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CAPE MAY-FLIES

By A. CECIL HARRISON.

PART VI. THE FAMILY BAETIDAE.

SMALL in size, but existing in prodigious numbers in suitable waters, these insects play a very important part in the diet of trout.

The Baetid nymphs fall under Pictet's type III (see *Piscator* No. 10, pp. 48/49), viz., "swimming larvae, usually with fringed tail-filaments forming an efficient tail-fin for very quick darting amongst the weeds and stone." There are, however, exceptions to this rule.

The Baetids have great associations with the famous trout streams of southern England, although they are by no means confined to the chalk streams. A number of members of this family are grouped by anglers under the general names of Olives (but not including the Blue-winged Olive—an Ephemerellid), Pale Wateries, Iron Blues and Spurwings. They have been prototypes for innumerable patterns of artificial flies, tied to represent either one of the winged stages or the nymph.

Diæreses and diphthongs had greater importance in the past than they have to-day. The Rev. A. E. Eaton in 1885, whilst crediting the entomologist Leach (1815) with the authorship of the genus, continued the spelling as *Baëtis*; but stated that the etymology, though doubtful, was probably a misreading of *Bætis*, the classical name of the Guadalquivir River in southern Spain. Recent and modern writers have shown preferences for both of these forms and also for one or other of the three renderings of the name of an allied genus; so Dr. Barnard's spelling of *Baetis* and *Cloeon* in his "South African May-flies", 1932, was a welcome simplification.

In 1929, when the investigation of the Cape May-flies was commenced, only two Baetids had been described from South Africa by Esben Petersen (*Ann. S.A.Mus.*, Vol. X, Pt. VI, 1913), and one by Lestage, and all were based on material collected in Zululand. One was a rather showy sub-tropical Spurwing (*Centroptiloides bifasciatum*—the large nymph of which was later described by Crass: *Ann. Natal Mus.*, Vol. XI, Pt. 1, 1947) and the others were small forms of wide distribution in South Africa (*Austrocloeon africanum* and *Centroptilum sudafricanum*). No flies of the well-known genus *Baetis* had been recorded from Africa, although Ulmer (1916) had known nymphs and Lestage (1917) had described those of two unnamed species.

Yet it was patent to any discerning angler that the familiar swimming nymphs and the traditional duns and spinners of the Baetidae were well represented—even in the stony trout streams of the south-western Cape where lush weed beds are absent.

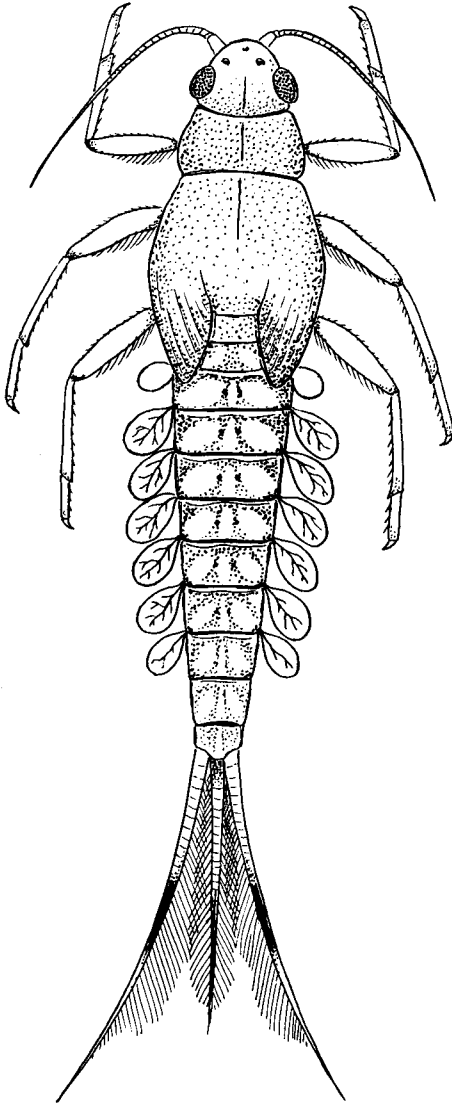
Autopsies on trout taken from the middle reaches of the Eerste River in spring showed that the fish had filled their stomachs by "nymphing", and it was obvious that the water was a veritable "soup" of darting, drifting and struggling Baetid nymphs.

