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*Hunter
Locusta Pt IV*



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VOLUME VIII.

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SERIES A.

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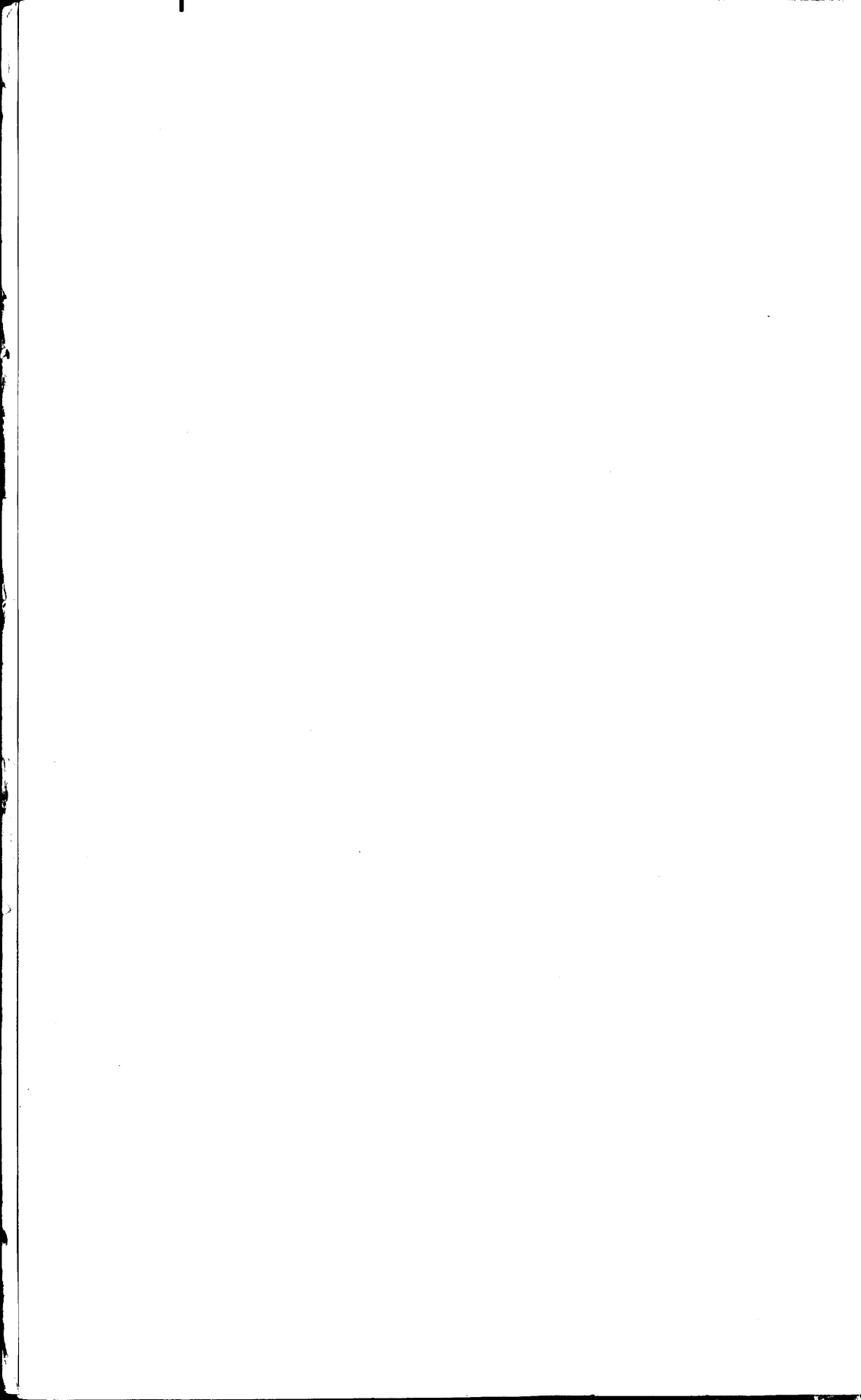
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- II.—A NEW THEORY OF COLLINEATIONS IN SPACE, II, *H. B. Newson.*
- III.—A NEW THEORY OF COLLINEATIONS IN SPACE, III, *H. B. Newson.*
- IV.—COCCIDÆ OF KANSAS, IV, *S. J. Hunter.*
-

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COCCIDÆ OF KANSAS, IV.

