after all, as originally supposed by Ehrenberg. Their gradual diminution in size towards the posterior pole, where they are nearly atrophied, would seem to indicate that they were in some way related to the power of the organism to move in a definite direction, the cells of the anterior end being provided with the best developed visual, sensory apparatus, or whatever it may be. If it should prove possible to show that these "eye-spots" are really sensory organs in *Volvox*, as all the facts which have been here noted would seem to indicate, it would be one of the few instances known of a plant possessed of visual or sensory organs of any kind, unless we except some such plants as the Venus' fly-trap.

The speaker stated that he had been unable to find any notice of any of the features of *Volvox* which are here described; all of the figures to which he had had access in standard works were entirely erroneous from their authors having completely overlooked these very salient and important features of this remarkable plant. This should therefore be regarded as his apology for bringing a very common organism to the notice of the Academy and to the renewed attention of the microscopists who take pleasure in studying it. It is to be hoped that some one who is skilled in such work will be induced to take up the study of *Volvox* anew and publish a well-executed drawing of a colony in which the facts here recorded are adequately represented. This is all the more desirable in that, if *Volvox* is really a plant, its psychological history should be as much a matter of interest as its singular beauty and its intricate methods of reproduction seem to have been.—*Proc. Acad. Nat. Sci. Philad.* May 21, 1889, p. 138.

On a Gall produced in Typhlocyba rosæ, *Linn., by a Hymenopterous Larva.* By M. A. Giard.

During last October the trunks of the horse-chestnuts in the Luxembourg Garden were covered with thousands of dead specimens of *Typhlocyba rosæ*, with the wings half open, and slightly attached to the bark, as if they had been killed by an Entomophthorean. The under surface of the leaves also bore a great number of dead specimens of this insect. By microscopic examination I could not detect any trace of Cryptogams. However, as R. Thaxter has lately noted the facility with which *Typhlocyba rosæ* and *mali* when infested by *Entomophthora sphærosperma*, Fres., completely discharge their spores, I thought I must have come upon the scene too late, and left a more complete observation to the summer of the present year*. I must confess that my curiosity was much excited by the

* *Typhlocyba rosæ* lives usually upon roses, apple-trees, and other Rosaceous plants, and often causes great mischief in gardens. I do not think that it has ever been indicated upon the horse-chestnut. In spite of a careful examination I have been unable to find characters clearly separating the variety *æsculi* from the type. M. Lethierry, whose knowledge of the Hemiptera is so great, ascribes the few differences observed to the action of the parasites upon the *Typhlocyba*. However, the *Typhlocybæ* which have become adapted to the horse-chestnut seem to neglect the roses planted in the vicinity.

fact that many of the skins of *Typhlocyba* presented a sort of appendage inserted at the upper part of the abdomen, and at the first glance producing an appearance as if the abdomen had been bifurcated from its origin.

This year, towards the end of June, the horse-chestnuts were again covered with *Typhlocybæ*, and I was able to convince myself that we had to do not with an Entomophthorean but with an animal parasite, a Hymenopterous larva the mode of life of which is very remarkable. Almost all the *Typhlocybæ* collected on the trunks of the trees bear, either to the right or left of the abdomen, a sac, of which the length and breadth are equal, or nearly so, to those of the abdomen itself. Concealed beneath the wings of the Homopteran, the flight of which it scarcely affects, this sac is inserted in the dorsal part of the second somite of the abdomen. A chitinous thickening in the shape of a V, or, rather, of a reversed circumflex accent, marks on the dorsal surface the point of insertion of the sac. In the interior we find a Hymenopterous larva bent upon itself ventrally in such a way that the mouth and the posterior extremity of the body meet towards the point of suspension. The two parts of the larva are separated from each other by a longitudinal partition which divides the sac into two portions in communication at the two ends. A narrow fissure, the margins and the posterior part of which are tinged with a blackish pigment, starts from the point of the chitinous V and extends longitudinally for a distance equal to the length of a somite of the *Typhlocyba*. When the larva is mature this fissure is extended to the free extremity of the sac, and by means of this kind of dehiscence the parasite is set free and falls either into the crevices of the bark or to the ground, where it speedily becomes transformed into a pupa within a coarse case, like that of some Braconidæ.

