036, II .036, III .036; second tarsal segments I .112-.117, II .117-.122, III .117-.128. Length of cornicle .224-.306. Length of cauda .092-.102.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.862-1.989. Coloration as in alate vivipara except that head and thorax are amber and concolorous with abdomen. Rostrum attaining coxae II.

Measurements. Antennal segments as follows: I .051-.061, II .061, III .209-.235, IV .163-.173, V .163-.168, VI .102-.112 + .116-.184. Rostral segments IV + V .117-.122 in length. Leg segments: femora I .306-.337, II .342-.367, III .449-.474; tibiae I .490-.541, II .571-.622, III .724-.831; first tarsal segments I .036-.041, II .041, III .036-.041; second tarsal segments I .107-.112, II .112-.122, III .112-.117. Length of cornicle .275-.296. Cauda .102-.107 in length, with three pairs of lateral setae.

Alatoid Nymphs. (none collected)

Collection Data. On terminal growth of black locust (Robinia pseudoachacia L.): Stillwater, Payne Co., Oklahoma, April 29, 1960. D. Shorter; Davidson, Tillman Co., Oklahoma, April 19, 1961, H. W. Van Cleave. On alfalfa (Medicago sativa L.): Kay Co., Oklahoma, April 15, 1966, D. Arnold.

Note. This species can be recognized in the natural state by the shiny black body and whitish marked legs and antennae of the adults with slate gray colored nymphs in close association in the same colonies.

This is the same species referred to by Palmer (1952) and other North American authors as Aphis medicaginis Koch. This author is not in position to pass judgment on the confusion so, consequently, has elected to follow current usage now in effect.

Aphis gossypii Glover

The Cotton Aphid or Melon Aphid

Aphis gossypii Glover, 1877. Rep. Comm. Agr. Operations Dep. for 1876: 36.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.508-1.768. Head and thorax dusky, abdomen amber. Antenna dusky to blackish brown. Rostrum amber, attaining coxae II. Wing membranes hyaline, venation normal. Legs mainly amber with tarsi and apices of tibiae dusky. Cornicles, cauda, and anal plate dusky to blackish brown. Cornicles cylindrical to slightly tapering, with distinct flanges at apices. Cauda with slight narrowing distal to the base giving a spoon shaped appearance, with 2-3 pairs of lateral setae. Anal plate rounded.

Measurements. Antennal segments as follows: I .051-.055, II .055-.061, III .265-.275, IV .184-.194, V .173-.184, VI .107-.112 + .235-.255. Secondary sensoria of medium size arranged in a row along posterior margin and numbering 6-8 on segment III and 0-1 on segment IV. Primary sensoria on segment V set in slightly from apex, in normal position on VI. Length of rostral segments IV + V .097-.102. Length of fore wing 2.392-2.652, hind wing 1.508-1.612. Leg segments as follows: femora I .337-.357, II .275-.296, III .377-.408; tibiae I .592-.673, II .571-.663, III .745-.867; first tarsal segments I, II, and III subequal .031; second tarsal segments I, II, and III subequal .082-.092. Length of cornicle .163-.224, cauda .061-.082.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.612-1.976. Body amber; antennae, legs, cornicles, cauda, and anal plate as in alate vivipara. Rostrum attaining coxae III.

Measurements. Antennal segments as follows: I .051-.056, II .051-.056, III .224-.265, IV .173-.194, V .153-.173, VI .097-.102 + .235-.255. Rostral segments IV + V .102 in length. Leg segments as follows: femora I .275-.306, II .275-.306, III .408-.434; tibiae I .439-.530, II .520-.592, III .745-.785; first tarsal segments I, II, and III subequal .031; second tarsal segments I .082-.087, III .092. Length of cornicle .245-.296, cauda .102.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.352-1.872. Body amber, wing pads dusky, remainder as above.

Collection Data. From greenhouses. Begonia: Tulsa, Tulsa Co., Oklahoma, November 19, 1958, C. F. Stiles. Chrysanthemum (Chrysanthemum sp.): Oklahoma City, Oklahoma Co., Oklahoma, November 24, 1958, H. H. Latham; Altus, Jackson Co., Oklahoma, December 5, 1958, A. C. Hatfield; Tulsa, Tulsa Co., Oklahoma, January 13, 1959, C. F. Stiles; Chandler, Lincoln Co., Oklahoma, February 7, 1959, R. G. Price. Hibiscus (Hibiscus sp.): Lawton, Comanche Co., Oklahoma, December 18, 1959, A. C. Hatfield. Hyacinth (Hyacinthus sp.): Hugo, Choctaw Co., Oklahoma, February 18, 1959, J. M. Goin. Flowering quince (Chaenomeles japonica, Lindl.): Perry, Noble Co., Oklahoma, January 31, 1959, R. G. Price; Chickasha, Grady Co., Oklahoma, February 7, 1959, R. G. Price.

On kalanchoe (Kalanchoe sp.): Tulsa, Tulsa Co., Oklahoma, January 13, 1959, C. F. Stiles. On ornamental gourd (Lagenaria siceraria Standl.): Stillwater, Payne Co., Oklahoma, September 5, 1960, H. W. Van Cleave. On sultana (Impatiens sp.): Tulsa Co., Oklahoma, January 13, 1959, C. F. Stiles. On velvet plant (Gynura sp.): Fredrick, Tillman Co., Oklahoma, November 12, 1958, A. C. Hatfield. From suction trap: Stillwater, Payne Co., Oklahoma, November 9, 1965.

Note. This is probably one of the most common species of aphid in Oklahoma and occurs on one of the widest ranges of host plants encountered in this study.

Aphis nerii Boyer de Fonscolombe

The Oleander and Mildweed Aphid

Aphis nerii Boyer de Fonscolombe, 1841. Ann. Soc. Entomol. Fr., 10:179.

Aphis lutescens Monell, 1879. U.S. Geol. Surv. Bull., 5:23.

Note. This species was recorded from Oklahoma by Medler and Ghosh (1968). The above synonymy is adapted from Kennedy, Day, and Eastop (1962). Due to a lack of material for examination, the following description is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma.

> Apterous Vivipara. Lemon-yellow on entire body or slightly brownish on head; antenna and hind tibia yellowish brown to dusky; blackish on femora, tarsi, distal portion of antenna and tips of tibiae; cornicle, cauda and anal plate black. Body length 2.2-3; hind tibia 1.10-1.50; antenna 1.50-1.63; rostrum attaining between 2d and 3d coxae.

Alate Vivipara. Head and thoracic lobes dark; abdomen bright lemon-yellow; lateral areas on abdominal segments and blotch posterior to base of each cornicle dusky to black; cauda, anal plate, antenna and cornicle black; tibiae yellowish to dusky with tips and tarsi black. Same in measurements as aptera except as figured. Secondary sensoria rather large, not tuberculate. Hairs pointed, drooping, about .02 on antennal III; on hind tibia, as long as diameter of tibia and rather numerous; .04-.05 on body. Cauda bearing 3 pairs of lateral, 2 pairs of dorsulateral and one median preapical hairs. Lateral, tubercles present on prothorax, and abdominal I and VII, but feebly developed.

Collection Data. Suction trap: Stillwater, Payne Co., Oklahoma, October 29, 1965.

Aphis pomi De Geer

The Apple Aphid

Aphis pomi De Geer, 1773. Mem. pour servir a l'histoire des insectes, III:53.

Aphis mali Fabricius, 1794. Entomol. systematica, IV:216.

Note. This species was recorded by C. E. Sanborn in the insect museum, Department of Entomology, Oklahoma State University. Since this species was not taken in this study, the synonymy and following description is taken from Palmer (1952) as an aid for future students of aphids in Oklahoma.

Fundatrix. Young. Newly hatched, very dark green; cornicle very short, shorter than antennal I and black. Body length .60, antenna .28. Adult. Yellowish apple-green, head dusky brown; tip of antenna, cornicle, cauda, anal plate, genital plate, tip of rostrum, tarsi and tips of tibiae blackish; remainder of appendages slightly dusky. Body length 1.50; antenna .75, III and V coalesced. Otherwise as in summer apterous vivipara.

Alate Vivipara. Head and Thorax black; abdomen light yellowish green or apple-green, rarely lemon-yellow; with darker green spots laterally but not true dusky areas; cauda, and appendages pale or slightly dusky; tarsi, tips of tibiae and of antennal III, IV and V and entire VI, cornicle, cauda and anal and genital plates blackish. Body length 1.50-1.90, hind tibia 1, antenna 1.15-1.30; rostrum obtuse, attaining between 2d and 3d coxae.

Apterous Vivipara. Young. First instar, very pale yellowish green. Adult. Same as alate vivipara except as follows: Head, thorax and lateral abdomen yellowish green. Hairs pointed, drooping; .04 long on body and .02 on antennal III; on hind tibia, length equalling or slightly exceeding diameter of tibia. Cauda elongated-cylindrical, with only slight tendency to constriction near base and blunt at tip, bearing 4 lateral and 3 dorsolateral hairs on each side and a median preapical pair near tip. Lateral tubercles present on prothorax and all abdominal segments except VIII.

Ovipara. Apterous. Usually dull green with tinge of rusty yellow to yellowish olive-brown; head light to dark dusky brown; cornicle, cauda, anal and genital plates, tarsi, knees, distal ends of tibiae and distal half of antenna black or blackish. Body length 1.40-1.50; antenna .85-1.0; hind tibia hardly swollen and bearing only about 10 large sensoria scattered along entire length.

Male. Apterous. Brownish yellow with head dusky brown; dark markings as in ovipara. Body length 1.10; antenna .90; cornicle .15.

Egg. Newly laid, light green; later shiny black. Size .60 by .26.

Collection Data. Apple (Malus sp.): Stillwater, Payne Co., Oklahoma, October 22, 1923, C. E. Sanborn.

Aphis rumicis Linnaeus

The Dock Aphid

Aphis rumicis Linnaeus, 1758. Systema Naturae, Ed. X:451.

Aphis carbocolor Gillette, 1907. Can. Entomol., 39:391.

Note. This species was recorded twice by C. E. Sanborn in the records of the insect museum, Department of Entomology, Oklahoma State University. The synonymy and the following descriptions are taken from Palmer (1952) as an aid for future students of the aphids in Oklahoma.

Fundatrix. Dull slaty black throughout except proximal half of antennal III, 1st femur, middle portion of all tibiae and proximal portion of all tibiae and proximal portion of rostrum. Body length 1.95; antenna .90, III and IV coalesced; cornicle .14. Otherwise as in summer aptera.

Apterous Summer Vivipara. Deep, dull, sooty-black throughout; appendages and rostrum mostly yellowish, blackish at distal ends of segments and entire tarsi. Body length 2.1-2.5; hind tibia 1; antenna 1.1-1.3. Dorsum of body reticulated.

Alate Vivipara. Color same as apterous vivipara except that dorsum is polished. Body length 1.9; hind tibia 1; hind tarsal II .3; antenna 1.3; secondary sensoria flat; rostrum attaining 2d coxa. Hairs pointed, fine; on body very sparse. Cornicle cylindrical, finely imbricated, and without flange. Lateral tubercles well developed on prothorax and all abdominal segments. Cauda broadly cylindrical, with slight neck, blunt, bearing about 7 pairs of lateral hairs.

Ovipara. Apterous. Color same as apterous vivipara. Body 1.9 long; antenna barely 1; hind tibia .83, proximal two-thirds slightly swollen and bearing about 10 small sensoria.

Male. Apterous. Color same as females or a little lighter. Length of body 1.30; antenna .94; cornicle .11.

Egg. Newly laid, yellowish brown; later, polished black. Size .66 by .288.

Collection Data. Strawberry (Fragaria sp.): Stillwater, Payne Co., Oklahoma, October 20, 1921, C. E. Sanborn. Cotton (Gossypium sp.): Stillwater, Payne Co., Oklahoma, October 20, 1922, C. E. Sanborn.

Aphis sp. (probably illinoisensis Shimer)

The Grapevine Aphid

Aphis illinoisensis Shimer, 1866. Prairie Farmer, Vol. 18, No. 20:316.

Siphonophora viticola Thomas, 1879. Eighth Rep. of the St. Entomol. of Illinois, 55.

Macrosiphum illinoisensis, Baker, 1917. J. Agri. Res., Vol. XI, No. 3:83.

Alate Vivipara.

This form was not taken during this study. The following description is taken from Baker (1917) as an aid to future students of aphids in Oklahoma.

> Fifth Instar (Adult). Color a deep reddish brown, appendages and cornicles darker, the tibiae with a lighter median area; eyes black; wings with dusky veins and stigma. The antennae are distinctly imbricated on all segments excepting I and II. Segment III armed with from 6 to 14 sensoria arranged in an uneven row on the basal three-fourths of the segment. In some cases the sensoria cover the entire segment. They are uneven in size, some being fairly large while others are quite small. The cornicles are somewhat tapering, very distinctly imbricated, and with distal extremity not distinctly flanged. Cauda about half the length of the cornicles. Length of fore wing, 2.4 mm; length from vertex to tip of cauda, 1.328 mm.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.248-1.560. Body amber to reddish amber. Antennal segments I and II reddish amber, segments III, IV, and V pale amber except for apices of

each which are dusky, base of VI dusky, unguis pale amber to slightly dusky. Rostrum pale amber, attaining coxae III. Basal half of femora pale, apical half dusky; tibiae pale with apices dusky; all of tarsi dusky. Contrasting coloration becomes progressively more distinct in the legs from front to rear with the contrast quite evident in the 3rd pair of legs. Cornicles large, slightly tapering from base to apex ending in an indistinct flange. Cornicles reddish brown in color and darker than the body. Cauda showing a slight constriction beyond the base, with 2-4 pairs of lateral setae. Anal plate broadly rounded. Cauda and anal plate reddish brown in color.

Measurements. Antennal segments as follows: I .056-.066, II .066-.071, III .316-.326, IV .204-.235, V .189-.204, VI .102-.117 + .275-.347. Length of rostral segments IV + V .112-.117. Leg segments as follows: femora I .296-.357, II .306-.337, III .398-.439; tibiae I .541-.587, II .571-.612, III .719-.847; first tarsal segments I .026-.031, II .026-.031, III .031-.036; second tarsal segments I .077-.087, II .082-.097, III .077-.092. Length of cornicle .376-.449, cauda .082-.102.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.352. Coloration as in apterous vivipara. Wing pads reddish brown but darker than body color.

Collection Data. On grape (Vitis sp.): Lebanon, Marshall Co., Oklahoma, August 15, 1960, F. Vinson.

Note. Synonymy of this species is adapted from Baker (1917).

Genus Brevicoryne van der Goot

Brevicoryne van der Goot, 1915. Beitrage z Kennt. d. Holl. Blattlause. 245.

Oedisiphum van der Goot, 1916. Zur Kennt. d. Blattlause Java's: 122.

Brevicoryne Das, 1918. Mem. Ind. Mus., Vol. 6:179.

Genotype: Aphis brassicae L. (monotypical).

Note. The synonymy above is adapted from Baker (1920). Only one species of this genus was taken in Oklahoma, consequently, the description is of that species.

Brevicoryne brassicae (Linnaeus)

The Cabbage Aphid

Aphis brassicae Linnaeus, 1758. Systema Naturae, Ed. X:452.

Brevicoryne brassicae, van der Goot, 1915. Beitrage zur Kenntniss der Hollandischen Blattlause: 246.

Alate Vivipara (not collected during this study).

The following description is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma.

> Alate Vivipara. Head and thorax black; abdomen pale greenish with broken dashes of dusky and with dusky lateral areas; appendages, cauda, anal plate and cornicle dusky. Body length 2-2.3; hind tibia 1.4; antenna 2, secondary sensoria with distinct margins, somewhat tuberculate; rostrum not attaining 2d coxa. Hairs pointed. Cornicle swollen, slightly wider at middle than hind tibia. Cauda tapering acute, bearing 2 pairs of lateral and one pair of dorsal hairs.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.184-2.444. Body amber to reddish amber. Antenna generally amber with apices of segments III, IV, and all of V and VI dusky. Rostrum amber and attaining coxae II. Legs amber to reddish amber with tarsi and apices of tibiae dusky. Cornicles shorter than the second tarsal segments, dusky in color. Cauda amber to slightly dusky, shaped in the form of a broad cone with 2-3 pairs of lateral setae.

Measurements. Antennal segments as follows: I .066-.072, II .061-.066, III .377-.408, IV .163, V .153-.184, VI .102 + .245 -.286. Rostral segments IV + V .122-.133 in length. Leg segments as follows: femora I .428-.459, II .398-.469, III .587-.602; tibiae I .673-.714, II .745-.769, 1.000-1.020; first tarsal segments I .041-.046, II .046, III .046; second tarsal segments I .158-.173, II .163-.176, III .194. Length of cornicle .133-.143, cauda .102-.112.

Collection Data. From cabbage (Brassica oleracea L.): Ardmore, Carter Co., Oklahoma, May 2, 1961, H. W. Van Cleave.

Genus Capitophorus van der Goot

Rhopalosiphum Koch (in part), 1854. Die Pflanzelause Aphiden., Nurberg: 28.

