

A SURVEY OF THE STREAM FAUNA OF LITTLE BARRIER ISLAND

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INTRODUCTION

The only recorded study on the fresh-water insect fauna of Little Barrier Island is that of Wose (1954) who made his collection in November when many of the streams were dry or contained very little water. This temporary nature of the inland waters places restrictions on the components of the fauna so that only those animals which can survive a dry period in some stage of their life cycle are able to live in the majority of the Little Barrier Streams. Only two, the Awaroa Stream and the TeWairere Stream contain water all the year round and in both of these the volume is considerably reduced, with much of the remaining water flowing below the surface of the boulder-covered stream bed, or escaping to a low water-table level.

The majority of streams have a rugged youthful appearance, but at present stream erosion appears to be insignificant. On the south-western coast where the topography is relatively more mature than elsewhere, most streams have graded their lower courses to beach level and here alluvium has been deposited. This is the case in both the Awaroa and Tirikakawa Streams.

This study was made in August 1963 when all but the smallest streams were flowing. None of the streams was in flood.

Surveys were made of the fresh-water fauna of four streams in the south-west corner of the island (see map). These were the Awaroa, Tirikakawa, Haowhehua, and Paraha-koakoa Streams. From a qualitative and quantitative study of the components of the fauna from each of the streams :-

1. A list of the stream animals was compiled.
2. A comparison was made between the faunas of pools and riffles.
3. The distribution of riffle animals in different regions of the stream was investigated.
4. Significant differences between streams were noted.

Owing to the limited time available for this work the results obtained must be considered as merely a preliminary study of the aquatic fauna of the Island.

Field Work Techniques

Stations were sampled by turning over and brushing all stones within an area of 2 - 3 square feet, so that the animals clinging to them would be swept into a hand net held down-stream.

SURVEY OF THE AWAHOA STREAM

Description of Sampling Stations

Zone 1: The topmost station, A, is a moss-covered sheet of rock forming a race, over which a shallow stream of water flows into station B, a riffle with water flowing over a bed of loose stones.

Zone 2: Station C is a clear pool 6-12 inches deep, the water flowing slowly over a substrate of flat stones. This region of the stream consists of numerous pools with rapid riffles connecting them. It is sheltered by dense vegetation which prevents penetration of sunlight but provides considerable accumulation of leaves and twigs in the stream. Station D is a narrow interconnecting riffle.

Zone 3: Station E is a riffle similar to those found in Zones 1 and 2, and Station F a slow flowing pool.

Zone 4: Station G is a riffle 500 yards from the river mouth, and Station H a pool with a smooth pebbly bottom.

TABLE I.

Riffles - stations A, D, E, G.
 Pools - stations C, F, H.
 Moss-covered rocks - Station B.

| | A | D | E | G | Total | C | F | H | Total | B |
|---------------------------------|----|---|----|----|----------|---|----|----------|-------|----|
| Ephemeroptera | | | | | | | | | | |
| <i>Dolastidium</i> sp. | 2 | 1 | 9 | 38 | 48 | 6 | 6 | | 12 | |
| <i>Zephlebia crucifata</i> | | | | | | | 2 | 1 | 3 | |
| <i>Z. versicolor</i> | | | | | | | 1 | 2 | 3 | |
| <i>Z. dentata</i> | | | | | | | | | | 2 |
| <i>Mesamialetus ornatus</i> | | | | 2 | | | | | | |
| <i>Amalestopteryx percitus</i> | | | | | | | 2 | 1 | 3 | |
| Plecoptera | | | | | | | | | | |
| <i>Stenoperla prasina</i> | 3 | 6 | 1 | 2 | 12 | 1 | | | 1 | |
| <i>Austroperla cyrene</i> | 4 | 2 | | | 6 | | | | | |
| <i>Nesoperla trivacata</i> | | | | 14 | 4 | | 18 | 9 | 9 | |
| <i>Zelandobius n. sp.</i> | | | | | | 7 | 7 | | | |
| <i>Zelandoperla</i> sp. | 5 | 1 | 10 | 6 | 28 | 1 | | | 1 | 28 |
| Trichoptera | | | | | | | | | | |
| <i>Hydropsyche fimbriata</i> | 12 | 1 | 5 | | 24 | | | | | |
| <i>Hellipsopsyche</i> sp. | | | | | Abundant | | | Abundant | | 1 |
| <i>Oligoia freddyi</i> | | | | | | 2 | | | | |
| <i>Plectrocnemia</i> sp. | 4 | 3 | 3 | | 12 | | | | | |
| Neuroptera | | | | | | | | | | |
| <i>Archichauliodes diversus</i> | 3 | 1 | 6 | 1 | 10 | | 1 | | 1 | |
| Diptera | | | | | | | | | | |
| | | | | | | | | | | |
| <i>Tipulidae</i> | | | | | 1 | | 1 | | | |
| <i>Odonata</i> | | | | | | | | | | |
| <i>Procordulia smithii</i> | | | | | | | | 1 | 1 | |
| <i>Platania</i> | | | | | | | 1 | | 1 | |

