

Freshwater Macroinvertebrates of Mount Buffalo

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Abstract

The macroinvertebrate fauna of Mount Buffalo is reported from surveys and the scientific literature. Five non-insect groups and 10 insect orders were found to occur on Mount Buffalo. Where possible the distribution, biology and ecology of the common and/or ecologically interesting species is documented. (*The Victorian Naturalist* 115 (5), 1998, 215-221).

Introduction

The adults of many aquatic macroinvertebrates are highly visible and most people are familiar with this stage of the life cycle. The bushwalker acknowledges the aesthetic beauty of the brightly coloured dragonfly and the fisherman mentally notes the form of the snow-flake caddisflies which are swarming *en masse*. However, the larval or nymphal stage, which is the longest lived and most abundant stage, is completed under-water and attracts little attention or notice. The streams on Mount Buffalo, considered here as those within the Buffalo National Park, are pristine with a diverse macroinvertebrate fauna, dominated by the speciose insect orders, Ephemeroptera, Plecoptera and Trichoptera.

The species reported here are the more common and/or ecologically interesting species presently known from Mount Buffalo and this paper is not a definitive appraisal of the total aquatic macroinvertebrate fauna. The information has been obtained from my surveys, plus information provided by colleagues or available in the scientific literature. The paper is organised in phylogenetic order (most primitive to most modern) and presents five non-insect groups and 10 insect orders, and in most cases devotes a paragraph to the species of an individual family.

This paper provides an overview of the macroinvertebrate fauna and if the reader requires additional information the following literature should be consulted. A broad classification of aquatic macroinvertebrates can be made in the field by using the 'Colour Guide to Invertebrates' (Hawking and Smith 1997) or the Gould League

publication 'Freshwater Invertebrates' (Miller 1996). However, scientific taxonomic keys must be used for positive identifications, and the keys are listed in Hawking (1998).

Non-Insects

Flatworms Tricladida

The flatworms are one of the most primitive macroinvertebrate groups occurring on Mount Buffalo and are represented by three species from the family Dugesiidae. *Spathula agelaea* Hay & Ball, is the most common flatworm, generally found in large clumps, but has never been found in company with *Reynoldsoni reynoldsoni* Ball, a species recorded only from the alpine area of Mount Buffalo. The third species *Cura pinguis* (Weiss), a common species throughout Australia, has been recorded from the disturbed section below The Reservoir (Hay and Ball 1979).

Mussels Mollusca, Bivalvia

The 'Pea mussel' *Pisidium casertanum* Poli, family Sphaeriidae, is commonly found in the mud and sand of pools in Running Jump Creek (Fig. 1). The mussel is small, growing up to 4 mm, burrows into the sediments, and feeds by filtering food which is ingested through a siphon.

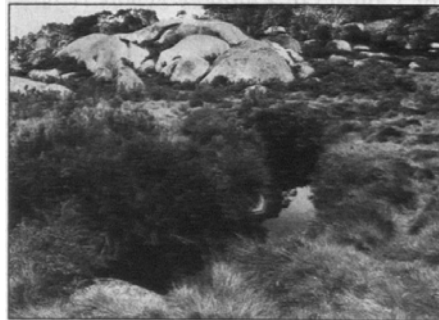


Fig. 1. Pools in Running Jump Creek, near Wirbill Plain.

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Worms Oligochaeta

The aquatic worms of Mount Buffalo have not been adequately surveyed, but from the limited collections, two species *Nais communis* Pignet, Naididae, and *Lumbriculus variegatus* (Muller), Lumbriculidae, are common. *Nais communis* is a small worm, up to 5 mm and *L. variegatus* is an elongate, slender worm, up to 10 cm long, with a dark coloured body (commonly known as black worms), often found in bundles. *L. variegatus* is a European species, which was introduced as live food for fish aquaculture, but has now become widespread and common.

Mites Acarina

The mites are small, most less than 3 mm, and are common in most stream habitats on Mount Buffalo. They belong to four families. A species of *Flabellifrontipoda*, Oxidae, was collected from the mud/detritus from Running Jump Creek. Three species of Hygrobatidae, *Australobates mutatus* K.O. Viets, *Aspidiobates similis* Cook and *Procorticacarus angulicoxalis* (K.O. Viets), were collected from the gravels of Eurobin Creek above Lake Catani and *Hydrodroma*, Hydrodromidae, and *Barwonius*, Aturidae from submerged logs in Eurobin Creek below the falls (Fig. 2).

