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THE 'HOT' SPRING AT KIMBERLEY

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Introduction

Staff and students of the Centre for Environmental Studies, University of Tasmania, visited the Kimberley Springs State Reserve (between Elizabeth Town and Sheffield) on 30 October 1986, to investigate the physical, chemical and biological characteristics of the spring. The Reserve contains an interesting aquatic environment, and the findings, together with related geo-chemical information, are detailed below.

Results and Observations

The spring is the focal point of the Kimberley Springs State Reserve, providing warm water (around 24°C) to a pool approximately 13m wide, 20m long, and 1.2m deep (Fig. 1). The water enters via the floor at the pool, near its centre, and a small stream leaves the pool and flows across the Reserve, eventually discharging into the Mersey River.

The geology of the Kimberley area, and the possible origin of the spring water, have been discussed by Matthews (1978), who concluded that the water probably comes very quickly to the surface from a depth of about 350m, and has contact with a deposit of either limestone or dolomite.

Three water samples were taken for chemical analysis, one from the spring at its source in the centre of the pool (Fig. 1), one from an adjacent 'cold' well, and one from the nearby Mersey River. The results are given in Table 1.

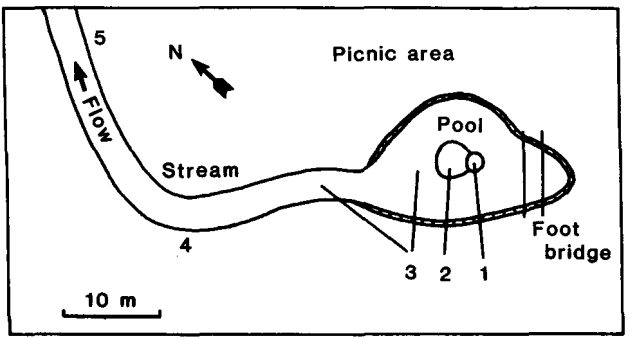

Figure 1. Sketch of the 'Hot' Spring area of the Kimberley Springs State Reserve. 1. Clear sandy area with continuous flow of spring water. 2. Adjacent area covered with sticks and leaves which 'opens' occasionally to allow other bursts of spring water to enter the pool. 3. Bottom of pool and stream covered by *Spirogyra*. 4. Stream bank covered by *Typha angustifolia* and other emergent macrophytes. 5. Approximate collecting site of *Spirodela* sp?.

Table 1. Analytical results of samples collected on 30 October 1986. (Ionic concentrations in milli-equivalents per litre). Analyses were done by the Tasmanian Government Analyst, using standard analytical techniques.

	Kimberley Spring	Nearby well	Mersey River
pH	7.9	5.4	7.4
Temperature °C	24.1	13.5	—
Conductivity at 25°C μ,mho/cm	385	154	70
Calcium	3.50	0.13	0.54
Magnesium	1.03	0.22	0.13
Sodium	0.52	1.04	0.15
Potassium	0.04	0.02	0.01
Bicarbonate*	1.89	0.05	0.30
Chloride	0.48	0.99	0.15
Sulphate	0.18	0.05	0.08

*De-gassing noticed, particularly in spring sample, prior to analysis and value likely to be an underestimate by around 50 per cent.

The temperature of the spring water at its source was 24.1°C. This agrees with a temperature of 24°C recorded on 26 January 1978 (Matthews, 1978). The temperature of the nearby well was only 13.5°C.

The spring water, which is 'crystal clear', does not have a particularly high conductivity, that is, it is not over-rich in dissolved salts. It is dominated by calcium, magnesium and bicarbonate ions, and has a relatively high pH. The 'cold well', only 30m to the south-east of the spring, is even more dilute and contains a more typical sodium chloride water, reflecting the preponderance of these elements in Tasmanian rainfall. The Mersey River sample, more dilute again, showed considerable enrichment by calcium and bicarbonate, as there are considerable limestone outcrops in the Mersey catchment (see Buckney and Tyler, 1973).

