No. 89
APRIL, 1987

The Tasmanian Naturalist

Registered by Australia Post – Publication No. TBH0495
Postal Address: G.P.O. Box 68A, Hobart, 7001
Editor: D.A. Ratkowsky Annual Subscription: $8.00

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[Editor's Note: as this issue went to press it was announced that Michael Sharland, a Life Member of TFNC, had died at the age of 87. An obituary will appear later.]

Michael Sharland's *TASMANIAN BIRDS*; an unusual origin.
Communicated by D.G. Hird

Recently I spoke with Michael Sharland who revealed to me that books on bird life are not always written in the calm of a study, with helpful reference books on hand, but sometimes in unusual places and at odd times. For instance Michael Sharland wrote his first book on birds-*Tasmanian Birds*-in an airforce hangar at Richmond, NSW, during World War Two.

While his mates would sit in the mess room after tea, drinking or playing cards, he would creep off to write. He would enter the hangar by a small side door, get a lamp going, and write for perhaps a couple of hours, relying mostly on his own memory rather than on literature (which he didn't have, anyway). It would be about 10pm when he had finished for the day. The night watchman was always alerted to the purpose of the light.

Tasmanian Birds was, in 1946, the first popular book of its type and format to be published. Prior works on Tasmanian Birds had included Legge's Checklist of 1887, Littler's comprehensive Handbook of 1910, and Lord's Descriptive List of 1917. *Tasmanian Birds* included two-tone photographs taken by the author during the 1920's and 1930's; some of these are regarded as amongst the best ever Australian bird photography. It was also highly regarded for its detailed local information.

The History of Ornithology in Tasmania, a recent article by Gillian Lord (Tasmanian Historical Research Assoc. Papers & Proc., *33*, pp87-102, 1986), gives further information on this general subject.

UNUSUAL ORGANISMS IN TASMANIAN LAKES

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Tasmania has many hundreds of waterbodies, some deep, glacial and nutrient-poor (e.g. Lake St. Clair), some shallow and nutrient-enhanced (e.g. Lake Crescent), and many that are small and darkly coloured due to dissolved humic material (e.g. South East Cape Lagoon).

Some 200 have been analysed for basic water chemistry (Buckney and Tyler 1973a, 1973b) but the majority have been sampled once only, or not at all. Biologically, only a handful have been investigated in detail (Sorell, Crescent, Great, Leake, Tooms, Fidler, Chisholm).

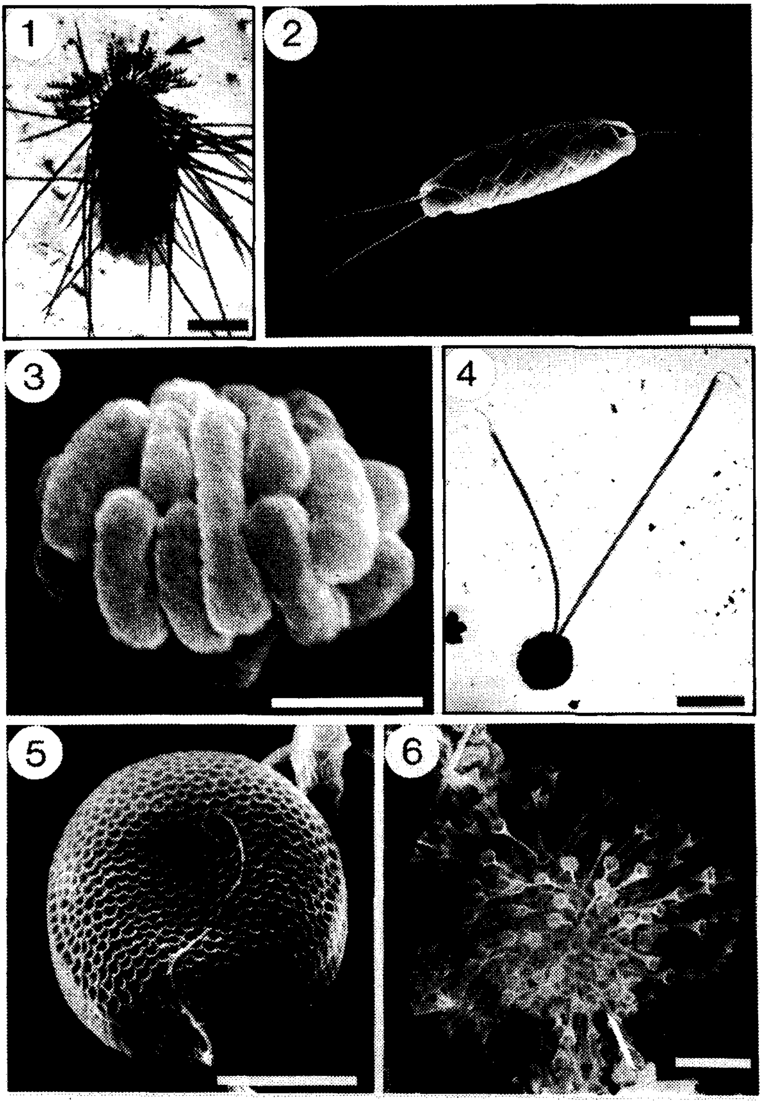
It is doubly significant then, that a few recent investigations of Tasmanian lakes have yielded major discoveries in both lake ecology and aquatic biology. This paper discusses a few of the more exciting biological findings.