Myzus Passerini (in part), 1860. Gli Afidi., 34.

Capitophorus van der Goot, 1913. Tijdschr. voor Entomol., Vol. LVI:84.

Genotype: Aphis carduina Walker (fixed by van der Goot, 1913).

Note. The synonymy above is adapted from Hille Ris Lambers (1953). Only one species of this genus has been reported from Oklahoma; therefore, the description is of that species.

Hille Ris Lambers (1953) covered the European species in his "Contribution to a Monograph of the Aphididae of Europe, V" and this is a helpful reference to any student interested in this genus.

Capitophorus elaeagni (Del Guercio)

Myzus elaeagni Del Guercio, 1894. Natur. Siciliano, Vol. XIII, No. 10:189-199.

Myzus braggi Gillette, 1908. Can. Entomol., XL:17.

Phorodon carduinum Davidson, 1912. J. Econ. Entomol., V:409.

Capitophorus elaeagni van der Goot, 1913. Tijdschr. v. Entomol., LVI:84-145.

Capitophorus braggii, van der Goot, 1915. Beitr. z. Kenntnis d. Holl. Blattlause: 119-122.

Mazus carthusianorum Haviland, 1918. Entomol., LI:658.

Capitophorus cynariella Theobald, 1923. Bull. Soc. Roy. Entomol. Egypte, Ann. V:39-42.

Capitophorus flaveolus partim., Theobald, 1926. The plant lice or Aphididae of Great Britain, I:250-252.

Capitophorus carthusianorum, Theobald, 1926. Ibid.: 256.

Capitophorus cirsii Nevsky, 1928. Entomol. Mitt., XVII:195.

Capitopitophorus flaveolus, Hottes and Frison, 1931. Illinois Natur. Hist. Surv. Bull., 19:282-283.

Note. This species was reported from Oklahoma by Medler and Ghosh (1968). The above synonymy is adapted from Hille Ris Lambers (1953). Due to a lack of material on which to base a description, the following description is taken from Palmer (1952) where the species is listed as Capitophorus braggii (Gillette).

On Cirsium arvense and Cynara sp. as summer hosts:

Apterous Summer Vivipara. Pale greenish yellow to flesh-colored with greenish vittae; appendages, cornicle and cauda pale. Body length 1.9; hind tibia 1.25; cornicle .70-.90; antennae 2.33-2.7; rostrum attaining 2d or 3d coxa. Hairs capitate or globate; .06-.07 on vertex; slightly shorter on body and sparse; .01, merely blunt and sparse on antenna and hind tibia.

Alate Vivipara. Head and thorax black or blackish; abdomen light yellow to greenish, with dark lateral areas and a dark green dorsal patch on III to VI. Other characters as in aptera except as figured.

Male. Alate. Color as in alate vivipara except that on abdomen the dorsal patch is broken into short bands which are present on all segments posterior to II. Body length 1.50-1.80; antenna 2.10-2.30.

On Elaeagnus augustifolia, as winter hosts:

Fundatrix. Newly hatched. Very light yellowish green with a pair of dorsolateral rows of dusky spots; cornicle often slightly dusky; head dusky with light median line. Body length .50-.55; cornicle .05-.07. Adult. Pale yellowish green with transverse mottling of darker green, forming a pair of dorsolateral vittae. Entire dorsum shagreened. Appendages, cornicle and cauda pale, with tarsi and tips of cornicle and antenna dusky. Body length 2; antenna 1.35; cornicle .55-.65; cauda .15 on median line, .18-.20 on side. Hairs on body capitate; simple, sparse and short on appendages.

Alate Vivipara. Distinguished from the above described alate form on thistle as follows: antenna 2-2.43, sensoria 36-40 on III, 19-30 on IV, 9-13 on V, and cornicle is longer than III instead of about equal.

Apterous Summer Vivipara. Same as apterous vivipara on thistle.

Genus Chaetosiphon Mordvilko

Aphis Linnaeus (in part), 1758. Systema Naturae, Ed. X:451.

Siphonophora Koch (preoccupied), 1855. Die Pflanzenlause Aphiden. Nurberg, 150.

Nectarophora Oestlund (in part), 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:78.

Myzus Passerini (in part), 1860. Gli Afidi.:34.

Capitophorus van der Goot (in part), 1913. Tijdschr. voor Entomol., Vol. LVI:84.

Chaetosiphon Mordvilko, 1914. Faune d.l. Russie, Ins. Hemipt., Vol. I:71.

Genotype: Capitophorus chaetosiphon Nevsky (fixed by Nevsky, 1929).

Note. The above synonymy and genotype fixation is adapted from Hille Ris Lambers (1953). In this study, Hille Ris Lambers covers the European species but it is a very useful paper in assisting a student in the current concept of this genus.

Only one species of this genus was found in Oklahoma; therefore, the description is of that species only.

Chaetosiphon fragaefolii (Cockerell)

The Strawberry Aphid

Myzus fragaefolii Cockerell, 1901. Can. Entomol., 33:101.

Capitophorus fragaefolii, Hottes and Frison, 1931. Bull. (Illinois) Natur. Hist. Surv., 19:283.

Capitophorus potentillae, Gillette and Palmer, 1934. Ann. Entomol. Soc. Amer., 27:153.

Chaetosiphon fragaefolii, Hille Ris Lambers, 1953. Temminckia, 9:66.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.560-1.664. Head and thorax dusky, abdomen amber with dusky markings on dorsum. Frontal tubercles well developed. Body and antennae armed with strongly capitate setae. Antenna dusky except extreme base of segment III. Rostrum attaining coxae II. Wing membranes hyaline. Radial sector of fore wing strongly curved, media usually twice forked, occasionally with only one fork. Venation of hind wing normal. Legs dusky except for coxae, trochanters, and bases of femora. Cornicles amber, elongate; broadest at base, narrowing in the central area, then broadening slightly toward the apex and ending in a distinct flange. Cauda amber, tapering to a narrow, rounded apex, with 2 pairs of lateral setae. Anal plate amber and broadly rounded. Setae on cauda and anal plate pointed, not strongly capitate as on body.

Measurements. Length of antennal segments as follows: I .071-.092, II .061-.066, III .490-.520, IV .316-.326, V .296-.316, VI .143-.153 + .571-.612. Secondary sensoria numbering 18-23 on segments III, 2-5 on IV. Rostral segments IV + V .097-.102 in length. Length of fore wing 1.924-2.080, hind wing 1.092-1.144. Leg segments as follows: femora I .418-.439, II .367-.388, III .469-.490; tibiae I .816-.836, II .765-.785, III .979-1.020; first tarsal segments I .026-.031, II .026-.031, III .031-.036; second tarsal segments I .092, II .097-.102, III .097-.102. Length of cornicle .286-.306, cauda .102-.112.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.300-1.560. Body amber. Frontal tubercles well developed with conspicuous, strongly capitate setae which are longer than those present on the alate vivipara. Antennal segments I, II, and basal half of III amber, beyond dusky. Rostral segments amber except extreme apex of segments IV + V. Rostrum attaining coxae III. Legs amber except for tarsi and apices of tibiae which are dusky. Cornicles, cauda, and anal plate as in alate vivipara.

Measurements. Antennal segments as follows: I .066-.071, II .056-.071, III .388-.449, IV .265-.296, V .265-.275, VI .122-.133 + .479-.530. Rostral segments IV + V .092-.097 in length. Leg segments as follows: femora I .337-.377, II .347-.388, III .428-.479; tibiae I .612-.694, II .612-.683, III .836-.918; first tarsal segments I .026-.031, II .026-.031, III .031; second tarsal segments I .087-.092, II .092, III .092-.102. Length of cornicle .376-.428, cauda .117-.128.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.404-1.872. Coloration as in apterous vivipara. Rostrum attaining coxae II.

Collection Data. From leaves of strawberry (Fragaria sp.): Stillwater, Payne Co., Oklahoma, May 19, 1960, G. A. Bieberdorf; Tulsa, Tulsa Co., Oklahoma, March 9, 1961, H. H. Latham.

Note. Synonymy of this species is adapted from Palmer (1952).

Genus Dactynotus Rafinesque

Aphis Linnaeus (in part), 1758. Systema Naturae, Ed. X:451.

Dactynotus Rafinesque, 1818. Amer. Mo. Mag. & Critic. Review, Vol. III:15-18.

Siphonophora Koch (preoccupied), 1855. Die Pflanzenlause Aphiden. Nurberg, 150.

Macrosiphum Passerini (in part), 1860. Gli Afidi., 27.

Nectarophora Oestlund (in part), 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:78.

Macrosiphoniella Del Guercio (in part). Redia, Vol. VII:332.

Uroleucon Mordvilko, 1914. Faune d.l. Russie, Ins. Hemipt., Vol. I, livr., 1:64.

Uromelan Mordvilko, 1914. Ibid., 64.

Eurythsiphum Mordvilko, 1919. Faune d.l. Russie, Ins. Hemipt., Vol. I, livr., 2:357.

Tritogenaphis Oestlund (in part), 1922. Nineteenth Rep. St. Entomol. Minn., 142.

Megalosiphum, Borner, 1928. (in Ferriere and Voekassovitch) Bull. Soc. Entomol. France, 26-29.

Belochilum Borner, 1932. Handb. d. Pflanzerkr., Ed. IV, Vol. V, pars 2:630.

Genotype: Aphis hieracium-paniculatum Rafinesque (fixed by Rafinesque, 1818).

General Characteristics. Frontal tubercles well developed and diverging. Antennae six-segmented, with secondary sensoria present on the 3rd segment in both the alate and apterous viviparae. Rostrum attaining coxae III; terminal segment (IV + V) rather long and narrow but without the concave margins of Macrosiphoniella. Wing membranes hyaline, venation typical for the tribe. Legs long; first segment of each tarsus normally with five setae. Cornicles long, usually

cylindrical; with reticulations covering the distal 1/9 to 2/5. Cauda elongate, rarely with basal constriction, with seven or more setae present.

Note. The above synonymy, fixation of type and general characteristics are adapted from Hille Ris Lambers (1938). Olive has published three papers concerning members of this genus found in North America (1963, 1965a, and 1965b). These papers for North American species along with the one by Hille Ris Lambers (1938) covering the European species serve as valuable references for those students interested in this genus.

Key to the Species of the Genus *Dactynotus* in Oklahoma

Cornicle cylindrical or subcylindrical (Fig. 31).....*ambrosiae*.

Cornicle distinctly wider at base and tapering toward apex (Fig. 32).....sp.

Dactynotus ambrosiae (Thomas)

The Brown Ambrosia Aphid

Siphonophora ambrosiae Thomas, 1877. Illinois State Lab. Natur. Hist. Bull., 2:4.

Nectarophora ambrosiae, Oestlund, 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:84.

Nectarophora solidaginis, Cockerell, 1903. Can. Entomol., 35:167.

Macrosiphum ambrosiae, Cockerell, 1904. Can. Entomol., 36:262.

Siphonophora solidaginis, Williams, 1910. Univ. Stud. Lincoln, Neb., 10:86.

Macrosiphum solidaginis, Gillette, 1911. J. Econ. Entomol., 4:383.

Tritogenaphis ambrosiae, Oestlund, 1922. Nineteenth Rep. St. Entomol. Minn., 142.

Tritogenaphis kosacaudis Knowlton, 1928. Pan-Pacific Entomol., 5:79.

Dactynotus ambrosiae, Hille Ris Lambers, 1939. Temminekia, 4:6.

Note. This species is recorded in the records of the insect museum, Department of Entomology, Oklahoma State University as having been collected by C. E. Sanborn. It was not taken during this study, consequently, the following description is taken from Palmer (1952) due to a lack of material for examination.

Apterous Summer Vivipara. Light to dark brown or sepia, with dusky areas about hair bases (most distinct in cleared specimens): cauda and anal plate pale; legs more or less dusky; cornicle and rostral III, IV, and V entirely black; antenna dusky to black but paler on I, II, and base of III. Body length 2.50-3.50; hind tibia 2.15-2.9; antenna 3.30-4.20; rostrum fully attaining 3d coxa. Hairs blunt to slightly capitate; on side of abdomen .04-.06. Cauda tapering to rather acute point and without definite constriction and bearing 7-8 pairs of lateral and dorsolateral hairs and several dorsal hairs.

Alate Vivipara. Color and measurements same as in apterous vivipara except as follows: thoracic lobes dark brown; dark blotch on abdominal VI posterior to base of each cornicle; dusky spots at bases of hairs often reduced or lacking; antenna entirely black; rostrum hardly attaining 3d coxa. Hairs on side of abdomen .03.

Ovipara. Apterous. Same as apterous vivipara except hind tibia which is slightly swollen on slightly more than proximal half and bearing numerous small sensoria.

Male. Alate. Head and thorax dark greenish brown; abdomen olive-green; cornicle and appendages except base of antennal III, blackish; cauda pale. Body length 2.15; hind tibia 2; antenna 3.25; cornicle .35-.40; reticulated area .10 long.

Collection Data. From ragweed (Ambrosia sp.): Soper, Choctaw Co., Oklahoma, October 27, 1925, C. E. Sanborn.

Note. The synonymy for this species is adapted from Olive (1965b).

Dactynotus sp.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.340-2.444. Head and thorax reddish brown, abdomen reddish amber. Frontal tubercles well developed and divergent. Antenna reddish brown except for extreme base of segment III which is amber. Rostrum attaining coxae II, rostral segments III, IV + V dusky to reddish brown, remainder amber. Wing membranes hyaline, venation normal. Legs medium brown to reddish brown except the bases of femora. Cornicle brown to reddish brown, broad at base narrowing toward apex, apical 1/3 to 2/5 reticulated, ending in a distinct flange. Cauda amber in color, elongate, with 4-6 pairs of lateral setae. Anal plate amber and broadly rounded.

Measurements. Antennal segments as follows: I .092-.097, II .087-.092, III .510-.581, IV .439-.510, V .377-.439, VI .163-.173 + .704-.724. Secondary sensoria on antennal segment III numbering 22-28. Length of rostral segments IV + V .133-.143. Length of fore wing 2.496-2.808, hind wing 1.196-1.404. Leg segments as follows: femora I .632-.694, II .602-.643, III .734-.806; tibiae I 1.000-1.102, II 1.030-1.081, III 1.408-1.500; first tarsal segments I .031, II .031, III .036-.041; second tarsal segments I .112-.117, II .112-.122, III .122-.128. Length of cornicle .541-.592, cauda .275-.306.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.496-2.808. Body color reddish amber to reddish brown. Remainder as in alate vivipara. Rostrum attaining coxae III.

Measurements. Antennal segments as follows: I .092-.112, II .082-.092, III .541-.632, IV .449-.500, V .377-.439, VI .153-.163 + .643-.663. Secondary sensoria numbering 9-12 on antennal segment III. Rostral segments IV + V .133-.153 in length. Leg segments as follows: femora I .643-.704, II .632-.694, III .806-.903; tibiae I .969-1.091, II 1.000-1.102, III 1.397-1.561; first tarsal segments I .031-.036, II .036, III .036-.041; second tarsal segments I .112, II .117-.112, III .122-.128. Length of cornicle .612-.632 with reticulations covering apical 1/3. Length of cauda .357-.383.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.560-1.872. Body reddish amber with antennae, wing pads cornicles and cauda reddish brown. Legs reddish brown except for bases of femora which are reddish amber.

Collection Data. From ironweed (Vernonia sp.): Conser, Le Flore Co., Oklahoma, September 7, 1960, H. W. Van Cleave; Clayton, Pushmataha Co., Oklahoma, September 15, 1960, H. W. Van Cleave.

Note. This species appears to be very close to D. ambrosiae but is slightly smaller, has fewer secondary sensoria on antennal segment III and the cornicles are distinctly wider at the base tapering toward the apices. The identity of this species is held in doubt. Miss L. M. Russell placed a sample of the material only to the generic level.

Genus Hyadaphis Kirkaldy

Siphocoryne Passerini, 1863. Aphididae Italicae:8 (preoccupied).

Hyadaphis Kirkaldy, 1904. The Entomol., 37:279.

Genotype: Aphis xylostei Schrank (fixed by Kirkaldy, 1904).

Note. The above synonymy and fixation of the genotype is adapted from Baker (1920). Only one species of this genus was collected in Oklahoma; therefore, the description is confined to that species.

Hyadaphis pseudobrassicae (Davis)

The Turnip Aphid

Aphis pseudobrassicae Davis, 1914. Can. Entomol., 46:231.

Rhopalosiphum pseudobrassicae, Gillette and Palmer, 1932. Ann. Entomol. Soc. Amer., 25:487.

Lipaphis erysimi, Hille Ris Lambers, 1948. Trans. R. Entomol. Soc. Lond., 99.

Hyadaphis erysimi pseudobrassicae, Kennedy, Day and Eastop, 1962. A Conspectus of Aphids of Plant Viruses, 67.