Three measurements of dissolved oxygen were made on site, by the (chemical) Winkler method. A value of 4.8mg/l was found in the spring water at its point of entry to the pool, 9.4mg/l at the side of the pool, and 11.6mg/l in the stream just before it left the reserve. The results indicate that the spring water is around 60 per cent saturated with oxygen as it enters the pool, and subsequently becomes 110-140 per cent saturated before leaving the Reserve.

Biologically, the most visual aspect of the spring is that the bottom of the pool, and of the effluent creek, is covered by a more or less continuous mat of the filamentous alga *Spirogyra* (Blanketweed). Its green colouration is striking, giving the whole spring a verdant character. Identification to species level was not possible, as no reproductive material was found. High concentrations of unidentified small bacteria were present amongst the *Spirogyra*.

The turnover time of the water in the spring pool is sufficiently rapid (around one hour?) to preclude the development of a true plankton. Nevertheless, a plankton tow was made and several organisms identified, presumably having been disturbed from the sediments or other substrates (rocks, filamentous algae, macrophytes etc.). The organisms included several diatoms (*Cymbella* sp., *Pinnularia* sp., cf. *Synedra* sp.), a blue green algal filament (*Oscillatoria* sp.), green algae (*Closterium* sp. and a small green flagellate), a yellow-green algal filament (*Tribonema* sp.), and a filamentous sulphur bacterium (*Beggiatoa* sp.).

None of these is particularly outstanding, but the finding of *Beggiatoa* is of some interest. The organism is non-photosynthetic and utilises dissolved sulphide in its metabolism: the filament seen had numerous sulphur granules within its cells. However, no trace of dissolved sulphide was detected in the spring water by nose, which is an extremely sensitive analytical 'instrument' for this element.

Four small fish were observed swimming together in the spring pool. Around 80mm long, they had the general appearance of native galaxids, but could not be caught for better identification.

The major aquatic macrophytes growing around the pool and along the stream were collected. The dominant macrophyte was the Bulrush *Typha angustifolia* L. : it was present in several stands along the creek and had obviously been recently cleared from other areas. Also found were the Common Reed *Phragmites australis* (Cav.) Trin. ex Steudel, the Buttercup *Ranunculus repens* L., the Sedge *Carex fascicularis* Boott, the Cress *Rorippa nasturtium-aquaticum* (L.) Hayek, the Loosestrife *Lythrum salicaria* L., and the Duckweed *Spirodela* sp?, a member of the Lemnaceae. The Floating Pondweed *Potamogeton tricarinatus* F. Muell. & A. Benn. was common in a pool fed by the stream, just outside the Reserve. Most notable of these findings is the plant tentatively identified as *Spirodela* which, to the best of the knowledge of those working at the Tasmanian Herbarium, occurs nowhere else in Australia south of Sydney (Morris, pers. comm.) presumably because of its need for warmer temperatures during winter. Specimens of *Spirodela* sp. (and of *Carex fascicularis*) have been placed in the collection of the Tasmanian Herbarium.

Discussion

The aim of the visit was to make a limnological assessment of the Reserve and its waters, and they proved to be interesting in several ways:

1. The spring offers for study a water of relatively constant chemical composition and temperature all year round. The latter character would allow, for instance, a study of seasonal effects (e.g. those associated with light) to be made in the knowledge that the main seasonal character, temperature, remained constant.

2. The temperature of the water appears to be around 24°C all year round, providing an unusual aquatic habitat for Tasmania. Some naturally occurring 'exotics' may be expected because of this. One, *Spirodela* sp.(?), has already been observed in the stream leaving the spring. It has the same general appearance as *Lemna minor* and has probably been confused with this in the past. It has not been discovered elsewhere in Australia as yet south of Sydney, and presumably survives in the reserve due to the high water temperatures during winter.

3. The gaseous composition of the spring water is interesting. Matthews (1978) found that the gas bubbling up from the base of the spring was up to 6 per cent CO_2, and the spring water at point of origin was found here to be already 60 per cent saturated with oxygen. Moreover, supersaturation with oxygen occurred quickly within the pool. The gaseous characteristics of the system would reward further study.

