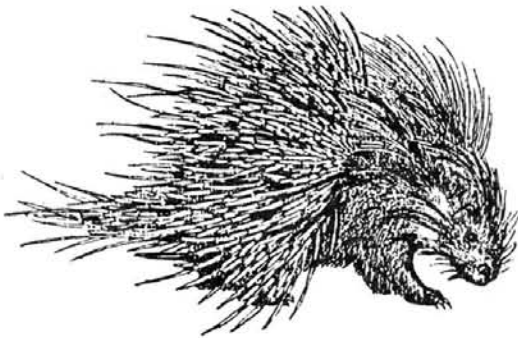


Porcupine!



Newsletter of the Department of Ecology & Biodiversity, The University of Hong Kong, in collaboration with Kadoorie Farm & Botanic Garden

Major wetland destroyed



Sham Chung marsh, lying on the northeast coast of Three Fathoms Cove (Sai Kung peninsula), has been almost completely destroyed by earth-moving works conducted over the past few months. The extensive (9 ha) marsh, which was one of Hong Kong's most highly-rated freshwater wetlands, has been drained and denuded of vegetation. The land on which the marsh stood was purchased by a major property developer (Sun Hung Kai) a few years ago, apparently with the long-term aim of constructing a golf course (see *Porcupine!* 16: 48).

Sham Chung was previously regarded as one of the top five freshwater marshes in Hong Kong in terms of its conservation value (see *Porcupine!* 16: 1), and was rated second in terms of rare macroinvertebrates, and first in terms of fish species richness, in a recent survey of freshwater wetlands conducted for the Agriculture & Fisheries Department by staff of the DEB (Dudgeon, D. and Chan, E.W.C., 1996. *Ecological Study of Freshwater Wetland Habitats in Hong Kong*. AFD). Perhaps most notably, Sham Chung was home to a large population of the rare Black Paradise Fish, *Macropodus concolor*. The marsh was also one of the few sites where the bog orchid *Liparis ferruginea* was known to be present.

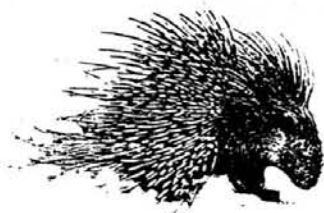
OUR LEAD ARTICLE for this issue (and a three-page feature inside) focuses on the disastrous developments at Sham Chung marsh, which may set a dangerous precedent for the treatment of other similarly unprotected wetlands - such as Luk Keng, Kuk Po and Sam A Tsuen - across the territory. The need for such sites to be brought under an improved, more rigorous protected areas system has never been more urgent.

Some readers may feel that this issue suffers from a surfeit of fish. However, the editor doesn't: there's plenty of stuff about insects, herps and mammals to balance things out. Three important new books are given the *Porcupine!* review treatment. Yvonne Sadovy weighs in on the artificial reefs issue, Neil Hutchinson gets into fable-telling mood, Gordon Maxwell attacks *Six Papers That Shook* with characteristic alacrity, Steve Pointing introduces himself, and the strangely absent Richard Corlett receives a taxonomic boot from Tim Utteridge. Oh, and *Porc* is coming back in the next issue, by popular demand (of all things).



Continued on page 28

Porcupine!



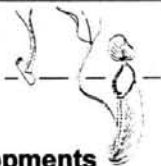
NUMBER 19
APRIL 1999

Newsletter of the Department of
Ecology & Biodiversity, the University
of Hong Kong, in collaboration with
Kadoorie Farm & Botanic Garden

CONTENTS

Editorial	1
Major Wetland Destroyed	1
DEB news	2
KFBG news	4
Feedback	7
Old stuff	7
Prokaryotes	8
Arthropods	10
Fish	15
Amphibians	18
Reptiles	20
Mammals	20
Artificial Reefs	22
A new hope	25
Wildlife Windows	26
Sham Chung	28
Book reviews	31
Six papers	34
Recent publications	35
In the news	37
Steve Pointing	39
FREE Column	40

DEB NEWS



Recent Developments

Beyond the usual research and teaching activities in the Department, the last few months has also involved a great deal of action (in some quarters!) related to our collaboration with The University of Nottingham's School of Biological Sciences in The Virtual School of Biodiversity.

Apart from the business of filling in applications for funding for the School and for travel grants related to its

activities, we were also invited to participate in the Tertiary Education Expo, a University Management Sharing Session, and IJH was invited to officiate at the launch of a Secondary School digital classroom initiative "Learning through creativity by means of IT".

The Tertiary Education Expo was held in BP House and all the Tertiary Institutes turned out to attract applicants. The Virtual School display was well received and a number of people commented both on the display and on the excellent "performance" of our students who presented it. I have already thanked them individually, but I repeat — Wellcome, Yanna, Olive, Jimmy, Celesta, Captain, Wendy, Rose, Mony, Tik, Richard and Benny, thank you all!

At the Management Sharing Session, Gray Williams presented "Where we were at" and "Where we are going" with the school and, as usual, it was a competent, dynamic, entertaining, informative and superbly delivered performance. Again, many thanks to Gray and to those staff who attended to support him!

Also Leo Chan and Ken Wong are to be congratulated and thanked on the great technical job they did for both the above.

The digital classroom initiative came as somewhat of a surprise. We have been priding ourselves on our efforts to enlarge on the Vice Chancellor's IT campus initiative by producing multimedia teaching material and, it appears that at the same time a group of secondary school principals have been developing an initiative for "the digital classroom". Our paths

crossed and I was invited to launch their "Learning through creativity by means of IT" seminar - Lion dance and all!

We are now investigating how we can interface with the secondary schools and help them in their moves to better incorporate IT into the classroom. Personally, I am pleased to have DEB involved in this since there are so few times when the Secondary / Tertiary "rift" is crossed.

John Hodgkiss (HoD)

Upcoming visits

Visiting Lecturer - Dr Lisandro Benedetti-Cecchi

In late April (probably a little late for this publication) Dr Lisandro Benedetti-Cecchi is visiting the Department for a week at the invitation of David Dudgeon and Gray Williams. Lisandro is an intertidal ecologist working on Mediterranean rocky shores from Pisa University in Italy. Lisandro's particular interests and skills lie in experimental designs to unravel spatial and temporal variation on different scales, using these designs to find out how general patterns and processes seen on shores actually are.

Visiting External Examiner - Prof Colin Townsend (from Prof David Dudgeon)

Every three years, the Department of Ecology and Biodiversity appoints an External Examiner to oversee the examination process. He/she reviews our examination questions, check marks samples of the scripts arising from all courses, and advises us on borderline cases and procedures. The External Examiner visits the Department at least once during this three-year period, during which time we take the opportunity to

review our teaching / examination practices, and discuss academic direction and the like. This year we are extremely fortunate to be hosting Professor Colin Townsend as our External Examiner. Colin is Professor of Zoology at the University of Otago, New Zealand. He has published widely, but is perhaps best known for his co-authorship of the textbook *Ecology: Individuals, Populations and Communities* (Blackwell Scientific Publications). This encyclopedic volume (the most recent - third - edition contains over 1000 pages) is widely used as a teaching aid in Universities (including HKU), and the content is notable in its successful integration of the ecology of plants and animals from marine, freshwater and terrestrial environments. Colin is also well known for his work as a freshwater ecologist, and he has devoted a considerable amount of effort (plus many papers) to understanding the forces which structure communities in streams. His main interests comprise three strands:

- i) The ecology and behaviour of invertebrates and fish in streams;
- ii) The influence of land use on river systems;
- iii) The impact of flow disturbances on stream communities.

In addition, Colin has been researching the biology and ecology of galaxiid fishes in New Zealand, and investigating the nature of their interactions with - and the threats posed by - introduced trout.

Colin will be visiting Hong Kong between May 16 and May 26, and will be giving a seminar. Announcements of that event will be sent out in

due course. Be sure to mark it in your diary!

Departmental Invited Visiting Professor — Professor Richard Primack (from Richard Corlett)

Richard Primack has kindly accepted our invitation to be the Invited Visiting Professor, 1999 in the Department of Ecology & Biodiversity. He will be in Hong Kong from 30 May - 8 June. During this period he will deliver a public lecture, a postgraduate seminar and chair a small workshop session based around conservation biology issues, specifically protecting biological diversity and rare species. The exact dates and titles will be announced — for more information please contact Richard Corlett - below Richard mentions some of the reasons why Prof Primack was selected as a Visiting Professor:

On his Boston University website, Professor Primack gives his research interests as: plant population biology, pollination ecology, tropical forests, conservation biology, and rare plant species. He is responsible for key publications in all these areas and, indeed, it is getting increasingly difficult to write anything without citing at least one of them. His papers are best described as "neat": clearly-written accounts of well-designed studies, using the most appropriate technology and the most appropriate time period. His research is clearly problem-driven, as opposed to so much recent ecological research, where the methods and time frame have apparently been chosen first, and a question has simply been tagged on afterwards. My favourite is an 11-year experimental study of the cost of reproduction in wild populations of the pink lady's slipper orchid, *Cypripedium acaule* (*American Journal of Botany* **85**:1672-1679), from

which one of the conclusions is that a 4-year study would have been too short, but 11 years is unnecessarily long! As if this was not enough, Professor Primack has also written several important reviews, has edited books on the conservation of both Southeast Asian and Central American rainforests, and has written two of the best Conservation Biology textbooks around.

Selected Recent Publications

Primack, R. and Stacy, E. 1998. Cost of reproduction in the pink lady's slipper orchid (*Cypripedium acaule*, Orchidaceae): an eleven-year experimental study of three populations. *American Journal of Botany* **85**:1672-1679.