Yabbies, Crayfish Crustacea

The Isopoda and the Decapoda are the most prominent crustaceans on Mount Buffalo. The isopod, *Colobotelson joyneri* (Nicholls), Phreatoicidae, was very common in the mud/detritus of the alpine bogs and streams. The most commonly found decapods, family Parastacidae, were Murray Cray *Euastacus armatus* (von Martens), Common Yabby *Cherax destructor* Clark, and Blunt-nosed Yabby or Land-crab *Engaeus cymus* (Clark) which were found in the montane section up to 700 m, of many of the streams draining from Mount Buffalo. *Euastacus armatus* occurred in permanent flowing rivers, whereas *C. destructor* occurred in some streams, but preferred billabongs, swamps and ponds. In contrast *Engaeus cymus* is semi-aquatic and lives in burrows in the banks of streams (Horwitz 1990).

Insects

Mayflies Ephemeroptera

Four families of Mayflies, Letophlebiidae,

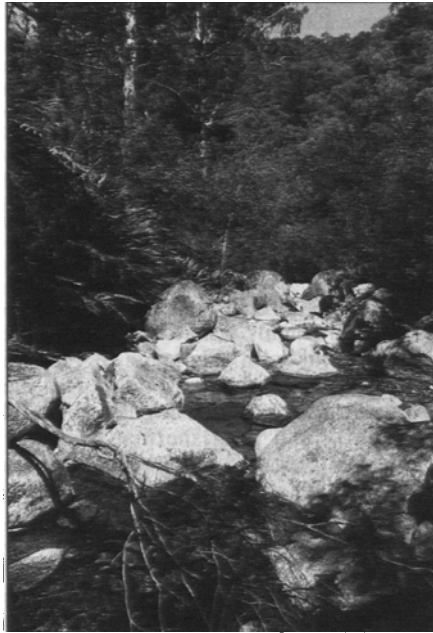


Fig. 2. Eurobin Creek, down stream of Eurobin Falls.

Baetidae, Ameletopsidae and Coloburiscidae are represented by 16 species. The most speciose family was the Letophlebiidae, with 12 species. Of these nine species occurred at Eurobin Falls, *Austrophlebioides pusillus* (Harker), *Atalophlebia* sp. AV4*, *Tillyardophlebia rufosa* Dean, *Tillyardophlebia* sp. AV3, *Neboissoflebia hamulata* Dean, *Ulmerophlebia* sp. AV2, *Koornga* sp. AV1, *Nousia* sp. AV2 and *N. sp. AV4*. Many of these species were also found in the alpine region, plus another three species, *Ulmerophlebia* sp. AV1 and *Garinjuga* sp. AV1 in Crystal Brook, and *Nousia* sp. AV1 in Running Jump Creek. A specimen of *Austrophlebioides pusillus* collected from Buffalo Creek, Rollason's Falls, had a larva of the chironomid *Symbiocladius aurifodinae* Hynes attached laterally to the thorax (Pl. 6B). The Chironomid parasitises the Mayfly causing reduced final growth (Hynes 1976).

Three species of the family Baetidae have been recorded from streams flowing

* Unnamed species are given Australian voucher numbers and lodged with the Museum of Victoria. This is a genus-based system, hence the repetition of numbers here.

through the mountain forest section of the lower slopes: Genus 2 sp. 1 from Eurobin Falls, and Genus 2 sp. 3 and *Bungona* sp. from Buffalo Creek, below Rollason's Falls (Phil Suter *pers. comm.*). Nymphs of *Mirawara* sp. (Ameletopsidae) were found amongst stones and cobbles of Buffalo Creek upstream of Rollason's Falls (Fig. 3.) The nymphs are predators and apparently bury into cobble substrates during the day and return to the surface at night to feed (Campbell 1980). In contrast, the nymphs of *Coloburiscoides* sp., Coloburiscidae, were found amongst cobbles and gravels in the fast current at Eurobin and Rollason's Falls, but are filter-feeders which use the fringes of setae on their fore- and midlegs to filter fine particles of food from suspension (Dean and Suter 1996).

