

the wild strawberry from time immemorial.

One would say that here were all the conditions of a most determined struggle for existence, in which one or more of these species must succumb. It is indeed interesting to see how the issue is evaded, and an adjustment reached by which competition is reduced to a minimum. The *Colaspis* larva makes the earliest attack upon the plant, beginning its work upon the root certainly as early as the first of May (half-grown individuals having been taken on the 15th), and finishing in June, all being of full size and preparing to pupate by the end of that month. Next comes *Paria*, in July and August, neither extreme of its period being exactly defined by our observations; and finally comes *Scelodonta*, adults of which were copulating on 1 July, young larvae occurring 7 August. As far as now known, the *Scelodonta* larva is left in undisturbed possession during the remainder of the year; although there is a break in our observations for October. Certainly by November it has completed its work, and retired, full-grown, and ready to transform, into its subterranean cell.

It seems clear, furthermore, that this curious succession of periods is related

to a difference of habit with respect to hibernation. Undoubtedly *Scelodonta* winters as a larva, and *Paria* as an adult. As *Colaspis* larvae were only half-grown on 15 May, they very probably hatched from the egg that spring; and as the adult *Colaspis* emerged about two months before the new brood of *Paria*, it seems hardly possible that both could have developed from eggs laid that spring; but it is much more likely that *Colaspis* hibernates in the egg. On this hypothesis, we shall have the eggs of *Colaspis* deposited in autumn, those of *Paria* in spring, and those of *Scelodonta* in midsummer, the first species hibernating in the egg, the second as an adult, and the third as full-grown larva, with the necessary result that their attacks upon their common food plant are delivered successively.

The immense advantage derived from this arrangement is evident, when we reflect that by this means as many of *each* of the species are fed upon the surplus structures and supernumerary individuals of the strawberry (that plant being a continuous grower), as it would be possible to maintain of *all three* if they came into simultaneous competition.

## COLLECTION AND PRESERVATION OF DIPTERA.

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From dearly purchased experience I have learned the necessity of care in the collection and preservation of entomological specimens, and it may be

that a few hints will be of service to the collectors of diptera and similar insects.

For collecting I use a cyanide-bottle,

EXPLANATION OF PLATE I.

- Fig. 1. *Paria aterrima* Oliv.  
Fig. 2. *Scelodonta pubescens* Mels.  
Fig. 3. Pupa of *Scelodonta pubescens*.  
Fig. 4. Head of *Paria aterrima*, front view.  
Fig. 5. Larval and pupal structures of *Scelodonta*.  
A, tip of abdomen of pupa, lateral view; with figure of anal hook, more enlarged. B, last abdominal segments of larva, viewed from beneath. C, mandible of larva.  
Fig. 6. Larval and pupal characters of *Paria*.  
A, tip of abdomen of pupa, lateral view. B, mandible of larva.  
Fig. 7. Larval and pupal characters of *Colaspis*.  
A, antenna of larva. B, labium and maxillae. C, mandible.  
D, labrum. E, last abdominal segments of larva, viewed from beneath. F, tip of abdomen of pupa, ventral view.  
Fig. 8. Larva of *Colaspis brunnea* Fab.

FIG. 1.

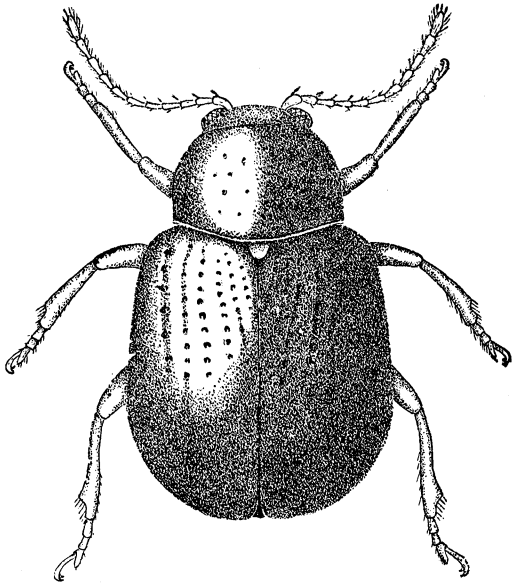


FIG. 2.