Primack, R., Bray, D., Galletti, H. and Ponciano, I. (eds.) 1997. *Timber, Tourists and Temples: Conservation and Development in the Maya Forest of Belize, Guatemala and Mexico*. Island Press, Washington D.C.

Drayton, B. and Primack, R. 1996. Plant species lost in an isolated conservation area in metropolitan Boston from 1894 to 1993. *Conservation Biology* **10**:30-39.

Primack, R. and Lovejoy, T.E. (eds.) 1995. *Ecology, conservation, and management of Southeast Asian rainforests*. Yale University Press.

Primack, R. 1995. *A Primer of Conservation Biology*. Sinauer Associates, Sunderland, MA.

Primack, R. and Miao, S. 1992. Dispersal can limit local plant distribution. *Conservation Biology* **26**:513-519.

Primack, R. and Hall, P. 1992. Biodiversity and forest change in Malaysian Borneo. *BioScience* **242**:829-837.

Memorandum of Understanding

The Department has recently signed two new Memorandums

of Understanding to go alongside the first link with the Fungal Group and the University of Goa, India. The first is with Prof Guidio Chelazzi and his group at the University of Florence, Italy. Prof Chelazzi is an expert in behavioural ecology and his group focuses on intertidal invertebrates and he has been to Hong Kong a number of times to work with Gray Williams. Currently Claudia Bruschini is in Hong Kong for a year sitting in on undergraduate courses and conducting a collaborative project on the effects of anaerobiosis on limpet physiology. Prof Chelazzi will visit Hong Kong again in September-October 1999.

The second new link is with Prof Subramanian and his research facility in India. Prof Subramanian is head of the National Facility for Marine Cyanobacteria at Bharathidasan University, India and will develop collaboration with Dr Sanjay Nagarkar and Gray Williams at the Department and Dr Geoff Brown in the Chemistry Department looking at natural products in marine epilithic cyanobacteria (see Sanjay's article in this issue of *Porcupine!*). In a recent visit to Hong Kong, Prof Subramanian gave a very interesting seminar which has stimulated ideas for future collaborations with Dr Gu and Dr Pointing at the Department.

Upcoming conferences

The Second Asia Pacific Phycological Forum: "Asia-Pacific Phycology in the Twenty-first Century, prospects and challenges". This conference will be held at the Chinese University of Hong Kong between 21-25 June, 1999. For further information contact Dr Put Ang of the Chinese University (e-mail [put-](mailto:put-ang@cuhk.edu.hk)

ang@cuhk.edu.hk; web site for conference at <http://www.cuhk.edu.hk/bio/forum/forindex.htm>), or Dr Gray Williams at HKU.

The Fourth International Conference on the Marine Biology of the South China Sea; to be held on 18-22 October 1999 in Quezon City, Metro Manila, Philippines. For further information see <http://msi01.cs.upd.edu.ph/conferences/SCS>.

KFBG NEWS



Breeding raptors

With the recent completion of purpose-built raptor breeding cages at KFBG, we can begin a new, more formal, raptor breeding programme, with the ultimate aim of helping to conserve selected rare birds of prey. Breeding from wild birds of prey (as opposed to birds that were themselves captive-bred) can be very difficult as it takes a long time for these nervous animals to feel comfortable enough to nest and mate. For example, in 1996 we bred (and later released) two offspring from a Eurasian Kestrel. She had been in captivity for seven years and therefore had become accustomed to a captive life.

Our breeding cages are designed to minimize disturbance to the birds and therefore reduce the length of this 'settling in' period. Furthermore, we will select for the first, experience-building phase of our breeding programme birds that we currently hold that have already shown signs of being likely breeders. These include:

- Collared Scops Owl (*Otus lempiji*). Two of our females nested and laid eggs in 1996

and 1997, but these proved to be infertile.

- Barred Owlet (*Glaucidium cuculoides*). Our female first laid and incubated eggs in her 3rd year of captivity in 1997 and has continued to do so every year. We are hoping to acquire a mate for her shortly.
- Eagle Owl (*Bubo bubo*). One of our birds, admitted in 1994, has begun to nest this year.
- Crested Goshawk (*Accipiter trivirgatus*). Our pair appear to be very compatible and often roost side by side. The female, admitted in 1989, although showing no signs of nesting or incubating, has laid 1 or 2 eggs every year since 1997.

It must be noted that all the above behaviour has occurred in cages on display to the public, so we have high hopes of success once these birds are placed in the new secluded breeding cages. All birds mentioned above are native resident species found in Hong Kong that cannot be released to the wild as a result of their injuries.

In future, before any species is placed in a breeding programme at KFBG, a meeting will be held by relevant staff and consultants to determine the conservation and scientific value of breeding that species. We hope to gain valuable experience from breeding the above birds, which can then be put to use in collaboration with other conservation organizations, to share our experiences and help with worthwhile breeding projects.

Rupert Griffiths
Conservation Officer

Breeding turtles

One of our 10 Black Pond Turtles *Geoclemys hamiltoni* (CITES I) laid 22 eggs on 18 April. Unfortunately, most of the eggs have some shell damage, although none are leaking. They have been removed for artificial incubation.

Currently, only 110 individuals of this species are listed in captivity in world zoos by the International Species Information System (ISIS), and there have been no births in the last six months. Hence our egg clutch represents a potentially important development in the captive breeding of this CITES I species.

Rehabilitation of Black-faced Spoonbill

On 15 January a Black-faced Spoonbill from Mai Po Marshes was admitted for veterinary assessment and rehabilitation. The spoonbill had been caught and fitted with a radio monitoring device to allow the tracking of the migration route of the critically endangered bird. It was successfully rehabilitated and later released at Mai Po Marshes on 20 January.

Blyth's Kingfisher comes to Hong Kong!

On 4 May 1999 the SPCA were called to collect a weak and grounded bird from an area near the Hung Hom railway station. The bird was delivered the next day to KFBG where rehabilitation staff rapidly enlisted the help of Lee Kwok Shing for identification of this non-resident species. It turned out to be a Blyth's Kingfisher which, after receiving rest, warmth and fluid-therapy, began to perk up. Its only other

problem appeared to be ulceration to the surface of both eyes, which is clearing up rapidly with treatment. Once it is recovered and quarantined we will be considering the purchase of a one-way ticket back to China. Quite how it got here in the first place remains a mystery, although its proximity to Kowloon Railway Station has given rise to speculation that it came in by train.

Paul Crow
Conservation Officer

Kadoorie beetles

At least 14 new species of rove beetles (Saphylinidae) have been described from KFBG and KARC recently. They were collected between 1990 and 1997 by Gary Ades, Graham Reels and Guillaume de Rougemont.

Update on constructed wetland project

The new constructed wetland system (CWS) for treating wastewater at KFBG is up and running. A practical design was chosen - one that emphasized low cost, low technology and the use of locally available aquatic plant life. *Phragmites australis* reeds were gathered, with kind permission, from the Mai Po Marshes Nature Reserve. *Eichhornia crassipes* (water hyacinth) came from an organic farm on Lamma Island. Remaining plants for the system were found in ponds at KFBG - *Pistia stratiotes* (water lettuce), *Lemna minor* (duckweed), and the floating ferns *Salvinia* and *Azolla*.

These aquatic plants, transplanted into the CWS ponds, are specifically chosen for their ability to assist in the biological treatment of wastewater, whether by absorption of

nutrients or their ability to transfer oxygen from their leaf to their root system.

Alternating aerobic and anaerobic environments work together to remove nitrogen from wastewater. Phosphorous is reduced as it chemically binds to crushed brick - the substrate used in the reed beds. BOD and phosphorous removal are relatively quick processes requiring an aerobic environment, while nitrogen transformation takes a longer period. The retention of wastewater in the CWS allows for this treatment to take place.

The system also fosters the growth of organisms such as zooplankton that feed on bacteria, and dragonfly nymphs and aquatic beetles which feed on mosquito larvae. Brown Tree Frogs have deposited spawn at several locations in the system. Eventually a functioning ecosystem will develop, which will aid in wastewater treatment.

At present, a walkway is being constructed for observation and education purposes and it is expected that the CWS will be open to visitors in June.

Energy Conservation Programme

A programme is under way at KFBG to reduce the present power consumption, involving the modification of all buildings that use energy. Individual building shells will receive particular attention during renovation work to ensure that highest efficiencies are achieved in thermal protection. At the same time the use of environmentally friendly materials will be promoted in conjunction with an innovative approach involving appropriate technology applications.

Electrical appliances have received a thorough audit resulting in plans for many of these to be replaced with latest technology units that have greater efficiency. 'Energy-saver' adaptors for these appliances will further reduce power consumption.

An important aspect of the programme will be to develop educational features at KFBG that highlight and promote the conservation of energy, and the ensuing environmental benefits.

David Sanders
Horticulture Officer

Update on SCBT activities

From 3 to 25 March, John Fellowes was joined by Prof. Zhou Shanyi of Guangxi Normal University. Prof. Zhou is the only other ant specialist active in the coastal China tropics, and his collaborative visit has greatly facilitated the synthesis and progress of ant taxonomy in the region.

In April, Billy Hau and John Fellowes attended the fourth China-Taiwan Convention on National Parks and Protected Areas, in Taipei. We joined a delegation from the mainland led by the Chinese Academy of Sciences Vice-President Prof. Chen Yi-yu, and with a number of leading officials from the State Forestry Administration. After the symposium the delegation visited several of Taiwan's National Parks, scenic areas and museums. Thanks to wide public support Taiwan invests a great deal in its protected areas, particularly in educational facilities which are world-class. During the trip we discussed with Prof. Li Bo-sheng, of Beijing Institute of Botany, plans for a study on eco-tourism in South China's nature reserves.

