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CAPE MAY-FLIES

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PART IV.—THE FAMILY LEPTOPHLEBIIDAE (*continued*)

THERE are three other common species of this family inhabiting the rocky streams of the Cape. They are smaller than the September and Summer Browns and the Pled and April Duns, but their general characters and life-histories are very similar.

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“Chestnut Dun” (*Castanophlebia calida*, Barnard).

In a chart showing the seasonal occurrence of adult May-flies of 30 Cape species, Dr. K. H. Barnard gave the Chestnut Dun credit for having been collected in all twelve months of the year—a distinction which it shared with the Yellow Dun (*Baetis harrisoni*). Like the majority of the species, it is in greater abundance during the spring, summer and early autumn months, which is the period of least rainfall in the south-western Cape. Dr. Barnard points out, however, that it should be borne in mind that collecting is often restrained in winter.

In rapid streams like the Groot Drakenstein Dwars and the upper Eerste and their tributaries, great numbers of small mature nymphs occur in spring, and those of the Chestnut Dun predominate. They are about 8 mm. in length of body, usually chestnut brown in colour with dark brown wing-cases, and their gill leaflets are long and narrow. They will be found under stones in the rapids, and are very common in places where there is a hard bed just out of the main current. In the same localities there are frequently numbers of small Stone-fly creepers (*Perlaria*) of the same colour, with which they should not be confused.

The flies which emerge from these nymphs have chestnut coloured bodies and three tail whisks, and their wings are greyish in the subimago and quite clear with faint chestnut veins in the imago stage. They vary from 6 to 8 mm. in body length, and their rather narrow wings are slightly longer than the body. Although the typical coloration is castaneous, there is considerable variation, and it was noted that nymphs from heavily-shaded streams were a light yellowish-brown with darker markings.

The Chestnut Dun is notably a day fly, and often appears in enormous numbers, both on dull rainy days and in bright sunshine. It is thus of interest to anglers, and approximates in size and colour to a small Red Quill.

One of the most spectacular “hatches” of small May-flies encountered during the investigations was that of Chestnut Duns on the Dwars River at Groot Drakenstein on October 27, 1930. They swarmed in the air over the river, and the subimagoes were resting everywhere on the banks, rocks and bushes. All stones protruding from the water were plastered with the skins of nymphs which had crawled out before the emergence of the flies. In that season the Chestnut Duns continued to appear in huge quantities until the end of November, when there was still a large reserve of maturing nymphs to ensure the continuance of the “hatch” for some weeks. In December the supply began to decrease, and only isolated specimens could be found by March; but on subsequent occasions mature nymphs were collected late in April, and adults were bred-out from them until the middle of May.

In the tank experiments it was found that this torrential form of nymph could rarely be kept successfully in still water in warm weather, but that in autumn and winter it was easy to handle them in this way. In summer the transformation from subimago to imago took place within 24 hours, and the adults were short-lived; but in cooler weather the final moult was delayed, and the adults were kept alive for as long as ten days. The female Chestnut Dun has the habit of resting for a few seconds on the surface of the water when depositing her eggs, and is thus accessible to trout at that stage.

(A second, and larger, species, *Castanophlebia albicauda*, Barnard, 9-10 mm. long, seems to be confined to mountain streams at higher altitudes. The body is also castaneous, but the terminal segments of the abdomen are pure ivory-white, a very conspicuous feature in the nymph. It was found at 4,000—5,000 feet in the Great Winterhoek mountains by Dr. Barnard, and on other high ranges.)

* * *

“Elegant Dun” (*Euthraulius elegans*, Barnard).—October to January, with stragglers until autumn.

This is the smallest Leptophlebiid to be recorded at the Cape, the adult being only 6 mm. long in the body and 6.5 mm. in the wing. The nymph occurs in stony stream beds, but is more tolerant of still-water conditions than that of the Chestnut Dun, perhaps because its gills have a larger surface for absorbing oxygen, and each broad leaflet has three prong-like extensions.

The little flies are brownish, and not so ruddy as the last species. The general body colour is raw umber, mottled with burnt umber and Vandyke brown, and with pale yellowish underparts. The wings of the subimago are blue-grey with rather long hairs along the hind margin; and after the final moult those of the imago are clear with faint yellowish-brown veins. The nymphs are mottled brownish, about 7 mm. long in the body, with pale fulvous cerci; and are recognisable by the treble filaments of the gills, which are held well over the back in life.

