

OBSERVATIONS ON THE NYMPH AND ADULT OF
EPHEMERELLA NOTATA EATON (EPHEMEROPTERA)

By

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In early May, 1942, we paid a brief visit to the R. Eden to obtain specimens of a Caddisfly, the Grannom (*Brachycentrus subnubilus* Curt.) and at Eden Bridge, near Temple Sowerby, amongst other insects we collected a number of nymphs of *Ephemerella*. These nymphs were found among strands of *Fontinalis* (Water Moss) on stones, and on examination were seen to differ in several characters from nymphs of *E. ignita* (Poda). The R. Eden is the type locality for *E. notata* Etn., and it seemed not unlikely that these nymphs might belong to that species. An examination of *Ephemerella* nymphs from Kildare, on the lower reaches of the R. Liffey (where *E. notata* also occurs), revealed two types of nymphs, one the typical *E. ignita* and the other identical with those from the R. Eden. The identity of these R. Liffey nymphs with *E. notata* had been established beyond doubt by the discovery of hatching nymphs in the stomachs of brown trout taken at a time when only *E. notata* duns were emerging and when no *E. ignita* were on the wing.

The imagines and subimagines of *E. notata* have been described by Eaton in his Monograph (1883-88) and since that time there have been few references to the species in entomological literature. This paucity of records may possibly be due to the superficial resemblance of *E. notata* to *Heptagenia sulphurea*, causing it to be overlooked by both anglers and entomologists, but it is probable that this insect is restricted to a narrower range of environmental conditions (stenoecic) than is *E. ignita* and consequently more localised in its geographical distribution.

Eaton's specimens were taken at Langwathby and Salkeld, on the R. Eden, and he also records a single subimago in Mr. King's collection from the "south of Scotland." On the Continent it has been recorded from Germany, Thüringer Wald and München (Ulmer 1929), Lohr, Gemünden and Langenprozelten am Main (Schoenemund 1930) and from Belgium (Ulmer 1929). The distribution of the species in the British Isles, as at present known, is as follows:—DEVON: Bovey Tracey, 3.vi.1931. SURREY: R. Wey, between Tilford and Elstead, 28.v.1933. RADNOR: R. Ithon, Llandrindod Wells, August 1912. YORKS: R. Nidd, Ripley, 16.vi.1925; R. Wharfe, above Grassington, 23.vi.1926; R. Wharfe, Boston Spa, 27.v.1927 (nymphs). CUMBERLAND: R. Eden, Langwathby and Salkeld, 13-27.vi.1885; R. Eden, Eden Bridge, 8.vi.1942 (nymphs); R. Eden, Briggle Beck, Skirwith, 19.vi.1924. DERRY: Moneymore, 5.vi.1933. CAVAN: R. Annalee, Cootehill, 2-12.vi.1936. MEATH: R. Boyne, near Trim, 22.v.1935. KILDARE: R. Liffey, Clane, PROC. R. ENT. SOC. LOND. (A) 18. PTS. 4-6. (JUNE 1943.)

12.v.-1.vi.1935; Straffan, 7.vi.1930, 22.v.-10.vi.1935, 22.v.1936, 23.v.-12.vi.1937, 8.v.1938.

We have seen examples from all the above British localities except the R. Ithon. In spite of the fact that these specimens were identified by Eaton himself (South 1913), the unusually late date for that record raises an element of doubt and the occurrence of the species at Llandrindod Wells requires confirmation. The Irish records (except that from Derry) are based on collections and observations made by the late Mr. R. Southern and one of us (W.E.F.) from 1930-38. The specimens taken at Straffan on 7th June, 1930, were

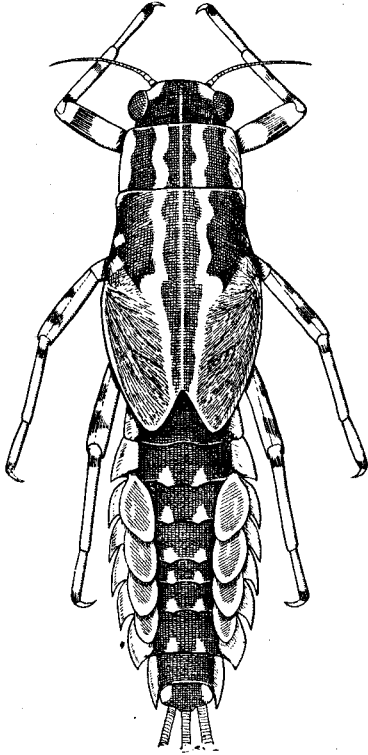


FIG. 1.—*Ephemera notata* Etn., nymph $\times 10$.