KFBG is funding a postgraduate student registered at Guangxi Normal University (GNU) to undertake research on the regionally threatened Forest Musk Deer, *Moschus berezovskii*. He is co-supervised by Prof. Xu Hungfa of the East China Normal University at Shanghai, and Prof. Lu Liren of GNU. In addition, we have provided tuition fees at Edinburgh University for Mr. Li Zhaoyuan to complete his Ph.D. research on the endangered White-headed Leaf Monkeys of Guangxi.

John Fellowes
Senior Conservation Officer

The 16th World Orchid Conference

The 16th World Orchid Conference was held in Vancouver from April 22nd to May 3rd. This tri-annual event is one of the most important gatherings of horticulturists and scientists in the orchid world, and more than 400 delegates from all around the world attended this event. The Conference was composed of 2 main elements - an extensive exhibition of orchid displays and sessions of lectures. This year **Conservation** was the theme of the whole event - there were some special poster displays on conservation works in the main exhibition arena and also conservation topics were presented in the opening plenary sessions. All lectures were by invitation and a total number of about 70 speakers gave talks on horticultural and scientific topics. The latter covered topics such as taxonomy, anatomy, molecular biology, germplasm preservation and conservation actions worldwide (e.g. China, India, Peru and Mexico etc.). We were invited to present a lecture in the first day's

conservation session and the title was "Orchid Conservation initiatives in Southern China". There was also a display of poster papers of interesting topics in different fields.

On April 30th the Orchid Specialist Group of the Species Survival Commission of IUCN held a meeting during the course of the conference, as many of the OSG members were in attendance. Altogether about 40 OSG members came to Vancouver and turned up at the meeting, which was chaired by Dr. Phillip Cribb of Kew Garden, who is also the Chairman of the OSG. Being members of the OSG, we both attended this meeting, during which the role and strategy of the OSG was discussed. A main direction of work of OSG in the near future is to form regional networks to facilitate communication, sharing experience in conservation and organized collaborative actions within a region by the members together.

This conference provided a good opportunity for us to meet other orchid experts and enthusiasts, especially those in the Asian region, and learn about their work. We also had a glimpse of the latest developments in orchid studies in the world.

Altogether 3 speakers talked about orchids in China and all shared the same feeling that orchid diversity in China is important for the region and there is an urgent need to act on conservation practices now. Overall the conference gave us many new ideas and stimulation for orchid conservation work in this region in the future.

Lawrence Chau
Manager, Flora Conservation
& SCBT,
& Gloria Siu
Senior Conservation Officer

Feedback

Porc protests!

Dear *Feedback*,
Bring back 'Porc'!

GEORGE WALTHER
Peterborough, England

Dear *Feedback*,
Bring 'Porc' back!

MICHAEL LAU
KFBG

Dear *Feedback*,
Where was 'Porc' in the last issue? I hope he comes back soon.

MICHAEL BARKER
Arundel, England

This is just a sampler of the overwhelming response we received following Porc's controversial exclusion from issue 18. Readers will doubtless be enthralled to discover Porc back in his rightful place for next issue - Ed.

Dear *Feedback*,
The recent article in *Porcupine!* (17: 7) by Richard Corlett on the, supposedly, tricky naming of plants has only caused more confusion to an ecological audience already sceptical of name 'changes'. Corlett's discussion is essentially correct, although no distinction can be drawn between the substantival and adjectival forms of specific epithets named after people (Corlett's rhododendron examples). Stearn (1995) states that "attempts have been made without success to differentiate the application of these adjectival and substantival epithets", going on to give, amongst others, the following examples: *Ceratostigma willmottianum* and *Rosa willmottiae* both commemorate E.A. Willmott, who collected and described neither of them. Readers of *Porcupine!* describing new plants are recommended to consult Stearn (1995: 286 *et seq.*) before fretting over 'corlettii' or 'corlettianum'.

TIM UTTERIDGE
utteridge@yahoo.com

Stearn, W.T., 1995. *Botanical Latin*, 4th edition. David & Charles, Newton Abbot.

OLD STUFF

Comparatively little attention has yet been paid to coal-mining in China, though there are known to be immense coalbeds practically untouched. Meanwhile they are content to denude the country of every vestige of timber for the sake of fuel, thus helping to cause an irregular rainfall and periodical flooding disasters.

We are liable in South China to very sudden changes of temperature. One April morning my thermometer registered 79° in the shade, and the air was filled with the voices of summer. The hum of the mosquito, the chirping of crickets, the croaking of frogs and the shrill cry of the cicada - all seemed to say "Summer has come." In two hours however the weather became bitterly cold, the thermometer suddenly dropping to 59°. A change into cooler clothes meantime brought on a violent attack of fever, which lasted three or four days.

The Canton Province is not overrun with wild animals, but tigers, leopards, and wild cats are found on the hills, and their skins may be bought in Canton. Reports are also not infrequent of woodcutters being carried off by tigers.

... partridges and pheasants, pigeons and doves, sparrows, martins, tailor-birds, woodpeckers, wading-birds and beautiful king-fishers abound. Magpies, crows, snipe, and cranes are also seen in great numbers about Canton, while hawks, vultures, eagles, owls, and peacocks are found in various parts.

From "Kwang Tung, or Five Years in South China", by J.A. Turner, 1894.



PROKARYOTES

Marine Cyanobacteria: the undiscovered treasures of rocky shores

by Sanjay Nagarkar

Cyanobacteria, also known as blue-green algae, comprise a unique group of micro-organisms whose distribution around the world is rivaled only by bacteria. These organisms were considered as algae due to their microscopic morphology, pigmentation and oxygen-evolving photosynthesis. This group with several other microalgae was treated with contempt as 'scum', since it was believed that these organisms had only nuisance value - fouling water bodies, causing disease and toxemia and causing unwary ecologists to slip over on wet rocks. Ecologists, however, started giving them respect as primary producers, in aquatic and marine systems and realized that without them no animal populations such as fish, molluscs etc. could exist.

With the development of sophisticated instruments such as the electron microscope it was realized that so-called blue-green algae are actually 'gram-negative bacteria' in their cell structure and chemistry and form a connecting link with algae by their pigment composition (chlorophyll *a*) and photosynthetic mechanism. These, along with bacteria and actinomycetes, constitute a group called 'prokaryotes' whereas the rest of the living organisms, irrespective of their plant or animal status, belong to another major group termed 'eukaryotes'. The discovery of the prokaryote nature of cyanobacteria coupled with the discovery that a number of these organisms are unique in not only having trophic independence for carbon but also for nitrogen, has evoked considerable interest in these organisms around the world.

In the marine environment, intertidal rocky shores are a rich potential habitat for cyanobacteria. Hong Kong rocky shores are no exception and are covered with various species of cyanobacteria throughout the year. In fact, in terms of primary producers, rocky shores in the tropics are dominated by cyanobacterial species. Due to their oxygen-evolving and nitrogen-fixing activities, cyanobacteria form the energy base of the rocky intertidal benthic food web. Cyanobacteria also provide the primary substrate with which all benthic organisms are in contact on rocky shores. Some of these cyanobacterial species contain toxins or secondary metabolites

although they are generally of high nutritional quality and can, therefore, influence grazer distribution and abundance - and as a result, secondary production and community structure - on rocky shores.

Though having great ecological significance, biodiversity studies of cyanobacteria in general, and intertidal epilithic cyanobacteria in particular, were overlooked for many years in Hong Kong. Only two epilithic cyanobacteria were recorded from Hong Kong previously. When I arrived in Hong Kong in 1992 with my previous experience in microbiology, I took the challenge to explore the world of epilithic cyanobacteria in Hong Kong. With the help of excellent instrumental facilities (i.e. confocal laser and scanning electron microscopes), I recorded 44 cyanobacterial species from various rocky shores of Hong Kong (see references). My estimate is there will be more than 200 cyanobacterial species in my sample collection awaiting identification, many of which are new to science and all of them new records for Hong Kong. I was amazed to see such a vast biodiversity of epilithic cyanobacteria. The most interesting part of cyanobacteria diversity is the wide range of genera from unicellular to filamentous, nitrogen fixing to non-nitrogen fixing, all of which are present on Hong Kong shores. These are *Aphanocapsa*, *Aphanothece*, *Brachytrichia*, *Calothrix*, *Chroococcus*, *Dermocarpa*, *Entophysalis*, *Gloeocapsa*, *Hormothamnion*, *Hyella*, *Kyrtuthrix*, *Lynghya*, *Microcystis*, *Nodularia*, *Oscillatoria*, *Phormidium*, *Plectonema*, *Spirulina*, *Stichosiphon*, *Symploca* and *Synechocystis* (see the attached check list).

Beside their ecological significance, cyanobacteria offer a great potential as organisms for biotechnology purposes. Cyanobacteria, until recently in oblivion, uncared for and unrecognized, have shot into fame and popularity owing to a host of their innate properties that make them ideal organisms for use in a variety of ways to meet our needs and to promise us a bright future. Among these potential biotechnological tools, it is the freshwater forms which have been most studied. Now, people have started realizing the scope available to harness the marine forms and to make them perform exacting tasks in varied areas such as chemical and dye, food, feed and fuel, fertilizer and medicine etc. Cyanobacteria have proved especially useful for the pharmaceutical industry. For example, debromoaplysiatoxin extracted from *Lynghya* sp. shows antileukemia activity,

sulfolipids extracted from *Oscillatoria* sp. show antiviral activity on the AIDS virus and an extract from *Phormidium* sp. shows antihepatitis-B activity. Cyanobacteria are also used in wastewater treatment, pollution treatment, and ammonia and hydrogen gas production. Some species which have proved useful are present in Hong Kong, e.g. *Lyngbya*, *Oscillatoria* and *Phormidium* species.