4. Little plankton was present (due to low retention times) and that found, which included the colourless sulphur bacterium *Beggiatoa*, had probably been disturbed from settlement or attachment sites. However, the green filamentous alga *Spirogyra* clothed the bottom of the pool and outflowing stream. While it is not a particularly unusual organism, its presence in such large quantities is visually striking and biologically unusual, particularly given its constant 24°C habitat.

Conclusions

Taken overall, the limnological character of the site is unusual and worthy of further study. It is a physically interesting environment, it is chemically unusual, and has several biological aspects of scientific and general interest.

Acknowledgements

Thanks to the staff and associates of the Tasmanian Herbarium for identification of plant species, Dr P. Tyler of the Botany Department, University of Tasmania, for assistance with algal identifications, and staff and students of the Centre for Environmental Studies, University of Tasmania, for their assistance during sampling.

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COLLECTION OF WHITE, SUPERB FAIRY-WREN *MALURUS CYANEUS*, AT LIFFEY VALLEY, TASMANIA

Chris P. Spencer

C/- Liffey Fernery, R.S.D. 354, Liffey, Tasmania, 7302

The specimen of a Superb Fairy-wren was taken from a domestic cat at the residence of N.W. and C.E. Fearn, of Liffey on 1 April, 1987 and donated to the Queen Victoria Museum (Registration No. 1987/2/60).

Description

Apart from some light brown on the outer ends of the primaries, the specimen was snowy white. Unfortunately, only 2 tail feathers remained intact.

Legs and feet were grey-brown, and the irides were blue-grey. Due to age, the specimen's sex was undeterminable.

Bill, eyering and gape were all red-brown, the latter having numerous whiskers of red-brown and white.

The specimen was of normal size, and the colouration of bill, eyering and gape were all consistent with a typical female of the species; however, the iris colour and the white whiskers were abnormal.

Acknowledgement

I thank Bob Green for assistance in sexing the specimen.

NOTES ON AN UNUSUALLY LARGE COLONY OF THE PASSALID *PHAROCHILUS POLITUS* (SCARABAEOIDEA, PASSALIDAE) IN TASMANIA

S. Fearn

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Introduction

Pharochilus politus Burm. is the only passalid recorded from Tasmania and is common and widespread over much of the state. It is a large, shiny black, somewhat flattened beetle some 30 to 40mm long and often flies to outside lights on warm summer evenings. Rotting stumps are the favoured food source for adults and their larval broods, and so, extensive logging operations in Tasmania are increasing their numbers and extending their range.

The Colony

On the twelth of August, 1984, a large colony of *P. politus* consisting of 21 adults and 67 larvae was discovered in a large chamber they had excavated, some 48cm by 46cm, between a large eucalypt stump and the surrounding soil.

The area in which the stump (some 75cm in diameter) was situated is in the Musk Valley at the foot of the Western Tiers approximately 60km from Launceston.

The area had been logged twenty four months previously leaving many large stumps. Earth had been piled up along one side of the stump by passing earth moving machinery; it was on that side of the stump that the colony was situated. The soil was removed with a spade to reveal the large cavity. The stump had been eaten into a depth of approximately 3cm. Large amounts of frass had built up in the lower portion of the cavity. All larvae were approximately 30mm long.

Most colonies of *P. politus* in Tasmania consist of 2 to 5 adults and 10 or so larvae.

References

Britton, E.B. 1970. Coleoptera. Chapter 30. *In: The Insects of Australia.* Melbourne University Press, Melbourne, pp. 495-621.

FLY PARASITES ON NESTLING BIRDS

R.H. Green

Queen Victoria Museum, Launceston

Flies of the family Muscidae are well known as scavengers and parasites, the many species having evolved to live and feed in a wide range of specialised niches. One such fly, *Passeromyia longicornis* (Macquart), a little known and apparently rather rare endemic Tasmanian species, was recently reared at the Queen Victoria Museum from larvae living on nestlings of the New Holland Honeyeater *Phylidonyris novaehollandiae*.

