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A PRELIMINARY STUDY OF THE INSECT GALLS OF IOWA

GORDON CARSTENSEN AND H. E. JAQUES

The abnormal growths frequently found on plants and known as insect galls have led to much study of their origin and manner of development. These abnormal plant structures may vary from a simple fold-like gall on a leaf to a highly complex structure resembling a fruit. Insect galls are found on at least 80 families of American plants. Some twelve plant families account for a large percentage of the known galls. Insects produce galls on many species of plants. Practically every part of a plant such as roots, stem, twigs, leaves, buds, flowers and fruits may develop galls.

The study of galls has led to much speculation as to the causative agents in their development. Nature's function of the gall is to furnish food and shelter for the insect host. These advantages are sometimes shared with insects of other species which are housed in the gall as secondary hosts or parasites of the gall-maker. The nature of the gall development is not the same for all galls. A relatively few galls are made by the cambium borers which, by girdling a stem or branch, cause the formation of wound tissue by the plant. This increased growth of wound tissue results in an enlargement known as a plant gall. A number of gall insects occupy cells in apparently normal stems or twigs and produce little or no enlargement of the infested part of the plant. A large number of comparatively simple galls seem to result from local irritation. This irritation stimulates the surrounding cells to increase growth.

A large number of galls develop in such a manner as to give the appearance of a nearly independent organism and show little relation to the plant structure from which they arise. These galls have a general structure that is analogous to that of a seed, the gall-maker taking the place of the seed and this in turn surrounded by nutritive and protective layers of plant tissue. Such galls are quite definite in size and structure for each species and the plant tissues appear to be dominated by the stimulus of the gall-maker. The production of these galls is dependent on the availability of enough meristematic tissue to permit the growth of the deformity from cells that would otherwise develop normally. The stimulus must be great enough to bring about a marked increase

in the number of cells as compared to the number that would normally be formed. The exact nature of this stimulus is as yet unknown but is thought to be some substance that the adult insect or its larva injects into the plant tissue.



Oak Pill Gall

Cincticornia pilulæ O. S.

- (a) Showing gall on leaf.
- (b) Enlarged gall.
- (c) Cross-section of gall.

Small Oak Apple

Andricus singularis (Bass)

- (a) Showing gall on leaf.
- (b) Opened gall showing radiating fibers and larval cell.

Galls produced by a given species of insect are nearly always the same in relation to size and structure. The gall will vary a slight amount according to where the gall is developed on the plant but the main characteristics of the gall will not be changed. The fact that the characteristics do not vary is the basis for the identification of the insect galls.

Nearly all of the gall producing insects are found in three main groupings, the aphids, the gall midges and the gall wasps although some mites, thrips, beetles, moths and true bugs play a part in gall-making. The aphids or plant lice have several gall-producing species among them the very destructive grape *Phylloxera*. The gall midges of the order *Diptera* produce galls on many species of plants and include several species of economic importance. The gall wasps or *Cynipids* are small *Hymenopterous* insects that primarily inhabit the various oaks.

The following list of galls are known to occur in the state. This list should be understood to be quite incomplete but is given as a basis for further work on these interesting insects.

| | |
|---|--|
| Order- Homoptera | Family- Trupaneidae |
| Family- Chermidae | <i>Eurosta solidaginis</i> Fitch |
| <i>Pachypsylla celtidis-mamma</i> Riley | Order- Hymenoptera |
| Family- Phylloxeridae | Family- Cynipidae |
| <i>Phylloxera caryaecaulis</i> Fitch | <i>Neuroterus noxiosus</i> Bass. |
| <i>P. vitifoliae</i> Fitch | <i>Diplolepis ignota</i> (Bass.) |
| Order- Lepidoptera | <i>D. palustris</i> (O.S.) |
| Family- Gelechiidae | <i>Disholcaspis globulus</i> (Fitch) |
| <i>Gnorimoschema gallaesolidaginis</i> | <i>Xanthoteras forticorne</i> (Walsh) |
| Riley | <i>Acraspis pezomachoides</i> (O.S.) |
| Order- Diptera | <i>A. erinacei</i> Walsh |
| Family- Cecidomyia | <i>A. villosa</i> Gill. |
| <i>Rhabdophaga strobiloides</i> Walsh. | <i>Andricus singularis</i> (Bass.) |
| <i>Dasyneura communis</i> Felt | <i>A. peliocola</i> Bass. |
| <i>Cincticornia pilulae</i> O.S. | <i>A. robustus</i> Weld |
| <i>Parallelodiplosis florida</i> Felt | <i>A. pisiformis</i> Beautm. |
| <i>Itonida foliora</i> Rssl. & Hkr. | <i>Diastrophus cuscuteiformis</i> O.S. |
| <i>Cecidomyia citrina</i> O.S. | <i>Aulacidea podagrae</i> (Bass.) |
| Family- Syrphidae | <i>Gonaspis potentillae</i> Bass. |
| <i>Platycheirus quadratus</i> Say | <i>Rhodites rosae</i> (L.) |

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