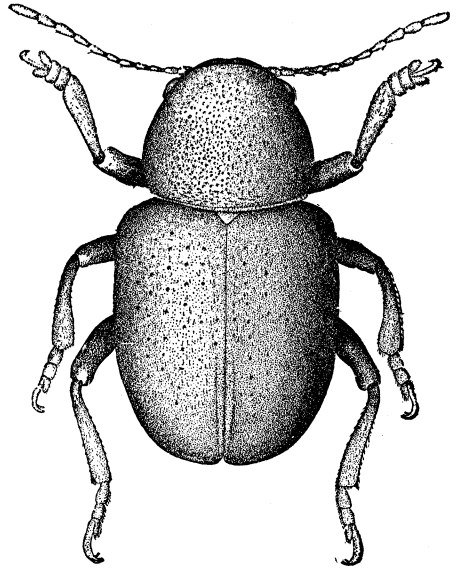


FIG. 3.

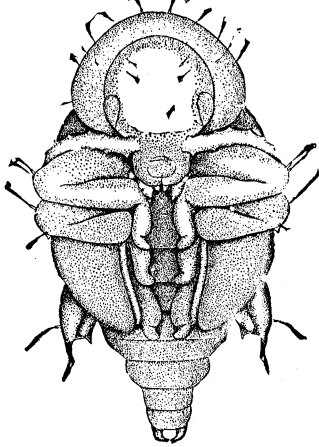


FIG. 4.

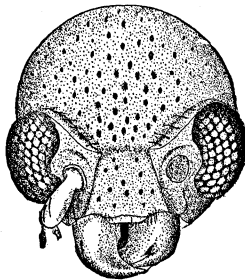


FIG. 5.

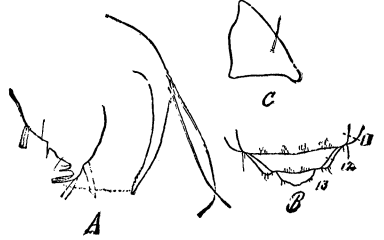


FIG. 6.



FIG. 7.

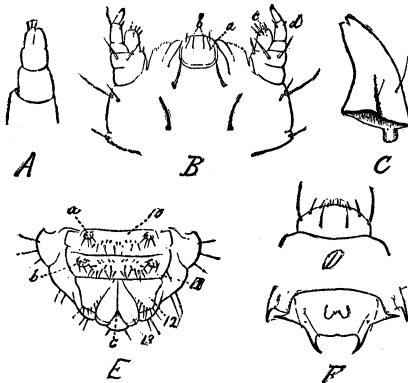
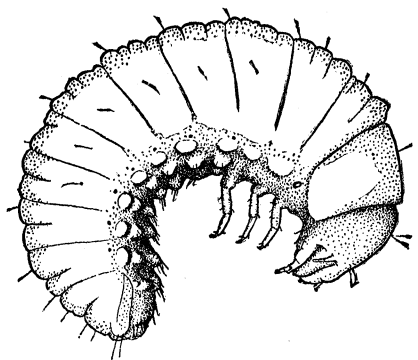


FIG. 8.



which, although objected to by European dipterologists, I have found the best and most convenient. But I do not mean an *ordinary* cyanide-bottle, for specimens collected in such are worthless for scientific or other purposes. I select several two ounce [60 c. c.], wide-mouthed bottles of the same form, and carefully line the bottom and sides with a good quality of blotting-paper. Good, firm corks are selected, which are interchangeable in the different bottles: in one of these corks a small hole is made, in which it is better to fit a small metallic ferule; a strip of blotting-paper is then coiled within this cavity, and it is over this that a few drops of a solution of cyanide of potash is poured. It is useless to collect flies in a bare bottle; the insects soon exhale moisture sufficient to ruin them. The blotting-paper prevents this, and the cork can readily be removed from one bottle and put into another when a sufficient quantity of flies is collected. *Moisture of any kind injures flies.* Some flies, such as the hairy *bombyliidae*, should always be pinned when caught. For this purpose a small, tight, pith-lined box may be carried in the pocket, together with a vial of benzine to kill the flies.