Mallomonas plumosa Croome et Tyler (Fig. 1)

M. plumosa is a single-celled member of the Chrysophyta, the yellow-green algae. The cell has a covering of silica scales, plumes and spines, all of which are synthesised within the cell before being deposited on the surface.

It was discovered in Lake Leake and Tooms Lake in 1970, but its formal description had to await use of electron microscopy as a routine tool in algal taxonomy. Its description (Croome and Tyler 1983) aroused immediate interest in phycological circles due to both its beautiful appearance and unusual form. Of particular interest was its possession of two such disparate processes as the plumes of the anterior scales and the bristles of the body scales.

Figures 1-6. Transmission (TEM) and scanning (SEM) electron micrographs of the organisms mentioned in the text. Fig.1. TEM of the yellow-green alga *Mallomonas plumosa* showing the unusual apical plumes (arrow), long serrated bristles and rounded body scales. Bar indicates 10 microns. Fig.2. SEM of the yellow-green alga *Mallomonas splendens* showing its distinctive body scales and anterior and posterior bristles. Bar indicates 10 microns. Fig.3. SEM of the bacterial consortium *"Chlorochromatium aggregatum"* showing the outer envelope of tightly packed photosynthetic bacteria. Bar indicates 1 micron. Fig.4. TEM of the tiny green alga *Scourfieldia caeca.* Bar indicates 5 microns. Fig.5. SEM of the golden-brown alga *Prorocentrum foveolata* showing its highly sculptured surface and one of its two flagella. Bar indicates 10 microns. Fig.6. SEM of the 'sun animacule' *Raphidocystis tubifera* showing its distinctive trumpet-like scales. Bar indicates 10 microns.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It is still relatively common in Lake Leake and Tooms Lake, and is also present in several other Tasmanian lakes, and a few in mainland Australia, including one on Fraser Island, Queensland. It has also been reported to us by a colleague from New Zealand.

Mallomonas splendens **(West) Playfair emend. Croome, Dürrschmidt et Tyler (Fig. 2)**

M. splendens was described by West (1909) from Yan Yean Reservoir, Melbourne, but has since been seen throughout Australia, and from Indonesia, India, Malaysia and, surprisingly, Holland (see Croome, Dürrschmidt and Tyler 1985).

It, too, is a striking chrysophyte, as attested by its name, its yellow-green colour showing vividly through its clear silica scales. it commonly has four bristles protruding from either end of the cell, and glides evenly through the water through the action of its single flagellum.

In Tasmania it can most easily be found in Lake Chisholm and Lake Mikany in the north-west, and in South East Cape Lagoon.

'Chlorchromatium aggregatum' **Lauterborn (Fig. 3)**

'C. aggregatum' is not a single organism (hence the inverted commas) but rather a consortium of two different types of bacteria. Green in colour, it inhabits an unusual habitat in Lake Fidler, adjacent to the Gordon River. Lake Fidler is unique in Australia, in that it is permanently stratified, with fresh water at the surface and saline water (approximately 1/10th seawater) at the bottom. The saline water has high levels of dissolved H_2S, and reaches to within 3 metres of the surface, so that light (for photosynthesis) just reaches it. A unique array of micro-organisms inhabits the zone across which the salinity charge occurs, including *'C. aggregatum'* (Croome and Tyler 1984a, 1984b).