Numbers of animals from the Awana Stream

Notes on the distribution.

In a comparison between the faunas of pools and riffles it was found that riffles contained 5-6 times as many individuals as pools. The principal components of the riffle fauna were larvae of the caddis-flies Hydropsyche, Limnephilus and Heptagenia, the stonefly Zelandoperla, and the mayfly Dolichidium. In pools the dominant forms are Dolichidium and Heptagenia. Larvae of the mayflies Lepidostoma and Amelitessus, and the dragonfly Procordulia were found only in pools.

Two apparent distributional trends were present. An increase in the numbers of Dolichidium upstream and Hydropsyche downstream.

SURVEY OF THE TIRIKAKAWA STREAMDescription of the Sampling Stations.

Station A is a riffle with angular rocks on a bed of shingle. A considerable amount of detritus and leaves was caught between the stones.

Station B is a pool with a substrate of angular and rounded stones on a base of silt.

All the riffles sampled were alike, with physical characteristics as in Station A above. Station D is a pool like Station B.

TABLE 2.

Riffles = stations A, C, E, F, G.
 Pools = stations B, D

| | A | C | E | F | G | Total | B | D | Total |
|---------------------------------|----|----|----|----|----|-------|---|---|-------|
| <u>Ephemeroptera</u> | | | | | | | | | |
| <u>Caenidae</u> , sp. | 4 | 11 | 14 | 15 | 15 | 79 | 8 | 3 | 11 |
| <u>Zephlebia cruentata</u> | 4 | 1 | 1 | 8 | 5 | 29 | 5 | 3 | 8 |
| <u>Z. versicolor</u> | | | | | | 1 | 2 | | 2 |
| <u>Z. dentata</u> | | | | | | | | 1 | 1 |
| <u>Ameletopeltis peractius</u> | | | | | 3 | 4 | 1 | | 1 |
| <u>Plecoptera</u> | | | | | | | | | |
| <u>Stenoperla prasina</u> | 5 | 2 | | 3 | | 10 | | | |
| <u>Zelandobius</u> sp. | | 9 | 11 | 3 | 3 | 26 | | | |
| <u>Nesoperla trivacuata</u> | 7 | | | | | 7 | | | |
| <u>Zelandoperla</u> sp. | | | 3 | | 3 | 6 | | | |
| <u>Trichoptera</u> | | | | | | | | | |
| <u>Oligosoma feredayi</u> | 5 | | 1 | 4 | 6 | 16 | 1 | | 1 |
| <u>Hydropsyche fimbriata</u> | 2 | 2 | 13 | | 9 | 26 | | | |
| <u>Plectrocnemia</u> sp. | 14 | 0 | 1 | 1 | 8 | 23 | | | |
| <u>Helicopsyche</u> sp. | | | | | | 4 | 4 | | |
| <u>Neuroptera</u> | | | | | | | | | |
| <u>Archichauliodes diversus</u> | 4 | 5 | 1 | 5 | 5 | 20 | | | |
| <u>Odonata</u> | | | | | | | | | |
| <u>Procordulia smithii</u> | | | | | | | 1 | 1 | |
| <u>Mollusca</u> | | | | | | | | | |
| <u>Potamopyrgus antipodum</u> | 1 | | | | | 1 | | | |

Numbers of animals from the Tiriakawa Stream.