Dragonflies and Damselflies Odonata

Adult dragonflies and damselflies are conspicuous insects and are readily seen flying over the summer and early autumn months. The most common damselflies are species from the family Lestidae. *Austrolestes psyche* (Hagen in Selys) larvae are very common in the reed beds along the margins of Lake Catani (Fig. 4). *Austrolestes cingulatus* (Burmeister) tends to inhabit pools in small streams and trickles while *A. annulosus* (Selys) prefers well vegetated still waters, such as near The Reservoir. Also collected in the vegetated waters near The Reservoir were two species of the family Coenagrionidae, *Austroagrion watsoni* Leiftinck and *Ischnura aurora* (Brauer). In contrast two species *Austroargiolestes calcaris* (Fraser) and *A. icteromelas* (Selys), Megapodagrionidae, were recorded from streams. The larva of

the former inhabits vegetated pools in the upper stretches of the streams, down to the elevation of Eurobin Falls, where it co-occurs with the later species, whose larvae inhabit logs and detritus.

The dragonflies were dominated by species of the family Aeshnidae (7 species). *Austroaeschna flavomaculata* Tillyard occurred on the stream bed or amongst marginal vegetation, while *Austroaeschna parvistigma* Selys occurred in rock pools, with dense growths of submerged vegetation, in small alpine streams. Three species were common in the streams flowing down through the mountain forests, with *A. atrata* Martin occurring on logs, *A. pulchra* Tillyard in the gravels and *Notoaeschna sagittata* (Martin) clinging to the underside of rocks. In contrast *Hemianax papuensis* (Burmeister) was a common species amongst the rush beds on the western margin of Lake Catani, whereas *Aeshna brevistyla* Rambur generally occurred in more densely vegetated still waters.

The larvae of *Synthemis eustalacta* (Burmeister), Sythemistidae, (Pl. 6C) inhabits areas of mud/detritus in the alpine bogs and streams. Of two cosmopolitan species of Corduliidae, *Hemicordulia tau* Selys, were very common at Lake Catani, while adults of *Procordulia jacksonensis* (Rambur) were found flying over the alpine marsh pools. The family Gomphidae is represented by *Austrogomphus guerini* (Rambur), whose larvae inhabit the gravel/cobble substrate of Eurobin Creek above Lake Catani. The adult is recognisable by the continuous yellow stripe on all abdominal segments.



Fig. 3. Rollason's Falls. Photo by Sharon Ford, January 1998.



Fig. 4. Reed beds on the western edge of Lake Catani.

Stoneflies Plecoptera

Species of the four Australian families (Eustheniidae, Austroperlidae, Gripopterygidae and Notonemouridae) have been recorded from Mount Buffalo. Species of the family Eustheniidae are distinguished by their white lateral gills on the first 5 or 6 segments. The most commonly found species is *Cosmioperla kuna* (Theischinger), a large nymph, final instar 25–38 mm long, occurring on loose stones in larger streams, such as Buffalo Creek (Hynes 1978).

Two species of Austroperlidae, *Austropentura victoria* Illies and *Acruroperla atra* (Samal), are common in most stony streams on Mount Buffalo. Austroperlid larvae are recognised by the presence of 5–7 beaded gill filaments, which includes the cerci. The nymph of *Austropentura victoria* is medium sized (final instar, 17–20 mm long) with three gills, plus cerci, a total of five beaded filaments and pale spots on the abdomen, whereas the nymph of *Acruroperla atra* is readily identified by the distinctive paired abdominal protuberances.

The Gripopterygidae nymphs are identified by the presence of a bunch of anal gills. The most commonly collected species was *Eunotoperla kershawi* (Tillyard), a large species 16–18 mm long, which occurred on large stones in the swift current (Hynes 1978). In contrast the Notonemouridae nymphs all lack gills and the sterna of abdominal segments 2–9 are divided into upper and lower segments. The nymphs of *Austrocercia tasmanica* (Tillyard) (Pl. 6D), *Austrocercella alpina* Theischinger (a species restricted to only alpine regions), and *Austrocercella communis obtusa* Theischinger (Eurobin Creek is the 'Type locality'), are common in most of the fast flowing streams.