The consortium's green colour is due to an outer envelope of photosynthetic bacteria, which actively photosynthesise using H_2S as an electron donor (and releasing sulphur) rather than the usual H_2O (and releasing oxygen). A large central bacterium within the consortium probably uses the sulphur released during photosynthesis, and most likely gives the consortium motility via a flagellum (not shown in Fig. 3 as I have never been able to observe it, despite examining many highly motile consortia).

'C. aggregatum' has been reported from similar lakes in the USSR, Norway, and North America, but never in the concentrations we have observed in Lake Fidler (up to 640 million consortia per litre).

Scourfieldia caeca **(Korsh.) Belcher et Swale (Fig. 4)**

S. caeca is another of the organisms inhabiting the O_2/H_2S interface in

Lake Fidler. It is a small (3-5 micron long) green, naked, highly motile flagellate alga present in Lake Fidler in very high numbers (up to 1300 million cells per litre) (Croome and Tyler 1985). It actively maintains a well defined position in the water column (sometimes in a layer less than 5cm thick) at extremely low levels of light, and is a major component of the lake's biota.

S. caeca has previously been found only in small ponds in Britain, and its discovery in Tasmania was certainly a surprise.

Prorocentrum foveolata **Croome et Tyler (Fig. 5)**

Prorocentrum is a genus of dinoflagellate (golden-brown) algae, and is usually thought of as exclusively marine.

Two new species *(P. foveolata* and *P. playfairi)* have been discovered recently in Tasmania from manifestly fresh waters (Croome and Tyler 1987). *P. foveolata* is found in Little Lake Waterhouse and Blackmans Lagoon (North-east), while *P. playfairi* is prevalent (up to 2000 cells/litre) in Lake Garcia (West coast) and also occurs in Perched Lake (adjacent to the Gordon River) and Lake Chisholm (North-west). The cells are enclosed by two large cellulose valves, and are propelled by two flagella.

The two species are clearly related to many of the 40 or so species known from the sea, some of which have been implicated in the production of toxins which lead to ciguateric fish poisoning. We presently have *P. playfairi* in culture and it will be interesting to see if its biochemical pathways are similar to those of its marine relatives.

Raphidocystis tubifera **Penard (Fig. 6)**

R. tubifera is a unicellular, free-living heliozoean, or 'sun animacule'. The cell is covered by numerous siliceous scales, looking remarkably like trumpets, between which pseudopodia protrude to capture particulate matter and prey organisms.

R. tubifera is one of several special of heliozoeans which have been discovered and described from Tasmania (Croome 1986, 1987a, 1987b), and has been found in Lakes Fidler, Mikany, Chisholm, Bellinger and Garcia, and Great Lake.

The above organisms are but a sample of those which we have discovered and described from Tasmanian waters, and the reader is referred to the references for further information. With regard to endemicity, it can be said that endemic distributions of freshwater algae (and heliozoeans) are rare, and when they do occur they are perhaps due to the patchiness of scientific observations rather than to the actual distribution of the organisms. However, the chrysophyte alga *Mallomonas plumosa* is of such striking appearance that its presence in Europe, Japan, or North America could hardly have gone un-noticed. It is thus possible that *M. plumosa* will prove to be endemic to Australasia.

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PSYLLIDS IN TASMANIA

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In the northern hemisphere, the psyllids (Psylloidea) are known as jumping plant lice, which is an appropriate name because they are small and most of them have the ability to jump. In Australia they are known as lerp insects, a name which should be used only for one out of the four major families represented here.

The Aborigines used the name lerp (originally "laap", according to some authors) for the white saccharine substance found on the leaves of some *Eucalyptus* trees. The name means "sugar", and no doubt applied to "manna", which is exuded from many eucalypts in inland Australia, probably in response to feeding by sap-sucking insects such as eurymelids and psyllids. A Hobart school teacher appears to have been the first to publish the name lerp (Dobson, 1851) for the white covering or scale built by *Glycapsis eucalypti* (Dobson), which he found in the Domain on *E. viminalis.*

Lerps are built by the immature stages (nymphs) of psyllid species belonging to only one family, Spondyliaspididae, and these species breed only on species of *Eucalyptus.* Each species is usually specific to one, or a closely related group, of eucalypt species, so much so that the host tree species can often be identified by the psyllid lerps found on it. In Tasmania, the only lerps with a significant sugar content belong to species of *Glycaspis.* Starches are the main constituent of these lerps, and of all others which have been chemically analysed. Most lerps in other genera contain little or no sugar. Excreted in liquid form by the nymph from the tip of its abdomen, these compounds rapidly solidify, so that the nymph is able to weave its lerp in a pattern characteristic for its species.