Additional Species, Food-plants and Bibliography of Kansas Coccidæ, with
Appendix on other Species Reported from Kansas.

BY S. J. HUNTER. With plate VIII.

A.—Additional Species.

Kermes pubescens Bogue. Plate VIII, fig. 1.

On white oak, Lawrence, Douglas county.

Kermes nivalis King and Ckll. Plate VIII, fig. 2.

On white oak, Lawrence, Douglas county.

Orthezia graminis Tinsley. Plate VIII, figs. 3, 4.

On goldenrod (*Solidago* sp.), Blue Rapids, Marshall county. Mrs.
S. G. Cady, collector.

B.—Food-plants of Kansas Coccidæ.

In order to understand the significance or importance of the food-plants of Coccidæ, or scale-insects, some knowledge of the life and habits of the insect is necessary. Scale-insects are plant parasites and locate themselves upon the bark or outer covering of the plants. They have long, slender beaks, which they are able to insert into the tissues of the plants and draw therefrom the plant juices. Some scale-insects choose but a single host-plant, and others seem to be able to subsist upon a very great variety of plants. This adaptability to various food-plants has much to do with the numbers of the several species in existence. It is evident that if a species of insect has to depend exclusively upon a single plant variety, the chances of life for this insect would decrease with a decrease in numbers of the host; while, on the other hand, scale-insects which have the power to adapt themselves to a number of plants have greater chances of life and better opportunities for numerical increase. In animal parasitism the parasite tends to increase as the host increases. The increase of the parasite, however, is generally in a greater ratio than the increase of the host, so that the parasite frequently becomes so numerous as to destroy or greatly curtail the increase of the host, and then the parasite must succumb likewise, or adapt itself to new conditions. Such relations between host and parasite exist to a certain extent be-

tween the scale-insects and their respective hosts. A study of the food-plants, therefore, of the scale-insects, becomes a matter of considerable importance in determining the continuation of a species and the possibilities of its numerical increase. The insects herein discussed have been found on certain food-plants in Kansas. They have likewise been found by other authorities on other food-plants in other parts of the globe. A record of each of these discoveries is given in the following pages:

Aspidiotus forbesi Johns.

- Honey-locust, *Gleditschia tricanthos* (Johns.), Ckll., Proc. Nat. M., XIX, p. 738.
 Peach, *Prunus*, Ckll., *ibid.*, p. 740.
 Apricot, *Prunus armeniaca*, Johns., Ent. News, p. 151 (1896).
 Garden currant, *Ribes rubrum*, *ibid.*
 Ash, Osborn, Proc. Iowa Acad. Sci., p. 229 (1897).
 Crab-apple, Hunter, K. U. Quart., VIII., No. 1, p. 4 (Jan. 1899).
 Pear, Johns., Ill. Sta. Lab. Nat. Hist., IV, p. 381.
 Plum, *ibid.*
 Apple, *ibid.*
 Quince, *ibid.*
 Currant, *ibid.*
 Wild and cultivated cherry, *Amygdalus persica*, Leonardi, Riv. di Pat. Veg., p. 43 (1897).
Acer fraxinus, *ibid.*
Staphylea trifoliata, *ibid.*

Aspidiotus ancylus Putnam.

- Linden, Comstock, 2d Corn. Univ. Rept., p. 140.
 Box-elder, *Negundo* sp., Ckll., Proc. Nat. M., XIX, p. 735.
 Apricot, *Prunus armeniaca*, Ckll., Proc. Nat. M., XIX, p. 741.
 Plum, *Prunus domestica*, in Santa Fé, N. M., Ckll., *ibid.*
 Black currant, *Ribes* sp., Ckll., Am. Nat., p. 731 (1895).
 Oaks, Comstock, 2d Corn. Univ. Rept., p. 140.
 Beech, *ibid.*, p. 139.
 Water locust, *ibid.*, p. 140.
Ilex verticillata, Felt., Bull. N. Y. Mus., VI, No. 31, p. 617 (1900).
 Hemlock, *ibid.*
 Mountain ash, *ibid.*
 Willow, Felt., Bull. N. Y. Mus., V, No. 23, p. 261 (1898).
 Apple, *ibid.*
 Elm, *ibid.*
 Pear, Gillette and Baker, Colo. Agr. Exp. Sta., Bull. 31, Tech. Ser., No. 1, p. 128.
 Black maple, Newell, Cont. Iowa St. Col. Agr., No. 3, p. 8.
 Birch, *ibid.*
 Snowball, *ibid.*
Gleditschia tricanthos, Ann. Mag. Nat. Hist., p. 323 (1898).
Quercus wrightii, Ckll., Can. Ent., vol. 28, p. 226 (1896).
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Spirea arnicus, King, Can. Ent., p. 226, vol. —.*

*The separates of the Canadian Entomologist have no date marks. It has been, therefore, impossible to locate accurately all references as to recent numbers of this magazine, since the department numbers are at the bindery.