Similarly, in the Groot Drakenstein Dwars River, in the deep shade of the woodlands when the water was low and clear at midsummer, rainbow trout could be seen poised near the surface feeding industriously on "invisible" objects. If the observer waded in carefully and stood quite still for a while in a patch of sunshine—with patience enough to wait until the fish had forgotten the disturbance—the trout would take up their favoured positions again and weave slowly amongst the streams of small drifting nymphs, ingesting them quietly and steadily with the minimum expenditure of energy.

A tiny wingless fly or artificial nymph would take them, tied to the finest available gut, if the angler's movements were snail-like and the offering made

when an opportunity served, and a fish came within reach of the line dangling from the almost motionless rod. Though any attempt at extending the line to a feeding fish was usually fatal under these conditions, when a trout of eight ounces to a pound was hooked and played very gently, its short rushes had little or no effect on the other persistent nymphs, and it was possible to bring three or more into the net without changing the stance; unless, of course, time pressed or cramp intervened!

Most of the subimagoes, which appeared so suddenly on the film of the water from the largest and commonest of these drifting nymphs, were a pale yellow, primrose in some lights—so the most prominent Baetid of our trout streams came to be known as the "Yellow Dun".



The Yellow Dun Nymph, *Baetis harrisoni*.

K. H. Barnard.

It has been a regular custom for writers of "angler's entomologies" to give simple keys to the Baetids, designed for those who like to go into the details of the natural fly they hope to imitate. The usual characters which are given in Britain are applicable also to the Cape Baetids.

All the flies have only two tail whisks (*cerci* or *setae*).

In *Baetis*, and the allied form *Acentrella*, the best known characteristic (which can be seen with a low-powered lens) is the presence of *pairs* of disconnected veinlets (*intercalaries*) between the main veins, all around the hind margin of the front wings. (See page 53.) Small hind-wings are present. (But there is an annoying complication in South Africa, as flies of another genus *Pseudocloeon* also have paired intercalaries—although, like *Cloeon*, they have no hind-wings.)

In the Spurwings, *Centroptilum*, the intercalary veinlets are single. (See page 53.) Hind-legs are present, and have the spur-like form of costal projection which gave the genus its name.

In *Cloeon* and *Austrocloeon* the intercalaries are also single, and hind-wings are absent.

In the nymphs of this family there are usually three tail cerci. The hairs on the inner sides of the right and left cerci are often so dense that they form a web with those of the central cercus, giving the nymph a horizontal "fish tail".

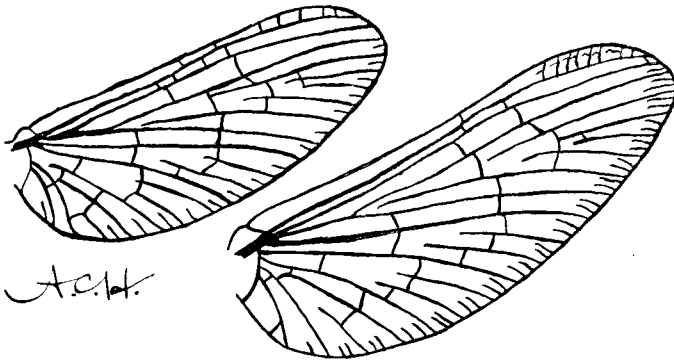


Diagram of venation of front wings.

Right: *Baetis harrisoni*.
with pairs of disconnected
veinlets around the hind
margin.

Left: *Centroptilum sudafricanum*, with single veinlets.

In some species, the central cercus is shorter than those flanking it; and in *Acentrella*, which is a "crawler" not a "darter", it is reduced to a mere conical point.

In general, it is difficult to give points of distinction for Baetid nymphs in simple terms. Most of them have seven pairs of gills, but sometimes the first pair is absent.

In *Baetis* (as illustrated) and *Centroptilum* all the gills are single leaflets. In *Pseudocloeon*, the gills are also single.

In the nymphs of *Cloeon* and *Austrocloeon*, the first and seventh pairs of gills are single leaflets, but all the other pairs from second to fifth are double leaflets. Their gills are capable of very free movement, no doubt because they are adapted for residence in still waters; whereas in the species which usually inhabit running water, the gills are fixed appendages.