Bugs Hemiptera

Aquatic bugs are opportunists which move between water-bodies, generally inhabiting still waters and backwaters or margins of streams. The families can be separated into three ecological groups: fully aquatic, shore-dwelling and surface-dwelling. The fully aquatic bugs are represented by the Water Boatmen Corixidae, with *Sigara sublaevifrons* (Hale) generally the most abundant species and the Back Swimmer *Anisops*, Notonectidae, which was very common in Lake Catani.

The surface dwelling families, Water Striders Gerridae, Small Water Strider Veliidae and Water Treaders Mesovelliidae have been collected at Mount Buffalo. *Tenagogerris euphrosyne* (Kirkaldy), Gerridae, has been collected from The Reservoir and Upper Rose River and a species, *Mesovelvia*, Mesovelliidae, has been collected from the waters of The Reservoir (I. Endersby pers. comm.). Three species of *Microvelia*, Veliidae, have been recorded: *Microvelia peramoena* Hale from The Reservoir, possibly the most common species, *M. oceanica* Distant from the Buckland Valley and *M. fluvialis fluvialis* Malipatil from the Buffalo River Valley (Malipatil 1980).

Alderflies, Dobsonflies Megaloptera

The larvae of a species of *Archichauliodes*, Corydalidae, is common on the undersides of rocks or amongst debris in the fast flowing streams. The larvae are distinguished by the large powerful prey-capturing mandibles and the eight pairs of lateral gills.

Lacewings Neuroptera

There are most likely other species of Neuroptera from Mount Buffalo, but I have only collected larvae of a species of *Kempynus*, Osmylidae, from under stones and damp litter amongst logs on stream margins at Eurobin Falls. The larvae are semi-aquatic carnivores and can be distinguished by their very long straight mandibles and maxilla, which are much longer than the head.

Beetles Coleoptera

Five families (Dytiscidae, Hydrophilidae, Elmidae, Scirtidae and Gyrinidae) were collected from Mount Buffalo. Adults of the predacious diving beetles dytiscids *Antiporus femoralis* (Bohemman), *A. gilberti* (Clark), and *Rhantus suturalis* (W. MacLeay) were collected from pools on Eurobin Creek, above Lake Catani. Both the adults and larvae are aquatic and are found swimming and diving in the edge zone of still and flowing waters. Also in the same pools was the larvae of an unknown species of marsh beetle, Scirtidae and two species of water scavenging beetles, *Enochrus mastersi* (W. MacLeay) and *Notohydrus* sp., Hydrophilidae. The two hydrophilid species have a widespread distribution and are common in still waters. Only the larval stage of the scirtids

is aquatic and these larvae can be recognised by their multisegmented antennae.

The larvae of two Riffle Beetles, Elmidae, *Notriolus maculata* Carter and *Kingolus yarrensensis* Carter & Zeck were collected from Mount Buffalo. *Notriolus maculata* is a wood-chewing species which was found in grooves in submerged logs at Eurobin Falls. In contrast *K. yarrensensis*, a grazer, occurred as an adult and larva in the submerged roots of native bushes growing on the edges of the stream at Dicksons Falls (Fig. 5). In contrast to the benthic dwellers is the Whirligig Beetle *Macrogyrus*, Gyrinidae, which swims on the surface and was very common in late summer. The adults have their eyes divided into an upper and lower section, which allows them to see above and below the water's surface simultaneously.

Scorpion-flies Mecoptera

The larvae of the scorpion-flies from Mount Buffalo have not been associated with a described adult and can only be identified to the genus *Nannochorista*, Nannochoristidae. The larvae are elongate, 16–20 times as long as their diameter, with a heavily sclerotised head and pronotum and are very common in the mud/detritus in the bogs and pools of Running Jump Creek.

True-flies or Two-winged-flies Diptera

The 'flies' are generally the first insect to greet visitors to Mount Buffalo during the warmer months, and are remembered for their nuisance value and/or painful bites. Many of these species have aquatic larvae and representatives of some of the more common families found on Mount Buffalo are presented below.