Check list of intertidal epilithic cyanobacteria of Hong Kong

- Aphanocapsa banarensis* Bharadw.
Aphanocapsa bififormis A. Br.
Aphanocapsa elachista var. *conferta* West et G. S. West
Aphanocapsa littoralis Hansgirg
Aphanocapsa muscicola (Menegh.) Wille
Aphanocapsa senciacensis Frémy
Calothrix contarenii (Zanardini) Bornet et Flahault
- Calothrix crustacea* Thuret
Calothrix javanica de Wilde
Calothrix scopulorum (Weber et Mohr.) C. Ag. ex Born. et Flah.
Chroococcus minor (Kützing) Nägeli
Chroococcus turgidus (Kützing) Nägeli
Dermocarpa leibleiniae (Reinch) Bornet et Thur.
- Dermocarpa olivacea* (Reinsch) Tilden
Entophysalis granulosa Kütz.
Gloeocapsa aeruginosa (Carm.) Kützing
Gloeocapsa crepidinum Thuret
Gloeocapsa pleurocapsoides Novacek
Gloeocapsa stegophila (Itzigs.) Rabenh
Hormothamnion enteromorphoides Grunow ex Born. et Flah.
Hyella caespitosa Bornet et Flahault
Kyrtuthrix maculans (Gomont) Umezaki
Lyngbya confervoides C. Agardh ex Gomont
- Lyngbya martensiana* Meneghini ex Gomont
- Lyngbya semiplena* (C. Agardh) J. Agardh ex Gomont
- Microcystis elabens* (Bréb.) Kütz.
Microcystis flos-aquae (Wittr.) Kirchner
Microcystis robusta (Clark) Nygaard
Microcystis viridis (A. Br.) Lemm
Nodularia spumigena Mertens ex Bornet et Flahault
- Oscillatoria* cf. *earlei* Gardner
Oscillatoria subbrevis Schmidle
Oscillatoria vizagapatensis C.B. Rao
Phormidium corium (C. Agardh) Gomont
Phormidium foveolarum (Montagne) Gomont
Phormidium fragile (Meneghini) Gomont
Phormidium tenue (Meneghini) Gomont
Plectonema terebrans Bornet ex Gomont

Scytonema cf. *crustaceum* C. Agardh ex Bornet et Flahault

Spirulina labyrinthiformis (Meneghini) Gomont

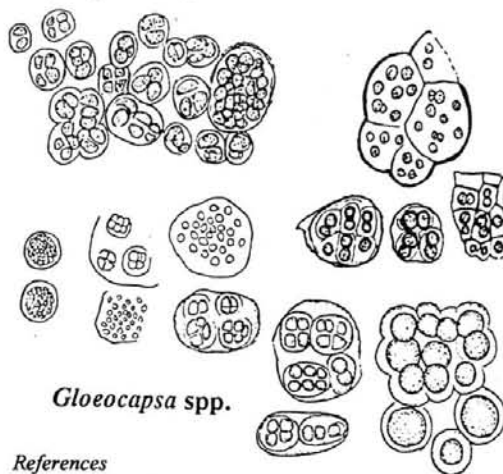
Spirulina subsalsa Oersted ex Gomont

Stichosiphon sansibaricus (Hieron.) Drouet et Daily

Symploca laete-viridis Gomont

Synechocystis pevalekii Ercegovic

There is an urgent need to describe the biodiversity of marine cyanobacteria in the light of their ecological significance and biotechnology potential. This urgency is only exacerbated by the vulnerability of cyanobacteria to environmental impacts and their possible depletion or extinction, as with other microalgae. Currently, together with Dr. Gray A. Williams I am documenting these species on an RGC funded project. Our research investigates their distribution patterns and possible causes of these patterns. We are also collaborating with Prof. G. Subramanian of the National Facility of Marine Cyanobacteria, Bharathidasan University, India to culture these species, and then Dr. Geoff Brown in the Chemistry Department (HKU), will isolate any novel compounds. Previous work on novel compounds from Hong Kong cyanobacteria by Geoff Brown and Charles Lee has revealed new chemical families which Charles and Benny Chan have shown to kill barnacle larvae. Such biocidal properties could be important in the antifouling industry and have applied uses. So, the next time you slip on a blue-green slick on the shore - don't swear - collect it! You may be sliding on a potentially very important species.

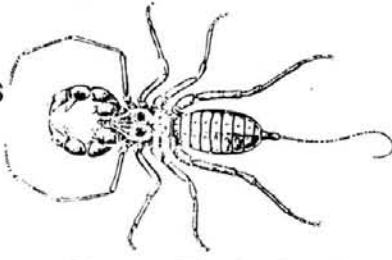


Gloeocapsa spp.

References

- Nagarkar, S. 1998a. New Records of Marine Cyanobacteria from Rocky Shores of Hong Kong. *Botanica Marina* 41: 527-542.
- Nagarkar, S. 1998b. New Records of Coccoid Cyanobacteria from Hong Kong Rocky Shores. *Asian Marine Biology* 15: 121-127.

ARTHROPODS



Another Hong Kong Thelyphonid Whipscorpion

In October 1995 Dr. Michael Lau photographed a fine, big whipscorpion in the woods on the north end of Tung Lung Chau (Junk Island). Unfortunately the photo is in lateral view and does not show the structure of the pedipalps, necessary for determining thelyphonids to generic level. I have followed up on Hong Kong's first thelyphonid (*Porcupine!* 14:30, 1996) and am describing it: a new species, Asia's first *Mastigoproctus* (submitted to the *Journal of Arachnology*). I was most anxious to see if the Tung Lung Chau animals were the same, although the photo did not indicate that.

On 21 January 1999 I got to Tung Lung Chau (with help from Keith Wilson and Martin Williams) and found two juvenile specimens, field tagged numbers 7612-3. I have put one in each of the Kadoorie Farm & Botanic Garden collection and Yale Peabody Museum. The pedipalps of juveniles do not allow determination to genus (therefore I question the use or validity of the genera), but other aspects of the anatomy easily separate these Tung Lung Chau specimens from Hong Kong's *Mastigoproctus*, as yet known only from Shek Kwu Chau.

Tung Lung Chau is a popular place to go and easily accessible. Whipscorpions live under rocks, boards, and detritus. One of mine was under a rock in a shady ravine, but the second was under concrete in the open in front of an abandoned building. Adventurous naturalists, not afraid of a little acetic acid (as in strong vinegar), might try to capture more of these whipscorpions on Tung Lung Chau (and keep an eye out for them elsewhere). Specimens can be kept alive in plastic bags in cool shade and should be delivered to Michael Lau or John Fellowes at Kadoorie Farm. Dead specimens can be kept frozen or pickled in ordinary 70% "rubbing" alcohol (isopropyl or ethanol). Who knows, you too might solve a mystery, or discover the definitive specimens of a new species.

JAMES (SKIP) LAZELL
The Conservation Agency

Hong Kong's Giant Short-winged Long-horn: What is it?

I was first introduced to "short-wings," neotenic grasshoppers that attain sexual maturity but remain incapable of flight, when a student on a field trip I led to Baja California, Mexico, collected them for an American expert, back in 1972. Those were members of the orthopteran family Acrididae: short-horned grasshoppers. They were not especially large.

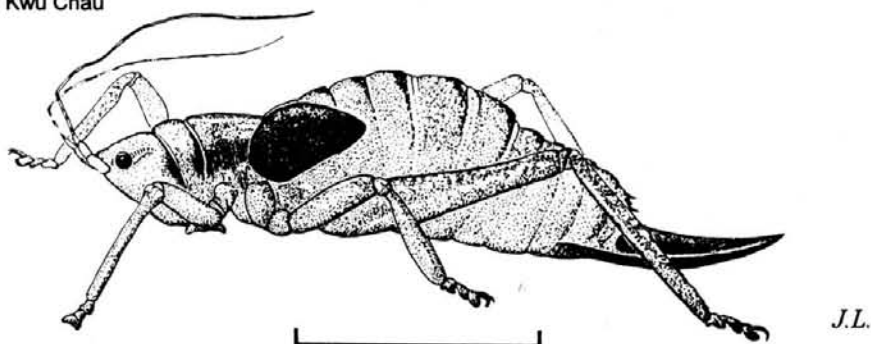
The somber, olive-brown beast I uncovered in HK back in 1997 is large: nearly six centimeters, head-body length, and stout. It is a member of Tettigoniidae, which are long-horned grasshoppers. The most common representatives we see around are bright green, have huge, leaf-like wings, and are called "katyids" by Americans, for the sounds they make. There is also a large, very long-winged, brown species in Hong Kong, *Mecopoda elongata*, that chirps like a bird.

I pickled and tagged mine, number 15420 of my field series (see opposite). It is an adult female. I sent photos to Professor Liang Ge-qiu at Zhongshan University in Guangzhou and Dr. Emmett Easton at Universidade de Macau. They agree it is a member of *Callimenellus*. Back in 1977, R. Winney collected one *Callimenellus ferrugineus* in Tai Po Kau forest. That specimen is preserved and curated at the Hong Kong Agriculture and Fisheries Department insect museum at Tai Lung Farm, Sheung Shui, where I examined it on 26 January 1999. A second specimen questionably labelled as this species is not a *Callimenellus* at all, but a nymph of something else. *C. ferrugineus* is half the size of 15420, less than 3cm, and of very different proportions. Professor Liang thinks the big one may be *C. fumidus* instead, but Dr. Easton thinks those might be the same thing. If so, 15420 could not be *C. fumidus* either. I sent the specimen to Dr. Easton, who collaborates with Professor Liang, and await results.