The latter kinds are intolerant of stagnant water conditions, and it is often impossible to hold them for more than a few hours in tanks without aeration. This makes the "breeding" of flies from *Baetis* and *Centroptilum* nymphs more difficult than those of the *Cloeon* group; but advanced nymphs will "hatch" quite well in jars when they are caught at the stage when the transformation is imminent.

BREEDING HABITS

The breeding habits of the Baetid May-flies (Olives, etc.) have been studied, both by entomologists and laymen, perhaps more than those of any other family of the order. This is a kind of economic entomology which may appear trivial, as it is connected almost solely with sporting amenities of a highly specialised nature; but it is a matter of deep personal importance to many who are passionately devoted to an entralling recreation.

The value of the dry-fly fisheries of southern England is very high, in terms of "filthy lucre". Admittedly, it is hardly a poor man's sport, although many an enthusiast is given a day by a kindly and more favoured mortal. Thousands of "ordinary trout anglers" take an academic interest in the subject on account of the high traditions connected with the classic waters.

The fact is that if there is no hatch of fly to bring the trout up to feed at the surface, the value of a highly specialised dry-fly water (including its rental) is much reduced. There may be a short annual festival of a couple of weeks when the trout gorge on the May Fly, and a certain amount of sport with the Blue-winged Olive and Sedges (Caddis-flies) and various oddments, but the staple hatch desired is that of the various Baetids.

Much has been written about the use of "fly boards", which are moored to float in the stream to provide laying surfaces for those Olives which crawl down under the water to deposit their eggs in masses; and, in theory at least, advantage can be taken of this habit of the insects to permit the transport of the eggs of a desired species in bulk to another water.

Mr. F. E. Sawyer, whose delightful and very practical contributions are appearing this year in the *Fishing Gazette* and the *Salmon and Trout Magazine*, has described in the latter (No. 128, January, 1950) his own methods of providing egg-laying sites for Olives. Mr. Sawyer is responsible for the well-being of a reach of the Upper Avon in Wiltshire. His practice is to place flat concrete slabs in the shallows of the river, resting them on iron spikes driven into the gravelly bed so that they slope downstream with some six inches of the tops protruding above the water. These are freely used by ripe female imagoes of the *Baetis* group. In his own words:—

“A closer examination is made of the stone as I heave it to the bank. On the underside and edges are many hundreds of semi-circular patches, some of a deep cream colour and others almost white, while amongst the patches are about fifty female spinners which are alive, and which we have disturbed while in their process of egg-laying. Some of these, even as we watch, take flight and move off upstream.

“The semi-circular patches are eggs, each patch the result of the egg-laying efforts of one spinner and contain anything up to two thousand eggs. On this stone alone are more than a million eggs and most of them will hatch if we put the stone back into its former position.

“The other stones are set in similar fashion, each resting on its spike and inclining to the gravel bed. Between each stone is a gap of about 12 inches through which the water is streaming in a series of fast currents downstream. Each of the stones has been used for egg-laying and their undersides are covered with a multitude of eggs. Until recent years the only egg-laying site for this area was some distance upstream, and the flies which have used this place had intended to go there as their parents had done before. Apparently they found the stones I have set to be too great an attraction to pass (they, no doubt, thinking that here is a satisfactory location) and that there was no necessity to travel farther. And so the flies are being arrested in their upstream migration, and are laying eggs in a place where they stand a very good chance of hatching, and where the larvae will find food.”

Mr. M. T. Gillies, who has made a close study of the Baetids on the Test and Itchen, wrote in the *Salmon and Trout Magazine*, No. 129, for May, 1950, that not all the species of *Baetis* used this method of depositing their eggs. He found that the two most abundant Olives (*rhodani* and *vernus*) certainly did employ this “traditional” method, and it is their eggs that cover the fly boards originated by the late Mr. W. J. Lunn, and doubtless the weirs and concrete slabs of the Avon also. He says that a third Olive (*Baetis atrebatinus*) lays by dipping to the surface, as does the Iron Blue, *B. pumilus*, and probably the other species, *B. niger*. On the other hand, one of the Pale Wateries, *B. scambus*, goes down to lay after the manner of the two common Olives. Another Pale Watery, Dun, *B. bioculatus*, appears to lay by dipping or dropping the eggs in small bundles when in flight; as do the Spurrings, *Centroptilum*.

