The ventral surface is strongly inflated at the metathorax, the abdomen strongly oblique from the metathorax to the apex; the last segment strongly flattened and the last three sutures very deep; clothed with greyish, stout, plumose, scale-like hairs with slender plumose hairs intermixed towards the middle line, with a *dark area* covering the last two segments and the caudal border of the 3rd densely clothed with erect black hairs.

The male has the front less concave, with a well-developed acute postepistomal median carina, with the hairs on the epistoma short except the marginal fringe, which is moderately long.

Labels with the type: San Diego, Cal., 7-18-15, olive, ♀. Adults and work in olive branches were received from Professor E. O. Essig and Dr. E. C. Van Dyke. The species was taken from living olive trees, at San Diego, Cal., in 1914, and was causing much injury to the host. Two specimens of the same species were received from Mr. Ralph Hopping, taken by him on brush in the chapparal belt, Camp Greely, Fresno Co., Cal., 3,000 ft., in 1909.

The type of this species is in the collection of the Entomological Branch. Ottawa.

THE NYMPHS OF ENALLAGMA CYATHIGERUM AND E. CALVERTI.

BY E. M. WALKER, TORONTO.

The nymph of *Enallagma cyathigerum* Charp. has been described by Lucas ('00)¹ and Ris ('09)², that of *E. calverti* Morse by the present writer ('13)³. No description of the nymph of the former species based on American specimens has, however, yet appeared, and this has been a desideratum for two reasons.

In the first place the American form of *cyathigerum* was originally described as a distinct species (*E. annexum* Hagen), and has been frequently cited under this name, or as *E. cyathigerum* race *annexum*, and although Williamson ('02)⁴ pointed out its identity with *cyathigerum*, and has been generally followed, the question of the validity of *annexum* as a race has always seemed to me not indisputable. I have examined a large number of Canadian specimens from a very wide range of territory and also a number of European examples, and, although I regard them all as one species, I have never had any difficulty in separating the

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males of the American form from those of the European form by the shape of the abdominal appendages. The difference is slight, but constant in the material I have examined.

In the second place, having recently reared *cyathigerum* at Toronto, I find that the nymph does not wholly agree with Ris' description and figure (I have not had access to Lucas' description), but that, on the other hand, it is so extremely like that of *calverti* that a comparative study of these forms is necessary in order to make their separation possible.

Early in June, 1914, I found *E. cyathigerum* in considerable numbers at "Fisherman's Island," a long narrow sand bar, south of the city, which separates Ashbridge's Bay from the open lake, and, until recent filling-in operations commenced, was margined on the inner side by a wide extent of marsh. It proved too late to obtain the nymphs that season, but on May 24 of the following year a visit was made to the same spot and about twenty mature nymphs were secured. They were accompanied by large numbers of *E. hageni*. On May 26 a male *cyathigerum* emerged, and as the identity of the nymphs was now assured, the remainder was preserved for study. Imagos had already become quite numerous on the island, and soon became abundant. A large number were examined, but all were alike; no specimens of *calverti* were found among them. Shortly afterwards they disappeared and were followed, as in the previous year, by swarms of *E. hageni*.

During the season of flight of *cyathigerum*, *E. calverti* was common about a pond in the vicinity of my house in Wychwood Park, Toronto, and I reared this species again here, as I had previously done at Lake Simcoe and Go-Home Bay, Ont. I was thus able to obtain sufficient material for a comparison of the nymphs of the two species.

The Nymph of *Enallagma cyathigerum*. (Pl. IX).

Very similar to *E. calverti* Morse in size, form and coloration (v. Can. Ent., XLV, 1913, p. 162, pl. 1, figs. 4, 5). Head as in

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1. British Dragonflies, pp. 297-307.
 2. Die Süßwasserfauna Deutschlands. Heft 9, Odonata, pp. 50, 54.
 3. Can. Ent., XLV, No. 6, p. 162.
 4. Proc. Acad. Ind., p. 121.

E. calverti, differing from that of *E. hageni*, *E. ebrium*, *Ischnura verticalis* and *Cænagrion resolutum* in the somewhat more prominent eyes and postero-lateral surfaces of the head, these parts having a somewhat more strongly sinuate outline in dorsal view (cf. Can. Ent., *l.c.*, figs. 4, 6). Labium of the usual form in this genus, the lateral margins in about the proximal two-thirds straight and diverging at an angle of about 30° , in the remainder at about 70° , breadth at the base of lateral lobes four-fifths of the length; mental setæ 4, sometimes 3 on one or both sides, lateral setæ 6; lateral lobes of the usual form, the end-hook preceded by 2 or 3 teeth, which are preceded by a more or less denticulated and incurved margin. Spinules on lateral margins of abdominal segments of moderate size, forming an irregular single or partly double series and not increasing much in size near the postero-lateral angles.