The adults of the families Biting Midges Ceratopogonidae, Black Flies Simuliidae and Mosquitoes Culicidae are the common nuisance species. The larvae of the ceratopogonid, *Bezzia* sp., are thin worm-like animals which are found in the detritus of pools and bogs of streams, being common in Running Jump Creek. Also occurring in this creek is the simuliid, *Austrosimulium furiosum* (Skuse), which can be found usually attached to plants and rocks. In contrast, the Mosquito larvae of *Aedes notoscriptus* (Skuse) were plentiful in rock-pools at Dicksons Falls and the adults sheltered in the shaded areas near the falls.

Two other interesting families are the Craneflies Tipulidae and the Athericidae, which both were found in the bogs and pools of the alpine streams, especially Running Jump Creek and Dingo Dell Creek. The tipulids could only be identified to the subfamilies Limoniinae and Tipulinae, and the athericid to the genus *Dasyomma*.

Blephariceridae larvae are unusual, differing from the generalised larval form in that they are flattened, and comprise six principal divisions, each with a well-developed sucker ventrally (Pl.6E, 6F). The larvae attach to rocks of swiftly flowing streams and graze on the algae attached to the rocks. Zwick (1977) recorded 3 genera, with 7 species from Eurobin Creek, near and below the falls; *Edwardsina pilosa* Zwick, *E. bubalus* Zwick (Type locality), *E. williamsi* Zwick, *E. torrentium* Zwick, *Edwardsina* sp. A, *Austrocurupira nicholsoni* (Tillyard) and *Apistomyia tonnoiri* Tillyard.

Species of three subfamilies of non-biting midges, Bloodworms Chironomidae Chironominae (*Polypedilum*, *Tanytarsus*, *Rheotanytarsus*), Tanypodinae (*Paramerina*, *Ablabesmyia*) and Orthocladiinae

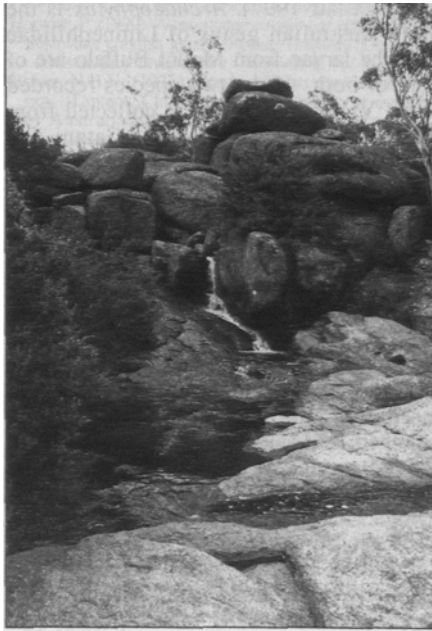


Fig. 5. Running Jump Creek at Dicksons Falls.

(*Cricotopus*, *Paralimnophyes*) have been collected from Running Jump Creek. The larvae of *Polypedilum* are shredders which feed on plant material, whereas the larvae of *Rheotanytarsus* are tube-dwellers, which attach to wood or stones and collect/filter food caught in a net at the outer end of the tube. Another interesting Chironominae species, found in the Buckland River, is *Imparipecten pictipes* Freeman, Chironominae, whose larva is a true wood-miner, forming excavated galleries in immersed wood (Cranston and Hardwick 1996). The other two subfamilies also show major feeding differences. *Paramerina* is a predator which engulfs its prey, while *Cricotopus* feeds by scraping attached algae from rocks, plants etc.

Caddis-flies Trichoptera

The Trichoptera are very diverse at the family level, with more than 11 families occurring on Mount Buffalo. Many families are speciose (Leptoceridae and Hydrobiosidae), but most contain a single species or only a few species. Likewise the family Calamoceratidae is represented by a single species of the genus *Anisocentropus*, whose larvae are readily distinguished by their flat case made of only two pieces of leaf material (St Clair 1997). *Archaeophylax* is the only Australian genus of Limnephilidae and the larvae from Mount Buffalo are of one or both, of the two species recorded from Victoria. The larvae collected from Eurobin Creek, above Lake Catani and Dingo Dell Creek were moderately large, up to 20 mm, with cylindrical, slightly curved cases consisting of plant materials. Another species which has a similar case, being very broad anteriorly, strongly curved, constructed of small sand grains, but considerable smaller (up to 5 mm) is *Austrheithrus* sp., Philorheithridae. The larvae can be recognised by the fused tibia and tarsus of the mid leg. They are predators and are always found in low numbers (St Clair 1997).