Hyadaphis pseudobrassicae, Russell, 1963. Coop. Econ. Ins. Rep., 13(5):83.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.924-2.132. Head and thorax dusky to medium brown, abdomen amber with dusky lateral spots on abdominal segments I-V, transverse dusky bands on dorsum of segments VI and VII. Antennae dusky to medium brown. Rostrum dusky. Membrane of wing hyaline, venation normal. Coxa, trochanter, femur, apex of tibia, all of tarsus dusky to brownish, most of tibia amber on each leg. Cornicle dusky, slightly clavate and

flanged. Cauda and anal plate dusky. Cauda gently tapering from base to apex with no noticeable constriction at "neck", with 2-3 pairs of lateral setae. Anal plate broadly rounded.

Measurements. Antennal segments as follows: I .071-.082, II .071-.082, III .388-.408, IV .204-.224, V .163-.224, VI .117-.143 + .301-.428. Secondary sensoria scattered on segments III and IV and numbering as follows: III 23-25, IV 7-10. Rostral segments IV + V .102-.112 in length. Length of fore wing 2.236-2.444, hind wing 1.560-1.768. Leg segments as follows: femora I .428-.459, II .337-.418, III .490-.562; tibiae I .734-.806, II .714-.847, III .947-1.112; first tarsal segments I .036, II .036-.041, III .036-.046; second tarsal segments I .122-.128, II .122-.148, III .128-.153. Length of cornicle .194-.214. Length of cauda .112-.117.

Apterous Summer Vivipara (not collected in this study. The following description is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma).

> Apterous Summer Vivipara. Olive-green, yellowish to medium; with head, lateral areas and two longitudinal dorsal rows of large spots dusky, coarsely reticulated; shining; cornicle, cauda and appendages pale to dusky. Body length .85-1.66; across eyes .40-.43; hind tibia .63-.90; antenna .95-1.40; rostrum obtuse, attaining 2d coxa.

Collection Data. Turnip (Brassica rapa L.): Stillwater, Payne Co., Oklahoma, November 6, 1960, H. W. Van Cleave.

Genus Hyalopterus Koch

Hyalopterus Koch, 1854. Die Pflanzelause Aphiden, Nurberg, 16.

Hayhurstia Del Guercio, 1917. Redia, Vol. XII:208.

Genotype: Aphis pruni Fabricius (Fixed by Passerini, 1860).

Note. The above synonymy and genotype fixation is adapted from Baker (1920). Only one species of this genus has been reported from Oklahoma; therefore, the description is limited to that species.

Hyalopterus atriplicis (Linnaeus)

The Boat Gall Aphid

Aphis atriplicis Linnaeus, 1761. Fauna Suecica, Ed. II (alt.), 262.

Aphis chenopodii Cowen (in Gillette and Baker), 1895. Bull. Agri. Exp. Sta. Colorado Tech. Ser., 1:119.

Hyalopterus atriplicis, Haghurst, 1909. Ann. Entomol. Soc. Amer., 2:88.

Note. This species was reported from Oklahoma by Medler and Ghosh (1968). Only a single specimen was available for examination by this author so the description along with the synonymy is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma.

> Apterous Summer Vivipara. Head brown; rest of body yellowish green, mottled with darker green on abdomen; powdery; cauda and cornicle pale to dusky especially at tip; appendages pale brownish, darker at tips. Body length 1.60; hind tibia .70-.75; hind tarsal II .14; antenna 1; rostrum attaining 2d coxa.
>
> Alate Vivipara. Head and thorax black; abdomen pea-green, with darker green lateral areas and dorsal cross-bands; powdery; appendages dusky brown with tarsi and tips of tibiae blackish; cornicle, cauda and anal plate slightly dusky. Body length 1.50; hind tibia .93; hind tarsal II .15; antenna 1.1--1.2; rostrum attaining halfway between

1st and 2d coxae. Hairs pointed, sparse; .01 long on hind tibia. Cornicle slightly incrassate, with flange and smooth, same width as hind tibia. Cauda elongate-spoon-shaped with two pairs of lateral and one pair of terminal hairs. Lateral tubercles present on prothorax and all abdominal segments.

Ovipara. Apterous. Pale yellowish green; powdery. Body length 1.80; antenna .70-.86; hind tibia distinctly swollen for almost entire length and covered with rather large subcircular sensoria.

Collection Data: Yellow pan trap: Stillwater, Payne Co., Oklahoma, May 15, 1964, (Det. A. Ghosh, 1964).

Genus Hysteroneura Davis

Heteroneura Davis, 1919. Can. Entomol., 51:228 (preoccupied).

Hysteroneura Davis, 1919. Ibid., 263.

Genotype: Aphis setariae Thomas (monotypical).

Note. The above synonymy is adapted from Baker (1920). Only one species is here recorded in this genus; therefore, the description is of that species.

Hysteroneura setariae (Thomas)

Siphonophora sitariae Thomas, 1878. Bull. Ill. State Lab. Natur. Hist., Vol. I, No. 2:5.

Aphis setariae, Oestlund, 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:67.

Hysteroneura setariae, Cutright, 1925. Ohio Agr. Exp. Sta. Bull., 387:197.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.248-2.132. Head and thorax dusky to brown, abdomen amber with dusky

spots on lateral margins of abdominal segments I-VII. Basal portions of antennal segments III, IV, and V amber, remainder of antenna dusky to brownish. Rostral segments III, and IV + V dusky. Wing membranes hyaline, venation of fore wing normal, hind wing lacking cubitus. Coxa, trochanters, femur (except extreme basal portion), apex of tibia, all tarsi dusky to brownish black, remainder of leg amber. Abdominal segments I-VI with lateral tubercles. Cornicles brown to brownish black. Cauda amber, nearly parallel sided, with two pairs of lateral setae. Anal plate brown.

Measurements. Antennal segments as follows: I .066-.092, II .071-.077, III .245-.345, IV .133-.265, V .133-.255, VI .087-.112 + .474-.755. Secondary sensoria numbering 7-19 on segment III, 0-10 on segment IV. Rostral segments IV + V .082-.128 in length, .061-.102 in width. Length of fore wing 2.132-2.756, hind wing 1.092-1.664. Leg segments: femora I .286-.479, II .245-.388, III .347-.612; tibiae I .530-.908, II .520-.857, III .622-1.234; first tarsal segments I .031-.036, II .036, III .036; second tarsal segments I, II, and III subequal .092-.112. Length of cornicle .214-.316. Length of cauda .102-.133.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.976-2.496. Head, thorax, and abdomen amber. Antennal segments I, II, V, VI, and apex of IV brown, remainder light amber. Rostrum, legs, cornicles, cauda and anal plate colored as above. Cauda with two pairs of lateral setae.

Measurements. Antennal segments as follows: I .071-.087, II .071-.082, III .265-.388, IV .173-.255, V .173-.214, VI .092-.112 + .428-.592. Rostral segments IV + V .102-.107 in length, .066-.077 in width. Leg segments: femora I .316-.388, II .362-.388, III .500-.561; tibiae I .551-.694, II .622-.734, III .836-1.010; first tarsal segments I .036-.041, II .036-.041, III .041; second tarsal segments I .107-.117, II .107-.122, III .112-.122. Length of cornicle .255-.357. Length of cauda .122-.133.

Alatoid Nymph. (none collected)

Collection Data. Plum (Prunus sp.): Idabel, McCurtain Co., Oklahoma, April 9, 1959, H. W. Van Cleave; Durant, Bryan Co., Oklahoma, May 3, 1960, F. Vinson. Suction Trap: Stillwater, Payne Co., Oklahoma, October 29, 1965, H. Chada. (Numerous notations of this species have been reported from most counties in the state through correspondence to the Department of Entomology, Oklahoma State University. These have been recorded in the records of the Entomology Museum, Oklahoma State University. These records are not reported in this study due to a lack of specimens to confirm the identifications. It is likely that this is a very common species in Oklahoma).

Note. Palmer (1952) notes that small and large forms occur in both the alate and apterous viviparous forms in this species. Both the small and large forms were encountered in this study and their size differences account for the wide variations reported in the measurements reported above.

Genus Macrosiphoniella Del Guercio

Aphis Linnaeus (in part), 1758. Systema Naturae, Ed. X:451.

Siphonophora Koch (preoccupied), 1855. Die Pflanzenlause Aphiden, Nurberg, 150.

Macrosiphum Passerini (in part), 1860. Gli Afidi, 27.

Macrosiphoniella Del Guercio, 1911. Reduam, Vol. VII:331-333.

Dielcysmura Mordvilko, 1914. Fauna d.l. Russie, Ins. Hemipt., Vol. I:65.

Tritogenaphis Oestlund (in part), 1922. Nineteenth Rep. State Entomol. Minn., 142.

Genotype: Siphonophora atra Ferr. (fixed by Del Guercio, 1911).

General Characteristics. Diverging frontal tubercles. Antennae six-segmented and longer than the body. Rostrum usually reaching to coxae III; with the last segment stiletto shaped, often with concave lateral margins. Wing membranes hyaline, venation typical of the tribe. First segment of each tarsus with three setae. Cornicles varying in shape from short and thick to long and slender; with reticulations covering the distal 2/5 to 3/4 of the total length; lacking a distinct or well defined flange. Cauda elongate often with a more or less constricted portion at the basal 1/3; with six or more setae (not necessarily arranged in well defined pairs).

Note. The above synonymy, fixation of type and general characteristics are adapted from Hille Ris Lambers' (1938) coverage of the European species of this genus. Russell (1967) listed the North American species currently placed in this genus.

Key to the Species of the Genus *Macrosiphoniella* in Oklahoma

Secondary sensoria present on antennal segment IV; cornicles thick at base and strongly tapering towards the apices.....*sanborni*.

Secondary sensoria not present on antennal segment IV; cornicles cylindrical to subcylindrical.....*ludovicianae*.

Note. Due to a lack of material from both species for comparison, the above key is adapted from Medler and Ghosh (1968).

Macrosiphoniella ludovicianae (Oestlund)

The Dark-leaved Wormwood Aphid

Siphonophora ludovicianae Oestlund, 1886. Minn. Geol. Natur. Hist. Surv. Rep., 14:23.

Nectarophora ludovicianae, Oestlund, 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:80.

Macrosiphum ludovicianae, Soliman, 1927. Univ. Calif. Pub. Entomol., 4:117.

Macrosiphoniella ludovicianae, Hille Ris Lambers, 1931. Tijdschr. v. Entomol., 74:176.

Note. Medler and Ghosh (1968) reported this aphid from Oklahoma. Due to a lack of material for examination, the synonymy above along with the following description is adapted from Palmer (1952) as an aid for future students of aphids in Oklahoma.

Fundatrix. Same as summer aptera except as follows: antenna 2.4; cornicle .50 with reticulated area .20; cauda .30 on median line.

Apterous Summer Vivipara. Yellowish slate-green or pale grape-green; slightly pulverulent; antenna greenish to dusky on I, II, and base of III, blackish or black beyond base of III, tarsi, rostrum beyond middle of II, especially on IV + V, and cornicle beyond dusky base black, cauda and anal plate yellowish to dusky; tibiae blackish. Body length 2-2.5; across eyes .40-.50; hind tibia 1.65-1.75; antenna about 4; rostrum attaining 3d coxa. Hairs slightly capitate to blunt; on side of body .06. Cauda spatulate, bearing 7-8 lateral pairs of hairs and 4-5 dorsal ones.

Alate Vivipara. Head and thorax dusky green; otherwise as in apterous summer vivipara as described above except hairs slightly shorter.

Ovipara. Apterous. Similar to apterous vivipara except often more pinkish on body. Proximal half of hind tibia slightly swollen, hardly twice diameter of narrowest portion and rather thickly covered with numerous sensoria.

Male. Alate. Head and thorax yellowish brown; abdomen yellowish olive-green to yellow-brown. Measurements as in alate vivipara or slightly smaller. Antenna with numerous sensoria on III and IV and a row along posterior edge of V.

Collection Data. Suction trap: Stillwater, Payne Co., Oklahoma, November 5, 1965 (Det. Ghosh).

Note. The synonymy of this species is adapted from Russell (1967).

Macrosiphoniella sanborni (Gillette)

The Chrysanthemum Aphid

Siphonophora chrysanthemicolens Williams, 1891. Spec. Bull. No. 1, Univ. Nebraska, Dept. Entomol., 8 (nomen nudum).

Macrosiphum chrysanthemi (Oestlund), Sanborn, 1904. Kansas Univ. Sc. Bull. Vol. III, No. 1:73 (misidentification - ref. Palmer, 1952).

Macrosiphum sanborni Gillette, 1908. Can. Entomol., 40:65.

Macrosiphoniella sanborni, van der Goot, 1917. Indian Mus. Records (Indian Sc. J.), 13:183.

Pyrethromyzus sanborni, Borner, 1952. Mitt. Thur. Bot. Ges., 3:168.

Dactynotus (Pyrethromyzus) sanborni, Eastop, 1961. A Study of the Aphididae (Homoptera) of West Africa, 19.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.288-2.652. Body brown. Antenna brown to brownish black except for base of segment III which is light brown to amber. Rostrum brownish black, attaining coxae III. Membrane of wings hyaline, venation normal. Femora amber at basal halves, blackish distally; tibiae amber with bases and apices blackish; tarsi blackish. Cornicles brownish black, broad at bases tapering sharply toward the apices, with weakly developed flanges at apices and reticulations covering slightly more than the distal halves. Cauda and anal plate brown. Cauda spoon-shaped with 4-5 lateral pairs of setae. Anal plate rounded.

Measurements. Length of antennal segments as follows: I .112-.122, II .087-.097, III .612-.683, IV .347-428, V .316-.357, VI .122-.143 + .541-.622. Secondary sensoria numbering 30-35 on segment III and 2-8 on segment IV. Primary and marginal sensoria in normal positions on V and VI. Rostral segments IV + V lanceolate and .53-.173 in length. Length of fore wing 2.700-2.756, hind wing 1.820-2.028. Leg segments as follows: femora I .622-.643, II .571-.622, III .683-.745; tibiae I .949-1.020, II .969-1.020, III 1.275-1.387; first tarsal segments I .031-.036, II .036, III .036; second tarsal segments I .112-.133, II .133, III .138-.143. Length of cornicle .235-.265, cauda .224-.270.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.132-2.288. Coloration as in alate vivipara.

Measurements. Length of antennal segments as follows: I .102-.117, II .087-.092, III .490-.530, IV .265-.316, V .265-.275, VI .097-.133 + .459-.469. Secondary sensoria present on segment III and numbering 18-22. Rostral segments IV + V .153-.163. Leg segments as follows: femora I .510-.520, II .510-.530, III .607; tibiae I .745-.765, II .785-.806, III 1.051-1.071; first tarsal segments I, II, and III subequal .036-.041; second tarsal segments I .122-.128 II .128-.133, III .133-.138. Length of cornicle .235-.265, cauda .265-.270.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.976-2.028. Coloration as above with wing pads concolorous with body.

Collection Data. Chrysanthemum (Chrysanthemum sp.): Tulsa, Tulsa Co., Oklahoma, November 7, 1958, R. G. Price; Oklahoma City, Oklahoma Co., Oklahoma, November 24, 1958, H. H. Latham; Lawton, Comanche Co., December 18, 1958, A. C. Hatfield; Terral, Jefferson Co., Oklahoma, April 11, 1960, F. Vinson.

Note. Synonymy of this species adapted from Palmer (1952) and Russell (1967).

Genus Macrosiphum Passerini

Aphis Linnaeus (in part), 1758. Systema Naturae, Ed. X:451.

Siphonophora Koch (preoccupied), 1855. Die Pflanzenlause Aphiden, Nurberg, 150.

Macrosiphum Passerini, 1860. Gli Afidi, 27.

Nectarophora Oestlund, 1887. Minn. Geol. 2nd Natur. Hist. Surv. Bull., 4:78.

Illinoia Soliman (in part), 1927. Univ. Calif. Pub. Entomol., Vol. IV:95.

Amphorophora Borner (in part), 1932. Handb. d. Pflanzenkr., Ed. IV, Vol. V, pars 2:626.

Genotype: Aphis rosae Linnaeus (fixed by Passerini, 1860).

General Characteristics. Frontal tubercles moderately well developed and diverging. Antennae six-segmented, unguis moderately long to long. Ocular tubercles well developed. Rostrum variable. Wing membranes hyaline, venation typical for the tribe. Legs long. First segment of each tarsus with three setae. Cornicles elongate, cylindrical but narrowing in the central portion, with reticulations covering the apical 1/10 to 3/10. Cauda long and slender, often constricted near the base giving a slender spoon-shaped outline, with six or more setae present but not necessarily arranged in noticeable pairs.

Note. The above synonymy, genotype fixation, and general description is adapted from Hille Ris Lambers (1939).

Key to the Species of the Genus

Macrosiphum in Oklahoma

Cornicles dusky to dark brown throughout their full length.....avenae.

Cornicles mainly pale amber with only the apices dusky.....euphorbiae.

Macrosiphum avenae (Fabricius)

The English Grain Aphid

Aphis avenae Fabricius, 1775. Systema Entomol., Flensburgi et Lipsiae, XXVIII:736.