The first two nymphs to be collected came from the Eerste River at Jonkershoek on December 7, and three days later male and female subimagoes emerged by daylight, using the surface of the water for the transformation. In the same month a large batch of nymphs was collected from the Dwars River, and used for tank experiments. All the flies which emerged in captivity did so on the surface film, the nymph never crawling out on to the stones, and nearly always by night. The adults were short-lived, and in one case a female which emerged from the nymph at 10 p.m. had moulted to the imago stage before 8 a.m. next morning.

From the angler's point of view, the Elegant Dun and its stone-haunting nymph are usually just minor items amidst the welter of small May-flies of a clean, productive river bed.

* * *

“Darkening Dun” and “Bronze Spinner” (*Choroterpes nigrescens*, Barnard).

Surely no insect has a lovelier scientific name! The Genus *Choroterpes* (“delighting in the dance”) was founded by Eaton (1884), and several species from Europe, North and Central America and Lower Burma had been included. The writer found the first African representative to be classified in the Dwars River at Groot Drakenstein in January, 1931. Previous to that he had diarised on April 21 1928, that a great swarm of dark May-flies was hovering over the Holsloot River (in the next kloof to the Smalb'laar) on a bright, warm and windless morning, and that a good rainbow which was jumping right out to take them was hooked on a small Blue Quill fly. From subsequent experience, these were recognised as the Bronze Spinners of *C. nigrescens*.

This species is larger than the Chestnut and Elegant Duns, and is of considerable interest from the angling standpoint, particularly when the adults make such notable displays on upland rivers in late summer and autumn. Another point of note is the variation in size of this May-fly in different localities.

In the Groot Drakenstein Dwars River, where large numbers were collected for tank experiments, the size of the nymphs and flies was not very impressive, but those from the Smalb'laar and Holsloot rivers were notably larger. A remarkable case, however, was the occurrence of this species in a limestone stream in the Bredasdorp Division, where the nymphs were veritable giants in comparison. In the Klippedriftfontein stream, Potteberg district: “The Darkening Dun appears to be the only May-fly present (besides a few common Baetids)

... where the stream bed is encrusted with brownish limy deposits and soft flocculant matter. The nymphs are strikingly plentiful in the clear fishless pools... their shiny brown forms contrasting with the pale-coloured substratum. The largest nymphs collected in May, 1936, were little more than half grown. In this locality, where it does not encounter competition from other May-flies of similar habits, the Darkening Dun seems to grow larger, and the subimagoes to emerge earlier in summer. Some exceptionally large and handsome adults (correlated with the nymph) were collected here by Mr. A. T. Packham in October, 1931, with body and wing lengths of nearly half an inch—larger than the material collected in the Groot Drakenstein and Du Toit's Kloof trout streams, where the season for the adults is from January to about the end of April." (Harrison, Circular No. 26, July 1936, Cape Piscatorial Society, *Aquatic Fauna of Streams of Limestone Downs.*)

The nymphs of the Darkening Dun were at first confused with those of the Elegant Dun, to which they bear superficial resemblance when not fully grown, as they were found under the same stones in the river at Groot Drakenstein. In that locality the species overlap in their time of appearance—the former beginning to attain their full development at the end of December when those of the latter are becoming scarce. They were found to be quite the hardiest of all the smaller May-fly nymphs to handle in tanks. This may be on account of the adaptation of this species to low water conditions; as like the April Dun it makes its final growth when the water in the rivers of the south-western Cape is barely flowing and the temperature high. The double gill leaflets of the Darkening Dun nymph have a spear-head extension (with the membrane on each side of it deeply incised to allow twist and flap), and are capable of very free movement for creating a current and more effective gaseous exchange in still water. The body of the nymph varies from 8.5 to 10 mm. long, and its setae are about $1\frac{1}{2}$ times the body length. In colour it is usually olivaceous, with brownish and golden-yellow markings.

The emergence of the fly from the nymph takes place on the surface of the water. In captivity the nymphs took no advantage of protruding stones placed for their convenience; in fact, when the final stage of surface swimming arrived, if it was placed on a wet stone the nymph would struggle to regain the water for the act of transformation. A large number of subimagoes of this species were bred-out in tanks, and they almost invariably emerged at night. In warm weather the period of life of the fly was ephemeral, moulting from subimago to imago occurring within 12 hours, and the imago being either dead or moribund by the evening of the same day. In autumn the adult life was extended to three days.

