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FRONTISPIECE

An account of a visit to the Glowworm Cave in 1923 by Mr C. L. Edwards
(Edwards 1924).

" 9th May, 1923

"Waitomo, the 'glow-worm', Caves.

"Our guided wanderings (all the while deep underground) brought us at last to the edge of a pool. Here the guide made a speech about the glow-worms which adorned the roof over the water, pointing out the long glistening threads of a cobwebby texture let down singly by each tiny worm apparently to catch minutiae on the wing. At an engrossing part of the description one of the tourists suddenly produced from under his coat a net, with which he made a sweep at a passing fly, but which caught the guide's acetylene lamp instead and became ablaze.

"However, this glow-worm lecture was only explanatory and preparatory to the great event next coming, to which we were to be introduced under an injunction to perfect silence. Vibrations of air caused by talking or any other sound affected the larvae, which thereupon put out their lights. This was clearly illustrated by the episode of the net and the commotion it caused. And it might here be said that that tourist afterwards detached himself from the party and stole back alone and unlighted to the unfathomed pool and redeemed his first folly by securing a cave-fly and a number of midges, which no doubt will come under the lens in South Kensington.

"And now, after due admonitions, and obeying the order to leave all lamps behind, we stepped cautiously in single file down, down to a still lower level. Collecting ourselves at an unseen bottom we held each one his breath, and listened. To each in turn a whisper floated, "Get into the boat." . . . Then gradually we became aware that a vision was silently breaking on us. Either we were moving (though without oars) or a panorama was passing before us. I recollect just noticing the glint of a wire which might have been fastened along the wall of the cave, and on which our dumb boatman might be pulling. But, at any rate, a radiance became manifest which absorbed the whole faculty of observation - the radiance of such a massed body of glow-worms as cannot be found anywhere else in the world, utterly incalculable as to numbers and merging their individual lights in a nirvana of pure sheen.

"And now as to the disposition of this mystic light, which produced itself all unaided in innumerable points. The cave was evidently similar in structure to all the others, giving an endless variety of outline; but whatever was there became dotted over with points of golden light as closely studded as the letters on a printed page, a truer parallel than the glibly quoted starry sky. It did strike me, however, that the higher reaches of the cave resembled the Milky Way. But from these heavens stretched down wondrous stalactites all clothed in living light, and appearing like arms ready to lift one right up to those far-away stars; and not only above the main silent river, along which our noiseless way was truly a gliding, but in branching fjords surprise burst on us again and again revealing fascinating vistas of the same glowing and shapely splendour. To bow the head in adoration of Beauty was but to meet its whole shimmer reflected, unwrinkled, in the quiet river below."

ECOLOGY OF THE NEW ZEALAND GLOWWORM
ARACHNOCAMPA LUMINOSA(SKUSE) (DIPTERA: MYCETO -
PHILIDAE) IN TOURIST CAVES AT WAITOMO.

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A thesis submitted to the University of Auckland for the
degree of Doctor of Philosophy.

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ABSTRACT

The New Zealand glowworm Arachnocampa luminosa (Diptera: Mycetophilidae) provides the national tourist industry with a unique attraction. The Glowworm Cave at Waitomo has an international reputation for the bioluminescent display produced by A. luminosa.

The aim of the present study was to investigate glowworm ecology in the tourist caves at Waitomo, the results to provide factual information so that scientifically sound management procedures could be devised to ensure the long term survival of the population. The literature on all aspects of A. luminosa is reviewed.

A continuous cycle of development occurs with most stages present throughout the year. However, the majority of the larval population pupates in late winter/early spring, producing a new generation in spring/early summer. There are five larval instars; the time for individual development in the Glowworm Cave varies considerably but is estimated to take 5 months on average.

Distribution of glowworms is dependent on an adequate food supply, cool, moist climate and a suitable horizontal rock surface. Their diet consists of chironomids with some tipulids, ephemeropterans and trichopterans, most of which emerge inside the cave. Factors likely to influence distribution and productivity of benthic fauna in the cave are reviewed, including the importance of flooding and stream drift fauna in restocking the cave.

Mortality is caused by two species of opiliones, cannibalism and a fungal pathogen identified as Tolypocladium sp. (Moniliales).

Preliminary experiments with Tolypocladium indicate that the higher temperatures of the Glowworm Cave may be responsible for the prevalence of the fungus compared with non-tourist caves in the district.

Observations on cave climate showed that the Glowworm Cave now has a higher range of temperature and relative humidity compared with earlier records and non-tourist caves at Waitomo. This is attributed in part to the free flow of air that occurs between the two entrances of the cave and the outside atmosphere.

Reasons for the decline in the glowworm display that has occurred in the past few years are discussed. The installation of an open grille on the Top Entrance of the Glowworm Cave in 1975 is suggested as one of the main factors responsible. Future research projects are mentioned, together with recommendations for cave management related to glowworm ecology.

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