Aphis granaria Kirby, 1798. Trans. Linn. Soc. Lond., Vol. IV:238.

Aphis hordei Kyber, 1815. Germar's Mag. f. Entomol., Vol. I:15.

Aphis cerealis Kaltenbach, 1843. Mono. der Familien der Pflanzenlause, 16.

Aphis lycopsidis Walder, 1848. Zool., Vol. VI:2219.

Siphonophora cerealis, Koch, 1855. Die Pflanzelause Aphiden, Nurberg, 186.

Siphonophora avenae, Thomas, 1879. Eighth Rep. State Entomol. Ill., 51.

Nectarophora granaria, Oestlund, 1887. Minn. Geol. Natur. Hist. Surv. Bull., 4:82.

Macrosiphum granarium, Schouteden, 1901. Ann. Soc. Entomol. Gelg., Vol. XLV:114.

Siphonophora granaria, Pergaude, 1904. U.S. Dept. Agr. Div. Entomol. Bull, 44:5-23.

Macrosiphum cerealis, Mokrzecki, 1913. Rep. on Inj. Insects, etc. of Taurida, Simferopol, 1-23.

Macrosiphum cereale (in part) van der Goot, 1915. Beitr. z. Kenntnis d. Holl. Blattlause, 22.

Macrosiphum alii Jackson, 1918. Scottish Natur., 83.

Sitobion avenae, Mordvilko, 1921. Bull. Petrograd Div. Stat. Protect., Vol. III, No. 3.

Macrosiphum miscanthi Takahashi, 1921. Aphididae of Formosa, Vo. I:8.

Macrosiphum alopecuri Takahashi, 1921. Ibid., 9.

Aphidella secretocauda Theobald, 1923. Entomol. Monthly Mag. (3), Vol. IX:105.

Illinoia granaria, Soliman, 1927. Univ. Cal. Publ. Entomol., Vol. IV:131.

Macrosiphoniella triglochiniella Theobald, 1928. Entomol. Vol. LXI:8.

Amphorophora avenae (in part), Borner, 1931. Anz. f. Schadlingsk., Vol. VII:29.

Macrosiphum avenae, Bodenheimer and Swirski, 1957. The Aphidoidea of the Middle East, 266.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.729-3.060. Head and thorax dusky to dark brown, abdomen pale amber with isolated dusky spots on lateral and dorsal surfaces. Antennae dusky to dark brown (segments I and II slightly lighter than distal segments). Rostrum extending approximately half way between coxae I and coxae II. Coloration approximately the same on all legs and as follows: coxae and trochanters pale amber; femora pale at basal 1/3 to 1/2, dusky to dark apically; tibiae pale basally with apex dark; tarsi dusky to dark. Wings hyaline with normal venation. Cornicles dusky to dark brown, reticulated at apical 1/5 to 1/4. Cauda pale, spoon-shaped and with three to four lateral pairs of setae, anal plate pale and broadly conical.

Measurements. Antennal segments as follows: I .102-.133, II .097-.112, III .653-.704, IV .479-.530, V .347-.388, VI .112-.133 + .775-.806. Secondary sensoria numbering 4-8 on segment III, 0 on segment IV and 0-1 on segment V. Primary and marginal sensoria in normal positions on segments V and VI. Rostral segments IV + V .107-.122 in length. Length of fore wing 3.698-4.080, hind wing 2.168-2.423. Leg segments: femora I .694-.745, II .653-.683, III .816-.887; tibiae I 1.173-1.244, II 1.153-1.234, III 1.550-1.683; first tarsal segments I .041-.046, II .046, III .040-.051; second tarsal segments I .138-.153, II .143-.153, III .148-.168. Length of cornicles .459-.490. Length of cauda .296-.337.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.499-2.882. Coloration as in alate vivipara except head, thorax, and abdomen pale amber.

Measurements. Antennal segments as follows: I .112-.122, II .092-.102, III .541-.673, IV .377-.490, V .301-.326, VI .112-.122 + .602-.765. Secondary sensoria present only on segment III and numbering 0-2. Rostral segments IV + V .107-.112 in length. Leg segments: femora I .592-.663, II .581-.643, III .775-.887; tibiae I .969-1.071, II 1.000-1.102, III 1.377-1.530; first tarsal segments I, II, and III subequal .046-.051; second tarsal segments I .143-.148, II .137-.153, III .153-.163. Cornicle .510-.520 in length. Cauda .347-.398 in length.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 2.423-2.805. Head, thorax, and wing pads slightly dusky to medium brown, remainder colored as in alate vivipara.

Collection Data. This is a very common species on small grain crops throughout the state. It was collected from virtually all of the counties in the state. Collections were taken mainly from wheat (Triticum aestivum L.) and barley (Hordeum vulgare L.) during the spring months. For the sake of brevity, individual collection data is not listed here.

Note. Synonymy adapted from Hille Ris Lambers (1939).

Macrosiphum euphorbiae (Thomas)

The Potato Aphid

Siphonophora euphorbiae and S. euphorbicola Thomas, 1877. Illinois State Lab. Natur. Hist., Bull., 2:6.

Siphonophora solanifolii Ashmead, 1882. Can. Entomol., 14:92.

Nectarophora asclepiadis Cowen (in Gillette and Baker), 1895. Bull. Agr. Exp. Sta. Colorado Tech. Serv., 1:123.

Nectarophora heleniella Cockerell, 1903. Can. Entomol., 35:168.

Macrosiphum solanifolii, Patch, 1907. Maine Agr. Exp. Sta. Bull. 147:235.

Macrosiphum gei, Theobald, 1926. The plant lice or Aphididae of Great Britain. London. I:81. (Misidentification or disputed synonymy - Palmer, 1952).

Macrosiphum euphorbiae, Gillette and Palmer, 1934. Ann. Entomol. Soc. Amer., 27:178.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.236-2.600. Head and thorax dusky, abdomen pale amber. Antennal segments I, II, and base of III pale amber, remainder brownish black. Rostral segments III, IV, and V dusky. Rostrum attaining a point between coxae II and coxae III. Membrane of wings hyaline, venation normal. Femora pale amber with apices blackish brown, tibiae dusky with bases and apices blackish brown, tarsi blackish brown. Cornicles pale amber at bases shading to brownish black at apices. Cauda and anal plate pale amber. Cauda elongate without a noticeable constriction tapering to a slightly rounded point, with 4-5 pairs of lateral setae. Anal plate rounded.

Measurements. Antennal segments as follows: I .092-.102, II .102, III .683-.714, IV .561-.581, V .530-561, VI .153 + .949-.979. Secondary sensoria numbering 13-17 on segment III. Rostral segments IV + V .133-.143. Length of fore wing 3.016-3.172, hind wing 1.560-1.820. Leg segments as follows: femora I .836, II .755, III .887-.918; tibiae I 1.408, II 1.387-1.397, III 1.826-1.856; first tarsal segments I .036, II .041-.046, III .041-.046; second tarsal segments I .138-.143, II .148-.153, III .148-.158. Length of cornicle .643-.673 with 1/5 to 1/4 of the length at apex reticulated. Length of cauda .245-.255.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.600-2.756. Body pale amber, appendages colored as above. Rostrum attaining coxae III.

Measurements. Antennal segments as follows: I .102-.117, II .092-.102, III .724-.836, IV .500-.612, V .479-.541, VI .148-.153 + .755-.989. Secondary sensoria numbering 3-4 on segment III. Rostral segments IV + V .122-.138 in length. Leg segments as follows: femora I .796-.877, II .765-.867, III .938-1.061; tibiae I 1.306-1.510, II 1.316-1.510, III 1.795-2.071; first tarsal segments I, II, and III subequal .041-.046; second tarsal segments I .143-.153, II .148-.153, III .143-.158. Length of cornicle .683-.796 with 1/8 to 1/5 of the length of apex reticulated. Length of cauda .306-.347.

Collection Data. On iris (Iris sp.): Perry, Noble Co., Oklahoma, April 10, 1966, D. Arnold.

Note. Synonymy adapted from Palmer (1952).

Genus Myzus Passerini

Myzus Passerini, 1860. Gli Afidi. 27.

Rhopalosiphum, Passerini, 1860. Ibid., 27.

Macrosiphum Del Guercio, 1900. Nuove Rel. R. Staz. Entomol. Agr. Firenze, ser. i, No. 2:159.

Myzoides van der Goot, 1913. Tijdschr. Entomol. 56:84.

Ovatus van der Goot, 1913. Ibid., 84.

Myzodes Mordvilko, 1914. Faune d.l. Russie, Ins. Hemipt. v. 1, livr. 1:52.

Neomyzus van der Goot, 1917. Contrib. Faune Indes Neerland. 1(3):50.

Myzopsis Matsumura, 1918. Sapporo Natur. Hist. Soc. Trans. 7:19.

Eumyzus Shinji, 1929. Lansania i:III.

Submacrosiphum Hille Ris Lambers, 1931. Mem. Mus. Stor. Natur. Venezia Trident. 1:22.

Genotype: Aphis cerasi Fabrieius (fixed by Passerini, 1860).

Note. The above synonymy is adapted from Mason (1940) who did a revision of the North American species of this genus. Any student of the group should certainly consult this paper. Only one species of Myzus was collected in Oklahoma; therefore, the description is limited to that species.

Myzus persicae (Sulzer)

The Green Peach Aphid

Aphis persicae Sulzer, 1776. Abgekurzte Geschichte Der Insecten. 4. Teile I:105.

Aphis dianthi Schrank, 1801. Fauna Boica, II Ingolstadt. 2:114.

Myzus persicae, Passerini, 1860. Parma. 35.

Siphonophora achyrantes Monell, 1879. U.S. Geol. Surv. Bull. 5:18.

Myzus malvae Oestlund, 1886. Minn. Geol. Natur. Hist. Surv. Rep. 14:31.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.340-2.756. Head and thorax medium brown, abdomen amber with extensive dorsal pattern of dusky spots and transverse dashes forming into a solid dusky area on segments III-V. Frontal tubercles well developed and converging inwardly at apices. Antennae, except for base of segment III, and rostrum dusky. Rostrum reaching approximately half way between coxae I and coxae II. Membrane of wings hyaline, venation normal. Legs dusky except for bases of femora and basal 4/5 of tibiae. Cornicles dusky, cylindrical with well developed flange apically. Cauda pale to dusky, spoon-shaped with three pairs of

lateral setae. Anal plate broadly rounded, dusky brown in color.

Measurements. Antennal segments as follows: I .092-.112, II .077-.087, III .571-.643, IV .418-.490, V .316-.367, VI .153 + .571-.612. Secondary sensoria on segment III numbering 12-15. Rostral segments IV + V .102-.112 in length. Length of fore wing 3.120-4.160, hind wing 1.976-2.340. Leg segments as follows: femora I .581-.612, II .561-.612, II .561-.581, III .673-.765; tibiae I 1.051-1.173, II 1.071-1.163, III 1.408-1.550; first tarsal segments I .036-.041, II .036-.041, III .041; second tarsal segments I .107-.117, II .122, III .133. Length of cornicle .408-.428. Length of cauda .153-.199.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.600-2.860. Head, thorax, and abdomen amber. Frontal tubercles well developed and converging inwardly at apices. Antennae and rostrum amber. Rostrum attaining coxae II. Legs amber except for apices of tibiae which are dusky, tarsi brown. Cornicles pale with apices slightly dusky, slightly swollen at apical 1/3. Cauda and anal plate pale. Cauda spoon-shaped with three pairs of lateral setae. Anal plate broadly rounded.

Measurements. Antennal segments as follows: I .092-.102, II .071-.082, III .388-.449, IV .306-.367, V .245-.275, VI .112 + .377-.490. Rostral segments IV + V .112 in length. Leg segments as follows: femora I .408-.520, II .418-.551, III .581-.704; tibiae I .714-.887, II .775-.928, III 1.040-1.255; first tarsal segments I .036-.041, II .036-.046, III .041-.051; second tarsal segments I .107-.117, II .112-.128, III .112-.143. Length of cornicle .490-.571, cauda .224.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 2.132-2.392. Head, thorax, and abdomen amber. Antennal segments amber except for apex of segment V and all of VI which are dusky. Rostral segments III, IV, and V dusky, remainder pale. Wing pads dusky. Legs amber with apices of tibiae dusky, tarsi brownish. Apices of cornicles dusky, remainder pale.

Collection Data. Chrysanthemum (Chrysanthemum sp.): Broken Arrow, Tulsa Co., Oklahoma, November 6, 1958, R. G. Price. Easter lilly (Lilium longifolorum Thumb., var. eximium Baker): Alva, Woods Co., Oklahoma, April 4, 1961, H. W. Van Cleave. Hollyhock (Althea rosea Cav.): Elk City, Beckham Co., Oklahoma, March 16, 1961, H. W. Van Cleave and R. Burke; Jefferson Co., Oklahoma, April 4, 1961, F. Vinson. Hybiscus (Hibiscus sp.): Ardmore, Carter Co., Oklahoma, May 2, 1961, H. W. Van Cleave and F. Vinson. Pepper (Solanum sp.): Tulsa, Tulsa Co., Oklahoma, December 4, 1958, C. F. Stiles. Snapdragon (Antirrhinum sp.): Walters, Cotton Co., Oklahoma, January 28, 1959, A. C. Hatfield. Turnip (Brassica rapa L.): Stillwater, Payne Co., Oklahoma, November 6, 1960, H. W. Van Cleave.

Note. Synonymy of this species is adapted from Palmer (1952). For a more complete synonymy, refer to Mason (1940).

This is a very common species on a wide variety of plants and will probably prove to be one of the most common species in the state when aphids have been more adequately collected.

Genus Neoceruraphis Shaposhnikov

Neoceruraphis Shaposhnikov, 1956. Trud. Zool. Inst. Akad. Nauk SSSR. 23:285.

Genotype: Ceruraphis viburnicola (Gillette). (Fixed by Shaposhnikov, 1956).

Note. Only one species of this genus has been reported from Oklahoma; therefore, the description is of that species.

Neoceruraphis viburnicola (Gillette)

The Snowball Aphid

Aphis viburnicola Gillette, 1909. Entomol. News. 20:280.

Anuraphis viburnicola, Smith, Dean and Kelly, 1946. J. Kans. Entomol. Soc. 19(2):44.

Neoceruraphis viburnicola, Shaposhnikov, 1956. Trud. Zool. Inst. Akad. Nauk SSSR. 23:285.

Note. This species was reported by Medler and Ghosh (1968). Due to a lack of material for examination, the following description is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma.

> Fundatrix. First Instar. Apparently ashy gray, but really pale greenish yellow, heavily covered with powder, with four rows of black dots; cornicle hardly elevated, appearing as a double ring; head, and appendages dusky brown. Young Adult. Light green; covered with powder; distal half to entire antenna, cornicle, cauda, anal and genital plates and entire tibiae and tarsi and tip of rostrum dusky to black. Old Adult. Deep green; covered with powder. Size 2.50-3 by 1.5; hind tibia .90; antenna .90, III and IV coalesced; hind tibia not noticeably swollen but bearing a few sensoria.
>
> Alate Vivipara. Newborn. Pale greenish yellow to very pale yellow; covered with white powder, not showing black spots as in young fundatrix. Adult Spring Migrant. Head and thorax black; abdomen pale greenish yellow with

dusky to blackish green lateral areas and dorsal bands, the latter coalesced on abdominal II to VIII; appendages, cornicle, rostrum and anal and genital plates dusky to black; cauda pale to dusky. Body length 2.5-2.7; hind tibia 1.25; antennae 1.2-1.6, secondary sensoria large, subcircular, tuberculate; rostrum obtuse, barely attaining 3d coxa. Antenna rather stout, as wide or wider than hind tibia; base of VI abruptly constricted to unguis. Hairs pointed, rather drooping, numerous. Cornicle cylindrical or slightly tapering, with flange and with denticulate, very closely placed imbrications. Cauda tapering, acute, about as broad as long and bearing 3 hairs on each side. Hind tibia of spring migrants swollen on distal half which portion bears about 20 sensoria. Lateral tubercles distinct. A pair of dorsal tubercles present on abdominal VIII. Fall Migrant. Same as spring migrant except as follows: Abdomen rusty brown instead of pale, with dark bands on II to VIII and hind tibia not noticeably swollen but usually bearing a few sensoria.

Ovipara. Nymph and Young Adult. Pale yellow; covered with white powder; later becoming sordid yellow. Older Adult. Apterous. Salmon-pink, mottled with brownish with eggs showing through dorsal body wall; appendages pale to light brownish. Body length 1.50-1.80; hind tibia .40; antenna .45-.50, III and IV coalesced; hind tibia distinctly swollen along entire length and bearing numerous sensoria.

Male. Alate. Head and thorax black; abdomen rusty brown, with lateral areas, blotch behind cornicle, and narrow dorsal bands dusky; antenna, tibiae, anal and genital plates and cornicle black; cauda dusky. Body length 1.8-2; hind tibia .55; antenna 1.40-1.60, segments thick .06 in diameter, broader than hind tibia.

