

CAPE MAY-FLIES

By A. CECIL HARRISON

PART III. THE FAMILY LEPTOPHLEBIIDAE (continued)

THE Genus *Aprionyx* Barnard. The Rev. A. E. Eaton placed his Table Mountain specimen (*tabularis*, 1884) in his genus *Atalophlebia*, which included some fine species well known in connection with the trout fisheries in Australia and New Zealand, as well as species from Ceylon and Chile. Subsequently, when the adult flies of several additional species were found in South Africa their characteristics justified their inclusion in that genus, but their nymphal stages were then unknown. However, when the nymphs of these May-flies came to light in the collecting of 1929-31, it was found that their claws were quite smooth, whereas those of the New Zealand species are toothed. Therefore, the new genus *Aprionyx* ("not-toothed-claws") was founded for the South African representatives.

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"Pied Dun" [*Aprionyx peterseni* (Lestage)]—October to April.

This species is mentioned first, as the flies appear throughout the greater portion of the trout-fishing season; whereas its larger relative, *tabularis*, is confined to autumn. Its common name came quite spontaneously, as the adult gives one the immediate impression of a whitish fly with black markings. It is fairly common in the mountain streams of the western Cape and in trout rivers such as the Eerste and Upper Berg, and is notably plentiful in the Witte River above Bain's Kloof, where its nymph-cases plaster the riverside stones at midsummer.

The female Pied Dun is usually somewhat less than half an inch long in both body and wing measurements, and the male rather smaller, although sexual disparity is not so marked as in some species. When the subimago emerges its whitish body has sharply contrasting black or dark brown markings, and its wings are cloudy. After about 22 hours the final moult occurs, and the general pattern of white and black is maintained and brightened; but the wings are now clear with very distinct blackish or dark-brown neuration. The cerci (twice as long as the body in the male) are also white with dark rings. Altogether it is a most striking fly, and easily distinguished from others of its group.

The Pied Dun nymphs bear some resemblance to those of the September and Summer Browns, and have similar habits, and are found in the same localities. In their later stages they are strikingly barred, as the markings of the subimago show through the clear amber of the nymph skin. At first they were confused with the growing nymphs of the larger April Dun (*A. tabularis*), but they lack the heavy fringes of hairs on the front legs and cerci which are such a prominent character of the latter. The first Pied Dun fly "bred" in captivity was from a nymph which had been obtained from the Eerste River at Jonkershoek late in July, and fed on Lakeside ooze through a series of moults until the subimago emerged by night on November 12th. This nymph had crawled up the side of the glass tank, so that the thorax was above the water-line before the fly broke out. In fact, throughout a long series of tank experiments with Pied Dun nymphs there was no single instance of the fly "hatching" from the nymphal shuck on the surface film of the water, and the nymphs usually managed to draw themselves half out of the water on the vertical glass of the tank, sometimes remaining thus for some hours before the transformation. This is the characteristic type of emergence of the Pied Dun in the rivers, but they usually pull themselves clear of the water on the rougher surface of the protruding stones. In captivity the season of emergence of this species extended from November until March. The "emptiness" (complete atrophy of the alimentary canal) can well be observed in the imago of the male Pied Dun, as the abdomen is unusually transparent. With a lens it can be seen that a regular flow of air bubbles passes from the thorax to the vent, appearing as

rings occupying the inner bore of the empty abdomen, and following each other at intervals of four seconds. It was also noticed that if the fluttering subimago became trapped in the surface film and was unable to disengage its wings, it sank to the bottom of the tank and sat with wings cocked or walked about with some freedom. The air bubbles were replaced by water passed along the abdomen by muscular force, and the subimago could live for as long as three hours in this unnatural state of submergence—but could not regain the air again and survive, as do some species of Baetidae which crawl underwater to lay their eggs.

Mention has been made above of the upper Witte River—the brown trout fishery of the Cape Piscatorial Society. It has a rather limited number of species of May-flies in comparison with the lower rivers. The September and Summer Browns and the April Dun did not appear in the 1929/31 collections from this part of the Witte River above the waterfalls, but the Pied Dun was very plentiful. On two recent occasions, viz., December 6th, 1947, and November 27th, 1948, fine dances of these May-flies were seen over the river during the late afternoon, and, as usual in summer, the stones were covered with Pied Dun nymph cases just at or above the water-line.