Notes on the distribution.

The most abundant animal in riffles was Deltastidium and relatively large numbers of Hydropsyche, Archichauliodes, Nanoperla, and Polycentropidae were also found. The dominant pool animals were Zephlebia crucifera and Deltastidium. Again a ratio of 1 : 5-6 was found between pools and riffles. As all sampling was done within a short stretch of stream no distributional trends upstream can be recorded.

SURVEY OF THE HAOWIEKNUA STREAMDescription of the Sampling Stations

A much younger and more rugged stream, the Haowiemus has carved its course through the Pleistocene boulders and lacks the alluvial beds of the former two streams. The bed is very steep and rocky, with falls connecting stretches of deeper, more placid water.

Station A is a riffle enclosed in a gorge. The stream rises very steeply to Station B where riffle conditions contribute to a larger area than at Station A. Many of the large stable boulders have a coating of moss above water level. Station C consists of angular stones forming a riffle among stable moss-covered boulders. Station E is at the mouth of the stream where the water runs through and beneath the rounded boulders forming the beach at and above high tide mark.

TABLE 3.

| | Stations | | | Total |
|---------------------------------|----------|----|----|-------|
| | A | B | C | |
| Ephemeroptera | | | | |
| <u>Dolatostidium</u> | 36 | 21 | 12 | 69 |
| <u>Zephlebia ornatata</u> | 2 | 1 | 5 | 8 |
| <u>Z. borealis</u> | 1 | | 8 | 9 |
| <u>Z. dentata</u> | | 9 | 2 | 11 |
| <u>Z. varicolor</u> | 1 | | | 1 |
| <u>Amelastopala peracuta</u> | | 1 | | 1 |
| <u>Calobarbus humeralis</u> | 11 | 4 | 1 | 16 |
| Plecoptera | | | | |
| <u>Stenoperla prasina</u> | 2 | 2 | 1 | 5 |
| <u>Zelandoperla</u> sp. | 2 | | | 2 |
| <u>Zelandotilus</u> n. sp. | 5 | 3 | 3 | 11 |
| <u>Neoperla trivacata</u> | 3 | | 1 | 4 |
| <u>Austroperla cyrene</u> | | | 7 | 7 |
| Trichoptera | | | | |
| <u>Hydropsyche fimbriata</u> | 11 | 9 | 8 | 28 |
| <u>Heliocopsycha</u> sp | 9 | 1 | | 10 |
| <u>Oligosia feredayi</u> | 3 | 4 | 2 | 9 |
| <u>Electrocnemia</u> sp | 3 | | 12 | 15 |
| Neuroptera | | | | |
| <u>Archichauliodes diversus</u> | 1 | | 1 | 2 |
| Mollusca (Gasteropoda) | | | | |
| <u>Potamopyrgus antipodum</u> | 2 | 3 | 2 | 7 |
| Diptera | | | | |
| <u>Ceratopogonidae</u> | | | 1 | 1 |

Numbers of animals from riffles in the Maowheua Stream.

Plotted on the distribution.

The dominant rapid-water form was Dolastidium. Large numbers of Caloburiscus hymenalis, Hydropsyche, and Electrocnemis were found. Numbers of Dolastidium show a definite increase in numbers upstream but Zephlebia dentata and Caloburiscus humeralis are more abundant downstream. At Station E large numbers of Holcopsyche and Potamopyges were present, as well as smaller numbers of Dolastidium, Zelandoperla, and Mesocapnia. At the sides of the stream in the vicinity of Stations B and C, Potamopygus and planarians were abundant on the underside of stones.

SURVEY OF THE PARIHAKAOKOA STREAM

Description of the Sampling Stations

Like the Haewherua, the Parihakao Stream has cut through the breccia and has a course of still pools and vertical falls over the hard rock faces. This is the most temporary of the four streams studied.

Station A is a pool with a substrate of silt and small smooth stones.

Station B is a trickle of water connecting two pools. The water moves slowly over a base of moss-coated rock.

Station C is a pool with larger stones lying on a silt base.

Station D is a plunge pool below a ten foot waterfall. The bed is silt and shingle.

Station E. This is the face of the fall above Station D. It has a coat of moss on a solid rock base.

