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CAPE MAY-FLIES

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Part VIII. THE FAMILY BAETIDAE (Continued)

RATHER striking refutation of the ancient presumption that May-Flies are creatures of but a day's existence is provided by the longevity of the female adults of the *Cloeon* group. This can be associated with their unusual method of reproduction. Whereas the eggs of most May-Flies take several weeks to hatch after they have been deposited in the water by the almost moribund spinner; those of *Cloeon* are retained within the body cavity of the living female during a similar period, until the embryos have made full development upon the nutriment contained within the eggs.

In his monograph of 1883-1888, the Rev. A. E. Eaton stated that the type species of the genus, *Cloeon dipterum*, Linn., "in southern Europe, inhabiting warm sites has been observed to be ovo-viparous".

M. Causard wrote in 1896 (quoted in Ann. & Mag. Nat. Hist., 1896, Vol. XVIII, p. 480):— "One would certainly not expect to encounter viviparity among the Ephemeridae which have the reputation of living but a very short time in the adult state . . . This short existence is incompatible with the development of the embryo in the maternal organism. Nor is it the general rule. I have studied recently a species in which an entirely different state of things prevails."

He noted that the females of *Cloeon dipterum* were very common in houses at the end of summer and the commencement of autumn—resting. He kept some for three weeks, and watched, under the microscope, the extrusion of a great number of little ovoid bodies which immediately began to move about and unroll themselves—each a larva capable of active swimming.

He examined a whole range of females and found eggs at every stage of development, and reared the larvae through a number of moults. Adult May-Flies have no functional digestive organs, and he found that almost the whole body cavity of the female *Cloeon* became occupied by the swelling egg sacs; and noted that when the larvae were ready to be extruded, the female fell onto the water with wings extended and when she raised the tail end of her abdomen to form a right angle, a slit occurred there from which the larvae emerged.

When material for identification was being collected at Sandvlei, Muizenberg (Lakeside) in July, 1930, it was noticed that spent female imagos of *Cloeon lacunosum*, either dead or incapable of flight, were strewn on the surface film, and that a slit near the end of the abdomen was present in nearly all specimens, and in some cases the last few segments were hanging by a shred.

Longevity of female imagos of this group was suspected in Cape species, when flies were bred-out from nymphs of *Austrocloeon virgiliae* obtained from a flooded area near the Silvermine River, Clovelly, in June, 1931. Males and females were kept in wire cages, but it is improbable that mating takes place except in free flight. The average life of the male flies was 14 days, but that of the females was longer, one surviving for 40 days.

A female of *C. lacunosum* lived in captivity for an even longer period. It was bred from a nymph obtained from Sandvlei and kept for three weeks in a tank with aquatic plants. The subimago emerged at 8 p.m. on July 15, 1932, and transformed during the night of the 16th/17th. The imago lived in a cage until 8 p.m. on September 7, 1932—54 days after emergence from the nymph.

Ovoviviparity in *C. lacunosum* was finally proved at the Muizenberg Reservoir (Silvermine) in December, 1932. A female alighted on the water alongside the retaining wall, and as she rested with wings spread flat on the surface a stream of larvules could be seen leaving her. She was floated into a tube of water, and

a few more came away. Many other females were behaving in the same manner, and a second one was secured immediately she alighted, and larvules streamed out into the water in the tube and swam fast in all directions.

The insects of this group are of importance in the food supply of pond and lake fish, as they are very prolific and occur in waters under a wide range of ecological conditions. For instance, *C. lacunosum* occurs in the very acid, brown water of the Muizenberg Reservoir on the mountain, and near sea-level in the alkaline waters of the lakes of the Cape Flats. Although they do not inhabit the swift and stony parts of streams, both nymphs and flies are by no means absent from the menu of trout, as they breed in sheltered back-waters and stagnant cut-offs in the vicinity of the rivers.

“RED BORDER-WING”, *Cloeon lacunosum*, Barnard

This Cape species is closely allied to the European *C. dipterum*.

The nymphs are up to 7.5 mm. long in body, with three fringed cerci of 3 mm. long; being of much the same size as those of the Yellow Dun (*Baetis harrisoni*). They are pale whitish, greenish or yellowish, taking on the colour of the water weeds amongst which they abide and take their food. They are plentiful in most still or slowly-flowing waters in the Cape Peninsula and south-western Cape, and can be found at nearly all times of the year.