Whilst the smaller trout obtain a good proportion of their food by picking up stone-haunting insect larvae in the rapids, it is not so certain that sizeable fish can collect enough in this way to compensate for the accompanying expenditure of energy. Leptophlebiid nymphs can often be seen feeding on the river bed, but at the slightest hint of danger they dart for cover, and the greatest number will always be found in the interstices beneath loose submerged stones of fair size. But the "zero hour", when the subimago is ready to emerge from the nymph, is a very critical time, particularly with those species which "hatch" at the surface. The trout's best opportunity for an easy and satisfying meal of highly nutritious "snacks" comes when there is a continuous drift of helpless nymphs which are about to disclose the subimago—notably in the case of the Baetids. To what extent some species gain immunity from predators by their habit of transforming by dark is not known. In the case of the Darkening Dun, it was noted that the time occupied in "surface hatching" varied a lot with individuals; and the strongest, which can perform a "quick-change act" and take off immediately to riverside cover, are doubtless the most likely to survive the crisis.

The "hatching nymph" stage is often of interest to fly-tiers, and the process which has to be undergone is not often described in detail. The following was the succession of events observed in the case of the Darkening Dun:—

A nymph was watched in the surface swimming stage on January 22 at a very usual time for this species—just before midnight. It was moving around very vigorously in the tank with its thorax touching the water surface, but at times it would reverse its position and walk back downwards, suspended from the film. It was floated into a watch-glass, and put under a strong lens and well illuminated. Its struggles continued whilst it was allowed to remain in water, and the gills were kept in rapid motion; but as soon as most of the water was drawn off the nymph became quiet. It moved the gills feebly for a few seconds, and then their action stopped abruptly. Simultaneously, the end of the abdomen could be seen in movement within the nymphal skin. At first the fly's tail whisks were noted to be drawn out of the nymphal sheaths, and then the whole abdomen contracted by a third of its former length before any other part of the body was affected. This contraction took place in a series of regular twitches occurring at intervals of about a second, and severed the tracheal branchiae from the spiracles—the first stage of ecdysis, by which the insect “burnt its boats” and abandoned its power of extracting oxygen from the water. Immediately the abdomen had been freed in this way, the “escape split” along the back of the thorax occurred very suddenly and completely, the suture appearing lengthwise over the mesonotum. This hole was extended laterally by the protrusion of the thorax, and the head was pulled backwards and freed from its nymphal covering. Then occurred a slight pause in the general forward movement whilst the fly could be seen to be working the main wing muscles in fluttering spurts of energy to withdraw the folded membranes from the nymphal wing-cases. As this was taking place the stage when the insect has so often been described as “growing longer” took place, and the sheaths which had enclosed the forelegs fell limply to the sides. The position was still precarious, with the head and thorax strained forward and upward in front of the exuviae, with the fore and intermediate pairs of legs trailing backward—the hind pair taking the strain of withdrawal, and the wings beginning to beat the air. When the specimen under observation had extended its wings it was able to disengage the hind legs and abdomen in readiness to “take off”.

As the names of this May-fly suggest, the adult darkens with age — its nigrescence is progressive. On account of its habit of emerging from the nymph and transforming to the imago during one night, teneral subimagos were not found in the wild state, and reliance had to be made on tank-bred specimens. These were very brightly coloured when they “hatched”.

The colours of the fresh subimago are not easy to describe in a few words. It displays a livery of shining raw umber, patterned and marbled with light yellow ochre, golden and warm brown; with smokey bluish-grey wings, light ochre legs, and light brown tail whisks ringed with darker brown.

But the Bronze Spinner stage is of more interest to the fly fisherman. The thorax of the male has become almost jet black under the wings and dark brown at the sides, and his abdomen brownish-grey ringed with dark brown and marked with golden brown, terminating in a black segment. The body of the female has a warmer rufescence. The imago wings are vitreous and iridescent with the membrane tinged with brown, and the network of veins coloured Vandyke brown and warm burnt umber. The female has a gamboge patch in the front part of the wing tip.

The males (which are the first to emerge) measure between 7 and 8 mm., with wings of similar length, and in this species the tail whisks are comparatively short, of little more than the body length. In both sexes the middle whisk of the three is usually the longest. The females were found to vary considerably in size (those bred from nymphs captured at the peak of the Groot Drakenstein season being the largest), with body and wings from 7 to 10 mm. long. When a swarm of male Bronze Spinners is seen in the air over the river they give the impression of being much larger insects than they prove to be when caught in the hat!