identified by Mr. Southern, who recognised that the capture constituted an addition to the list of Irish Ephemeroptera. In the course of work and angling excursions, many reaches of the Liffey were visited but *E. notata* was found only in those places where the river flowed over limestone rocks and the water was alkaline in character, such as at Straffan. Considering the foregoing list of localities, it is interesting to note that all the streams appear to be situated either on lime-bearing rocks or else to receive their water as drainage from such rock-formations. The Eden, for example, at Eden Bridge, Skirwith, and Salkeld flows over New Red Sandstone, but most of its water drains from the surrounding Carboniferous Limestone. Tilford and Elstead, on the R. Wey, are situated in an area of Lower Greensand, but much of the water is

received from the Chalk Downs to the north and west. Other factors which may affect the distribution of this species are the size and rate of flow of the river, factors which are themselves influenced by the configuration of the land and the amount of rainfall. Small becks and streams do not appear to be suitable for *notata*, although they will support *E. ignita*. The presence of *Fontinalis* is not necessarily a factor, since on the Liffey this plant occurs at both Ballysmuttan (where the river flows over granite and is acid in character) and Straffan, but *E. notata* is absent from the former station.

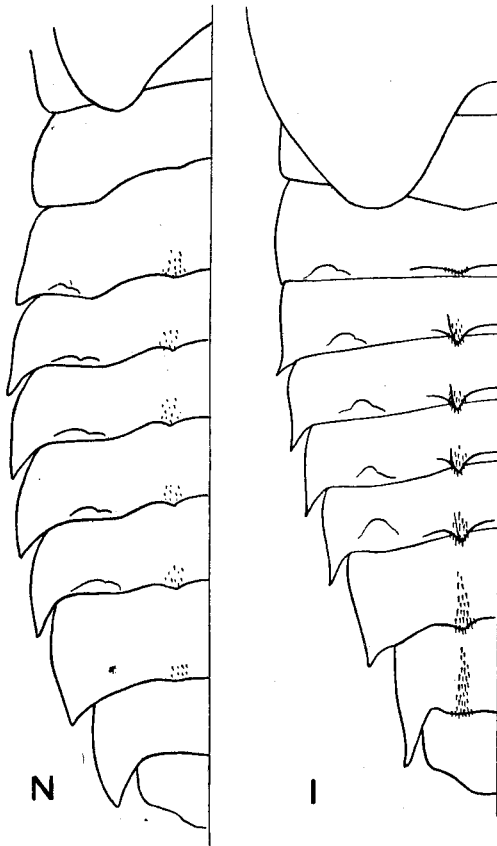


FIG. 2.—Dorsal abdominal armature of N, *E. notata*, I, *E. ignita* nymphs. Left half only of each abdomen shown, gills omitted.

Schoenemund (1930) was the first to recognise the nymph of *notata*. He separated it from *ignita* as follows:—

- Underside of abdomen brown to blackish (“dunkelfarbig”), on each side with a fine, somewhat oblique, very conspicuous black line *Ephemerella ignita* (Poda).
- Underside of abdomen yellowish-brown, on the second to seventh sternites in the middle with two backwardly divergent dark streaks, behind which are two black spots *Ephemerella notata* Etn.

The Eden Bridge examples showed considerable variation in the depth of colouring of the underside of the abdomen, some of them having a median longitudinal dark brown stripe, as dark as in *ignita*; his second character, the "fine, somewhat oblique, very conspicuous black line" on each side of the

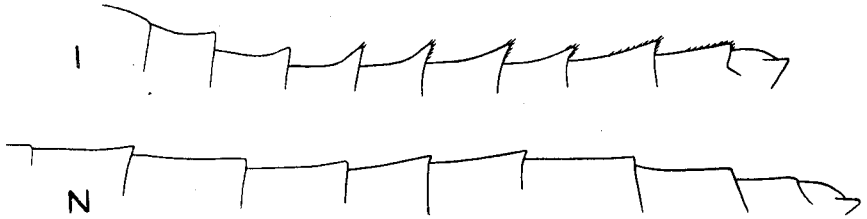


FIG. 3.—Profile of abdominal tergites, N, *E. notata*, and I, *E. ignita*.