The most noticeable character of the female fly is the handsome chestnut-coloured border to the leading edge of the wing. (Hind wings are absent in this group). This border has a series of clear window-like spots (*lacunae*). The male, as usual, is smaller and his wings are clear and without the ornamentation of those of the female.

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Common names have not been given to the other members of this genus. *Cloeon chaplini*, Barnard, is a larger species than *lacunosum*, the body of the female being 9 mm. and wings 9.5 mm. long. The wings are clear in both sexes, with pale yellowish veins. The original specimens were found by Mr. F. G. Chaplin on the trout ponds at Jonkershoek at midsummer 1930/31.

A smaller species, *C. perkinsi*, Barnard, named in honour of Mr. James Perkins, Secretary of the Worcester Trout-Anglers' Association, was found in the ornamental pond in the centre of his town. It is a very pretty little fly, with five red stripes on the abdomen, and the wing of the female is ornamented somewhat like that of *lacunosum*.

Two smaller species were described by Dr. Barnard, viz. *C. aeneum* from Groot Drakenstein, and *C. delicatissimum* from French Hoek. The latter is the smallest Baetid recorded at the Cape, the body of the female being only 3 mm. long.

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When the nymph of Esben-Petersen's species *africanum* was identified in 1931, Dr. Barnard instituted a new genus *Austrocloeon*, based on larval characters which justified separation from *Cloeon*. This species, *A. africanum*, has a wide distribution in South Africa. In the south-western Cape the flies were found in March and April, but specimens from other parts of the Union were taken at different seasons. The wings are clear, and the species is distinguished from that following by the fact that it has only a single cross-vein near the tip of the front marginal area of the wing.

The Keurboom Yellow, *Austrocloeon virgiliae*, first found by Dr. Barnard in the Keurbooms River, Plettenberg Bay district (the keurboom tree is *Virgilia* sp.), is a slightly larger species than the last, with two prominent cross-veins in the front margin of the wing. This May-fly seems to have a more limited distribution, but the collection of new material in 1931, 1932 and 1933 was confined to the southern Cape region. The female fly is up to 7 mm. long in the body, and 7—7.5 mm. in the wing. The subimago is a pale, creamy-yellow with milky-

white, wings, but the imago exhibits a more distinct pattern on the body and has clear wings with pale yellow veinings.

Nymphs were found in quiet waters in the trout areas of Stellenbosch, Groot Drakenstein and Worcester, and were particularly plentiful in the lower part of the Silvermine River, Clovelly. It was noted that those from the watercress beds were olive-green and that the subimagos emerging from them had a similar chlorophyll pigment which faded to yellow in alcohol.

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Two species from the streams of the south-western Cape were placed in the genus *Pseudocloeon*, Klap. These flies have paired disconnected veinlets around the rear margin of the wings (like *Baetis*, page 53, No. 14), and lack hind-wings.

The larger species, *P. vinosum*, Barnard,—a brownish fly, which emerges from a brown nymph of about 6 mm. long—was first found at Groot Drakenstein and in the Cape Peninsula, notably in the small Schusters stream near Simonstown where it appeared to be the only species of May-fly.

The second species, *P. magae*, Barnard, which is only about 4 mm. long, was secured in the Hex River, Sandhills. It is also a brownish insect and takes its name from *maga*, a witch—Hex! (Hex casts her magic spell over many—though she can reveal a heart as stony as her bed.)

The nymph of *magae* was not discovered. Indeed it is highly probably that further research will disclose a number of small and inconspicuous forms new to science.

THE FAMILY BRACHYCERCIDAE

IN this family, the adult flies are indeed very short-lived, in marked contrast to those of *Cloeon*.

The Cape Cain-fly, *Austrocaenis capensis*, Barnard.

The Cain-fly (*Caenis*) and its relatives have only two wings but possess three cerci or tail whisks. They have incurred a bad reputation with some British angling writers, mainly because they are said to induce violent rising of trout which will accept no imitation or substitute when they come on to feed on the masses of the spent spinners on the surface of a river or lake.

Eaton made some interesting notes on *Caenis* in his monograph. He recorded species from Europe, Africa, Asia and America, and as mentioned in Part I of these articles he found a specimen at Cape Town during his brief visit here in 1874, but did not describe it.