TABLE 4.

Rapid water - stations B, E.

Pools - stations A, C, D.

| | A | C | D | Total | B | E | Total |
|------------------------------|---|----|----------|-------|---|----------|-------|
| Ephemeroptera | | | | | | | |
| <u>Zephlebia dentata</u> | 3 | 21 | 12 | 46 | | | |
| <u>Z. borealis</u> | 4 | 5 | 3 | 12 | 1 | 2 | 3 |
| <u>Z. n. sp.</u> | | | 1 | 1 | | | |
| Psocoptera | | | | | | | |
| <u>Zelandoperla</u> sp. | | | | | 1 | | 1 |
| Trichoptera | | | | | | | |
| <u>Pallachorema</u> sp. | 7 | 1 | 3 | 11 | 1 | 1 | 2 |
| Diptera | | | | | | | |
| <u>Paratina</u> sp. | | | 1 | 1 | | 1 | 1 |
| Mollusca | | | | | | | |
| <u>Potamopygus antipodum</u> | | | | | | Abundant | |
| <u>Planaria</u> | 1 | 1 | 1 | 3 | | | |
| Crustacea - Amphipoda | | | Abundant | | | Abundant | |

Numbers of animals from the Parihakao Stream.

Notes on the distribution.

No Dolastidium was found in this stream which consists primarily of a series of pools. The dominant animals were small amphipods, the small Potamopyrgus, and to a lesser extent mayflies of the genus Zephlebia. Microgygia were present on the surface of many pools. The insect fauna of this stream is poor.

DISCUSSION

The most significant differences in composition of the faunas of the streams can be attributed to gross physical factors. The Awacea and Paribahkoakos Streams produce the widest comparison of physical conditions, the former being a relatively permanent watercourse while the latter is of a very temporary nature.

The mayfly Dolastidium, and all the members of the Plecoptera, are typical components of continuously flowing waters, and they are significantly absent from the Paribahkoakos Stream, whereas they form a most important part of the total population found in the Awacea Stream.

Large numbers of Helicopsyche were peculiar to the Awacea Stream. Caloburiscus humeralis was found only in the Maowhenus, and Zephlebia borealis was restricted to the west coast streams. The reasons for these distributional patterns was not apparent but could be elucidated after more intensive field work.

SPECIES LIST

Insecta

Ephemeroptera

Family Siphlonuridae

Ameletopsis persimilis (Eaton)

Mesamalea ornatula (Eaton)

Caloburiscus humeralis (Walker).

Family Leptophlebiidae

Dolastidium sp. p.

Dolastidium mysobranchia

Zephlebia borealis (Phillips)

Zephlebia cruentata (Hudson)

Zephlebia versicolor (Eaton)

Zephlebia dentata (Eaton)

Zephlebia n. sp.

Plecoptera

Family Eusthenidae

Stenoperla prasina (Newman)

Family Austroperlidæ

Austroperla cyrene (Newman)

Family Gripopterygidae

Zelandoperla n. sp.*Nesoperla trivacuata* Tillyard.*Zelandobius* n. sp.

Trichoptera

Family Sericostomatidae

Oeconesus maori (McLachlan)*Obtinga feredayi* (McLachlan)*Helicopsyche* sp.*Pycnocentria* sp.

Family Leptoceridae

Triptiloides obsoleta (McLachlan)

Family Polycentropidae

Polyplectropus puerilis (McLachlan)*Plectrocnemia* sp.

Family Philopotamidae

Hydrobiosella stenocera (Tillyard)

Family Rhynchosiphidae

Hydrochorema crassicaudatum (Tillyard)*Paleochorema* sp.

Family Hydropsychidae

Hydropsyche imbricata (McLachlan)

Neuroptera

Megaloptera

Family Corydalidae

Archichauliodes diversus (Walker)

Odonata

Anisoptera

Family Corduliidae

Procordulia smithii (White)

Diptera

Family Dixidae

Dixa (Paradixia) sp.

Family Tipulidae

Family Ceratopogonidae

Family Chironomidae

Coleoptera

Family Dytipidae

Mollusca

Gastropoda

Family Hydrobiidae

Potamopyrgus antipodum.

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References

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