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Quince, *ibid.*

Maple, Putnam, Proc. Dav. Acad. Nat. Sci., vol. II, p. 346.

Peach, Comstock, U. S. Dept. Rept. Com. Agr., 1880, p. 59.

Osage orange, *ibid.*

Hackberry, *ibid.*

Bladder-nut, *ibid.*

Ash, *ibid.*

Chestnut, in U. S. Dept. Agr. Coll. Howard.

Cratægus, *ibid.*

Elagnus reflexa, *ibid.*

Lonicera, *ibid.*

Syringa, *ibid.*

Prunus pissardi, *ibid.*

Aspidiotus uve Comst.

Grape, Comst., 2d Rept. Dept. Ent. Cor. Exp. Sta., p. 71, 1883.

Hickory, *ibid.*

Aspidiotus osborni Newell.

Quercus alba, Hunter, K. U. Quart., vol. VIII, No. 1, p. 6.

Ironwood, *Ostrya virginica*, Newell, Cont. Iowa St. Col. Agr., No. 3, p. 7.

Aspidiotus ulmi Johns.

White elm, *Ulmus americana*, Johns., Ill. St. Lab. Nat., vol. IV, art. 13, p. 388.

Slippery or Red elm, *Ulmus fulva*, Hunter, K. U. Quart., VIII, No. 1, p. 6.

Catalpa, Hunter, K. U. Quart., VIII, No. 1, p. 6.

Aspidiotus fernaldi Ckll., subsp. *albiventer*.

Maple, *Acer* sp., Hunter, K. U. Quart., VIII, No. 1, p. 7.

Aspidiotus obscurus Comst.

Willow oak, Comst., 2d Corn. Univ. Rept., p. 140.

Black oak, *Quercus* sp., Hunter, K. U. Quart., VIII, No. 1, p. 7.

Chestnut, Hunter, found in Miami county, Kansas, June, 1901.

Aspidiotus juglans-regiæ Comst.

Peach, *Prunus* or *Amygdalus persica*, Ckll., Proc. Nat. M., XIX, p. 740.

English walnut, Comst., 2d Corn. Univ. Rept., p. 61.

Prune, *Prunus* sp. (Ehrhorn), Ckll., Can. Ent., 1895, p. 260.

Crab-apple, Hunter, K. U. Quart., vol. VIII, No. 1, p. 8.

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Cherry, *ibid.*

Locust, *ibid.*

Ash, Fernald, Pa. Dept. Agr., Bull. No. 43, p. 20.

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Cherry, Howard, Bull. 12, U. S. Dept. Agr., Div. Ent., p. 13.

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Black walnut, *ibid.*

Japan walnut, *ibid.*

English willow, *ibid.*

- Golden willow, Bull. 12, U. S. Dept. Agr., Div. Ent., p. 13.
Rocky Mountain dwarf cherry, *ibid.*
Flowering quince, *ibid.*
Japanese quince, *ibid.*
Strawberry, *ibid.*
Black currant, *ibid.*
Lombardy poplar, *ibid.*
Carolina poplar, *ibid.*
Golden-leaved poplar, *ibid.*
Silver maple, *ibid.*
Cut-leaved birch, *ibid.*
Mountain ash, *ibid.*
Milkweed, *ibid.*
Catalpa speciosa, *ibid.*
Actinidia, *ibid.*
Citrus trifoliata, *ibid.*
Red dogwood, *ibid.*
Snowball, *Viburnum*, *ibid.*
Juneberry, *ibid.*
Loquat, *ibid.*
Laurel, *ibid.*
Akebia, *ibid.*
White currant, Lochhead, Ont. Dept. Agr., p. 31, Mar. 1900.
White ash, *ibid.*
Ornamental birch, *ibid.*
Maple leaf, *ibid.*
Rhubarb, *ibid.*
Hemp, *ibid.*
Lamb's-quarters, *ibid.*
Garden knotweed, *ibid.*
Mustard, *ibid.*
Beggar-ticks, *ibid.*
Goose-foot, *ibid.*
Ragweed, *ibid.*
Sunflower, *ibid.*
Weeping willow, Smith, Rept. N. J. Agr. Col. Exp. Sta., p. 547, 1896.
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Kilmarnock willow, *ibid.*
Linden, *ibid.*
English walnut, *ibid.*
Flowering currant, *ibid.*
Euonymus, *ibid.*
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Acacia, Leguminosæ, *ibid.*
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Osage orange, *ibid.*
Pecan, *ibid.*
Hickory, *ibid.*
Alder, *ibid.*
Chestnut, *ibid.*
Oak, *ibid.*