He included two small species (about 3—4 mm. long) from Lake Nyasa, which came to him in a rather unusual way. In 1877, H. B. Cotteril sent him a packet endorsed "Edible midges, which natives of Nyasa make into cakes, sold in their markets by the name of Kungu". Eaton says that this kungu was composed almost exclusively of a species of Culicidae (mosquito), but he extracted dried specimens of *Caenis* which he named *kungu* and *cibaria*.

The common, small species of the Cape is notable for periodical appearances in enormous numbers, the flies emerging from breeding areas which have provided favourable conditions—even if these have been transitory.

The nymphs inhabit still or gently flowing water and prefer silted or weedy bottoms. They are usually found in lakes, ponds and dams, but also occur in the back waters of rivers in the dry summers of the western Cape. (In February, 1931, the nymphs and flies of *A. capensis* were fairly plentiful in the stagnant parts of pools in the Dwars River, Groot Drakenstein.)

The mature nymphs vary considerably in size, but can be up to 8 mm. long with cerci 5 mm. long. They are of a uniform pale brown colour. They are found amongst weed and algae, but also burrow in or crawl on the mud of the bottom,

and are usually covered with particles of silt. The most noticeable feature is the "ballet skirt" arrangement of the abdominal gills. In keeping with their habits, the delicate gill membranes are protected by a pair of opercular or elyroid covers on the dorsal surface, from which a fringe of fine filaments may protrude.

The nymph rises to the surface of the water to disclose the subimago. The subimagos bred in captivity went through the final moult after a very short interval, usually "hatching" and moulting in the hours of darkness. In nature, the subimaginal skins can be found perched on trees, rocks and buildings adjacent to the water, white specks like pale ghosts of their former occupants.

The adult flies are coloured white, grey, buff and orange, the females being 4—6 mm. long, with wings 5—6.5 mm. long and cerci 4—6 mm. long. The males are slightly smaller, but their tail-whisks are enormously produced, being 15—17 mm. long and used as balancers in the nuptial flights. The females carry a large egg mass, at first yellow or orange, but turning black when ready to be deposited in the water.

The year 1930 must have been particularly favourable for the production of the Cape Cain-fly at Sandvlei, Muizenberg (Lakeside). Great swarms were first noticed on March 10, 1930, strewing the railway station platform near the lake early on a wet morning—the air being full of long-tailed males, accompanying females with pendulous black egg-masses. From that time onwards into the winter, the great emergences of these flies became evident even to the general public, particularly as the fronts of electric trains and the radiators and wind-screens of motor-cars were plastered with them. With a north-west wind, a continuous drift of Cape Cain-flies followed the railway line from Lakeside to Muizenberg and St. James, where they fell into the sea and were washed up by the waves on the beaches.

The station platform and buildings at Lakeside were so thickly covered with the bodies of the spent spinners that the railway workers were collecting them in great bulk, and Mr. F. G. Chaplin (then in charge of the Jonkershoek Trout Hatchery) arranged for paraffin tins crammed with the flies to be sent to Stellenbosch as trout food.

The shallow lake dried completely during the late summers of subsequent years, and the emergence of this May-fly was not noted thereafter in such quantities.

Eric Taverner ("Trout Fishing from all Angles", Seeley, Service, 1929) says that the largest British species, *Caenis halterata*, "is just worth trying to imitate . . . The dun hatches from a crawling larva, and rapidly changes into a spinner; the change takes place almost as soon as the dun has emerged and sometimes in the air. The trout feed less on the dun than on the spinner, which the angler may often see as it floats downstream spent, its outspread wings flush with the water. At certain times all the fish feed madly and exclusively on this fly".

He notes that Halford recommended his dressing of the jenny spinner for such occasions, but admitted that it was too large. Taverner's own pattern, on which he had taken fish feeding on the spent spinner of *Caenis*, was a tiny creamy-white hackle fly, tied on a 00 or 000 hook.

The Cape Cain-fly has similar habits, but it has not yet been found emerging in quantities from waters containing trout.

Crass found *Austrocaenis capensis* to be exceedingly plentiful in Natal and Eastern Cape, but varying considerably in both colour and size, the wings of some males being under 3 mm. long.

Dr. Barnard recorded a male from the Citrusdal district with body only 2 mm. long and wings 2.25 mm. long, which he considered to belong to a separate (undescribed) species.