On 23 December 1986 Mr Brian Larner reported finding, at Beauty Point, West Tamar, a honeyeater's nest containing two partly fledged nestlings beneath the skin of which was a number of maggots. At my request he brought the nest to me, complete with young, one of which was then dead and the other almost so. The nest and contents were placed in a glass container, covered with fine gauze and left in the hope that the larvae would mature to adults. The second nestling died soon after receipt and next day all the larvae had apparently left the hosts to pupate in the body of the nest (Registration No. 1987/2/68).

The first adult flies emerged on 7 January 1987 and the last, of 35, emerged on 20 January. All were pinned and dried and 21 were subsequently lodged in the Australian National Insect Collection, Division of Entomology, C.S.I.R.O., Canberra. The remaining 13 are in the collections of the Queen Victoria Museum. I am grateful to Dr Don Colless of the above Division for identifying the fly and for providing the following information. It was previously known only from "the ancient holotype, another old specimen collected by White and a series reared by you in 1959 from *Passer domesticus!* ANIC has only 4 specimens (from the latter series)".

This information stirred my memory and I recall, at Antill Ponds in the late 1940s, also finding nestlings of Goldfinches *Carduelis carduelis* similarly infested with fly larvae, probably also of this species. Such infestations were found only in late season nests, about December, and never in springtime, at the peak of breeding.

Little appears to be known of this specialised Tasmanian species, its blood-sucking larva or its host preference. Examination of nestlings found in December and January might reveal further information. The larvae are usually easy to see, even without touching the nestlings, as they embed themselves just beneath the surface of the skin on the head, wings, etc.

It is suggested that if some are found, the nest be left undisturbed for about 10 days after which time the nestlings would have either survived and flown or more likely, have died in the nest. In either instance the nest could then be removed and placed in a large plastic bag or clear container in the hope of rearing further specimens.

Museums or other such research institutions would always be pleased to receive the material and associated data.

FLY ATTACKS LEECH

R.H. Green
Queen Victoria Museum, Launceston

On 31 March 1987, Mr Craig Reid of Associated Pulp and Paper Mills brought to me a large leech which appeared to have been parasitised by a fly larva. Craig found the leech at Liffey the previous week, with the larva attached. He collected it in a plastic bag and noted that the larva then became detached and the leech was bleeding freely. Some time later, when preserving the specimens in alcohol, he found the larva had reattached.

I sent the specimens to Dr Don Colless, Division of Entomology, C.S.I.R.O., Canberra, for lodgement there and sought his comments. In response I received the following information: "It is a tabanid, probably genus *Scaptia*. Tabanid larvae are reputed to prey on other invertebrates and annelids, according to my Canadian colleagues; but I must say that I would not have expected one to tackle a creature as large as that leech. They are not really ectoparasites — ruthless predators is more like it! The little known of them suggests that the larva slices a hole in its prey, using its sabre-like mandibles, then buries its head in the tissues and sucks up the fluids. No doubt that is what your specimen was doing when first noticed; the leech was so large and strong that the wounds were not immediately incapacitating. In this case at least, the larva was also getting a second-hand blood meal".

In my many years of working in leech infested habitats I have never encounted such an occurrence, nor have others of whom I enquired. It appears to be a rather rare observation and is worthy of investigation should anyone have the opportunity to collect further material.

If such is found, both leech and larva should be collected in a plastic bag or roomy container together with some moist vegetation, such as moss, and kept in a cool or cold environment in an attempt to rear the larva to an adult fly, thus facilitating specific determination.

Tabanids somewhat resemble colourful blowflies and the family includes the marchflies. I would always be pleased to receive such material for further study.

A DIFFERENT HOLIDAY THIS SUMMER?

The Australian National University will be conducting a **1988 Summer School on the Environment**. All courses are residential. The dates and localities are:

24-28 January.	**Kosciusko in Summer**, in Kosciusko National Park.
3-6 February.	**Rainforests of Southern New South Wales**, at Kioloa, South Coast of NSW.
8-12 February.	**Native Plant Identification**, at Jervis Bay, South Coast of NSW.
12-14 February.	**Nature and Landscape Photography**, in Kosciusko National Park.

For further information, telephone (062) 49 3016, 49 4754. Centre for Continuing Education, Australian National University, GPO Box 4, Canberra, ACT 2601.