Gills long and relatively narrower than in *E. hageni*, the margins of a little less than the proximal half spinulose, the spinules somewhat coarse, particularly on the dorsal margin of the median gill and the ventral margins of the lateral gills, distal margins with moderately long slender hairs; apices convexo-angulate or rounded. The greatest breadth is just before the distal end of the spinulose margins, measuring between one-fourth and one-fifth (median gill) or one-fifth and one-sixth (lateral gills) of the length. Beyond this point the gills are suddenly, though slightly, narrowed.

The lateral appendages (superior appendages of adult) differ in form in the two sexes. In the male, they are rounded and somewhat depressed, in profile about half longer than deep, and, when viewed obliquely from above, they present a distinct, though shallow, dorso-caudal concavity; viewed directly from above, they appear about as broad as long with convex margins, especially the outer. In the female, these appendages are subpyramidal, tapering to a blunt apex, the outer margin in dorsal view nearly straight, the inner margins somewhat more convex toward the base.

Colour—Olivaceous or brownish-green (brownish-yellow in alcoholic specimens), generally nearly uniform, but frequently more or less speckled with dark irregular spots, the abdomen

usually with diffuse, dorsal longitudinal dark band, divided by a pale median line, and sometimes with a definite row of dark spots on the sides, legs pale, femora with a darker anteapical annulus, which may be faint in pale specimens. Gills generally diffuse greyish-brown, sometimes very pale, sometimes quite dark, typically with three or four narrow, transverse, somewhat angular bars about the middle or slightly beyond, following one another closely and sometimes partly confluent, the first band usually the most distinct and in very pale specimens sometimes the only one present. In well-marked specimens there may be an indication of another band farther distad, and in dark specimens there may also be considerable pigmentation along the tracheal branches and sometimes dark blotches independent of the tracheæ.

Length of body 21-21.5 mm.; hind wing-pad 4-4.8 mm.; hind femora 3.8-4.4 mm.; gills 7.5-8.5 mm.

As in the case of the adults, the nymphs of *E. cyathigerum* and *calverti* differ apparently only in one constant character, the form of the superior (lateral) abdominal appendages of the male. In the nymph of *calverti* these appendages in profile appear fully as deep as long, with a much broader and more bluntly rounded apex, which is somewhat above the mid-longitudinal axis. The sulcation seen in *cyathigerum* in an oblique view from above is not present in *calverti*. The outline of the appendage viewed directly from above is less rounded than in *cyathigerum*, the outer margins being but slightly curved, and passing into the posterior margins by a rounded angle. There is a distinct submedian longitudinal ridge.

Ris' figure of the gill of a European specimen of *E. cyathigerum*, reproduced from a photograph, differs considerably from the gills of my specimens, being more like those of *E. hageni* and *E. ebrium* in form. It is little more than three times as long as broad; the margins are more evenly convex, and the marginal spinules appear decidedly smaller, those of the stronger series not interrupting the curve of the margin as in American specimens and in *E. calverti*. In Ris' figure, the gill is broadest beyond the apex of the spinulose part of the margins, while in American specimens the greatest width is just before this point. The gill is also described as having no transverse bands and none appear on the figure.

EXPLANATION OF PLATE IX.

Figs. 1-5, *Enallagma cyathigerum*, Charp., nymph; 1, median gill; 2, lateral abdominal appendages of female, dorsal view (median gill removed); 3, lateral abdominal appendages of male, dorsal view; 4, right appendage of male, profile view; 5, same, dorso-lateral view. Figs. 6-8, *Enallagma calverti* Morse, nymph; 6, lateral abdominal appendages of male, dorsal view (median gill removed); 7, right appendage of male, profile view; 8, same, dorso-lateral view.

GEOFFREY MEADE-WALDO.

All who attended the Jubilee Meeting of the Entomological Society of Ontario in August, 1913, remember, among other pleasant recollections of that meeting, the pleasure which the presence of Mr. Meade-Waldo occasioned; Mr. Meade-Waldo attended the meeting as a representative of the British Museum of Natural History. To all those and to his other friends in Canada his untimely death in March will come as a shock. He had a peculiarly winning manner and a deep love not only of the science to which he chiefly devoted himself, but to nature generally, as he was a keen ornithologist and an ardent advocate for the preservation of wild life. His enthusiasm was very marked during the excursion we made at the time of the meeting to Grimsby, from which excursion he arrived home not only with his hands full, but, in the absence of a third prehensile organ, carrying in his mouth a twig bearing a Sphinx caterpillar.

Mr. Meade-Waldo was born in January, 1884, and after being educated at Eton and Magdalen College, Oxford, he visited the East, including the Federated Malay States and Borneo. In 1909 he was appointed to the Entomological Department of the British Museum, Natural History, where at the time of his death he had charge of the Hymenoptera. In this group he had already carried out valuable and much-needed work, and his death will be a severe loss not only to British entomology, but to a still wider body of entomologists who were following his promising career with great expectations.

C. GORDON HEWITT.