The larva greatly resembles that of the Torymidæ and especially of the genus *Misocampus*. Upon each segment it bears a transverse row of long stiff hairs; the mandibles are well developed. The digestive canal is rudimentary and there is no anus; the fatty bodies are very voluminous and filled with rectangular crystals belonging to the right prismatic system with a rectangular base. In a few days I hope to obtain the perfect insect and thus to arrive at a more precise determination of the parasite. But it seemed to me to be useful at once to call attention to this first-known example of a true animal-gall produced on the exterior of an Arthropod by another Arthropod. The sac of the *Typhlocyba* is, in fact, the extreme case of a series of deformations, such as those caused in certain Hymenoptera by *Stylops*, or in the Decapod Crustacea by the Bopyridæ. It may also be compared with the sacs also produced by hyperplasty of the cuticular hypodermis, but in the interior of the host, by the Tachinidæ (*Ocyptera* and *Masicera*) either in Heteroptera or in Coleoptera, or, further, to the sac in which the Entoniscidæ live. It is evident that the *Typhlocybæ* were infested in the pupa- or even in the larva-state, and it would be very interesting to follow the development of the sac step by step. The physiological effects pro-

duced upon the infested organism (parasitic castration &c.) are also of much interest, and I hope to make them known in a future communication. It is marvellous to see the infested *Typhlocybæ* move, leap, and fly like healthy individuals at the precise moment when the Hymenopterous larva quits the sac and abandons its host reduced to an inanimate skin.

Dr. Thomas, generalizing with great sagacity the old notion of the *vegetable gall*, has given the name of *cecidia* to every morphological manifestation caused by the local reaction of a plant to an animal or vegetable parasite, whence the distinction between *zoocecidiæ* and *phytocecidiæ*. It seems to me that we may employ a parallel nomenclature for the animal galls. I propose to call these productions *thylaciæ*. We already know a certain number of *zoothylaciæ*, for example the *carcinothylaciæ* produced by the Bopyridæ upon the Decapod Crustacea, the *entomothylaciæ*, such as the tumours caused by the *Cuterebræ* upon the skin of the Mammalia, or the sac of *Typhlocyba* which we have just been considering. We also know some *phytothylaciæ*, the coccidial tumours of fishes, the anthrax-pustule (*bacteriothylacia*), &c.

We must also distinguish from these external thylaciæ the *internal thylaciæ*, such as the sacs of the larva of Tachinidæ, the Entoniscidæ, the cysts of the *Trichinæ*, &c. The thylacia of *Typhlocyba* is formed by a gradual dilatation of the hypodermis, which secretes an abnormal cuticle more strongly adorned with undulated striæ than that which covers the actual body of the insect.

I must warn entomologists who may wish to repeat my observations against a cause of error which stopped me for some time. A good many of the *Typhlocybæ* of the alleys of the Luxembourg are infested, not by the Hymenopterous larva above-mentioned, but by a Dipterous larva, and as the latter, when mature, issues rapidly from the body of its host when this is placed in a collecting-tube, it gets mixed with the larvæ of Hymenoptera which have also escaped. One might then be tempted, knowing the habits of the Tachinidæ, to believe that the Dipterous larva is the producer of the gall and the Hymenopterous one its parasite.

This has probably been done formerly; but I have been able to ascertain that the Dipterous larva occurs in the body of the *Typhlocyba* itself, with the head directed towards the extremity of the abdomen of its host, which it distends so much as to make it slightly pass beyond the wings, which is not the case in the normal state. This Dipterous larva, after issuing through the dorsal part of the middle abdominal somites, becomes converted into a naked pupa at the surface of the ground, and I hope shortly to be able to describe the perfect insect.—*Comptes Rendus*, July 8, 1889, p. 79.