Is this yet another relict barely surviving in a remnant of the once-vast monsoon forest? Perhaps so. Of course you know where I got mine: Shek Kwu Chau, the biological Treasure Island of the South China Sea.

JAMES (SKIP) LAZELL
The Conservation Agency

Specimen # 15420 from Shek Kwu Chau
Scale bar is 2 cm



New moth species for Hong Kong, part 3; further 1997-1998 records by Roger Kendrick

Continuing research on the composition of Hong Kong's moth fauna has uncovered yet more species. As was mentioned in part one (Kendrick, 1998a), many of the micro-lepidoptera recorded during 1997 and 1998 had not been placed beyond subfamily. The opportunity to rectify this situation arose as part of a trip to visit several institutions in Britain and North America at the beginning of the year.

Time was spent identifying recorded species by comparison with material at the Natural History Museum (BMNH), London and the Munroe collection housed in the National Insect Collection (CNIC), Agriculture Canada, Ottawa. A small number of macro-lepidoptera have been added to the list, primarily as a result of time spent at the BMNH and also due to continuing species determination work by Tony Galsworthy. Whilst at the BMNH, there was a little time to view the Oxford University Expedition (OUE) specimens of micro-lepidoptera collected in 1981. Some of the species reported here were first noted at this time, but no results have been published for this group by the expedition: only a couple of papers by various taxonomists have incorporated some previously unknown species during generic reviews (e.g. Diakonoff, 1984). Species with OUE 1981 after the date of capture indicate these species.

Also visited during the trip was the Bishop Museum (BPBM), Honolulu. Here, there is a large amount of material (estimated at some 10,000 specimens, mostly micro-lepidoptera) collected, using light-traps and malaise-traps at Tai Po Kau,

Sai Kung and Castle Peak, during 1964 and 1965 by W.J. Voss, Wai Ming Hui and Lee Kit Ming. Almost all of this material remains unsorted and undoubtedly contains many species not otherwise known from Hong Kong; my very limited time at the BPBM barely allowed me to ascertain the scale of the collection, never mind attempt to sort and identify material. Investigations have yet to reveal whether any results of the Voss *et al.* recording were published.

Other reading shows very little published work on microlepidoptera for southern China. The only papers of note are by Caradja & Meyrick (1933, 1934), who report on the independent fieldwork carried out from 1909 until around 1925 by R. Mell and by H. Höne in Guangdong (mostly from Guangzhou, Lo Fao Shan and Ding Wu Shan, also from Lung Tao Shan, Tsa Hyen Shan, Sho Jun Shan, Man Tsi Shan and Tsat Muck Ngao (near Linping) but nothing from Hong Kong).

All the identifications are by comparison with material at the BMNH (or CNIC if stated), or by determination (det.) by the stated authority. I thank the Trustees of the BMNH and J.D. Holloway, M.R. Honey (MRH), I.J. Kitching, G.S. Robinson (GSR), K. Sattler (KS), M. Shaffer (MS) and K.R. Tuck (KRT) for giving permission to access the BMNH Lepidoptera collections and card indices and for their assistance during my week at the BMNH. I also thank J.D. Lafontaine for giving permission to access the Munroe Collection at CNIC, and to R. Vincent for assisting my searches to identify some Hong Kong species from Munroe Collection. Thanks, too, to G.M. Nishida, Collections Manager of Entomology and D. Preston, Collections Technician (Dept. of Entomology) at BPBM for granting access to, and assisting my study of the Lepidoptera collection. I

am again indebted to Tony Galsworthy (ACG) for assisting in the identification of some macrolepidoptera.

Unless stated otherwise, the list contains first records of species recorded from Hong Kong using mercury-vapour light traps at Kadoorie Agricultural Research Centre, Shek Kong, N.T. Many of the microlepidoptera did not match species in the institutions' collections and are placed as "species near to" (sp. nr.) a closely allied species. It is likely most of these are undescribed species. Species unidentified above species level are not listed. The two species of Lecithoceridae listed are tentatively identified from Gates Clarke (1965) and have not been checked against the BMNH material. Species marked with # were listed by Caradja & Meyrick (1933, 1934)

Tineidae: Hieroxestinae

Opogona sp. nr. *trigonomis* Meyrick, 1907. 9 Oct. 1997

Opogona sp. nr. *xanthocrita* Meyrick, 1911. 27 Mar. 1998

Tineidae: Tineinae

Hapsifera seclusella (Walker, 1864) #. 11 Apr. 1998; Shek Hang Wai car park, Tai Mong Tsai (det. GSR)

Monopis monachella (Hübner, 1796) #. 28 Feb. 1997

Monopis sp. nr. *congestella* (Walker, 1864). 11 Apr. 1998; Shek Hang Wai car park (det. GSR)

Monopis sp. nr. *hemicitra* Meyrick, 1906. 8 Aug. 1998 (det. GSR)

Gracillariidae

Caloptilia (Parectopa) sp. nr. *zehntneri* Snellen, 1901. 24 Feb. 1997

Oecophoridae: Stathmopodinae

Hieromantis sp. nr. *ephodophora* Meyrick, 1897. 2 Oct. 1997 (det. GSR)

Stathmopoda sp. nr. *isoleuca* Meyrick, 1913. 8 Aug. 1998

Stathmopoda stimulata Meyrick (Voss colln., BPBM; OUE 1981. The commonest stathmopodid moth species in Hong Kong)

Cosmopterigidae

Cosmopterix aculeata Meyrick, 1909. 6 Mar. 1997

Cosmopterix hamifera Meyrick, 1909. 5 Aug. 1998

Cosmopterix sp. nr. *basilisca* Meyrick, 1909. 5 Aug. 1997

Gelechiidae

Anarsia sp. nr. *isogona* Meyrick, 1913. 30 Jul. 1998

Dichomeris corniculata (Meyrick, 1913). 27 Mar. 1998 (det. KS)

Dichomeris sp. nr. *mesoglana* Meyrick, 1923. 7 Apr. 1998

Dichomeris sp. nr. *ochthophora* Meyrick, 1936. 10 Apr. 1998

genus nr. *Harpagidia*, sp. *amplexa* Meyrick, 1925 (described under *Gelechia*); type locality "Canton". (BMNH microlepidoptera collection drawer M10-238) [note: This species is one of the commonest gelechiid species in Hong Kong and is represented by over 100 specimens in the BPBM. Also recorded by the OUE, 1981. It awaits allocation to a suitable genus (or the description of a new genus, K. Sattler, pers. comm).]

Lecithoceridae

Homaloxestis sp. nr. *cholopis* (Meyrick, 1906) #. 29 Aug. 1998

Homaloxestis sp. nr. *myloxesta* Meyrick, 1932. 30 Jan. 1997

Tortricidae: Olethreutinae

Arcesis threnodes (Meyrick, 1905). 20 Sep. 1997 (also OUE 1981) (det. KRT)

Ophiorrhada sp. nr. *cellifera* (Meyrick, 1912). 7 Nov. 1998 (det. KRT)

Rhctogonia ancalota (Meyrick, 1907). 30 May 1998 (det. KRT)

Spilonota mortuana (Walker, 1863). 19 Oct. 1997 (det. KRT)

Alucitidae

Alucita sp. ? *spilodesma* (Meyrick, 1908). 5 Feb. 1997

Pterophoridae: Deuterocopinae

Deuterocopus socotranus Rebel, 1907. 25 Jul 1997, Tai Po Kau Special Area (also OUE 1981)

Pterophoridae: Pterophorinae

Pterophorus leucadactylus (Walker, 1864) (= *niveodactyla* Pagenstacher) #. 1 Jan. 1997

Thyrididae: Siculodinae

Hypolamprus ypsilon (Warren, 1899). 7 Jun. 1997 (det. MS)

Pyralidae: Galleriinae

Lamoria adeptella (Walker, 1863). 30 May 1997

Pyralidae: Epipaschiinae

Catamola funerea (Walker, 1863). 15 Jan. 1997 (det. MS) [note: this species was previously only known from Australia, so is suspected to have been introduced accidentally on imported plants, possibly *Eucalyptus* sp. (M. Shaffer, pers. comm.). There are two records, Jan 1997 and Feb. 1999, both from KARC]

Pyralidae: Pyralinae

Perisseretma endotrichalis Warren, 1895 #. 3 Nov. 1997 (det. MS)

Stemmatophora flavicaput Shibuya, 1928. 3 May 1997

Tyndis sp. indet. / nov. 13 Jun. 1998. Chatham Path, Barker Road, Hong Kong Island (det. MS)

Pyralidae: Phycitinae

Addyme inductalis (Walker, 1863). 11 Jul. 1997 (also OUE 1981)

Indomyrlaea ferrotincta (Hampson, 1912). Shek Hang Wai, Tai Mong Tsai. 14 Nov. 1998

Nephopterix ochribasalis (Hampson, 1896) #. 1 Jan. 1997 (also Voss et al, BPBM and OUE 1981)

Phycita cavifrons Meyrick, 1932. 5 Aug. 1998
Volobilis sp. (sensu Kendrick, 1998b) is confirmed as *biplaga* Walker, 1858. (also leg. Voss et al., 1964, BPBM; OUE, 1981)

Pyralidae: Phycitinae; Peoriini

Polyocha pulveralis Hampson, 1893. 1 May 1998

Pyralidae: Crambinae

Calamotropha formosella Bleszynski, 1961. 21 Jun. 1997

Calamotropha sp. nr. *melanosticta* (Hampson, 1895) #. 6 May 1998

Gargela sp. indet. / nov. 25 Mar. 1998

Pyralidae: Nymphulinae

Agassiziella sp. nr. *albidivisa* (Warren, 1896). 29 Aug. 1998.