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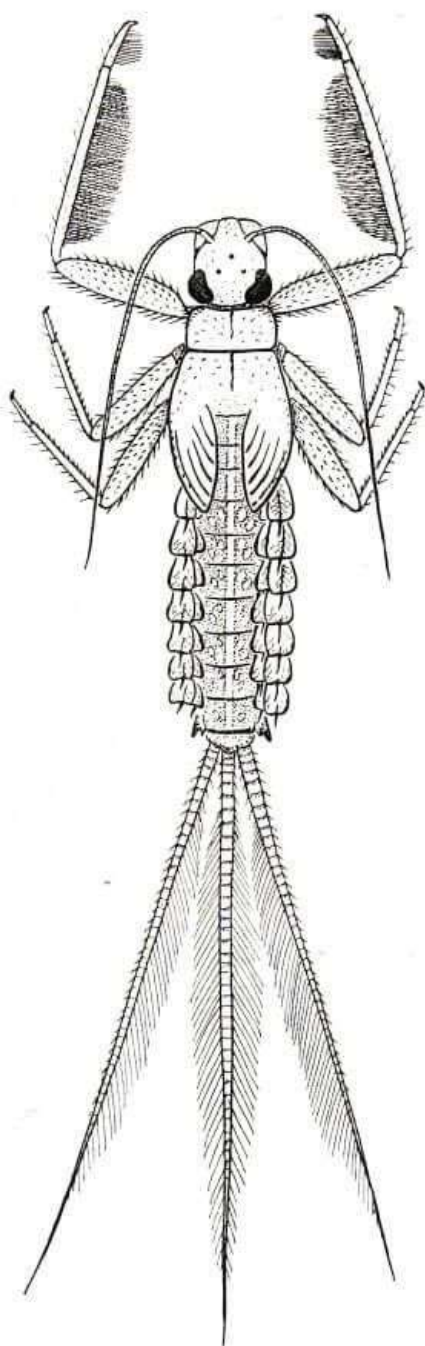
“April Dun” [*Aprionyx tabularis* (Eaton)]—March to June.

This is one of the largest of our Cape May-flies, and is rather strictly seasonal in its appearance. The common name was suggested by the spectacular flights of this insect over the Dwars River at Groot Drakenstein late in April—which is the peak of its season of emergence in most years. On one day in particular, April 27th, 1930, with the river low and clear during a warm sunny forenoon, the subimagoes were emerging from the nymphs which had crawled up the stones and many were fluttering on the water. But the majority of the April Duns were in the final, imago stage—the males gaily spinning and dancing in the air over the river. When an egg-laden female came lumbering along, pairing would take place in the air, and ripe females were continually dipping down to the water in the act of dropping their eggs. A No. 10 fly (tied with wing of marly-brown hen pheasant sword, whisks of the same, brown partridge hackle and fine tapered silver body) was cast to the rising rainbow trout until the limit of twelve had been kept. But the artificial was nothing like an exact imitation—although the size was approximately correct.

The body and forewings of the female April Dun are both about half an inch in length. In life the thorax of the female subimago, or dun, is reddish-brown with darker markings especially between the wings, and appears almost claret-coloured in some lights. Her abdomen is reddish-brown dorsally, with lighter dots on each segment, and the underparts are a light golden-brown. Her legs are brownish-red, mottled with a darker tint, her eyes are small and dark brown, the three cerci reddish-brown, and her forewings and small hindwings are greyish with well-marked neuration. When she has undergone the final moult there is not much difference in her body colours, but her tail cerci have increased in length, and her wings become clear. When ripe her body is distended with yellow eggs, and when she is spent it becomes depressed and assumes a “fallen-leaf” shade.

The male dun is smaller than the female, and the nymph from which he emerges is far less bulky than that of the opposite sex. His abdomen is slenderer, and terminates (as in all male May-flies) in a pair of forceps or claspers. His eyes are larger and a light reddish-brown, and his wings, legs and cerci are like those of the female. The body coloration and markings are brighter in the male subimago. The wings of the male spinner are gauzy with brownish veins, and his large turbinate eyes are a dull magenta, but in some lights shine like opals. The body colours have become darker; the thorax has the appearance of deep ruddy-bronze peacock herl, and the abdomen is sepia-brown with paler markings and smokey-grey underneath. The three “tail-whisks” are now more than two lengths of the body.

The fully-fed nymph of the April Dun can be easily distinguished from similar Cape May-flies, both by its size (up to 16 mm. long, with antennae 9 mm. long, and plumose tail cerci up to 20 mm. long) and its heavily-fringed forelegs. The nymphs are usually a rather light reddish-brown with paler mottlings, in contrast to the sepia-brown of the September Brown nymphs.



K. H. Barnard del.

The April Dun Nymph

The front legs, with their thick fringe of hairs on the tibia, are held forward in a rather aggressive and grasping position, although actually the creature is not at all predatory in its feeding habits. The long hairy cerci are brownish, and, like the antennae, are constantly waved when the nymph is resting or crawling, and are used as balancers in swimming. The gills are of the same general type as those of the September Brown nymph, but are blunt and notched, and not produced along the projecting central filament. When the nymph is nearing its final stage, the colours of the subimago within are barely masked by its skin, and the wing cases become much darker.

The April Dun nymphs occur in most of our trout streams. But as they are going through their final and most rapid period of growth in summer when the streams are usually very low, they tend to congregate in the deeper pools, where they can feed rather grossly on vegetable detritus. Under observation in tanks, the April Dun nymphs appeared to use the fringed forelegs as food-rakes, and were seen to pass this fringe laden with ooze through their mouth-parts apparently in the action of feeding. Of course, it might have been only cat-like aversion to untidiness!