Egg. Newly laid, pale yellow; later, black; shining. Size .66 by .20.

Collection Data. Suction Trap: Stillwater, Payne Co., Oklahoma, October 29, 1965.

Genus Pleotrichophorus Borner

Aphis, Kaltenbach (in part), 1846. Stettin. Entomol. Zeit. Vol. VII:170.

Myzus, van der Goot (in part), 1912. Tijdschr. Entomol. Vol. LV:68.

Capitophorus, Theobald (in part), 1926. The plant lice or Aphididae of Great Britain. Vol. 1:246

Pleotrichophorus Borner, 1930 (subgenus of Capitophorus van der Goot). Arch. f. Klass. u. Phylog. Entomol., Vol. I:138.

Pleotrichohorus, Hille Ris Lambers, 1953. Temminckia. 9:114.

Genotype: Aphis glandulosa Kaltenbach (fixed by Borner, 1930).

General Characteristics. Frontal tubercles generally rather small, diverging and smooth. Median frontal tubercle rather well developed and armed with capitate setae. Antennae usually six-segmented (rarely five-segmented). Secondary sensoria rather small and present on the antennae of both the alate and apterous forms. Rostrum of medium length, but at most, just reaching coxae III; segments IV + V acute to very acute. Legs long and thin; first segment of each tarsus armed with three setae. Wing venation normal, veins rather heavy, dark brown and all narrowly bordered with brown. Dorsum of abdomen covered with numerous capitate or funnel shaped setae, which are rather thick and placed on rather strong bases. Cornicles elongate, cylindrical to subcylindrical, regularly imbricated and with small flange. Cauda elongate, from 2/5 to over twice the length of the cornicle.

Note. The above synonymy, genotype fixation, and general characteristics are adapted from Hille Ris Lambers (1953).

Key to the Species of the Genus

Pleotrichophorus in Oklahoma

Ultimate segment of the rostrum acute, tapering evenly from the base.....*wasatchii*.

Ultimate segment of the rostrum needle-shaped, abruptly narrowed near the base.....*glandulosus*.

Note. Due to a lack of material for examination, this key is adapted from Medler and Ghosh (1968).

Pleotrichophorus glandulosus (Kaltenbach)

Aphis glandulosa Kaltenbach, 1846. Stettiner Entomol. Zeitschr., Vol. VII:170-171.

Myzus pilosus van der Goot, 1912. Tijdschr. v. Entomol., Vol. LV:68.

Myzus glandulosus, van der Goot, 1915. Beit. z. Kenntnis d. Holl. Blattlause. 106-107.

Capitophorus pilosus, Theobald, 1926. The plant lice or Aphididae of Great Britain. Vol. I:246-248.

Capitophorus glandulosus subspec. *ispharinus* Nevsky, 1929. Tli. Sredne: Asii.:140-141.

Pleotrichophorus glandulosus, Borner, 1930. Auch. f. Klass. u. Phylog. Entomol., Vol. I:138.

Note. Medler and Ghosh (1968) reported this species from Oklahoma. Due to a lack of material from which to write a description, the following description, along with the synonymy above, is taken from Hille Ris Lambers (1953).

Fundatrix. Morphological characters. Much like apterous viviparous female. Antennae about as long as body: IIIrd segment with 1, rarely 2 rhinaria; processus terminalis about 3-3 1/2 times as long as base of VIth segment, about as long as IIIrd segment.

Colour. As in apterous viviparous female, but slightly more green.

Measurements of one specimen: Length of body: 2.06 mm; ant.: 1.98 mm: siph.: 0.44 mm; cau.: 0.20 mm. Prop. of ant. segments: $\frac{100}{III}$: $\frac{72}{IV}$: $\frac{66}{V}$: $\frac{(31 + 92)}{VI}$.
Rhin. on IIIrd ant. segment: I and I.

Apterous viviparous female.

Morphological characters. Body pyriform, not more than 2.5 mm. long. Tergum membraneous, colourless, smooth, covered with very numerous thick hairs with knobbed, fan-shaped apex which are implanted on strong bases and are placed in multiple transverse rows across each segment; the hairs on the first 5 abd. tergites up to about 1 1/2 times as long as basal diameter of IIIrd segment; those on VIIIth tergite, of which 6 are placed in an interrupted line, 1-5 cephalad of this line, about 1 2/3 times as long as basal diameter of IIIrd segment. Frontal tubercles rather low, diverging, smooth. Median tubercle present, on which two thick hairs are implanted. Antennae at least 1 1/4 times as long as body, in small specimens up to 1 1/2 times as long; first segment at inner apex with an area of coarse, blunt scales and there rounded; second segment with faint imbrications; IIIrd segments with 1-3 flat rhinaria on the slightly incrassate base; processus terminalis 5-6 1/2 times as long as base of VIth segment, up to 1 1/2 times as long as IIIrd segment. Antennal hairs normal, less than half as long as basal diameter of IIIrd segment, with blunt, normal apices. Rostrum reaching the hind coxae; apical segment 4/5 of length of second joint of hind tarsi, stiletto-shaped, very slender, with 2 pairs of thin hairs and near base with 1-2 much stouter pairs about 2 2/3-3 times as long as the thin ones. Siphunculi thin, cylindrical, slightly incrassate near base, evenly imbricated, colourless, with a very small, inconspicuous flange, about 2/9 of the length of the body. Cauda rather variable in length, triangular with blunt apex, not constricted, pale 2/5-1/2 of the length of the siphunculi, with 5-8 hairs. Legs rather long, pale; first tarsal joints with 3, 3, 3 rather short hairs of which the middle one is about half as long as the lateral ones. Mesothoracal furca on a short base, which is about as long as it is thick.

Colour. Opaque creamy white with a very faint greenish tinge. Antennae, legs, siphunculi and cauda nearly colourless. Sometimes a very faint greenish dorsal line present.

Measurements of one specimen: Length of body: 2.36mm; ant.: 2.89 mm; siph.: 0.54 mm; cau.: 0.26 mm. Prop. of ant. segments: $\frac{100}{III}$: $\frac{75}{IV}$: $\frac{62}{V}$: $\frac{(24 + 135)}{VI}$.
Rhin. on IIIrd ant. segment: 2 and 3.

Alate viviparous female.

Morphological characters. Much like apterous viviparous female, but the hairs on tergum thinner, on smaller bases and with less incrassate apices. Head brownish sclerotic, darker around the ocelli; mesothorax brown. Antennae up to 1 1/2 times as long as body, brown except the base of IIIrd segment, the IInd segment and the outer half of Ist segment, which are pale; IIIrd segment with 14-23 rhinaria approximately in a row, IVth with 0-3. On abdomen rather small marginal sclerites present, which are pale with a dark central spot, and dark pleural intersegmental sclerites. Other characters as in apterous viviparous female, but legs with slightly darker knees and apices of tibiae. Veins of the wings dark brown, slightly shadowed, otherwise normal.

Colour. As in apterous viviparous female, but the thorax brown.

Measurements of one specimen: Length of body: 2.20 mm; ant.: 3.02 mm; siph.: 0.42 mm; cau.: 0.23 mm. Prop. of ant. segments: $\frac{100}{III}$: $\frac{78}{IV}$: $\frac{69}{V}$: $\frac{(26 + 153)}{VI}$.
Rhin. on IIIrd ant. segment: 16 and 18; on VIth: I and I.

Oviparous female.

Morphological characters. Very strongly like the apterous viviparous female, but the cauda remarkably thick and sack-like. Hind tibiae considerably swollen on basal half, which is darker than the remaining part and bears numerous small pseudosensoria.

Color. As in apterous viviparous female.

Measurements of one specimen: Length of body: 2.08 mm; ant.: 2.61 mm; siph.: 0.52 mm; cau.: 0.21 mm. Prop. of ant. segments: $\frac{100}{III}$: $\frac{76}{IV}$: $\frac{65}{V}$: $\frac{(26 + 155)}{VI}$.
Rhin. on IIIrd ant. segment: 2 and 2.

Apterous male.

Morphological characters. Body very slender. Head with 3 ocelli, like the prothorax brownish sclerotic; abdomen with very well developed smoky brown intersegmental pleural sclerites which per segment are connected by much paler spino-pleural transverse bars, marginal sclerites small, brownish. Hairs as in alate viviparous female. Antennae about 1 1/2 times as long as body, dark brown to black; IIIrd segment with 35-45 small rhinaria, IVth with 20-28; Vth with 10-15. Siphunculi slender, pale, cauda normal, darker. Genitalia well developed, claspers rather slender, more or less acute. Legs very long and thin, as in alate viviparous female. Other characters as in other forms.

Colour. Pale yellowish with the sclerotic pattern more or less faintly brown.

Measurements of one specimen: Length of body: 1.72 mm; ant.: 2.88 mm; siph.: 0.36 mm; cau.: 0.15 mm. Prop. of ant. segments: $\frac{100}{III}$: $\frac{81}{IV}$: $\frac{72}{V}$: $\frac{(26 + 155)}{VI}$. Rhin. on IIIrd ant. segment: 37 and 41; on IVth; 23 and 23; on Vth: 14 and 13.

Pleotrichophorus wasatchii (Knowlton)

Capitophorus wasatchii Knowlton, 1927. Can. Entomol. 59:238.

Pleotrichophorus wasatchii, Medler and Ghosh, 1968. Species of Aphids Trapped During NC-67 Project on Aphid Migration (unpublished). 94.

Note. This species was reported from Oklahoma by Medler and Ghosh (1968). Due to a lack of material for study, the following description is taken from Palmer (1952) as an aid to future students of aphids in Oklahoma.

Apterous Summer Vivipara. Pale green appearing frosted due to capitate hairs; antenna dusky distally, often all beyond II; cauda, cornicle and legs pale to slightly dusky with tarsi black and tips of tibiae dark. Body length 1.75-2; across eyes .47-.50; hind tibia .95-1.05; hind tarsal II .13-.14; antenna 2.40-2.70; rostrum acute but not needle-like at tip, surpassing 2d coxa. Hairs on vertex funnel-

shaped with slight shaft, on dorsum of body sessile, .02-.03 long and numerous; on antenna and hind tibia blunt to slightly capitate; on venter of abdomen mostly simple.

Alate Vivipara. (Mounted on slide), body immaculate; color of appendages as in apterous vivipara. Body length 1.80; antenna 2.80; hind tibia 1.20. Hairs as in aptera or slightly shorter.

Ovipara. Apterous. Color and measurements as in apterous vivipara except that some examples are brown and proximal half on hind tibia is more or less swollen and bearing rather numerous moderately large sensoria.

Male. Alate. Antennal measurements about as in apterous ovipara and vivipara.

Genus Rhopalosiphum Koch

Rhopalosiphum Koch, 1854. Die Pflanzenlause Aphiden: 23.

Siphocoryne Passerini, 1860. Gli Afidi: 28.

Rhopalosiphon Scudder, 1882. Nomenclator Zoologicus.

Coloradoa Wilson, 1910. Ann. Entomol. Soc. Amer. 3:323.

Siphonaphis van der Goot, 1915. Beitrage zur Kennt. d. Holl. Blattlause: 238.

Stephensonia Das, 1918. Mem. Ind. Mus., Vol. 6:175.

Genotype: Aphis nymphaeae Linnaeus, 1761 (fixed by Gerstaecker, 1856).

General Characteristics. This genus is similar to the genus Aphis in general body shape, size, etc., but differs in that the cornicles have a distinct flange and vary in shape from cylindrical to swollen or clavate. The cornicles are longer than the entire length of the cauda. The cauda is parallel-sided or tapering. The setae on the body and appendages vary in length and may be either pointed or slightly capitate.

Note. The above synonymy and genotype fixation is adapted from Baker (1920). Richards (1960) published a study of this genus which should be referred to by any student of this group.

Key to the Species of the Genus

Rhopalosiphum in Oklahoma

1. Antennae 5-segmented.....rufiabdominalis.
   Antennae 6-segmented.....2.
2. Antennal segment IV usually without secondary sensoria.....nymphaeae.
   Antennal segment IV usually with secondary sensoria.....3.
3. Unguis 2 to 2 1/2 times longer than the base of antennal segment IV.....maidis.
   Unguis 3 to 4 times longer than the base of antennal segment VI.....padi.

Rhopalosiphum maidis (Fitch)

Corn Leaf Aphid

Aphis maidis Fitch, 1856. New York Agric. Soc. Trans. 15:550.

Rhopalosiphum maidis, Webster, 1887. Riley Rept. 148 (Palmer, 1952).

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.964-2.321. Head and thorax black, abdomen amber with dusky lateral patches on segments anterior to the cornicles and dorsal transverse dusky bands on segments posterior to the cornicles. Antennae rostral

segments III, IV and V legs, cornicles, cauda and anal plate dusky to blackish. Rostrum reaching nearly to coxae II. Wing membranes hyaline, venation normal. Cornicles slightly incrasate with distinct constriction just before the flange, strongly spiculose imbrications present over full length.

Measurements. Length of antennal segments as follows: I .050-.071, II .061-.066, III .326-.367, IV .179-.204, V .163-.189, VI .107-.122 + .233-.255. Secondary sensoria number 19-22 on III, 5-8 on IV, 0-3 on V. Rostral segments IV + V .082-.087. Leg segments as follows: femora I .398-.459, II .346-.388, III .490-.551; tibiae I .673-.755, II .632-.714, III .867-.949; first tarsal segments I .036-.046, II .036-.-41, III .031-.041; second tarsal segments I .102-.112, II .112-.122, III .102-.112. Length of fore wing 3.009-3.590, hind wing 1.785-2.091. Length of cornicle .138-.148.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.080-2.652. Body amber. Antennae, rostral segments III, IV, and V, legs, cornicles, cauda, and anal plate dusky to blackish. Rostrum nearly attaining coxae II. Cornicles swollen on basal half with constriction just before flange, spiculose imbrications present throughout the length.

Measurements. Length of antennal segments as follows: I .061-.077, II .061-.066, III .168-.287, IV .097-.143, VI .092-.102 + .173-.224. Rostral segments IV + V .097-.092. Leg segments: femora I .286-.388, II .265-.403, III .393-.571; tibiae I .388-.571,

II .418-.632, III .602-.836; first tarsal segments I .041-.046, II .036-.046, III .041-.046; second tarsal segments I, II, and III subequal .107-.117. Length of cornicles .143-.194.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.768-2.444. Head and abdomen amber, thorax antennae, rostral segments III, IV, and V, wing pads, legs cornicles, cauda and anal plate dusky to blackish. Rostrum not attaining coxae II.

Collection Data. This species is common throughout the state and was collected from barley (Hordeum vulgare L.), corn (Zea mays L.), and grain sorghum (Sorghum vulgare Pres.). Populations were general, but heaviest on young plants, from early spring through late fall.

Comments. Live winged specimens have the head and thorax black with deep green abdomen with black markings and antennae, legs, cornicles, cauda, and anal plate black. Wingless forms have deep green to bluish green bodies with black appendages. Mature females quite often have black pigmentation on the abdomen around the bases of the cornicles and the bodies may be covered with a whitish powder.

Rhopalosiphum nymphaeae (Linnaeus)

The Waterlily Aphid

Aphis nymphaeae Linnaeus, 1761. Fauna Suecica, Ed. II (alt.):260.

Aphis aquatica Jackson, 1908. Ohio Nat. 8:243.

Rhopalosiphum nymphaeae, Patch, 1912. Maine Agr. Exp. Sta. Bull. 202:171.

Note. Due to an inadequate series of specimens, the following descriptions are taken from Palmer (1952) for the convenience of future students of the aphids of Oklahoma.

> Apterous Summer Vivipara. Light olive-green to golden brown; pulverulent on sides of head and prothorax; all appendages dusky except cornicle lighter proximally. Body length 2-2.30; hind tibia .95-1.10; antennae 1.20-1.50; rostrum obtuse, attaining 3d coxa.
>
> Alate Vivipara. Color and measurements same as apterous vivipara except as figured. Cornicle clavate, swollen on distal half and with distinct flange, narrow portion with faint transverse wrinkles, otherwise smooth. Hairs pointed; .01-.02 on body. Cauda blunt, parallel-sided with slight neck, bearing 2 hairs on each side. Lateral tubercles small but present on prothorax and abdominal segments. Fore wing with 2d fork of media short, arising about quarter the distance from margin of wing to 1st fork.

Collection Data. Taken in Suction Trap: Stillwater, Payne Co., Oklahoma, November 15, 1965 (Det. A. K. Ghosh, 1967).

Note. Two additional collections were taken during this study which are probably this species. Cattail (Typha sp.): Mooreland, Woodward Co., Oklahoma, April 11, 1961, H. W. Van Cleave; Tom, McCurtain Co., Oklahoma, June 20, 1961, H. W. Van Cleave.

Rhopalosiphum padi (Linnaeus)

Aphis padi Linnaeus, 1758. Systema Naturae., Ed. X:451.

Aphis prunifoliae Fitch, 1854. New York Agric. Soc. Trans. 14:826.

Aphis pseudoavenae Patch, 1917. Bull. Me. Agric. Exp. Sta. 267:293.