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Pyrus japonica, *ibid.*
 Satsuma plum, *ibid.*
Prunus pissardi, *ibid.*
Prunus maritimi, *ibid.*
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 Cottonwood, *ibid.*
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 Crab grass, Johnson, Bull. No. 57, Md. Agr. Exp. Sta., p. 61, 1898.
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 Spirea, *ibid.*
 Raspberry, *ibid.*
 Hawthorn, *ibid.*
 Cotoneaster, *ibid.*

Aspidiotus greenii Ckll.

- Palm, *Howea belmoreana*, Hunter, K. U. Quart., VIII, No. 1, p. 11.*
 Banana, Townsend, An. & Mag. Nat. Hist., ser. 7, III, p. 169.*
Cycas (Green), Ckll., Bull. Div. Ent., Tech. Ser., No. 6, p. 27.*
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 Palm, *Seaforthia elegans*, Ckll., Entom., XXXII, p. 93, Apr. 1899.*
 Guava, Ckll. and Parrott, Industrialist, p. 277, May, 1899.*
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Aspidiotus hederæ Ball., var. *nerii* Bouche.

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 Nightshade, *Solanum douglasii*, *ibid.*
 China tree, *ibid.*
 English ivy, *ibid.*
 Oak, *Quercus agrifolia*, *ibid.*
 Arborvitæ, *Thuja occidentalis*, on cones of, *ibid.*
 Acacia, Comstock, 2d Rept. Corn. Univ. Exp. Sta., 1883, p. 13.
 Cherry, *ibid.*
 Currant, *ibid.*
 Grass, *ibid.*
 Clover, *ibid.*
 Orange tree, *ibid.*
 Lemon, *ibid.*
 Maple, *ibid.*

*Those succeeded by a star were kindly furnished by Mr. Kotinsky, through Dr. Howard.

- Melia, Comstock, 2d Rept. Corn. Univ. Exp. Sta., 1883, p. 13.
 Oleander, *ibid.*
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 New Zealand flax, *Phormium tenax*, Comst., 2d Corn. Rept., p. 140.
 Holly, Comst., *ibid.*
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 Oleander (Ckll.), Gillette, Colo. Agr. Col. Ex. Sta., Bull. No. 31, Tech. Ser., No. 1, p. 128.
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 Fracaena (Ckll.), Gillette, *ibid.*
 Olive, *Olea europea*, Ckll., Jour. Trin. Nat. Fld. Club, vol. II, No. 12, p. 307.
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Pinus (leaves), *ibid.*
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Nerium oleander, *ibid.*, p. 49.
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Cycas, *ibid.*
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Cycas revoluti, Osborn, Proc. Iowa Acad. Sci., V, p. 230, 1897 (1898).
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Dalbergia, *ibid.*
Aristea major, Indian Ent. Mo. Mag., XXXIII, p. 69, Mar. 1897.
Aucuba, Douglas, Ent. Mo. Mag., XXIII, pp. 151, 152, Dec. 1896.
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Aspidiotus aesculi Johns., subsp. *solus*, subsp. nov. Hunter.

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Mytilaspis pomorum Bouche.

