a large number of specimens from different parts of the country, and without exception have demonstrated their composite nature.

This compound character of the galls implies a close interdependence between the fungus and insect. That *Rhytisma solidaginis* or *R. asteris* cannot occur without the presence of *Cecidomyia carbonifera*, or *vice versa*, cannot be said; yet I have never seen one without the other. Only a study of the development of the galls can show whether the insect paves the way for the fungus or lives only in leaves previously attacked by the latter; but the great powers of multiplication and dissemination possessed by most fungi incline me to the belief that the former is the case, the mycelium being unable to penetrate the uninjured plant, as Hartig has shown to

be the case with parasitic species of *Nectria*, etc. From the carbonization of all the species of *Rhytisma*, it is probable that the color of the galls in the present instance is due to the fungus.

The form of fruit of the *Rhytisma*, and the early development of the galls, could be easily made out by any collecting entomologist or botanist living in the eastern states, where they occur; and as I no longer have access to good material these notes are published in their present incomplete form to draw attention to a very interesting subject for further study.⁷

⁷ Sections of an undetermined cecidomyid gall on *Impatiens fulva*, from Medford, Mass., prepared in my laboratory by Miss L. N. Martin, show a mycelium somewhat similar to that noticed in *Aster* and *Solidago* leaves, and there is also a certain amount of carbonization. It will be interesting to observe whether the mycelium is always present in this gall which is not uncommon.

WANT OF SYMMETRY AMONG INSECTS.

BY OSKAR PAUL KRANCHER, LEIPZIG, GERMANY.

The extraordinary symmetry which occurs among insects is usually brought prominently forward in most of the books which treat of entomology. Nothing is pictured more symmetrically than, for instance, the structures of bees and ants, or the color of butterflies, which latter is prominently reputed to have a perfectly symmetrical bilateral equality. Although there is much truth at the bottom of all this, although nature in many cases works with great symmetry, yet it must not be overlooked that even this symmetry is often converted into its

strict opposite. Surely no observing lepidopterologist has failed to notice that the coloration of the wings of his favorites is to be recognized as strictly symmetrical only in the smallest number of cases, that, indeed, that of one side, which certainly resembles that of the other in its superficial aspect, still shows many differences in its details, and there is little foundation for asserting that they are symmetrical. I might cite innumerable examples of this, but the reader can better see them for himself. This is most plainly shown in the

species of *Vanessa*, *Argynnis*, *Melitaea*, *Arctia*, etc. I have found this also very striking in *Papilio machaon*, a specimen of which, now in my collection, has a distinct black spot in the first yellow area at the tip of the left front wing, while, as usual, there is no such spot on the right wing.

In how diverse a manner nature works, moreover, in the different animals of one and the same species, in animals which are sought for as so-called varieties, a striking proof is given by collections which contain often ten or twelve or even more specimens of one and the same animal. How long one has to hunt among duplicates in order to find two butterflies which are perfectly alike! This field of inquiry has interested me to an unusual degree for a long time and I have had the good fortune to obtain many interesting results in it. Here again *Papilio machaon*, *Arctia caja*, different noctuids and geometrids (for instance, *Abraxas grossulariata*), have excited my special delight by their peculiarly diverse clothing.

But the so-called gynandromorphs, especially those of the lepidoptera, are yet far more remarkable. As is well known, these are animals which show the coloration and structure of one sex on the right wings, and those of the other sex on the left wings. Of course these can only be observed in such animals as show some kind of difference between the coloration and shape of the wings, or the form and structure of the antennae, in the two sexes. A few years ago a gynandromorph of *Endromis versicolora* was found here in the

neighboring village of Leina. This, after various wanderings, is now deposited in the Natural history museum at Altenburg. Gynandromorphs of *Ocnecia dispar*, *Smerinthus populi*, etc., are not very rare. I had an opportunity this spring of adding a partial gynandromorph to my own collection. I obtained from a pupa of *Agria tau*, the "Nagelfleck," a specimen which had one antenna male, the other female, that is to say, one filiform, the other pectinate. In its other characters, especially in the coloration of the wings, the specimen appears throughout to be a female.

Finally some attention may be bestowed upon crippling among insects. My few observations again concern the butterflies. Mutilations often occur in these on one side only, and on account of this unfortunate circumstance the specimen which had been so carefully nursed as larva and pupa is entirely useless for the collection, and is ill-humoredly thrown aside by the raiser unless it is kept in spirits to furnish occasion for subsequent observations. The collector is still more displeased with those specimens which have the wings of both sides crippled. Even if such specimens are not well suited for breeding purposes, and so deny various uses to the one who has raised them, yet for other reasons I should not want to condemn such a specimen without further consideration. In spite of all apparent irregularity, nature often works quite regularly, as is well shown by the annexed figure. This specimen was going to be thrown away together with several other cripples, when Mr. Reich-

ert, of Leipzig, who had raised it, recognized its wonderfully regular crippling, and of course spread the specimen and so made clearly manifest that perfectly symmetrical incision in the fore and hind wings. The undulate nerves