Rhopalosiphum prunifoliae, Baker and Turner, 1919. Jour. Agric. Res. 18:311.

Rhopalosiphum padi, Rogerson, 1947. Bull. Entomol. Res., 38:157.

Rhopalosiphum fitchii (in part), Palmer, 1952. Thomas Say Foundation. 5:215.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.785-2.117. Head and thorax medium brown, abdomen amber. Antennae except for base of segment III dusky to brown. Rostral segments III, IV, and V dusky with rostrum nearly attaining coxae II. Bases of femora pale, apical two-thirds dusky. Bases and apices of tibiae dusky with control areas pale. Tarsi dusky. Wings hyaline with normal venation. Cornicles pale to dusky with apices darker, shape varying from cylindrical to slightly vasiform with distinct constriction next to the prominent flange at apices. Cauda pale, anal plate slightly dusky.

Measurements. Antennal segments as follows: I .066-.082, II .051-.071, III .347-.428, IV .204-.235, V .153-.199, VI .102-.112 + .357-.418. Secondary sensoria on segment II numbering 19-28, IV 5-10, V 0-5. Length of rostral segments IV + V .097-.112. Leg segments as follows: femora I .357-.464, II .337-.408, III .479-.561; tibiae I .602-.765, II .602-.775, III .836-1.020; first tarsal segment I .031-.041, II .036-.041, III .036-.041; second tarsal segment I .097-.102, II .102-.107, III .094-.102. Length of fore wing 2.550-3.570, hind wing 1.785-2.091. Length of cornicle .204-.245.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.015-2.499. Body amber. Antennae dusky except at base of III. Rostrum attaining coxae II. Rostral segments III, IV, and V dusky. Bases of femora pale, shading to dusky past the basal one-third. Bases and apices of tibiae dusky with central areas pale. Cornicles

pale to dusky with apices darker. Cornicles varying in shape from nearly cylindrical to slightly variform with a distinct constriction near the apices next to the well developed flange. Cauda and anal plate pale to slightly dusky.

Measurements. Antennal segments as follows: I .066-.082, II .066-.077, III .316-.388, IV .173-.224, V .148-.194, VI .087-.102 + .300-.367. Length of rostral segments IV + V .102-.112. Leg segments: femora I .316-.398, II .347-.428, III .474-.587; tibiae I .510-.632, II .581-.702, III .806-.969; first tarsal segments I, II, and III subequal .036-.046; second tarsal segments I .097-.102, II .102-.112, III .102-.107. Length of cornicle .224-.275.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.555-2.091. Coloration as in apterous vivipara with wing pads being concolorous with body.

Collection Data. This is a very common species and was collected from throughout the state from early fall to late spring on wheat (Triticum aestivum L.) and barley (Hordeum vulgare L.). Populations usually reached their highest levels during late November, December, and early January.

Comments. The general body color on all forms when alive is pale to medium green with reddish to reddish orange areas surrounding the bases of the cornicles. The tips of the cornicles vary in color from dusky to black. The head and thorax of the winged forms vary from brownish black to black. They resemble R. rufiabdominalis but differ

in having six segments in the antennae and only two setae on the dorsum of abdominal segment VIII. This species has been confused in the past with R. fitchii and has been reported in error on numerous occasions from Oklahoma. All specimens examined keyed to R. padi when following the key constructed by Richards (1960).

Rhopalosiphum rufiabdominalis (Sasaki)

The Rice Root Aphid

Toxoptera rufiabdominalis Sasaki, 1899. Nippo Nosakumosu Gaichn Hen. 202.

Siphocoryne splendens Theobald, 1915. Bull. Entomol. Res., 6:116.

Yamataphis oryzae Matsumura, 1917. Jour. Coll. Agric., Sapporo. 7:412.

Aresha shelkovnikovi Mordvilko, 1921. Bull. Sta. Reg. Prot. Plantes Petrograd. 3:54.

Yamataphis pavaveris Takahashi, 1921. Aphidae of Formosa. Part I. Taihoka, Agric. Exp. Sta. Formosa. 39.

Yamataphis rufiabdominalis, Takahashi, 1921. Ibid. 43.

Rhopalosiphum avenae (in part), Takahashi, 1923. Rep. Dept. Agric. Govt. Res. Inst. Formosa. No. 4:34.

Rhopalosiphum avenae, George, 1925. Jour. Asiat. Soc. Beng. (N.S.). 20:309.

Aphis splendens, Hall, 1926. Bull. Minist. Agric. Egypt, No. 68:26.

Rhopalosiphum prunifoliae (in part), Theobald, 1927. The plant lice or Aphididae of Great Britain. Vol. II:72.

Rhopalosiphum annuae (in part), Borner and Schilder, 1932. In Sorauer. Handb. Pflanzenkr., 5, II. Teil:594.

Rhopalosiphum subterraneum Mason, 1937. Proc. Entmol. Soc. Wash. 166.

Aresha setigera Blanchard, 1939. Physis. 17:900.

Rhopalosiphum splendens, Palmer, 1939. Jour. Econ. Entomol. 32:345.

Pseudocerosipha pruni Shinji, 1941. Monograph of Japanese Aphids. 1011.

Cerosipha californica Essig, 1944. Hilgardia. 16:177.

Cerosipha subterranea, Zimmerman, 1948. Insects of Hawaii, Vol. 5. Homoptera: Sternorhycha. 93.

Alate Vivipara (one specimen).

General Characteristics. Length from vertex to tip of cauda 2.184. Head and thorax blackish brown. Antennae five-segmented, blackish brown throughout. Coxae and trochanters brown, femora brown except for bases, tibiae brown at bases and apices with most of the length in between being dusky to amber, tarsi dusky. Wings hyaline. Abdomen amber with lateral dusky patches on segments I-V, lateral patches coalescing with dorsal transverse patches on segments VI and VII. Cornicles, cauda and anal plate dusky to brown. Cauda spoon-shaped with two pairs of lateral setae, anal plate rounded.

Measurements. Antennal segments as follows: I .082, II .071, III .510, IV .173, V .092 + .520. Secondary sensoria numbering 23-25 on III and 2-3 on IV. Primary sensoria at apices of IV and at junction of base of V and unguis. Length of rostral segments IV + V .122. Leg segments: femora I .469, II .377, III .561; tibiae I .775, II .745, III 1.000; first tarsal segments I, II, III equal .036; second tarsal segments I .102, II .102, III .107. Length of fore wing 3.328, hind wing 1.976. Length of cornicle .224.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.664-2.132. Body amber. Antennae five-segmented and dusky throughout

with long setae. Rostrum attaining coxa II. Femora and basal half of tibiae slightly dusky, remainder amber. Cornicles, cauda, and anal plate dusky.

Measurements. Antennal segments as follows: I .056-.061, II .056-.061, III .173-.214, IV .071-.042. V .051-.061 + .306-.367. Length of rostral segments IV + V .128-.148. Leg segments: femora I .291-.347, II .291-.352, III .383-.479; tibiae I .434.-.500, II .428-.530, III .632-.755; first tarsal segments I .041-.046, II .036-.041, III .036-.041; second tarsal segment I .092-.097, II .092-.097, III .092-.102. Length of cornicle .214-.235.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.404-1.820. Body color amber. Rostral segments III, IV, and V dusky. Rostrum attain coxa II. Apical half of femora slightly dusky. Remainder of appendages concolorous with body.

Collection Data. On roots of wheat (Triticum aestivum L.): Agawam, Stephens Co., Oklahoma, March 16, 1960, H. W. Van Cleave and F. Vinson; Okemah, Okfuskee Co., Oklahoma, October 19, 1960, A. S. Pela. In suction trap: Stillwater, Payne Co., Oklahoma, December 12, 1965.

Comments. This species can be recognized by having medium green body color with reddish-orange blotches around the base of the cornicles and the segments in the antennae usually reduced to 5. A number of authors report the six-segmented antennae form but none were collected in this study. If specimens have six segments in the

antennae, they can be distinguished from other species of Rhopalosiphum by the presence of four or more setae on abdominal tergum VIII while the other species will have only two setae present.

Genus Schizaphis Borner

Rhopalosiphum Koch (in part), 1854. Die Pflanzenlause Aphiden. 23.

Toxoptera Koch (in part), 1856. Die Pflanzenlause Aphiden. 253.

Schizaphis Borner, 1931. Anz. Schadlingsk. 7:8-11.

Genotype: Toxoptera graminum (Rondani) (fixed by Borner, 1931).

Note. Only one species of this genus was collected in Oklahoma; therefore, the description is of that species. Students of this group should find Eastop's (1961) key to the species helpful.

Schizaphis graminum (Rondani)

The Greenbug

Aphis graminum Rondani, 1852. Nuove Ann. Sci. Nat. e. Rendic. Bologna, b. Ser. 3:10.

Toxoptera graminum, Pergande, 1902. U.S. Dept. Agr. Div. Entomol. Bull. 38:7.

Schizaphis graminum, Borner, 1931. Anz. Schadlingsk. 7:10.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.612-1.872. Head and abdomen amber, thorax brownish amber. Antennal segments I, II, and base of III amber, remainder dusky. Femora, apices of tibiae and tarsi dusky. Wing hyaline, media of fore wing once-branched, occasional twice-branched in one wing, rarely in both

fore wings. Lateral tubercles developed on prothorax and abdominal segments I and VII. Cornicles cylindrical with dusky tips (usually without dusky tips from grain sorghum). Cauda elongate, usually slightly spoon-shaped with two pairs of lateral setae, anal plate rounded.

Measurements. Antennal segments as follows: I .061-.071, II .056-.071, III .293-.354, IV .195-.244 V .171-.232, VI .098-.116 + .323-.488. Secondary sensoria numbering 5-10 on III and 0-3 on IV. Rostral segments IV + V .077-.087. Leg segments as follows: femora I .342-.388, II .306-.332, III .444-.500; tibiae I .571-.683, II .601-.700, III .796-.928; first tarsal segments I .031-.041, II .036, III .031-.036; second tarsal segments I .102-.112, III .102-.112. Length of fore wing 2.236-2.860, hind wing 1.248-1.456. Length of cornicle .173-.224.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.820-2.236. Body amber. Antennae dusky beyond base of segment III. Figure-like process present on ventral surface of each frontal tubercle. Apices of tibiae and all of tarsi dusky. Tips of cornicles dusky (usually without dusky tips on specimens taken from grain sorghum). Cornicles cylindrical to tapering from base to tip, with flange at apices. Cauda spoon-shaped, anal plate rounded.

Measurements. Antennal segments as follows: I .061-.071, II .056-.071, III .235-.357, IV .133-.224, V .133-.235, VI .082-.102 + .214-.439. Rostral segments IV + V .077-.087. Leg segments: femora I .260-.357, II .255-.357, III .377-.510; tibiae I .403-.571,

II .459-.643, III .632-.816; first tarsal segments I .036, II .031-.041, III .031-.036; second tarsal segments I .102-.112, II .102-.117, III .102-.117. Length of cornicle .204-.296.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.716-2.080. Body amber, wing pad dusky, at least toward apices, coloration on antennae, legs and cornicles as in alate vivipara.

Collection Data and Comments. This species was taken from throughout the state on wheat and barley. It has been taken, also, from grain sorghum, broom corn, and unidentified native grass. Populations reached their highest levels on wheat and barley during late winter and early spring. An outbreak of this species occurred on grain sorghum during July and August of 1968 with the live specimens being much lighter in color than the winter and spring forms on wheat and barley and were generally characterized by the absence of the dusky tips on the cornicles. Due to the large number of collections of this species, individual collections are not reported here.

Subfamily Eriosomatinae

General Characteristics. Vertex convex, frontal tubercles not well developed. Secondary sensoria on antennal segments transverse or annular. Unguis shorter than the base of antennal segment VI. Rostrum apparently four-segmented, with segment V indistinct. Media of fore wing once-branched or simple (not branched). Wax glands, of varying shapes, present on body. Setae inconspicuous. Anal plate broadly rounded.

Note. The general description of the subfamily is adapted from Palmer (1952) and the concept of the subfamily as used in this study follows that of Professor Palmer's.

Key to the Tribes of the Subfamily Eriosomatinae in Oklahoma

Wax glands composed of a row of facets surrounding a central space (Fig. 33); cornicle distinct, a pore usually on a slight mammiform base.....Eriosomatini.

Wax glands not composed of a row of facets surrounding a central space; cornicle indistinct, merely a ring.....Pemphigini.

Note. The above key is adapted from Palmer (1952).

Tribe Eriosomatini

General Characteristics. Prominent wax glands present. Antennae of alate forms with annular secondary sensoria which often nearly encircle the segments completely. Cornicles distinct but reduced to mere pores or pores on low bases. Other characteristics are as outlined for the subfamily.

Key to the Genera of the Tribe Eriosomatini in Oklahoma

Annular secondary sensoria present on antennal segments III, IV, V, and VI of alate vivipara; those on segment VI numbering more than five.....*Gobaishia*.

Annular secondary sensoria present on antennal segments III, IV, V, and occasionally VI of alate vivipara; if present on VI, then numbering less than five.....*Eriosoma*.

Genus *Eriosoma* Leach

Eriosoma Leach, 1818. Trans. Hort. Soc. London, Vol. 3:60.

Myzoxylus Blot, 1831. Mem. Soc. Roy. Agr. et de Com. Caen., Vol. 3:332.

Schizoneura Hartig, 1837. Jahresb. u. d. Fortschr. d. Forstwiss. und forstl. Naturk., Vol. 1:645.

Mimaphidus Rondani, 1848. Nuovi Annali della Scienze Naturali, Ser. 2, Vol. 9:35.

Genotype: *Aphis lanigera* Hausmann (monotypical).

Note. The above synonymy and genotype fixation is adapted from Baker (1920). Only one species of this genus was collected in Oklahoma; therefore, the description is confined to that species.

Eriosoma lanigerum (Hausmann)

The Woolly Apple Aphid

Aphis lanigerum Hausmann, 1802. Magazin f. Insekten Kunde, Bd. I:440.

Schizoneura americana, Gillette, 1898. Agr. Exp. Sta. Bull. 47, Fig. 32 (misidentification - Palmer, 1952).

Schizoneura lanigera, Gillette, 1908. J. Econ. Entomol. 1:306.

Eriosoma lanigerum, Becker, 1918. Univ. Ark. Exp. Sta. Bull. 154:3.

Eriosoma rosetti Gillette, 1936. Colorado Exp. Sta. Press Bull. 89:3 (nomen nudum - Palmer, 1952).

Eriosoma crataegi, Heriot, 1938. Proc. Entomol. Soc. British Columbia, Feb. 16 (9 pages in separate, not numbered).

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 1.560-1.820. Head brown, thorax blackish brown, thorax reddish amber. Antennae dusky to reddish brown throughout. Rostrum extending nearly to coxae II. Membranes of wings hyaline. Media of fore wing once branched, occasional simple and not branched; if branched, the point of branching appears to be variable. Remainder of venation in both wing typical for aphids. Legs amber to reddish amber with apices of femora dusky. Cornicles, flatten or low cones, with few, isolated setae scattered over the cone area. Cauda and anal plate broadly rounded and concolorous with abdomen.

Measurements. Antennal segments as follows: I .041, II .061, III .347-.398, IV .102-.122, V .092-.122, VI .066-.071 + .010-.020. Secondary sensoria prominent, annular and numbering 20-26 on segment III, 6-8 on IV and 3-7 on V. Primary sensoria circular and in normal positions on V and VI. Length of rostral segments IV + V .163-.173. Length of fore wing 2.184-2.444, hind wing 1.300-1.508. Leg segments as follows: femora I .398-.148, II .326-.388, III .398-.418; tibiae I .541-.602, II .561-.632, III .704-.714; first tarsal segments I, II, and III subequal .031; second tarsal segments I .128-.133, II .143, III .143-.153.

Apterous Vivipara (single specimen).

General Characteristics. Length from vertex to tip of cauda 1.872. Body reddish amber, remainder as in alate vivipara. Rostrum extending nearly to coxae III. Wax gland arranged in two longitudinal rows on dorsal surface and in single rows along lateral margins of the body.

Measurements. Antennal segments as follows: I .051, II .077, III .255, IV .082, V .092, VI .061 + .051. Length of rostral segments IV + V .153. Leg segments as follows: femora I .326, II .367, III .449; tibiae I .479, II .510, III .632, first tarsal segments I .031, II .041, III .041; second tarsal segments I .122, II .143, III .153.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 1.456-1.612. Body reddish amber with wing pads slightly darker, remainder as in alate and apterous viviparae.

Collection Data. From leaves of American elm (Ulmus americana L.): Stillwater, Payne Co., Oklahoma, May 14, 1962, H. W. Van Cleave.

Note. Hille Ris Lambers reviewed the current status of the confusion involving this species on American elm, in the Aphidologists' Newsletter, Vol. 7, No. 5, October 30, 1968. It may well be that the specific determination followed by American authorities over the years may be proved to be in error in the near future. Until the problem has been resolved, I have elected to follow the usual usage. The synonymy of this species is adapted from Palmer, 1952.