Plectrocnemia sp. AV1, Polycentropodidae, was found in the alpine region, at Dingo Dell and Running Jump Creek. Its larvae construct retreats of a loose silken net on rocks (Cartwright 1998). Another related family is the Ecnomidae, of which larvae of a species of *Ecnomina* were collected from Buffalo Creek, below Rollason's Falls (Phil

Suter pers. comm.). *Ecnomina* larvae are predatory, free living and construct fixed tubes or retreats of silk on rocks or logs (Cartwright 1997).

The family Leptoceridae is represented by at least four genera, with ten species. Four species of *Notolina* were recorded. *N. fulva* Kimmins and *N. spira* St Clair have both been found associated with detritus and macrophytes in The Reservoir and *N. ordina* St Clair was found at Eurobin Falls with *N. bifaria* Neboiss in a small creek below The Reservoir. *N. bifaria* is associated with the riparian vegetation, usually near the water surface, whereas the other three species are benthic dwellers (St Clair 1991). *Notoperata maculata* (Mosely), *Triplectides elongatus* Banks and *T. varius* Kimmins are all found in sphagnum bogs and alpine creeks above 1500 m on Mount Buffalo. *Lectrides varians* Mosely and *T. ciuskus* Mosely are reported from a wide range of habitats and at Mount Buffalo were found at Lake Catani (St Clair 1994). In contrast *T. truncatus* Neboiss was only collected from Eurobin Falls, at a much lower elevation than the other species.

A species of *Helicopsyche* (only Australian genus of Helicopsychidae) was collected from Eurobin Falls and near Rollason's Falls (Phil Suter pers. comm.). The larvae are easily recognised by their small (up to 6 mm) helical case and were usually found on stones where they grazed on algae.

Two species of Hydropsychidae were found: *Asmicridea* sp. AV1 (Eurobin Falls and Crystal Brook) and *Diplectrona* sp. AV2 (Eurobin Creek, at the Falls and at the underground river, downstream of Lake Catani) (John Dean pers. comm.). The hydropsychid larvae are readily distinguished by their conspicuous branched abdominal gills and their three sclerotised nota. The larvae construct retreats, of plant and mineral material, with an upstream entrance organised into a capture net which filters food particles.

Eight species of Hydrobiosidae have been collected from Mount Buffalo and were very common at the following sites: Eurobin Falls, *Psyllobetina atunga* Neboiss, *Ulmerochorema rubiconum* group, *U. seona* (Mosely), *Taschorema evansi* Mosely, *Ethochorema turbidum* (Neboiss); Eurobin Creek upstream of

Lake Catani, *Apsilochorema obliquum* (Mosely), *Koetonga clivicola* Neboiss, *E. turbidum*, *Ptychobiosis* sp.; Crystal Brook, Reservoir Road, *U. rubiconum* gp., *T. evansi*, *E. turbidum*, *Ptychobiosis* sp. (John Dean pers. comm.). The hydrobiosid larvae are predacious and free living, and are reported to trail a silken thread which is attached to the substrate (Dean 1997).

Two species of Philopotamidae, *Hydrobiosella waddama* Mosely and *Chirmarra monticola* Kimmins (Pl. 6G) occurred in both the alpine and forest streams on Mount Buffalo. Their larvae construct silken tubes or sack-like nets on the underside of rocks in flowing water. They feed by cleaning the fine detritus and algae from the net with their highly specialised labrum. The labrum is membranous, a feature which distinguishes the larvae (Cartwright 1997).