The eggs are dropped in clusters as the female in flight dips her abdomen to the surface of the water — usually favouring the larger and more permanent pools for the purpose. The eggs are oval and of a light yellowish colour, pitted, but without attachment threads, and about .25 mm. in long diameter. A female April Dun, netted in the act of ovipositing on April 27th, discharged her entire egg-mass on being put into a tube of water; and the eggs, several hundreds, separated as they sank to the bottom. These eggs were retained in the same tube of Dwars River water, and on May 20th larvae hatched from the majority—22 to 23 days after laying. The newly-hatched larva was about .5 mm. long, plus its three tail cerci, and was hyaline-

yellow—resembling the later instars in general form, but without external gills or “aggressive” front tibiae. Attempts to rear them under various conditions were not successful.

Owing to the similarity of its appearance to the nymphs of the Pied Dun and the Intermediate, the early stages of the April Dun nymph are hard to isolate in river collections; but it was found that by December they were unmistakable when half-grown, the characteristic “stance” with the fringed front

legs held before it, and the plumose cerci, being very evident. They were light brown in colour, and not barred like the Pied Dun nymphs. In January they were very plentiful in all the pools, and their growth during the next $2\frac{1}{2}$ to 3 months was rapid in situations which provided their food-matter under low-water conditions.

April Dun nymphs in captivity disclosed the subimago from the middle of April, but the peak of the season was later. It was noted that in some instances the wing-cases, although large, were of the same light reddish-brown as the rest of the body of the nymph when it was captured, but that about a week before transformation they became dark brown. In other individuals dark wing-cases were present for a longer period. For some hours before the time of emergence of the subimago, the nymph becomes very restless and active. In some transformations the nymph was seen to hang at the surface with the dorsal part of the thorax just protruding through the film; the head, legs and abdomen drooping, but the gills very active. Then gill movement ceased abruptly, the thorax split, and the subimago emerged on the surface—an easy prey for trout! In the majority of cases the nymph crawled out on a stone before the fly emerged. It was found that the subimago stage lasts for about two days, and thereafter the imago will live in captivity for at least five days longer—but they were never as tolerant of enforced confinement as the spring May-flies. April Dun nymphs obtained in January and fed on the Lakeside ooze were reared to maturity in late April—the last female emerging on May 25th; but other individuals, probably undernourished, lingered on until late June before they died without transforming.

INDICATORS OF POLLUTION

In the very dry summer of 1949 it was found with much regret that a portion of the Dwars River at Groot Drakenstein, which had been a "happy hunting ground" for May-fly collecting in former years, was almost devoid of all bottom fauna. On April 18th a careful search was made in a series of pools when the river flow was reduced to a mere trickle, and not a single nymph of the April Dun could be found in identical places where they could always be expected before. The ecological conditions had deteriorated to an appalling extent as the result of water abstraction and from farming, domestic and abrasive pollutions. Higher upstream in the Dwars River, above the village of Pniel, the conditions were more normal, and April Dun nymphs were still to be found, as they were at the same time in the Eerste River at Jonkershoek. It is therefore evident that the April Dun nymph is a valuable indicator of the state of a stream. On this occasion the early instars of other May-flies were present in small numbers in the runs, and it is probable that the population of winter and spring forms would be partially restored during the winter rainy season. But the April Dun is particularly susceptible to inferior water conditions during late summer and autumn when it is making its final burst of growth; and no mature nymphs means no continuation of the species by ovipositing females in the affected part of the river. It is liable to be destroyed by this type of pollution before other species, as the result of interference with the tenor of its life cycle.

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"The Intermediate" [*Aprionyx intermedius* (Barnard)]—Winter and Spring.

This May-fly is not as plentiful in the angling season as the foregoing, and appears to be mainly a winter fly, with stragglers emerging in spring and early summer. It is smaller than the April Dun, which it resembles in general colouration, but a rather distinctive feature is that the three tail-whisks of the Intermediate are whitish with dark rings, whereas those of the April Dun are brownish.

The Intermediate nymph resembles that of the Pied Dun very closely (it is without the fringes of the front tibiae and the plumose median cercus and fringes on the lateral cerci of the nymph of *tabularis*), but its skin encloses a

darker subimago. Nymphs were collected in the Dwars River, Groot Drakenstein, in October, and the emergence of one female subimago was observed by night after the nymph had crawled out on to a stone in the tank. Adult flies were also collected in the woods near the river during that month, and Dr. Barnard recorded a male nymph, ready to disclose the subimago, as late as December.

Little is known about this species, and further research may show that it is not at all rare in its season in favoured localities, particularly in the higher mountain streams.

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Two other Cape species of the genus *Aprionyx* were recorded by Dr. Barnard. Both are known from collections made in the mountain streams at high levels, and not from the trout streams proper.

Aprionyx rubicundus, Barnard, is much smaller than any of the three species mentioned above, resembling the Chestnut Dun. It is a pretty little fly with distinctive maroon colour on the thorax, and wings with bright brown veins. It is very dark when fresh, and looks quite black when settling on white stones.

Aprionyx pellucidulus (Esben-Petersen) is a larger May-fly, with superficial resemblance to the April Dun, but as yet all those recorded have come from the higher mountain slopes in the Cape western area—at about 4,000 feet. Dr. Barnard got both adults and nymphs in the Great Winterhoek Mountains in November, 1932.