Genus Gobaishia Matsumura

Gobaishia Matsumura, 1917. Synopsis of the Pemphigidae of Japan: Gifu, Japan. 75.

Genotype: Gabaishia japonica Matsumura, 1917 (fixed by Matsumura, 1917).

Note. Only one species of this genus has been reported in Oklahoma; therefore, the description is limited to that species.

Gobaishia ulmi-fusa (Walsh and Riley)

Pemphigus ulmi-fusus Walsh and Riley, 1869. Amer. Entomol. I:109.

Gobaishia ulmi-fusus, Hottes and Frison, 1931. Illinois Natur. Hist. Surv. Bull. 19:359.

Note. Medler and Ghosh (1968) reported presumably this species from Oklahoma under the name Kaltenbachiella ulmifusa (Walsh and Riley). Due to a lack of material for examination on which to base a decision, I have elected to follow Palmer (1952) until such time material becomes available. The synonymy above and the following description are from

Palmer (1952). Future students of aphids in Oklahoma should refer to page 354, figure 424 of Palmer's work for illustrations of this species.

Fundatrix. Body length 2; hind tibia .35; hind tarsal II .10; antenna .26, rostrum attaining between 1st and 2d coxae.

Alate Vivipara. Body length 1.45; hind tibia .55; antenna .60-.70; rostrum as in aptera.

Collection Data. Suction trap, Oklahoma, October (from Medler and Ghosh, 1968).

Tribe Pemphigini

Note. Only one genus and one species of this tribe was collected in Oklahoma; therefore, the description is confined to that species.

Genus Prociphilus Koch

Prociphilus Koch, 1857. Die Pflanzenlause Aphiden: 279.

Stagonia Koch, 1857. Ibid.: 284.

Holzneria Lichtenstein, 1875. Bull. Soc. Entomol. France (5), Vol. 5:LXXVI.

Nishiyana Matsumura, 1917. Synopsis of the Pemphigidae of Japan: 90.

Genotype: Aphis bumeliae Schrank (fixed by Gerstaecker, 1859).

Note. The above synonymy and genotype fixation is adapted from Baker (1920). Only one species of this genus was collected in Oklahoma; therefore, the description is of that species.

Prociphilus fraxinifolii (Riley)

The Leaf-curl Ash Aphid

Pemphigus fraxinifolii Riley, 1879. Bull. U.S. Geol. and Geog. Surv. Terr. 5:17.

Prociphilus fraxinifolii, Jackson, 1908. Proc. Columbus Hort. Soc. 22:211.

Alate Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.288-2.548. Head and thorax brown, abdomen pale amber. Antenna and rostrum brown. Rostrum not attaining coxae II. A prominent pair of wax glands on the posterior margin of the head with a larger pair of wax glands on the mesothorax (Fig. 34). Membrane hyaline, media vein of fore wing simple, not branched. Legs dusky. Cornicles absent. Cauda and anal plate pale. Cauda broadly rounded, anal plate broadly rounded.

Measurements. Length antennal segments as follows: I .071-.076, II .087-.097, III .296-.332, IV .133-.173, V .153, VI .163-.173 + .031-.036. Secondary sensoria annular, numbering 7-10 on segment III, 3-5 on segment IV and 4-6 on segment V. Primary sensoria at normal positions on segments V and VI. Length of rostral segments IV + V .102. Length of fore wing 2.652-2.808, hind wing 1.820-1.924. Leg segments as follows: femora I .469-.510, II .449-.479, III .561-.612; tibiae I .643-.683, II .663-.734, III .847-.949; first tarsal segments I .041-.051, II .046-.051, III .051-.056; second tarsal segments I .168-.189, II .179-.204, III .209-.224.

Apterous Vivipara.

General Characteristics. Length from vertex to tip of cauda 2.600-2.808. Body and appendages amber. Rostrum attaining coxae II. Cornicles absent. Cauda and anal plate each broadly rounded.

Measurements. Antennal segments as follows: I .071-.087, II .102-.107, III .275-.306, IV .138-.143, V .143, VI .179-.184 + .031. Rostral segments IV + V .107 in length. Leg segments as follows: femora I .408-.428, II .418-.459, III .530-.571; tibiae I .510-.561, II .581-.426, III .724-.796; first tarsal segments I, II, and III subequal .051-.061; second tarsal segments I .168-.178, II .163-.179, III .194-.209.

Alatoid Nymph.

General Characteristics. Length from vertex to tip of cauda 2.132-2.496. Body and appendages amber.

Collection Data. Leaves of ash (Fraxinus sp.): Stillwater, Payne Co., Oklahoma, May 29, 1959, R. G. Price; Love Co., Oklahoma, May 13, 1961, F. Vinson; Perry, Noble Co., Oklahoma, May 21, 1965, D. Arnold.

Note. Synonymy adapted from Palmer (1952).

CHAPTER V

HOST PLANT INDEX

This host list is restricted to the plants that have been found infested with aphids within the state of Oklahoma.

Acer negundo L. (boxelder)
- *Periphyllus lyropictus* (Kessler)
- *Periphyllus negundinis* (Thomas)

Acer saccharinum L. (silver maple)
- *Drepanaphis acerifoliae* (Thomas)

Acer saccharum Marsh (sugar maple)
- *Drepanaphis kanzensis* Smith

alfalfa (see *Medicago sativa* L.)

Althea rosea Cav. (hollyhock)
- *Myzus persicae* (Sulzer)

Ambrosia sp. (ragweed)
- *Dactynotus ambrosiae* (Thomas)

American elm (see *Ulmus americana* L.)

Andropogon scoparious Michx. (little bluestem)
- *Anoecia querci* (Fitch)

Antirrhium sp. (snapdragon)
- *Myzus persicae* (Sulzer)

arborvitae (see *Thuja orientalis* L.)

apple (see *Malus* sp.)

ash (see *Fraxinus* sp.)

Austrian pine (see Pinus nigra Arnold)

barley (see Hordeum vulgare L.)

Begonia sp.

Aphis gossypii Glover

black locust (see Robinia pseudoachacia L.)

boxelder (see Acer negundo L.)

Brassica oleracea L. (cabbage)

Brevicoryne brassicae (Linnaeus)

Brassica rapa L. (turnip)

Hyadaphis pseudobrassicae (Davis)

Myzus persicae (Sulzer)

broomcorn (see Sorghum vulgare var. technicum (Koern)

burr oak (see Quercus macrocarpa Michx.)

cabbage (see Brassica oleracea L.)

Carya illinoensis (Wang.) K. Kock (pecan)

Longistigma caryae (Harris)

Monellia costalis (Fitch)

Tinocallis caryaefoliae (Davis)

Carya sp. (hickory)

Monellia caryella (Fitch)

Monellia microsetosa Richards

cattail (see Typha sp.)

Chaenomeles japonica Lindl. (flowering quince)

Aphis gossypii Glover

Chrysanthemum sp. (chryanthemum)

Aphis gossypii Glover

Macrosiphoniella sanborni (Gillette)

Myzus persicae (Sulzer)

Cineraria sp.

Anuraphis helichrysi (Kaltenbach)

corn (see *Zea mays* L.)

Cornus sp. (Dogwood)
- *Anoecia querci* (Fitch)

cotton (see *Gossypium* sp.)

cottonwood (see *Populus deltoides* Marsh.)

crapemyrtle (see *Lagerstronemia indica* L.)

Diospyros virginiana L. (persimmon)
- *Monelliopsis caryae* (Monell)

dogwood (see *Cornus* sp.)

Easter lilly (see *Lilium longifolorum* Thumb. var. *eximium* Baker)

elm (see *Ulmus* sp.)

flowering quince (see *Chaenomeles japonica*, Lindl.)

Fragaria sp. (strawberry)
- *Aphis rumicis* Linnaeus
- *Chaetosiphon fragaefolii* (Cockerell)

Fraxinus sp. (ash)
- *Prociphilus fraxinifolii* (Riley)

Gossypium sp. (cotton)
- *Aphis rumicis* Linnaeus

grape (see *Vitis* sp.)

grass
- *Anoecia querci* (Fitch)
- *Schizaphis graminum* (Rondani)

Gynura sp. (velvet plant)
- *Aphis gossypii* Glover

Hibiscus sp.
- *Aphis gossypii* Glover
- *Myzus persicae* (Sulzer)

hickory (see *Carya* sp.)

hollyhock (see Althea rosea Cav.)

Hordeum vulgare L. (barley)
- Macrosiphum avenae (Fabricius)
- Rhopalosiphum maidis (Fitch)
- Rhopalosiphum padi (Linnaeus)
- Schizaphis graminum (Rondani)
- Sipha flava (Forbes)

Hyacinthus sp.
- Aphis gossypii Glover

Impatiens sp. (sultana)
- Aphis gossypii Glover

Iris sp.
- Macrosiphum euphorbiae (Thomas)

ironweed (see Vernonia sp.)

Johnson grass (see Sorghum halepense (L.) Pres.)

Juglans sp. (walnut)
- Monelliopsis caryae (Monell)

Kalanchoe sp.
- Aphis gossypii Glover

Lagenaria siceraria Standl. (ornamental gourd)
- Aphis gossypii Glover

Lagerstronemia indica L. (crapemyrtle)
- Tinocallis kahawaluokalani (Kirkaldy)

Lathyrus odoratus L. (sweetpea)
- Acyrthosiphum pisum (Harris)

Lilium longifolorum Thumb. var. eximium Baker (Easter lilly)
- Myzus persicae (Sulzer)

little bluestem (see Andropogon scoparious Michx.)

loblolly pine (see Pinus taeda L.)

Malus sp. (apple)

Aphis pomi De Geer

Medicago sativa L. (alfalfa)

Acyrthosiphum pisum (Harris)

Aphis craccivora Koch

Therioaphis trifolii form maculata

Melilotus sp. (sweetclover)

Therioaphis riehmi (Borner)

oak (see Quercus sp.)

ornamental gourd (see Lagenaria siceraria Standl.)

pecan (see Carya illinoensis (Wang.) K. Kock)

pepper (see Solanum sp.)

persimmon (see Diospyros virginiana L.)

pin oak (see Quercus palustris Muench.)

pine (see Pinus sp.)

pinon pine (see Pinus edulis Engelm.)

Pinus caribaea Morelet. (slash pine)

Cinara watsoni Tissot

Schizolachnus lanosus Hottes

Pinus echinata Mill. (shortleaf pine)

Cinara pinivora (Wilson)

Essigella pini Wilson

Schizolachnus lanosus Hottes

Pinus edulis Engelm. (pinon pine)

Essigella pini Wilson

Pinus nigra Arnold (Austrian pine)

Eulachnus rileyi (Williams)

Pinus ponderosa Dough, var. scopulorum Engelm. (western yellow pine)

Essigella pini Wilson

Pinus taeda L. (loblolly pine)

Schizolachnus lanosus Hottes

Pinus sp. (pine)

Cinara pinivora (Wilson)

Cinara watsoni Tissot

Essigella pini Wilson

Schizolachnus lanosus Hottes

Plantanus occidentalis L. (sycamore)

Longistigma caryae (Harris)

plum (see Prunus sp.)

Populus deltoides Marsh. (cottonwood)

Chaitophorus populicola Thomas

Prunus sp. (plum)

Hysteroneura setaria (Thomas)

purpletop (see Triodia sp.)

Quercus macrocarpa Michx. (burr oak)

Hoplochaitophorus quercicola (Monell)

Myzocallis discolor (Monell)

Quercus palustris Muench. (pin oak)

Myzocallis bella (Walsh)

Myzocallis frisoni Boudreaux and Tissot

Quercus sp. (oak)

Hoplochaitophorus quercicola (Monell)

Longistigma caryae (Harris)

Myzocallis discolor (Monell)

Myzocallis punctata (Monell)

Stegophylla sp.

ragweed (see Ambrosia sp.)

Robinia pseudoachacia L. (black locust)

Aphis craccivora Koch

Salix babylonica L. (weeping willow)
Pterocomma smithiae (Monell)

Salix sp. (willow)
Chaitophorus nigrae Oestlund
Lachnus salignus (Gmelin)
Pterocomma smithiae (Monell)

shortleaf pine (see Pinus echinata Mill.)

silver maple (see Acer saccharinum L.)

slash pine (see Pinus caribaea Morelet.)

snapdragon (see Antirrhium sp.)

Solanum sp. (pepper)
Myzus persicae (Sulzer)

sorghum (see Sorghum vulgare Pres.)

Sorghum halepense (L.) Pres. (Johnson grass)
Sipha flava (Forbes)

Sorghum vulgare Pres. (sorghum)
Rhopalosiphum maidis (Fitch)
Schizaphis graminum (Rondani)
Sipha flava (Forbes)

Sorghum vulgare var. technicum (Koern.) (broomcorn)
Schizaphis graminum (Rondani)
Sipha flava (Forbes)

strawberry (see Fragaria sp.)

sugar maple (see Acer saccharum Marsh)

sultana (see Impatiens sp.)

sweetclover (see Melilotus sp.)

sweetpea (see Lathyrus odoratus L.)

sycamore (see Plantanus occidentalis L.)

Thuja orientalis L. (arborvitae)

Cinara louisianensis Boudreaux

Cinara tujafilina (Del Guercio)

Triodia sp. (purpletop)

Anoecia querci (Fitch)

Triticum aestivum L. (wheat)

Macrosiphum avenae (Fabricius)

Rhopalosiphum padi (Linnaeus)

Rhopalosiphum rufiabdominalis (Sasaki)

Schizaphis graminum (Rondani)

Sipha flava (Forbes)

turnip (see Brassica rapa L.)

Typha sp. (cattail)

Rhopalosiphum nymphaeae (Linnaeus)

Ulmus americana L. (American elm)

Eriosoma lanigerum (Hausmann)

Tinocallis ulmifolii (Monell)

Ulmus sp. (elm)

Longistigma caryae (Harris)

Tinocallis ulmifolii (Monell)

velvet plant (see Gynura sp.)

Vernonia sp. (ironweed)

Dactynotus sp.

Vitis sp. (grape)

Aphis sp. (probably illinoisensis Shimer)

walnut (see Juglans sp.)

weeping willow (see Salix babylonica L.)

western yellow pine (see Pinus ponderosa Dough. var. scopulorum Engelm.)

wheat (see Triticum aestivum L.)

willow (see Salix sp.)

Zea mays L. (corn)

Rhopalosiphum maidis (Fitch)

Taken in traps - host undetermined

Aphis nerii Boyer de Fonscolombe

Capitophorus elaeagni (Del Guercio)

Cinara braggii (Gillette)

Essigella fusca Gillette and Palmer

Gobaishia ulmi-fusca (Walsh and Riley)

Hyalopterus atriplicis (Linnaeus)

Iziphya flabella (Sanborn)

Macrosiphoniella ludovicianae (Oestlund)

Neoceruraphis viburnicola (Gillette)

Pleotrichophorus glandulosus (Kaltenbach)

Pleotrichophorus wasatchii (Knowlton)

Rhopalosiphum nymphaeae (Linnaeus)

CHAPTER VI

SUMMARY

The main period of collecting for this study was from September 1958 to September 1961, with limited collecting being continued through August 1964.

Approximately fifteen hundred samples have been taken from throughout the state representing all counties in Oklahoma. Sixty-five different host plants were represented by the collections with the majority of the samples being taken from plants of some economic importance.

A total of two subfamilies, five tribes, forty genera, and sixty-eight species of aphids were recorded in the study of the family in Oklahoma. Keys and descriptions to the various taxa encountered are furnished.

LITERATURE CITED

Bailey, L. H. 1966. Manual of cultivated plants (ninth printing). The MacMillan Co., New York. 1116 pp.

Baker, A. C. 1917. Life history of Macrosiphum illinoisensis, the grapevine aphis. J. Agr. Res. XI(3):83-89.

_____. 1920. Generic classification of the hemipterous family Aphididae. USDA Bull. 826:109.

Boudreaux, H. B. 1946. An unpublished key to the Louisiana aphids. Dept. of Entomol., Louisiana State Univ., Baton Rouge. 20 pp.

_____ and A. N. Tissot. 1962. The black-bordered species of Myzocallis of oak (Homoptera, Aphidae). Misc. Pub. Entomol. Soc. Amer. 3(4):122-144

Davidson, W. M. 1920. A new Myzocallis. Can. Entomol. 52:176.

Dickson, R. C. 1959. On the identity of the spotted alfalfa aphid in North America. Ann. Entomol. Soc. Amer. 52:63-68.

Eastop, V. F. 1961. A key for the determination of Schizaphis, Borner (Aphididae, Hem.). Entomol. 94:241-246.

Gillette, C. P. 1909. Two little-known aphids on Carex sp. Entomol. News. 20:119-121.

_____ and M. A. Palmer. 1931. The Aphidae of Colorado, Part I. Ann. Entomol. Soc. Amer. 24:827-934.

Gould, F. W. 1962. Texas plants, a checklist and economic summary. Texas Agr. Exp. Sta. MP-585. Texas A&M Univ., College Station. 112 pp.