Cataclysta angulata Moore, 1886. 18 Jan. 1997.

Eristina sp. nr. *bifurcalis* (Pryer, 1877). 8 Aug. 1998

Nymphicula sp. nr. *xanthobathra* (Meyrick, 1894). 28 May 1997

Parapoynx diminutalis Snellen, 1880. 5 Aug. 1997

Parapoynx sp. nr. *villidalis* (Walker, 1859). Shek Hang Wai car park, 4 Apr. 1998

Pyralidae: Musotiminae

Cymoriza sp. nr. *albiflavidalis* Warren. 27 Mar. 1998

Musotima suffusalis (Hampson, 1893) #. 5 Sep. 1997 (also leg. Voss et al., 1964, BPBM (ex. Tai Po Kau))

Pyralidae: Pyraustinae

Eurrhyarodes accessalis (Walker, 1859) #. 5 Aug. 1998

Pagyda auroalis (Moore, 1888) #. 27 Sep. 1998 (CNIC)

Pagyda lustralis Snellen, 1890 #. 18 Jun. 1997 (CNIC)

Pagyda sp. nr. *salualis* Walker #. 5 Aug. 1998 (CNIC)

Parthenodes stellata (Warren, 1896) #. 6 May 1998

Prophantis adusta Inoue, 1986 #. 10 Mar. 1997 1997 (also leg. Voss et al., 1964, BPBM; OUE, 1981)

Stenia minoralis (Snellen, 1880) #. 10 Oct. 1997 Tai Po Kau

Lymantriidae

Calliteara sp. nr. *axutha* Collonette, 1934. 15 Aug. 1998

Arctiidae: Lithosiinae

Cyclosodes flavicostata Hampson. 29 Aug. 1998

Noctuidae: Acontiinae

Autoba abrupta (Walkr, 1865). 6 Jun. 1998

Autoba rubra Hampson, 1902. 14 Aug. 1997

Niaccaba sumptualis Walker, 1865. 10 Oct. 1997 Tai Po Kau (det. MRH)

Oruza crocedota (Turner, 1903). 25 Jul. 1998. Shek Hang Wai car park

Noctuidae: Sarrothripinae

Risoba vialis Moore, 1881. 7 Nov. 1998

Noctuidae: Nolinae

Idioclytta sp. nr. *tornotis* Meyrick, 1907. 14 Aug. 1997

Meganola sp. nr. *diversalis* Inoue, 1991. 16 Jan. 1997

Nola sp. nr. *izuensis* Inoue. 15 Nov. 1997

Noctuidae: Ipimorphinae

Callopietria aethiops Butler, 1878. Pat Sing Leng AFD Mgt. Ctr., Nam Chung, 25 Mar. 1998 (det. ACG)



There are also some taxonomic developments that have come to my attention during these studies; three important ones are as follows:-

Prophantis octoguttalis (Felder & Rogenhofer) (Pyralidae: Pyraustinae) has been split into several species (Inoue, 1986), one of which occurs in Hong Kong – *P. adusta* Inoue, 1986. All voucher specimen records for Hong Kong that I have seen are *P. adusta*.

Euclasta defamatalis (Walker, 1859) (sensu Lee & Winney, 1981) (Pyralidae: Pyraustinae). There was a recognised undescribed species in this genus, which occurs in Africa and Asia, including Hong Kong. This species was described by Maes (1997) as *Euclasta vitalis* Maes, 1997 and appears to be the only *Euclasta* to occur in Hong Kong, although *E. defamatalis* should occur.

Acrocercops cramerella Snellen, 1894 (Gracillariidae). This species has been transferred to a different genus (*Conopomorpha*) and split into several species (Bradley, 1986). The species referred to by Lee & Winney (1981) as *A. cramerella* is now referable to as *Conopomorpha sinensis* Bradley, 1986. It is possible that *C. cramerella* (Snellen) may also occur in Hong Kong.

References:

- Bradley, J.D. (1986) Identity of the South-East Asian cocoa moth, *Conopomorpha cramerella* (Snellen) (Lepidoptera: Gracillariidae), with descriptions of allied new species. *Bulletin of Entomological Research* 76: 41-51.
- Caradja, A. von & Meyrick, E. (1933) Materialien zu einer microlepidopteren-fauna Kwangtungs. *Dt. Ent. Z. Iris, Dresden* 47: 123-167.
- Caradja, A. von & Meyrick, E. (1934). Materialien zu einer microlepidopteren-fauna Kwangtungs: Pterophoridae – Tortricidae - Tineidae. *Dt. Ent. Z. Iris, Dresden* 48: 28-43.
- Diakonoff, A. (1984) Synopsis and descriptions of new species of the South Asiatic Cochyliinae (Lepidoptera: Tortricidae), with an appendix. *Zoologische Mededelingen, Leiden* 58: 261-293.
- Gates Clarke, J.F. (1965) *Catalogue of the Type specimens of Microlepidoptera in the British Museum (Natural History) described by Edward Meyrick*. 5. British Museum (Natural History), London.
- Inoue, H. (1986) A new species of the genus *Prophantis* from Indo-Australian Region (Pyralidae, Pyraustinae). *Tyô to Ga* 36: 157-161.
- Kendrick, R.C. (1998a) New moth species for Hong Kong; 1997 records. *Porcupine!* 17: 14.
- Kendrick, R.C. (1998b) New moth species for Hong Kong, part 2; 1997-1998 records. *Porcupine!* 18: 7-8.
- Lee, L.H.Y. & Winney, R., 1981. Check list of agricultural insects of Hong Kong 1981. *Agriculture and Fisheries Department Bulletin No.2*. 164 pp.
- Maes, K.V.N., 1997. On the designation of the types of *Euclasta defamatalis* (Walker, 1859) and *E. filigeralis* Lederer, 1863 and the description of a new species (Lep., Pyraloidea, Crambidae, Pyraustinae). *Bull. Anns Soc. r. belge Ent.* 133: 21-22.

ROGER KENDRICK

Big-headed Ant resurfaces on Lantau

On 4 February 1999 Graham Reels was doing fieldwork between Tai Ho and Pak Mong on northern Lantau. He noticed two ant species, one of which occurred in large numbers both in the abandoned agricultural land and in feng shui woodland. He brought specimens of both species back to Kadoorie Farm & Botanic Garden for identification. While I instantly recognised one species as the Long-legged Ant, *Anoplolepis gracilipes* (F. Smith), a species probably originating in Africa but widespread in open habitats in South China, the more numerous species was unfamiliar to me. I took it to the Natural History Museum in London, where Mr. Barry Bolton was able to confirm my suspicion: that it was the invasive southern African ant, *Pheidole megacephala* (Fabricius), sometimes known as the Big-headed Ant.

This is not the first record of *P. megacephala* from Hong Kong: in the 1920s, it was collected by Professor F. Silvestri at Repulse Bay (Wheeler, 1928). It is also known from Guangdong Province (Wu & Wang, 1995). However during several years of work in the 1990s (Fellowes, 1996 and unpublished), I had not previously recorded the species, and began to doubt the validity of the old record.

The presence of the species is noteworthy because of its potential impacts on native biodiversity. For many years *P. megacephala* has been viewed as a threat to ants and other invertebrates on tropical islands, such as the West Indies (Haskins & Haskins, 1965) and the Hawaiian archipelago (Vander Meer *et al.*, 1990). More recently such impacts have been documented in northern Australia, where in one locality studied the species has caused the virtual elimination of native ant species and reduced the abundance of other native invertebrates to 15% of their natural levels (Hoffmann, 1998). It has also had severe impacts on agriculture (e.g. Vander Meer *et al.*, 1990 and Williams, 1994) and on cables and plastic tubing (various references in Hoffmann, 1998) throughout the tropics.

In Asia, there has been very little attention to the impact of exotic ants on native biodiversity (Fellowes, in press). Perhaps there is an assumption that the native insect community in mainland Asia

is somewhat resistant to invasion. Yet if the species-rich, highly competitive ant communities of northern Australia are at risk, then there is no reason to be complacent here. One barrier to understanding is the 'taxonomic impediment' – for some groups it takes some years of specialist study before a biologist is able to distinguish natives from exotics (for some ant taxa, nobody knows). Possibly the time is ripe for cross-taxon training in identification of exotic or invasive species, such that all active field biologists can contribute to our understanding of the problem. Could this be incorporated into undergraduate or postgraduate training?

As in many situations, here the interests of biodiversity conservation match long-term economic interests: whether your land management goals include agricultural viability, recreation, urban development or conservation, invasive species may be ignored at your peril. Should the Government be coordinating the available expertise?

JOHN R. FELLOWES



Pheidole megacephala

References

- Fellowes, J.R., 1996. *Community Composition of Hong Kong Ants: Spatial and Seasonal Patterns*. Ph.D. thesis, The University of Hong Kong, Hong Kong, 367 pp.
- Fellowes, J.R., in press. Exotic ants in Asia: is the mainland at risk? The case of Hong Kong. *Aliens*.
- Haskins, C.P. & E.F. Haskins, 1965. *Pheidole megacephala* and *Iridomyrmex humilis* in Bermuda: equilibrium or slow replacement. *Ecology* **46**: 736-740.
- Hoffmann, B.D., 1998. The Big-headed Ant *Pheidole megacephala*: a new threat to monsoonal northwestern Australia. *Pacific Conservation Biology* **4**: 250-255.
- Vander Meer, R.K., K. Jaffe & A. Cedeno (eds.), 1990. *Applied Myrmecology: A World Perspective*. Westview Press, Boulder, Colorado.
- Wheeler, W.M., 1928. Ants collected by Professor F. Silvestri in China. *Bollettino del Laboratorio di Zoologia generale e agraria del R. Istituto Superiore agrario di Portici* **22**: 3- 38.
- Williams, D.F. (ed.), 1994. *Exotic Ants: Biology, Impact and Control of Introduced Species*. Westview Press, Boulder, Colorado, 332 pp.
- Wu, J. & C. Wang, 1995. *The Ants of China*. China Forestry Publishing House, Beijing, 214 pp.