In the earlier part of the season many rare specimens of diptera may be obtained by beating. For this purpose a I employ rather heavier net-wire, to which a pointed net of cheese-cloth is attached. On such occasions it is necessary to carry with one a larger bottle with a little cotton-wool in the bottom,

and a vial of chloroform in the pocket. By thrusting the end of the net, with its contents, for a few seconds into the chloroform bottle, one can then remove the specimens undisturbed. Very minute flies it is expedient to preserve alive in small bottles filled with paper clippings and through the cork of which a small glass tube is thrust nearly to the bottom. For a collecting net, after many experiments and failures, I have found most serviceable a simple, rather light, brass wire, soldered together to form a ring about 28 cm. in diameter and firmly attached to a light handle about one metre long. The net is made of very coarse bobbinet lace, the most serviceable and, in the end, cheapest material. The net should be readily handled with one hand.

For the collection of diptera a few hints here will suffice. The best season in New England is June, yet specimens may be collected every month in the year. In May and the early part of June, beating will give excellent results. A little later, patches of blackberry (*Rubus*), wild cherry (*Prunus*), dogwood (*Cornus*), Canada thistle (*Cirsium*), or other melliferous blossoms, will afford desirable specimens. It is better to let specimens come to the collector than to go hastily about looking for them. I have spent six hours about a patch of *Cornus paniculata* not ten metres in diameter, and been amply repaid. But few specimens are found in shady woods; those few are to be sought for there. The favorite place for *tabanidae*, as indeed for most

flies, is on the border of woods, open glades, meadow lands, etc.

Specimens should not be allowed to remain over night unpinned. The large specimens may be pinned through the thorax, preferably with japanned iron pins. They should be placed on the pin only low enough so that the head may be grasped with the thumb and forefinger without danger to the specimen. *The wings should never be spread.* Spreading not only renders the specimens more difficult to study, but it spoils the natural appearance of the insects, and is a positive injury to them for the cabinet. All that is necessary is to push aside the wings so that they will not conceal the abdomen. Minute specimens should be pinned with fine iron wire from the underside, and then pinned upon small strips of thin cork, the upper surface of which

has been covered with white paper, and through the other end of which a pin is thrust. Small specimens should never be glued to bits of card-board, as is commonly done with coleoptera. Only one specimen should be placed on the piece of cork.

The greatest enemy to dipterological collections is dust: insects can be guarded against, but it is difficult to exclude dust, unless tight cases are used. Dampness and mildew do often much mischief.

A good dipterological specimen must be unrubbed, unmoistened, not dusty nor greasy, and with the wings unspread. It is quite as easy to collect *good* specimens as poor ones and much more satisfactory.

[For other articles on the collection and preservation of diptera, see Rec., 157, 2335, 3396, 3404 and 3405.]

MUSEUM PESTS OF SERVICE TO THE ENTOMOLOGIST.—*Trogoderma tarsale* has heretofore been viewed with un-mixed hatred by entomologists, but for the last few days I have been showering blessings on the heads of a particular colony which had established itself in a pill-box containing some hundreds of specimens of a pteromalid reared from the cocoons of *Apanteles aletiae* Riley. It is true that nothing but fragments of the pteromalid remained after the *Trogoderma* had been at work for a year or more, but among these fragments

I have found a number which illustrate points in the external anatomy better than the most careful dissections. Certain points concerning the form and structure of the metanotum—always hard to study in the complete insect, and very difficult to dissect out, owing to a disagreeable tendency to break through the middle as readily as at a suture—are admirably exhibited by these accidental anatomical preparations. Truly it is an ill wind that blows no good.

L. O. Howard.

Washington, D. C., 25 Jan. 1884.



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