sternite is often more noticeable in *notata* than in *ignita*, in which it is frequently concealed by the brown ground-colour. Admittedly *E. notata* shows, in addition, the characteristic two pairs of ventral spots on the abdomen from which

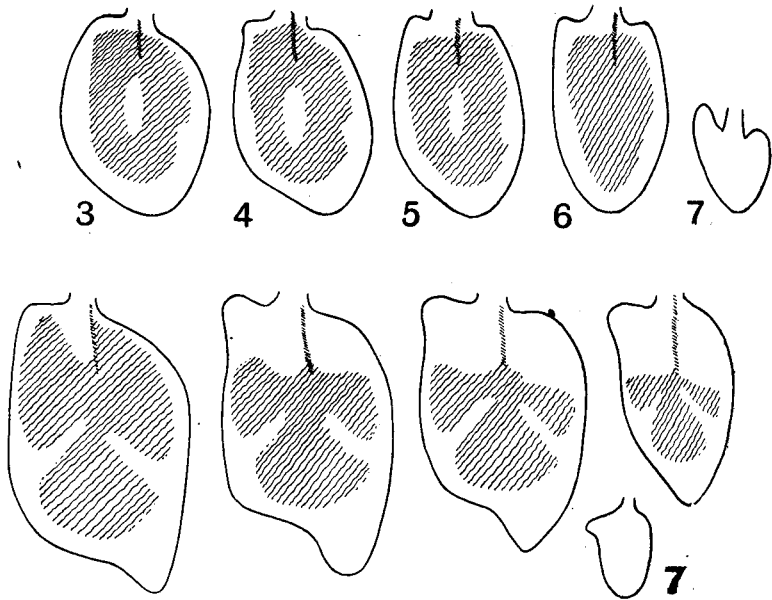


FIG. 4.—Gill lamellae of abdominal segments 3-7. Upper row, *E. notata*, lower row, *E. ignita*.

the adult takes its name, but these are sometimes obscured by the dark median band.

Comparison of the nymphs of *notata* and *ignita* has revealed several other differences, some of them structural, which appear to offer more useful dis-

tinctions than those given by Schoenemund. Firstly there are the caudal setae or "tails"; in *ignita* these are marked with alternate broad brown and whitish bands, and the apices of the segments are set with whorls of short spines, whereas in *notata* the tails are whitish throughout, being at most only finely ringed with brownish at the joints. The apices of the segments carry whorls of short spines only towards the base of the setae, the remaining part being fringed with hairs. The dorsal tubercles on the abdominal segments in *ignita* are strongly produced, and in side view noticeably elevated; in *notata* they are much less strongly produced and but slightly elevated (figs. 2, 3). Schoenemund uses as a generic character for *Ephemerella* the possession of strongly projecting tubercles on the hind margins of the tergites. Such are certainly not present in nymphs of *E. notata* which I have examined.

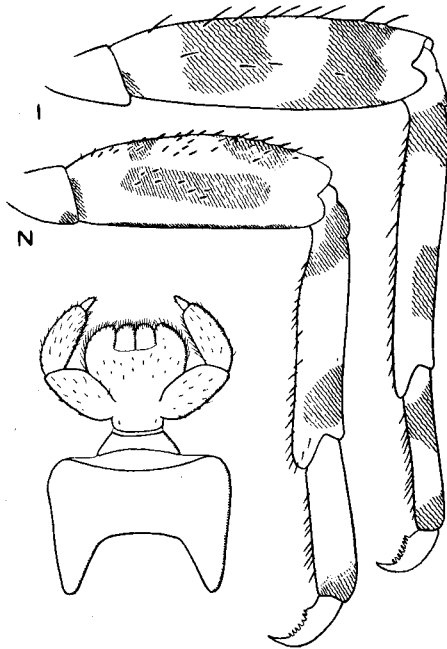


FIG. 5.—Median legs of nymphs of I, *E. ignita*, and N, *E. notata*, and labium of *E. notata*.

The gill lamellae of abdominal segments three to six are different both in outline and in the shape of the pigmented pattern in the two species (fig. 4). In *ignita* the inner apical angle is very definitely produced, and the pigmented area is shaped somewhat like a clover-leaf. In *notata* the apical angle is rounded, and the pigmented area roughly duplicates the shape of the lamella, with a pale ovate spot in the centre of the first three lamellae. The gill-cover of segment seven (fifth gill) in *notata* has two basally directed lobes at the base which are absent in *ignita*.