- Apple, Comst., 2d Corn. Univ. Rept., p. 139.
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 Bladder-nut, *Staphylea* (Comst.), *ibid.*, p. 736.
 Broom, *Cytisus scoparius*, Ent. Mo. Mag., p. 138, 1893.
 Cultivated locust, *Robinia pseudacacia*, Ckll., Proc. Nat. M., XIX, p. 738.
 Hawthorn, *Crataegus oxycantha*, *ibid.*, p. 744.
 Wild gooseberry, *Ribes cynosbati*, Country Gentleman, p. 27, Jan. 16, 1895.
Cornus californicus (Harvey), Ckll., Proc. Nat. M., XIX, p. 735.
 Pear, Maskell, Scale Insects of N. Z., p. 52 (1887).
 Plum, *ibid.*
 Peach, *ibid.*

- Apricot, Maskell, Scale Insects of N. Z., p. 52 (1887).
 Lilac, *ibid.*
 Thorn, *ibid.*
 Sycamore, *ibid.*
 Cottoneaster, *ibid.*
Foliis variegatus (Harvey), Ckll., Proc. Nat. M., XIX, p. 752.
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Fraxinus americanus, Country Gentleman, p. 27, Jan. 10, 1895.
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 Hop-tree, Hunter, *ibid.*
 Buckthorn, *ibid.*
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 Citrous plants, *ibid.**
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Amorpha (an exotic), *ibid.*
 Water locust, *ibid.*
 Raspberry, *ibid.*
Ribes alperum, *ibid.*
Lonicera pulverulenta, *ibid.*
Planera kaku, *ibid.*
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Ailanthus glandulosus, Maskell, Ent. Mo. Mag., XXXIII, p. —, Nov. 1897.*
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 p. 138, 1893.*
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 Cocoa-palm leaves, Morgan, Ent. Mo. Mag., XXV, p. 350, Aug. 1889.*
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 Honeysuckle, *ibid.*
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 Hackberry, *ibid.*
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 Willow, *ibid.*
 Wild red cherry, Lochhead, Ont. Dept. Agr., p. 41, Mar. 1900.
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 Juneberry, *ibid.*
 Birch, *ibid.*
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Bittersweet, Lochhead, Ont. Dept. Agr., p. 41, Mar. 1900.

Walnut, Smith, N. J. Agr. Exp. Sta., p. 140.

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Sycamore (Maskell), Ckll., Proc. Nat. Mus., vol. XIX, p. 736.

Diaspis snowii Hunter.

Salix nigra, Hunter, K. U. Quart., VIII, No. 1, p. 15.

Lecanium (Macluræ) aurantiacum Hunter.

Osage orange, *Maclura aurantiaca*, Hunter, K. U. Quart., VIII, No. 2, p. 68.

Lecanium canadense Ckll.

Ulmus racemosus, Ckll., Can. Ent., p. 254, 1895.

Ulmus americana (Glenn), Hunter, K. U. Quart., VIII, No. 2, p. 69.

Lecanium kansasense Hunter.

Cersis canadensis, Hunter, K. U. Quart., VIII, No. 2, p. 69.

Juglans nigra, Hunter, K. U. Quart., VIII, No. 2, p. 70.

Ulmus fulva, Hunter, *ibid.*

Lecanium cockerelli, nov. sp., Hunter.

Ulmus americana, Hunter, K. U. Quart., VIII, No. 2, p. 70.

Juglans-nigra, Hunter, K. U. Quart., VIII, No. 2, p. 71.

Oak, *Quercus* sp., King, Can. Ent., vol. —, p. 252.

Sweet fern, *Comptonia asplenifolia*, *ibid.*

Plum, Hunter, K. U. Quart., vol. IX, Ser. A, No. 2, p. 107, Apr. 1900.

Hickory, *ibid.*

Populus sp., King, Psyche, IX, p. 117, Oct. 1900.

Wild crab-apple on University campus, Hunter.

Lecanium armeniacum Craw.

Plum, Hunter, K. U. Quart., VIII, No. 2, p. 71.

Grape-vine, Country Gentleman, June 16, 1898.

English gooseberry, Felt., Bull. N. Y. Mus., VI, No. 31, p. 617.

Apricot, Webster, Can. Ent., XXX, No. IV, 1898.

Prune, *ibid.*

Cherry, *ibid.*

Pear, *ibid.*

Peach, Cockerell, Jour. N. Y. Ent. Soc., VII, p. 257, Dec. 1899.*

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Pulvinaria innumerabilis.

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Pulvinaria pruni.

- Pulvinaria pruni* Hunter, K. U. Quart., vol. IX, No. 2, p. 104, (1899).

Parlatoria pergandei.

- Parlatoria pergandei* Comstock, Rept. Ent. in Rept. Com. Agr. 1880, p. 327.
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The following synonymy is taken from C. L. Marlatt's MSS. of March 2, 1900:

Pergandei Comst. (merges into *proteus* Curt.)