In South Africa, Mr. R. S. Crass has made careful observations proving that females of the Yellow Dun, *Baetis harrisoni*, crawl down and cling to the undersides of rocks projecting from the water to deposit their eggs; similar to the method of oviposition of *Acentrella capensis* recorded by the present writer. Indeed in the case of the latter species, which will be cited later, it is probable that *Baetis* egg-masses were mixed with those of *A. capensis*, although only the submerged females of that species were collected for identification by Dr. Barnard. Crass also found evidence that *Baetis bellus* uses the same method, as does one of his Natal species, *B. cataractae*. He noted that the females of a fairly large Natal species of *Centroptilum* (*flavum*, Crass) apparently laid by dipping.

The breeding habits of some of the flies of the *Cloeon* group, which inhabit still waters, are very different, as the fertilised eggs are retained within the abdomen of the female until they are ready to hatch and the larvules unroll

themselves and can swim away immediately they are extruded. Instances of the longevity of female imagoes and a definite record of ovoviviparity in Cape species will be given later in this series.

As the accepted order of priority of genera is not being followed in these articles, the Baetids of the trout streams are mentioned first.

"Yellow Dun" (*Baetis harrisoni*, Barnard)

It was noted in 1930 that amongst the welter of small May-flies which were probably Baetids, there was one very common species which resembled the typical *Baetis* of English waters.

In size, the male is 5—6 mm. in body length, with forewing of similar length; and the female 6.5—8 mm. in body length, with wing from 7.5—9 mm. long. The two tail whisks of the male spinner are twice the length of his body. This corresponds approximately to the proportions of the British Olive and Pale Watery Duns. The subimago could be called an olive-yellow dun, and the imago, in some cases, has enough wine-coloured pigment in the body to be called a "red spinner" when seen in flight in the sun. The veining of the forewing follows the characters of the *Baetis* group, and the hind-wing is oval.

Dr. Barnard records the adult flies of this species in all months of the year, but they are notably plentiful in the spring months, when the supply of advanced nymphs in the water is at its peak.

The nymph is a succulent morsel for the trout, up to 9 mm. in length of body, plus the "tail-fin" formed by the hairy cerci, which is 4—5 mm. long, a total length of about nine-sixteenths of an inch. It is usually pale brown or straw-coloured above and whitish underneath. In some specimens there is a sharply-defined pattern on the upper surface of the abdominal segments—which is continued on that of the subimago when it emerges. The legs and cerci of the nymph are pale; but there is often a dark area running across the middle of the length of the "tail-fin", which appears as a vague dot behind the creature when it darts about—similar, perhaps, to the mark sometimes occurring on the tail of a fish fry, associated with protective colouration.

In addition to general distribution in the trout streams in the Cape Western area, the Yellow Dun inhabits the streams of the Cape Peninsula and Table Mountain, notably in the Silvermine Stream which goes to Fish Hoek Bay. Crass records it in the Cape Eastern area, and says that it has been found to be one of the most plentiful Natal May-flies, and that imagoes have been taken at all times of the year.

"Small Pink Dun" (*Baetis bellus*, Barnard), Autumn to Spring.

The second species of *Baetis* recorded at the Cape is smaller. (Imago: body 5 mm., wing 5.5—6 mm., cerci 6 mm. Nymph: body 5 mm.) It is distinguishable from *harrisoni* by the narrow hind-wings, without coastal process, and in this respect it resembles the English species, *B. atrebatinus*. Crass, however, has shown that there is considerable variation in this character in Natal, where the species is extremely plentiful in all rivers and streams wherever the current is not too strong.

The small adult nymph was first noticed in the Groot Drakenstein streams in March, 1931. The emergence of the subimago from the nymph was observed to take place at the surface of the water; and the colours of the fresh dun were reddish above and yellowish beneath.

The advanced nymph and the subimago have pale lines, dots and comma-shaped markings on the upper surface of the abdomen.

The imago, or spinner, becomes darker, castaneous or burnt sienna colour, with clear wings.