FISH

Hong Kong's Freshwater Fish: Who Cares?!?

by Bosco Chan

An on-going survey of the ichthyofauna in lowland waterways, as part of my Ph.D. study concerning the environmental effects of channelization in Hong Kong, has revealed the desperate need for such studies. Twenty-two lowland watercourses, of different sizes and various degrees of human impacts, have so far been visited. A total of 45 species in 20 families have been recorded. Eight species are new Hong Kong records including two newly established exotic species. Five of the eight species have not been recorded in Guangdong Province (see Table 1). Brackish water species and marine vagrants were excluded from this survey.

Table 1 New records of freshwater fishes for Hong Kong

Species	Remarks
<i>Noemacheilus incertus</i>	
<i>Awaous melanocephalus</i>	not recorded in Guangdong
<i>Ctenogobius cervicosquamus</i>	not recorded in Guangdong
<i>Stiphodon</i> sp.	await identification, not recorded in Guangdong
<i>Channa gachua</i>	
<i>Mastacembelus armatus</i>	
<i>Poecilia sphenops</i>	exotic species, not recorded in Guangdong
<i>Tilapia zillii</i>	exotic species, not recorded in Guangdong

While new records of freshwater fishes are still being made locally, there is no room for complacency. The overall prospect for fauna and flora associated with lowland streams looks extremely bleak indeed; the rate of channelization, a by-product of rural development, has never been higher. It is particularly disturbing because the engineering designs of flood channels in Hong Kong have rarely if ever considered the ecological consequences of replacing a natural stream by a homogeneous concrete ditch. Also the Government's efforts at pollution control are far from satisfactory (go to Ho Pui at Kam Tin and Ping Yuen River above Sheung Shui if you don't believe me!). Other lowland streams which still support good fish populations are being regularly electrofished, a fishing method well known to

greatly deplete fish populations and alter composition. Dudgeon (1993) listed 11 native freshwater fishes as threatened with extinction or possibly locally extinct already; only 4 species listed were recorded during the present survey (*Rasbora steineri*, *Acrossocheilus wenchowensis beijiangensis*, *Rhodeus* sp., and *Oryzias latipes*). Sadly, all were found in and around development sites. In addition, five of the recently recorded species were found in only one location. Considering the rate of urbanization and the alarming appetite for channelization shown by our government, these five fish could be considered as threatened with extinction in Hong Kong. All are freshwater or amphidromous species mainly confined to lowland watercourses (see below).

List of freshwater fish threatened with local extinction in Hong Kong (based on Dudgeon (1993), and the present survey conducted by the author).

* = Species recorded during the present survey

Plecoglossus altivilis
*Rasbora steineri**
Tanichthys albonubes
Aphyocypris lini
Rasborinus formosae
Rhodeus sp.* (see Note below)
Acanthorhodeus macropterus
*Acrossocheilus wenchowensis beijiangensis**
Pseudorasbora parva
Cobitis sinensis
*Oryzias latipes**
*Awaous melanocephalus**
*Ctenogobius cervicosquamus**
Stiphodon sp.*
*Channa asiatica**
*Channa gachua**
Macropodus concolor
*Mastacembelus armatus**

The study is still in its early stages. However, the urgent need for the protection of native freshwater fish is already obvious; half of the 45 species recorded so far were found in only one or two sites, none of the sites visited are protected and many are being destroyed for development. Furthermore, no lowland freshwater waterways are protected in Hong Kong. With many of the rural villages being re-developed, and pending projects to develop north Lantau and a new 8-lane highway between Shatin and Sha Tau Kok, the freshwater fishes, together with other wildlife living in and along the lowland rivers, are highly susceptible to local extinction. Any loss of fish species due to careless development is likely to be permanent and they will never be naturally restored by colonization from populations elsewhere. It is hoped that this study can race against time to help government

decision-makers to evaluate the environmental impacts of developments around lowland streams. My ultimate intention in writing this article, however, is to draw some much-needed attention to the protection of native freshwater fishes, many of which depend entirely on lowland waterways. These lowland streams/ivers, together with the adjacent marshes, are probably the most threatened wildlife habitats in Hong Kong at present.

Six years have elapsed since Dudgeon (1993) warned us about our fast-disappearing native freshwater fish and urged us to protect them. Regrettably, ABSOLUTELY NOTHING has been done (or even attempted?!) in regard to this matter. Are freshwater fishes really that worthless? Does anybody care?

Note: The bitterling (*Rhodeus* sp.) that occurs in Kam Tin stream, was discovered and identified as Rosy Bitterling (*Rhodeus ocellatus*) by Mr. K. W. Cheung of AFD in *Porcupine!* 18. However, specimens collected during the present study from the same site fitted the description of *Rhodeus sinensis* (Chinese Bitterling) rather than *R. ocellatus*. The body depth : body length ratio and colour in alcohol of the specimens are of particular diagnostic value in distinguishing this species from *R. ocellatus*. See Ye (1990) and Akai & Arai (1998) for detailed descriptions of the identification for the subfamily Acheilognathinae, especially the genus *Rhodeus*.

References

- Akai, Y. and Arai, R. (1998). *Rhodeus sinensis*, a senior synonym of *R. lighti* and *R. uyekii* (Acheilognathinae, Cyprinidae). *Ichthyological Research* 45 (1): 105-110.
- Cheung, K. W. (1998). Sightings of three freshwater fish. *Porcupine!* 18: 9.
- Dudgeon, D. (1993). Hong Kong's vanishing freshwater fishes. *Porcupine!* 4: 1 & 6.
- Ye, F. L. (1990). The Acheilognathinae. In *The Freshwater Fishes of Guangdong Province*, pp. 123-136. Ed. J. H. Pan. Guangdong, China: Guangdong Science and Technology Press. (In Chinese)

A little message

I have been contemplating organizing a freshwater group, believing such a group may be useful for the exchange of relevant information and discussion of issues of concern about Hong Kong's freshwaters amongst interested people. Any suggestions to, or anybody interested in this idea please contact **Bosco Chan** via email: bochan@hkusua.hku.hk or mobile: 96399240.

More about Hong Kong freshwater fishes

by David Dudgeon

In the last three issues of *Porcupine!* there have been reports of sightings of new and/or rare freshwater fishes by K.W. Cheung and Keith Wilson *et al.* Their records update those published by Chong Dee-hwa and myself in 1993. There are a couple of matters arising from K.W. Cheung's two articles which I would like to address. The record of *Rhodeus ocellatus* (the bitterling) from a stream near Kam Tin reported in *Porcupine!* No. 18 is exciting: I had guessed that these fish were extinct in Hong Kong [*but see preceding article*]. The bad news is that this stream is now polluted with silt arising from work on the new KCRC extension. Excessive sedimentation is known to degrade stream habitats in Hong Kong and elsewhere (e.g. Dudgeon, 1994), but the not-so-bad news is that KCRC have promised to install a silt trap in an attempt to correct the situation as soon as possible.

Rhodeus ocellatus (and related species in the same genus) has the unusual symbiotic habit of laying its eggs inside the body of another animal: the swan mussel, *Anodonta woodiana*. The eggs develop inside the respiratory chamber of the mussel and, in due course, hatch into tiny fish which escape to take up a free-living existence (see Dudgeon, 1985). Interestingly, during the initial stages of their lives, the larvae of the swan mussels (called glochidia) are parasitic on fishes, although the species identity of the host fish does not seem to be critical for *Anodonta woodiana* glochidia (Dudgeon & Morton, 1984). The bitterling cannot breed if the mussels are not present. K.W. Cheung did not report finding any mussels in the stream when he visited, but Bosco Chan and myself uncovered some during a recent visit. This stream is **the only place in Hong Kong** where we know that the fish and their mussel hosts co-occur in this symbiosis. *Anodonta woodiana* is reported from **only one other site in Hong Kong** (Plover Cove Reservoir: see Dudgeon & Morton, 1983). Unfortunately, swan mussels are highly sensitive to siltation and other environmental changes. Indeed, on a global basis, this family (the Unionidae) has an exceptionally large number of endangered species (World Conservation Monitoring Centre, 1996).

Back to K.W. Cheung's records. In *Porcupine!* No. 17 he reports a 'new' *Eleotris* sp. (Eleotrididae)

from a waterlogged field in Sai Kung. *Eleotris* spp. spend most of their lives in freshwater but swim down streams into estuaries in order to breed. The larvae of these fish are planktonic so the marine phase of their life cycle is essential. It is therefore surprising and interesting to come across a juvenile in a marshy area. Presumably, this fish became lost while migrating upstream. Incidentally, I doubt this juvenile represents a new record for Hong Kong. Several Eleotrididae are known from the Territory and different species in the genus *Eleotris* are very difficult to identify when small. I suspect that this is a juvenile of one of the species already reported by Chong & Dudgeon (1992).