Hille Ris Lambers, D. 1938. Contributions to a monograph of the Aphididae of Europe, I. Temminckia. III:1-44.

_____. 1939. Contributions to a monograph of the Aphididae of Europe, II. Temminckia. VI:1-134.

_____. 1947. Contributions to a monograph of the Aphididae of Europe, III. Temminckia. VII:179-319.

Hille Ris Lambers, D. 1950. On mounting aphids and other soft-skinned insects. Entomol. Berichten, No. 298, deel XIII:55-58.

_____. 1953. Contributions to a monograph of the Aphididae of Europe, V. Temminckia. IX:1-176.

_____. 1960. The genus Chaitophorus Koch in North America (Homoptera, Aphididae). Tijdschr. voor Entomol., deel 103, afl. 1/2:1-30.

Hottes, F. C. 1957. A synopsis of the genus Essigella (Aphidae). Proc. Biol. Soc. Wash. 70:69-109.

Kennedy, J. S., M. F. Day and V. F. Eastop. 1962. A conspectus of aphids as vectors of plant viruses. Commonwealth Institute of Entomol., London. 114 pp.

Kring, J. B. 1952. Aphids or plant lice (Aphididae, Hemiptera) in Kansas. Ph.D. Dissertation, Kansas State Univ., Manhattan. 251 pp.

_____. 1955. Some aphid and host plant records from Missouri. J. Kansas Entomol. Soc. 28:64-66.

Leonard, M. D. 1959. A preliminary list of the aphids of Missouri. J. Kansas Entomol. Soc. 32:9-18.

_____ and A. N. Tissot. 1965. A preliminary list of Texas aphids. Florida Entomol. 48:255-264.

Mason, P. W. 1940. A revision of the North American aphids of the genus Myzus. USDA Misc. Pub. No. 371. 30 pp.

Medler, J. T. and A. K. Ghosh. 1968. Species of aphids trapped during NC-67 project on aphid migration. Dept. of Entomol., Univ. of Wisc., Madison. (unpublished manuscript). 107 pp.

Olive, A. T. 1963. The genus Dactynotus Rafinesque in North Carolina (Homoptera: Aphidae). Misc. Pub. Entomol. Soc. Amer. 4(2):32-66.

_____. 1965a. A new subgenus and two new species of Dactynotus. Ann. Entomol. Soc. Amer. 58:284-289.

_____. 1965b. A list of the species of Dactynotus Rafinesque of North America, with new combinations and synonymy. Proc. Entomol. Soc. Wash. 67:209-214.

Palmer, M. A. 1952. Aphids of the Rocky Mountain Region. The Thomas Say Found. Vol. V. 452 pp.

Price, R. G. 1959. A survey of arthropod pests in Oklahoma greenhouses in fall, winter, and spring. M.S. Thesis, Dept. of Entomol., Okla. State Univ., Stillwater. 70 pp.

Richards, W. R. 1960. A synopsis of the genus Rhopalosiphum in Canada (Homoptera: Aphididae). Can. Entomol. Suppl. 13. (accompanies Vol. XCII). 51 pp.

_____. 1963. Two new Dactynotine aphids. Can. Entomol. 95:254-257.

_____. 1965. The Callaphidini of Canada (Homoptera: Aphididae). Mem. Entomol. Soc. Can. 44:149 pp.

_____. 1966. A new species of Myzocallis Passerini, with a key to the North American species. Can. Entomol. 98:876-880.

_____. 1967. The Pterocomma of Canada and Greenland with notes on the phyletic position of the Pterocommatini. Can. Entomol. 99:1015-1040.

_____. 1968. A synopsis of the world fauna of Myzocallis (Homoptera: Aphididae). Mem. Entomol. Soc. Can. No. 57. 76 pp.

Russell, L. M. 1967. A list of the species of Macrosiphoniella Del Guercio described from North America. Proc. Entomol. Soc. Wash. 69:184-189.

Sanborn, C. E. 1904. Kansas Aphididae. Kansas Univ. Sci. Bull. Vol. III, No. 1. 82 pp.

Smith, C. F. and D. G. Dillery. 1968. The genus Drepanaphis Del Guercio (Homoptera: Aphididae). Ann. Entomol. Soc. Amer. 61:185-204.

Tissot, A. N. 1939. Notes on the Lachnini of Florida with descriptions of two new species (Homoptera: Aphiidae). Florida Entomol. 22:33-48.

Waterfall, U. T. 1962. Keys to the flora of Oklahoma (second edition). Dept. of Botany and Plant Pathology and Research Found., Okla. State Univ., Stillwater. 243 pp.

ILLUSTRATIONS

PLATE I

Figure 1. An outline labelled drawing of a hypothetical aphid.

Figure 2. Antenna of Anoecia querci (Fitch).

Figure 3. Antenna of Eriosoma lanigerum (Hausmann).

PLATE I

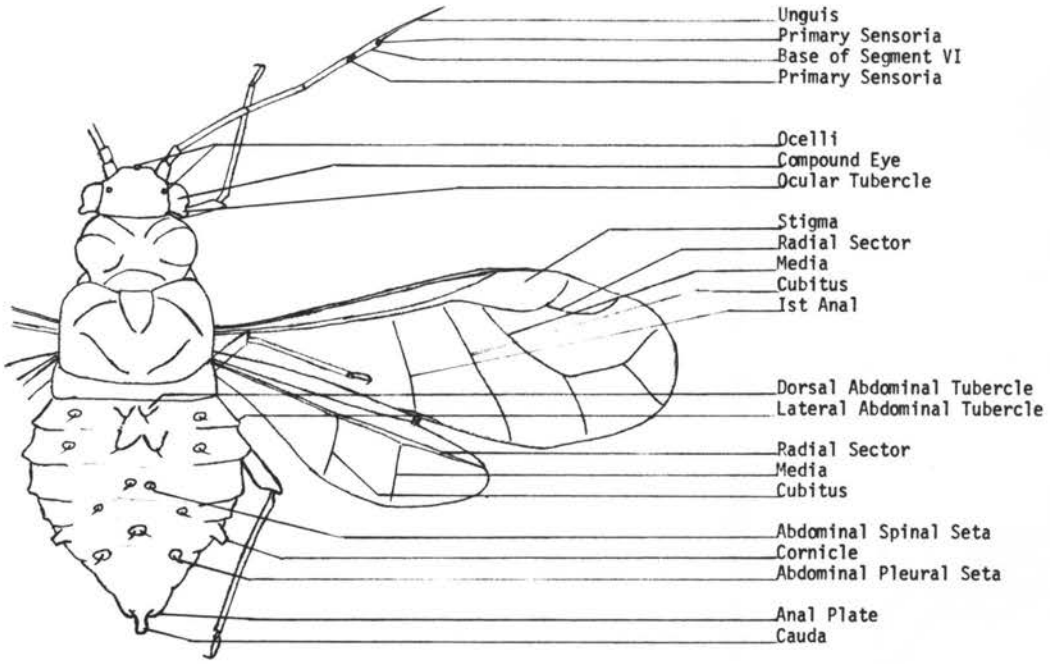


Figure 1

Figure 2

Figure 3

PLATE II

Figure 4. Cauda and anal plate of *Cinara tujafilina* (Del Guercio).

Figure 5. Cauda and anal plate of *Therioaphis riehmi* (Borner).

Figure 6. Tarsus of *Anoecia querci* (Fitch).

Figure 7. Tarsus of *Essigella pini* Wilson.

Figure 8. Rostrum of *Cinara watsoni* Tissot.

Figure 9. Rostrum of *Essigella pini* Wilson.

Figure 10. Cornicle of *Schizolachnus lanosus* Hottes.

Figure 11. Cornicle of *Cinara pinivora* (Wilson).

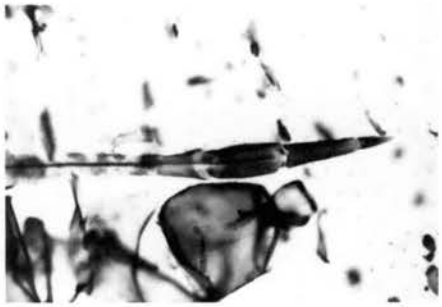
PLATE II

Figure 4

Figure 5

Figure 6

Figure 7



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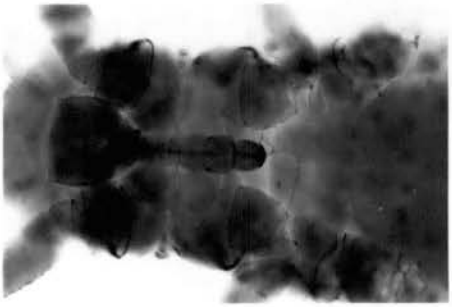


Figure 9

Figure 10

Figure 11

PLATE III

Figure 12. Apical portion of fore wing, Longistigma caryae (Harris).

Figure 13. Cornicle and body hair of Iziphya flabella (Sanborn).

Figure 14. Cornicle of Periphyllus negundinis (Thomas).

Figure 15. Dimorph of Periphyllus negundinis (Thomas).

Figure 16. Thorax and abdomen of Drepanaphis acerifoliae (Thomas).

Figure 17. Thorax and abdomen of Drepanaphis kanzensis Smith.

Figure 18. Cornicle of Myzocallis discolor (Monell).

Figure 19. Cornicle of Myzocallis frisoni Boudreaux and Tissot.

PLATE III

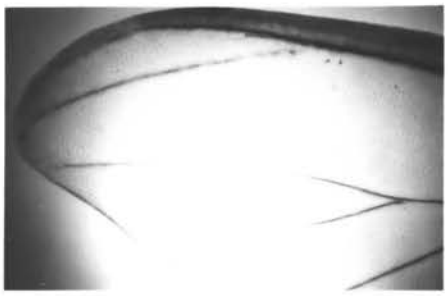
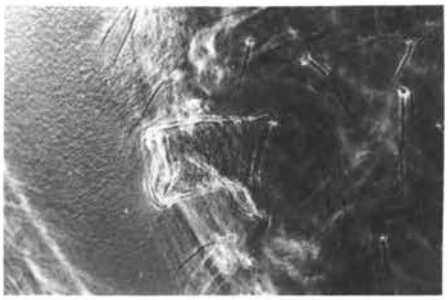


Figure 12

Figure 13



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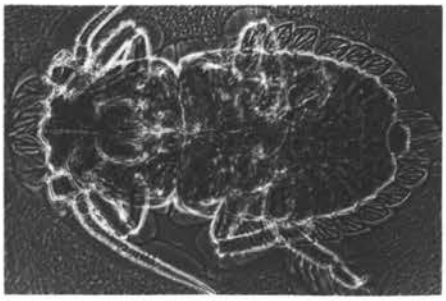


Figure 15

Figure 16

Figure 17

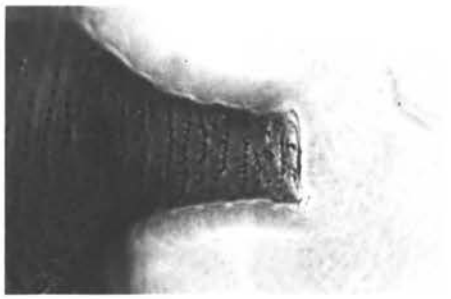


Figure 18

Figure 19

PLATE IV

Figure 20. Therioaphis riehmi (Borner).

Figure 21. Therioaphis trifolii (Monell).

Figure 22. Head of Aphis craccivora Koch.

Figure 23. Head of Acyrthosiphum pisum (Harris).

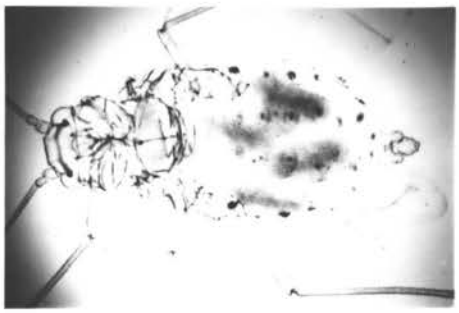
Figure 24. Cornicle of Rhopalosiphum padi (Linnaeus).

Figure 25. Cornicle of Aphis craccivora Koch.

Figure 26. Cornicle of Neoceruraphis viburnicola (Gillette).

Figure 27. Cornicle of Macrosiphoniella sanborni (Gillette).

PLATE IV



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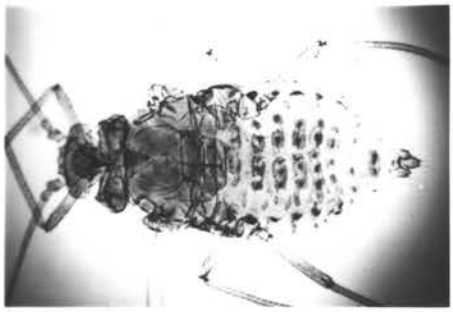

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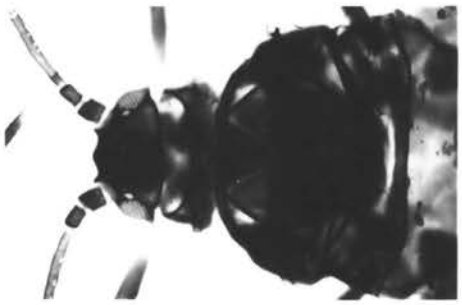

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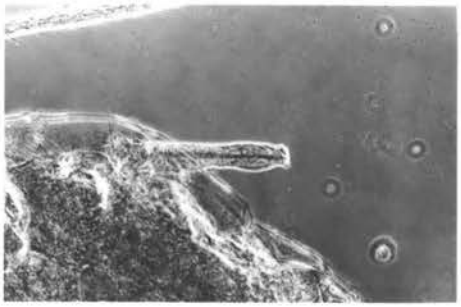

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Figure 25

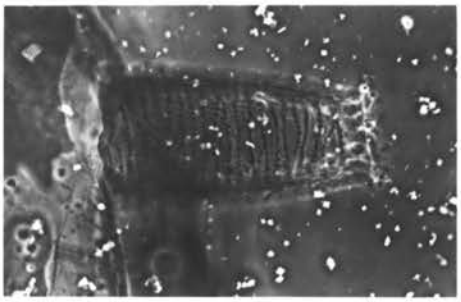

Figure 26

Figure 27

PLATE V

Figure 28. Capitate abdominal setae of *Chaetosiphon fragaefolii* (Cockerell).

Figure 29. Head of *Myzus persicae* (Sulzer).

Figure 30. Abdomen of *Aphis nerii* Boyer de Fonscolombe.

Figure 31. Cornicle of *Dactynotus ambrosiae* (Thomas).

Figure 32. Cornicle of *Dactynotus* sp.

Figure 33. Wax glands on abdomen of *Eriosoma lanigerum* (Hausmann).

Figure 34. Wax glands on head and mesothorax of *Prociphilus faxinifolii* (Riley).

PLATE V

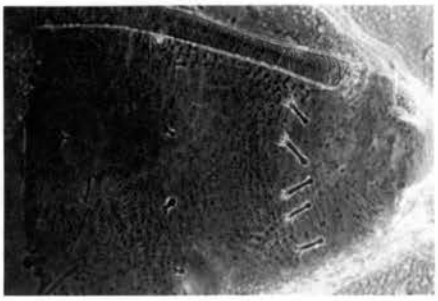

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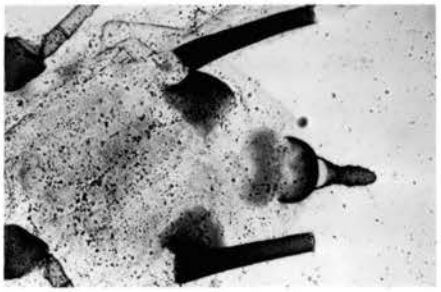
Figure 29



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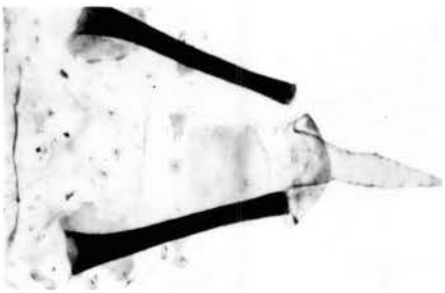
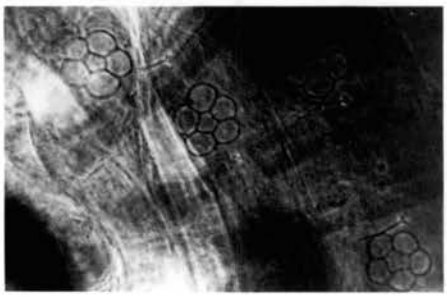


Figure 31

Figure 32



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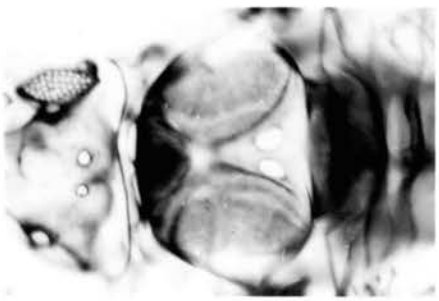

Figure 34

VITA

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Candidate for the Degree of

Doctor of Philosophy

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