The setae on the dorsal carina of the femur in *ignita* are sparse and moderately long, whereas in *notata* they are much denser and short (fig. 5). The tarsus in *ignita* is dark with a pale band before the apex; in *notata* it is pale with a dark apex. There are also slight differences in the mouth-parts, particularly in the proportions of the palpal segments. The maxillary palpi in *notata* beginning with the basal segment are 43 : 24 : 20 and in *ignita* 21 : 12 : 30.

The labial palpi in *notata* (fig. 5) are stouter, the terminal segment being relatively shorter and narrower than in *ignita*.

Nymphs of both species are subject to variation in colour and pattern; *E. ignita* particularly so. *E. notata* has often a pair of pale dorsal stripes on the thorax which are continued as pairs of spots on the abdominal tergites (fig. 1). Ventrally the lateral flanges of the abdominal segments are usually pale in *notata*, although the middle portion of the segment may be darker.

In some respects, especially in the fringed nature of the caudal setae, the less produced dorsal tubercles and the form of the fifth gill lamella, *E. notata* nymphs recall those of the genus *Chitonophora*, and examples of *notata* might conceivably run out to that genus in Schoenemund's key (1930). The shape of the fifth gill as figured by Lestage (1917), however, differs from that figured by Schoenemund. The former shows the basal lobes projecting outward (*Chitonophora* sp.), the latter with them directed basally (*Chitonophora krieghoffi*). The proportions of the palpal segments also approach those of *Chitonophora*. The imaginal characters of *E. notata*, however, appear to us clearly to be those of *Ephemerella*. In the absence of authentic material of *Chitonophora*, it is not proposed to consider here the claims of this genus to generic rank. There is something to be said for the view put forward by Traver that it should be treated provisionally either as a group or subgenus of *Ephemerella*.

It has already been mentioned that little is known about *E. notata* and therefore the following account of its habits may interest the entomologist and also the fly-fisher. Its emergence period on the R. Liffey extends from 10th May to 12th June, and records from other waters prolong this period to 27th June. The transformation from the nymph takes place soon after sunset, the duns appearing in large numbers on the water. The bright yellow body and whitish-grey wings tinged with yellow which characterise both sexes makes the dun of *E. notata* a most conspicuous "fly" even at dusk. At first glance, as has already been suggested, it might be confused with *Heptagenia sulphurea* (known to anglers as the "Little Yellow May Dun" or "Yellow Hawk"), but the latter has only two tails (setae), and its colouring is less intense, being, as its name suggests, more sulphur-yellow. *H. sulphurea* may also be seen on the water during May and June, and the fact that on the Liffey the two species sometimes share the name of Yellow Hawk is evidence that such confusion does exist.

There are few observations on the spinners, but those we have, suggest that the flies are on the wing in the afternoon and early evening in fine hot weather. From two observations made on the R. Wey (Kimmins 1933) it seems likely that the nuptial flight of the spinners may take place at some distance, *i.e.*, 200 yards from the water. The female spinners carry their egg-masses in a manner similar to that of *E. ignita*, but we have no information whether or no they fly upstream before oviposition, as in that species.

Angling experience on the R. Liffey, and the examination of stomach contents of brown trout taken from that river during the hatch, show that the fish feed predominantly on the emerging nymphs, although some duns are also eaten. When the fish are feeding thus at dusk it has been found that the artificial flies "Yellow Sally" (a representation of the stonefly *Isoperla*) and "Yellow May" fished dry may be usefully tried as imitations of the duns, since both may be dressed with yellow wings and hackle. A sunken "Yellow Sally" was taken well by the fish, presumably because it resembled the emerging nymphs on which the fish were chiefly feeding.

It is curious that this fly, which is so distinctive, does not appear to be

mentioned in angling literature. Further information about its geographical distribution is desirable, but it would seem to be far more localised in its occurrence than is the closely related and well-known *E. ignita* (Blue Winged Olive), a fact which may partly account for this neglect. The late hour at which the duns emerge, the comparatively short period of the season during which the flies are on the wing, and the superficial resemblance to *H. sulphurea*, may also have contributed to its having escaped the notice of anglers.

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