Syn. var. *camelliae* Comst.

“ var. *crotonis* Ckll.

“ var. *affinis* Newst.

“ var. *calianthina* B. & L. (not seen; ? var. *theae* Ckll.)

“ var. *theae* Ckll. (? *calianthina* B. & L.)

“ (?) *dryandrae* Full.

“ var. *euonymi* Ckll.

“ *myrtus* Mask.

“ (?) *pittaspori* Mask.

“ *sinensis* Mask.

“ var. *viridis* Ckll.

“ var. *virescens* Mask.

“ *viridis* Full.

Parlatoria pergandei Morgan, La. Sta., Bull. 28, 2d ser., pp. —, (18—).

La. Sta., Sp. Bull., pp. —, (18—).

Parlatoria proteus Curt., var. *pergandei* Comst., King. Can. Ent., vol. —, p. 228.

Parlatoria pergandei Reh., Zeitschrift für Entom., vol. V, p. 162, June, 1900.*

do Ckll., Amer. Nat., July, 1897, p. 592.*

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Kermes nivalis.

Kermes nivalis King and Ckll., Ann. and Mag. Nat. Hist., ser. 7, vol. II, 1898.

do King, Can. Ent., p. 139, (1899), vol. XXXI.

Psyche, p. 80, July, 1900.

do Ckll., Psyche, IX, p. 44, Apr. 1900.*

Kermes pubescens.

- Kermes pubescens* Bogue, Can. Ent., vol. 30, No. 7, p. 172, (1898).
do King, Can. Ent., p. 139.
Psyche, p. 80, July, 1900.
do Ckll, Psyche, IX, p. 44, Apr. 1900.*

Orthesia graminis.

- Orthesia graminis* Tinsley, Can. Ent., vol. 30, No. 1, p. 13, (1898).

NOTE.—To the list of food-plants Miss Etta Willett, a student of this department, added a number, an exact account of which was not taken at the time.

APPENDIX.

Other Coccidæ Reported from Kansas.

- Kermes concinnulus* Ckll., Cockerell, on oak, Can. Ent., p. 172, (1898).
Aspidiotus marlatti Parrott, on *Andropogon scoparius* and *Andropogon furcatus*, Can. Ent., p. 282, (1899).
Antonina nortoni Parrott and Ckll., on *Bouteloua racemosa*, Can. Ent., Oct. (1899).
Lecanium longulum Dougl., Parrott, Industrialist, p. 39, (1899).
Lecanium pruinosum Comst., ibid.
Aspidiotus cyanophylli Sign., ibid.
Aulacaspis boisduvalii Sign., ibid.
Parlatoria proteus Curt., ibid.
Aspidiotus helianthi Parrott, Can. Ent., vol. 31, p. 176 (1899).
Antonina boutelouæ Parrott, on *Bouteloua hirsuta*, Parrott, Kan. Agr. Coll. Bull. No. 98, p. 138, (1900).
Antonina purpurea Sign., on *Milium* and *Agripyrum*, ibid.
Antonina graminis Parrott, on *Eragrotis trichodes*, *Bulbilis dactyloides*, *Paspalum ciliatifolium*, ibid., p. 140.
Gymnococcus nativus Parrott, on *Sporobolus cryptandrus*, ibid., p. 143.
Pseudolecanium obscurum Parrott, on *Andropogon scoparius* and *Sporobolus longifolius*, ibid., p. 145.
Pseudolecanium californicum Ehrhorn, on *Andropogon furcatus*, ibid., p. 145.
Ericoccus kemptonia Parrott, ibid., p. 144.
Pulvinaria hunteri, on maple, King, MS.



FIG. 1.—*Kermes pubescens* on *Quercus alba*, Lawrence.



FIG. 2.—*Kermes nivalis* on *Quercus alba*, Lawrence.



FIG. 3.—Ventral view of *Orthezia graminis* on goldenrod (*Solidago* sp.), without posteriorly elongated egg sac. Mrs. S. G. Cady, col., Blue Rapids, Marshall county.

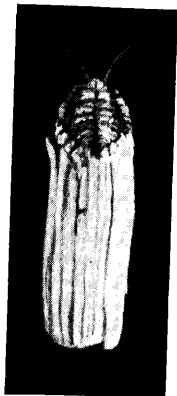


FIG. 4.—Dorsal view of *Orthezia graminis*, showing posteriorly elongated egg sac.

Photographs by the author.