Three species of Hydroptilidae, *Hellyethira simplex* (Mosely), *Oxyethira columba* (Neboiss) and *Orthotrichia* sp. were all collected from Running Jump Creek. *Hellyethira simplex* constructs a more or less rectangular case built of secretions, and is found attached to rocks amongst filamentous green algae. *Oxyethira columba* secretes a flask-shaped case (Pl. 6H), which it attaches to rocks amongst filamentous green algae. The final instar larvae of the Mount Buffalo species of *Orthotrichia* have a very small head and a body that resembles a 'honey-pot' in an elongate case with rounded ends. The pupae don't attach to rocks as do those of many other hydroptilids, but parasitise the pupae of hydropsychids and philopotamids (Alice Wells pers. comm.).

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References

Campbell, I.C. (1980). Diurnal variation in the activity of *Marawara purpurea* Riek (Ephemeroptera):

- Siphonuridae) in the Aberfeldy River, Victoria, Australia. In: J.F. Flanagan and K.E. Marshall (eds.). 'Advances in Ephemeroptera Biology'. pp. 297-308. (Plenum Press: New York).
- Cartwright, D.I. (1997). Preliminary guide to the identification of late instar larvae of Australian Ecnomidae, Philopotamidae and Tasimiidae (Insecta: Trichoptera). Identification Guide No. 10. 33 pp. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Cartwright, D.I. (1998). Preliminary guide to the identification of late instar larvae of Australian Polycentropodidae, Glossosomatidae, Dipsuedopsidae and Psychomyiidae (Insecta: Trichoptera). Identification Guide No. 15. 28pp. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Cranston, P.S. and Hardwick R.A. (1996). The immature stages and phylogeny of *Imparipecten* Freeman, an Australian endemic genus of wood-mining chironomid (Diptera). *Aquatic Insects* 18, 193-207.
- Dean, J.C. (1997). Larvae of the Hydrobiosidae (Insecta: Trichoptera). Identification Guide No. 11. 53 pp. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Dean, J.C. and Suter, P.S. (1996). Mayfly nymphs of Australia; A guide to genera. Identification Guide No. 7. 82 pp. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Hay, D.A. and Ball, I.R. (1979). Contributions to the biology of freshwater planarians (Turbellaria) from the Victorian Alps, Australia. *Hydrobiologia* 62, 137-164.
- Hawking, J.H. (1998). A guide to keys and zoological information to identify macroinvertebrates from Australia freshwaters. 2nd ed. Identification Guide No. 2. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Hawking, J.H., and Smith, F.J. (1997). Colour guide to invertebrates from Australian inland waters Identification Guide No. 8. 204 pp. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Horwitz, P. (1990). A taxonomic revision of species in the freshwater crayfish genus *Engaeus* Erichson (Decapoda: Parastacidae). *Invertebrate Taxonomy* 4, 427-614.
- Hynes, N.B.N. (1976). *Symbiocladus aurifodinae* sp. nov. (Diptera: Chironomidae), a parasite of nymphs of Australian Leptophlebiidae (Ephemeroptera). *Memoirs of the Museum of Victoria* 37, 47-52.
- Hynes, H.B.N. (1978). Annotated key to the stonefly nymphs (Plecoptera) of Victoria. *Australian Society of Limnology Special Publication* No. 2, 64pp.
- Malipatil, M.B. (1980). Review of Australian *Microvelia* Westwood (Hemiptera: Veliidae) with a description of two new species from eastern Australia. *Australian Journal of Marine and Freshwater Research* 31, 85-108.
- Miller, R. (1996). *Freshwater Invertebrates*. (Gould League of Victoria: Melbourne).
- St Clair, R.M. (1991). The genus *Notalina* (Trichoptera: Leptoceridae: Triplectidinae) in south-eastern Australia, with descriptions of the larvae and pupae. *Invertebrate Taxonomy* 4, 895-934.
- St Clair, R.M. (1994). Some larval Leptoceridae (Trichoptera) from south-eastern Australia. *Records of the Australian Museum* 46, 171-226.
- St Clair, R.M. (1997). Preliminary guide to the identification of late instar larvae of Philorheithridae, Calamoceratidae and Helicopsychidae (Insecta: Trichoptera). Identification Guide No. 12. 42 pp. (Cooperative Research Centre for Freshwater Ecology: Albury).
- Zwick, P. (1977). Australian Blephariceridae (Diptera). *Australian Journal of Zoology. Supplementary Series* No. 46, 1-121.