In the same article, K.W. Cheung makes the important comment that some of the fishes mentioned by Chong & Dudgeon (1992) are more widespread than previously thought. He mentions *Yaoshanicus arcus* as an example. This gives me the opportunity to make two points: firstly, the name *Yaoshanicus arcus* given by Chong & Dudgeon (1992) is probably incorrect; the species concerned is almost certainly *Nicholsicypris normalis* [*see following article*]. Secondly, the 'under-reporting' of fish reflects the fact that the Chong & Dudgeon (*op. cit.*) paper included only the records we had to hand which were based on our rather unrepresentative series of collections; we did not survey every single stream in the Territory. A systematic survey of stream fishes in Hong Kong is now ongoing. That part of the survey dealing with lowland streams is being undertaken by Bosco Chan and, later in the year, I will be hiring a research assistant to work on sites that Bosco or I have yet to sample. The survey will be completed by the end of 1999. Initial work by Bosco Chan (reported separately in this issue of *Porcupine!*) has revealed a host of new records and interesting findings (including one I did not believe until I saw it with my own eyes!). Certainly, K.W. Cheung is right to say that caution should be exercised in assessing the ecological value of sites for fishes, and (to round things up neatly) it appears that the presence of bitterlings was not mentioned in the EIA report prepared for the KCRC extension.

References

- Chong, D.-h. & Dudgeon, D., (1992): Hong Kong stream fishes: an annotated checklist with remarks on conservation status. *Memoirs of the Hong Kong Natural History Society* 19: 79-112.
- Dudgeon, D. (1985): *Anodonta woodiana* (Bivalvia: Unionacea): the egg repository of *Rhodeus sinensis* (Pisces: Cyprinidae). - *Malacological Review* 18: 110.

- Dudgeon, D. (1994): Functional assessment of the effects of increased sediment loads resulting from riparian-zone modification in a Hong Kong stream. - *Verhandlungen Internationale Vereinigung für theoretische und angewandte Limnologie* **25**: 1790-1792.
- Dudgeon, D. & Morton, B. (1983): The population dynamics and sexual strategy of *Anodonta woodiana* (Bivalvia: Unionacea) in Plover Cove Reservoir, Hong Kong. - *Journal of Zoology, London* **201**: 161-183.
- Dudgeon, D. & Morton, B. (1984): Site selection and attachment duration of *Anodonta woodiana* (Bivalvia: Unionacea) glochidia on fish hosts. - *Journal of Zoology, London* **204**: 355-362.
- World Conservation Monitoring Centre, 1996. *1996 IUCN Red List of Threatened Animals*. Gland Switzerland & Cambridge, U.K.: World Conservation Monitoring Centre: 228 pp.

Yaoshanicus no more, but Nicholsicypris galore!

The long-time taxonomic confusion over a native cyprinid has finally been solved, thanks to the expert help of Dr. Sadovy at HKU. This handsome freshwater fish, previously identified as *Yaoshanicus arcus* (with three rows of lower pharyngeal teeth) is actually the superficially identical *Nicholsicypris normalis* (with two rows of lower pharyngeal teeth).

Nicholsicypris normalis is widespread in Guangdong, southern Guangxi and Hainan, while *Yaoshanicus arcus* is endemic to the Yaoshan area in Guangxi. In Hong Kong, the fish has only previously been found in the Sai Kung area and Sha Lo Tung. Recently it was found to be quite common in two locations near Sha Tau Kok in the northeast New Territories, and a stream on northern Lantau. The Lantau record represents a rather dramatic local range extension, being the first record from the western side of the Territory.

BOSCO CHAN

Even more about Hong Kong freshwater fishes

Previous records of Hong Kong's freshwater fish have included *Plecoglossus altivelis*, *Rasbora formosae*, *Tanichthys albonubes* and *Aphyocypris lini*, referring to them as endangered or possibly extinct. *Plecoglossus altivelis* has been reported from Tai Ho Stream on North Lantau and may still survive there. There is a chance that this stream may soon be designated as an SSSI. The other

three species are almost certainly extinct locally, and I have doubts that *T. albonubes* - a popular aquarium fish that is common in trade - was ever present in the wild. (I would be very pleased if someone could contradict me on this.) According to the *China Red Data Book of Endangered Animals: Pisces* published in 1998, *T. albonubes* and *A. lini* are extinct in the wild in China; *R. formosae* and *P. altivelis* is listed as 'vulnerable'. The authors of the *Red Data Book* suggest that attention needs to be paid to habitat protection including maintenance of channels to allow spawning migrations by anadromous *P. altivelis* fish.

A surprising entry in the *Red Data Book* is the listing of *Parazacco spilurus* as 'vulnerable'. This minnow is widespread and abundant in Hong Kong hillstreams but has a limited distribution elsewhere in China where it seems to be declining. Perhaps Hong Kong fishes could provide broodstock for reintroduction into China once habitat protection can be ensured. To extend this suggestion further, I would like to explore the possibility of reintroducing *T. albonubes* to sites in Hong Kong where it used to occur - if I can obtain unequivocal evidence of an original presence. So any ideas?

DAVID DUDGEON

AMPHIBIANS

Philautus romeri in Hong Kong: a frog re-introduction to a degraded tropical landscape by David Dudgeon and Michael Lau

Much has been made of Hong Kong's endemic tree frog, Philautus romeri. With the recent completion of Michael Lau's Ph.D. thesis on this animal, we take the opportunity to revisit research on P. romeri in order to summarise what has been done, what we have learned, and why it is important.

The Special Administrative Region of Hong Kong includes the most densely populated urban conurbation in the world. The area has experienced centuries of human impact, and the original forest cover disappeared over 400 years ago. Despite past and ongoing human impacts, Hong Kong is host to 23 species of amphibians; 22 of them are anurans,

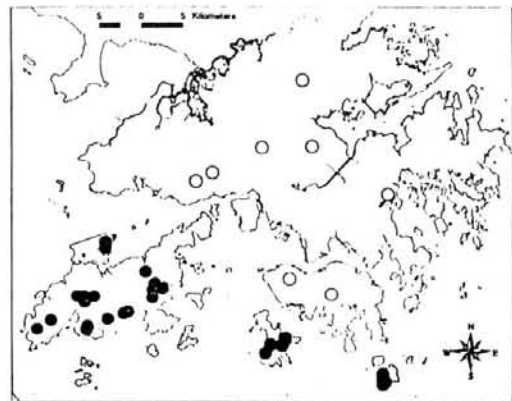
and one - *Philautus romeri* (Rhacophoridae) or Romer's frog - is endemic. This tiny frog (adults are less than 2 cm long) was first discovered in 1952 by John D. Romer who found a population breeding in a small cave on Lamma Island. These individuals were apparently wiped out when the roof collapsed in 1953. The frogs were not rediscovered on Lamma until 1984 and, since then, they have been recorded at a few other localities. Extensive field work by one of us (ML) - involving visits to 165 sites throughout Hong Kong - showed that *P. romeri* has a relict distribution being confined to the islands of Lamma, Lantau and Po Toi in Hong Kong (Fig. 1). It does not occur on other islands or along the coast of southern China. A fourth island population on Chek Lap Kok (close to the northern coast of Lantau) was threatened by plans to construct a new international airport. That island was levelled in 1993, destroying all natural habitats and ruling out *in situ* protection of *P. romeri*. Extensive collections were made from Chek Lap Kok during 1992 in an attempt to rescue the frogs: 230 adults were obtained. Together with several clutches of eggs and tadpoles, they formed the basis of captive breeding populations maintained at the University of Hong Kong. Thirty adults were sent to Melbourne Zoo (Australia) so that a second breeding population could be established. The frogs survived well in captivity, and over 180 egg clutches were produced by the Hong Kong University population alone. The Melbourne Zoo programme was successful also, and a total of 706 captive-bred frogs were sent to Hong Kong.

Research funding from the Royal Hong Kong Jockey Club Charities Ltd allowed us to attempt the re-introduction of *Philautus romeri* to parts of Hong Kong from which it had been eliminated. Studies of the habitat of the frog revealed that it was a forest-floor species, that bred in unpolluted standing or slow-flowing waters. We do not know what caused the range restriction of *P. romeri*, but its restriction to island habitats was probably due to a combination of forest clearance plus habitat destruction and degradation (by pollution). In addition, *P. romeri* tadpoles and eggs are susceptible to predation by the introduced mosquito-fish (*Gambusia affinis*), and it is notable that this frog is only able to breed in places the fish has yet to colonise.

With the support of a number of organizations (Agriculture & Fisheries Department of Hong Kong Government, Kadoorie Farm & Botanic

Garden, and The Hong Kong Zoological & Botanical Gardens), eight release sites which appeared to offer suitable conditions for *Philautus romeri* were identified: six on the mainland, and two on Hong Kong Island (see Fig. 1). A total of 1170 frogs and 1622 tadpoles was released in 1993 (at three sites) and 1994 (at eight sites). At least 90 individuals per site were introduced to provide an adequate founder population. *Philautus romeri* can breed in small water bodies, and thus some release sites were 'engineered' by the addition of suitable containers or the construction of small pools so as to provide fish-free habitat. Monitoring the success of re-introduction was carried out each year during the breeding season (when calling males can be detected and tadpoles provide evidence of reproduction). As of 1998, populations had been able to persist at 7 of the 8 release sites. *Philautus romeri* lives for approximately three years in the wild, but females are reproductively active for only two breeding seasons. The persistence of some of the re-introduced populations for 4-5 years is therefore indicative of successful establishment. However, the size of each population is small and only one has expanded its range significantly.

Fig. 1. Distribution of *Philautus romeri* (Romer's Tree Frog) in Hong Kong: ●, original location; ○, re-introduction sites.



Philautus romeri are tiny and extremely cryptic. Annual monitoring at some sites failed to detect any animals in some years, even though visits in subsequent years revealed their continued presence. There is some evidence that interaction with other amphibians may limit the population size of adult *P. romeri* at release sites, since larger frogs of other species treat them as suitable food. This is the first time a breeding and release programme has been used to conserve a tropical frog, and the preliminary results indicate that the approach has promise.

First published in Re-introduction News, 17: April 1999