The most striking Tasmanian lerp is a large yellow one, about the size of a fingernail. It is built by *Creiis longipennis* on *E. viminalis* and related species. Three others, *Cardiaspina spinifera, C. squamula* and an undescribed species of *Creiis,* are also found on *E. viminalis* at higher altitudes. *Hyalinaspis rubra,* which builds a clear glassy lerp like a mussel shell, is very common on the monocalypt group, *E. amygdalina, E. tenuiramis, E. coccifera, E. obliqua* and others.

In some species of *Glycaspis,* the nymph causes the formation of a bubble-shaped gall on the upper side of the leaf, with a small opening on the under side, which is plugged by lerp material until it is time for the adult insect to emerge. These are often seen on *E. pulchella*; the gall is in the middle of the narrow leaf, which bends away from the gall on each side at an angle of about 90°. Some lerp-building species in other genera also cause rolling of the tips or edges of the leaves, with fragile bi-valve lerps underneath the rolled edges.

In the Aphalaridae, tribe Ctenarytainini, we have a group of genera which are all free living, although the species of two of them are nearly always found associated with lerp-building species. Their nymphs use the deserted lerps for shelter, and Froggatt (1900, p. 269) actually described the nymphs of one of them as those of the lerp-building species. The aphalarids are easy to recognize because their nymphs secrete long white filaments and their shelters (deserted lerps, rolled leaves or leaf mines) are usually filled with this white woolly material. Other genera, such as *Ctenarytaina,* which is well represented in Tasmania, feed on the growing tips of *Eucalyptus, Melaleuca, Leptospermum* and other Myrtaceae. One species, *C. eucalypti,* is almost invariably present on the juvenile leaves of the blue gum, with copious white powdery exudate. Another species occurs on *Boronia.*

The large family Psyllidae is also well represented in Tasmania. On most of the wattles *(Acacia* spp.) there is at least one, sometimes two or three species, of *Acizzia* and/or *Psylla.* Many other native trees and shrubs are host to species in this family, but very few of these species have been described.

Finally, many species of the large family Triozidae are found in Tasmania. The best known genus is *Schedotrioza*, all species of which form spherical woody galls on *Eucalyptus* leaves. The nymphs are completely enclosed in their galls, and the adult insects can only emerge when the gall begins to dry out and split open. This only happens at a time when fresh spring growth, where females can lay their eggs, is available on other trees or branches of the same tree (Taylor, 1985). As in the Psyllidae, there are many species of *Trioza* on a wide range of other native plants. Most of them cause shallow cup-galls or other distortion of the leaves. These can often be found on several species of *Callistemon*.

Aacanthocnema, another triozid genus, occurs on *Casuarina*. Some species are found at very high density in favourable seasons. At least one, probably two other triozid genera, also occur on *Casuarina*. Their nymphs are found partly wrapped around the branchlets or at their bases.

There are probably some psyllids on Tasmanian rain forest hosts, although none has yet been recorded. There are some rain forest species in Queensland and New South Wales, representing only one or two genera in each of the remaining four psyllid families. Most of them are typically Indo-Malayan.

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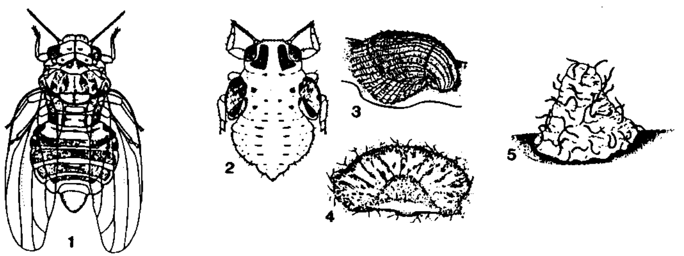

Psyllids and lerps. (1-2) *Cardiaspina fiscella* Taylor: (1) adult female (2) nymph (3) *Cardiaspina spinifera* Froggatt, lerp; (4) *Cardiaspina squamula* Taylor, lerp; (5) *Glycaspis* sp., lerp. [1-2 (1x8), reproduced by permission from the Australian Journal of Zoology, Vol. 10, p. 301, 1962; 3-5 (x3), drawn by Kathy McQuillan.]