Fig. 12. Deformed *Aporia crataegi*.¹

of the wings of this specimen appear remarkable at the same time, as the figure represents. *Aporia crataegi*, which is the butterfly mentioned, is a well known species, so that I need not say much about it. The caterpillar, which is found moderately common in this vicinity, lives especially on *Crataegus oxyacantha*, *Prunus spinosa* and *P. domestica*, species of *Pyrus*, etc. At the end of five or six weeks from the time of hatching of the eggs, the caterpillar pupates by fastening its anal extremity and then maintaining itself in a horizontal position by means of a thin thread around the thorax. After fourteen days more the butterfly emerges.

It seemed that it would be interesting to ascertain the cause of these regular notchings, and so we found in the pupa-case from which this butterfly came, that the thoracic girdle had been drawn exceedingly tense, and so firmly, besides, that a sort of depression was to be found

in the pupa. From this observation it is easy to conclude that this was the cause of the mutilation that has been mentioned, and since the continuous pressure was here a perfectly uniform one, the irregular development could not but be perfect and uniform. Whether such a mutilation can also be produced artificially with this regularity might be learned from our investigations which are to be instituted for the purpose.

A single glance at a bee-hive will convince one that there are many irregularities also in the colonies of bees. The most regular structures made by bees are the cells, which, as is well known, are so arranged with mathematical exactitude as to accomplish the most with the least material. Worker-cells and drone-cells, both of which serve at the same time as honey-cells, are made in this way, but besides these we find three other different kinds of cells in the commonwealth of bees, of which we may give the name of holding-cells to those which serve to fasten the comb all around to the wall of the hives or to the frames. They are usually only two-thirds formed, the sixth or both the fifth and sixth sides of the hexagon of the cell being wanting. The so-called transition-cells, which constitute the intermediary between the large drone-cells and the smaller worker-cells in one and the same comb show still greater irregularities. They are in shape from four- to nine-angled, for the most part entirely out of place and warped. Undoubtedly the last two named kinds of cells, in spite of their irregularity, demand our fullest admira-

¹ We are indebted to Mr. Otto Heidemann, xylographer in the U. S. Department of agriculture, for his generosity in transferring this illustration to wood, and engraving it. [Eds.]

tion, since they give proof that the bees know how to help themselves under all circumstances, that they understand how to overcome any obstacle. The most irregular cell in the bee-hive is the queen-bee cell, in which, as is well known, the queen has to pass her youthful stages. This queen-bee cell is shaped like an acorn, and does not stand horizontally like all the other bee cells, but

hangs vertically, with the opening downward.

These few quite imperfect remarks may serve to call attention to some of the so numerous irregularities among insects. I hope they may incite others to further new and more interesting observations.

Leipzig, 15 June 1884.

FOOD-PLANTS OF BEETLES BRED IN MARYLAND.

BY OTTO LUGGER, BALTIMORE, MD.

[The numeros (inserted by the editor) are, for the coleoptera, those of G. R. Crotch's "Check list of the coleoptera of America, north of Mexico" (PSYCHE, Rec., no. 43), and, for the food plants, those of Horace Mann's "Catalogue of the phaenogamous plants of the United States" . . . Where the species of the food-plant is not stated, the numero expresses a conjecture.]

BUPRESTIDAE.

3691.	<i>Dicerca pugnata</i>	2574.	<i>Quercus alba</i> .
3726.	<i>Buprestis apricans</i>	2658.	<i>Pinus mitis</i> .
3767.	<i>Chrysobothris azurea</i>	2579.	<i>Quercus coccinea</i> var. <i>tinctoria</i> .
3799.	<i>Ptosima gibbicollis</i>	705.	<i>Cercis canadensis</i> .
3801.	<i>Mastogenius subcyaneus</i>	2603.	<i>Ostrya virginica</i> .
3814.	<i>Agrilus lecontei</i>	1053?	<i>Cornus</i> [florida?].
3825.	" <i>politus</i>	575.	<i>Robinia pseudacacia</i> (spines).

ELATERIDAE.

3863.	<i>Tharops obliquus</i>	2600.	<i>Fagus ferruginea</i> .
4260.	<i>Corymbites vernalis</i>	2660?	<i>Pinus</i> ? [strobis?].
4310.	" <i>hamatus</i>	447.	<i>Rhus toxicodendron</i> .

RHIPICERIDAE.

4374.	<i>Sandalus petrophya</i>	2574.	<i>Quercus alba</i> .
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CERAMBYCIDAE.

4925.	<i>Sphenostethus taslei</i>	2574.	<i>Quercus alba</i> .
4941.	<i>Smodicum cucujiforme</i>	2621?	<i>Salix</i> [alba?]
4943.	<i>Dularius brevilineus</i>	2538?	<i>Ulmus</i> [americana?].