

Porcupine!

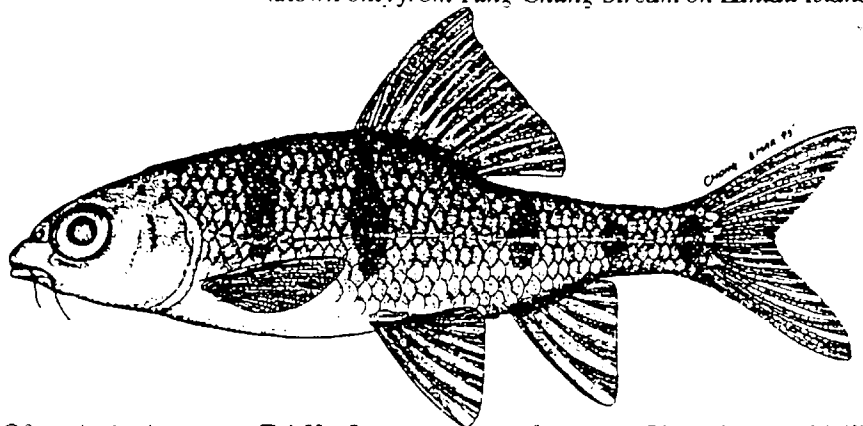
Newsletter of the Hong Kong University Ecology Research Group



Hong Kong's vanishing freshwater fishes

A recent survey of Hong Kong's freshwater fishes by Chong Dee-hwa and David Dudgeon of the Zoology Department of Hong Kong University yielded 96 species in 12 orders and 34 families; 17 species were new freshwater records for Hong Kong including 7 that were new for Guangdong Province. Over one third (35 species) of the fishes collected were marine vagrants, while a further 24 were species which inhabit brackish water but ascend streams and rivers also. Of the remainder, 32 species were primary freshwater fishes; two additional species were catadromous eels and three species were amphidromous. Four species may have been feral populations derived from market fishes translocated from elsewhere in China, or could represent natural range extensions. Gobies dominated the river and stream fishes, comprising 16 genera and 21 species. However, if brackish-water species and marine vagrants were excluded, the Cyprinidae - with 14 genera and 16 species - were preeminent.

Acrossocheilus (Lissolichthys) wenchowensis beijiangensis - known only from Tung Chung Stream on Lantau Island



Of particular interest at Tai Ho Stream on north Lantau is *Plecoglossus altivelis* - the Ayu. This species - which is related to the salmon - is known from nowhere else in Hong Kong or Guangdong and, like its relatives, is born in freshwater and migrates to the sea before returning to freshwater to breed.

In addition to 96 indigenous species, Hong Kong freshwaters are host to nine cyprinids (carps) translocated from China for aquaculture, as well as eight exotic fishes which originate outside the Oriental region. Some of these species appear to be confined to reservoirs, and the breeding status of certain major carps has yet to be determined. However, exotic poeciliids and cichlids (tilapias) are well established and widespread in local freshwaters of all types. Taking these species into account, a grand total of 114 fish species were recorded in the Territory.

(continues inside)

CONTRIBUTIONS to our newsletter from members of the general public have risen sharply over the past two months, (as is reflected in this issue's *Wildlife Windows*), due primarily to some positive media coverage. We gratefully welcome all records of wildlife sightings - although we may not have room to print them all - so please keep them coming in. The many letters of encouragement we have received have prompted us to print a small selection. Let us have your comments, criticisms and suggestions, and perhaps a regular letters page, providing a useful forum for dialogue and discussion, will evolve. It's up to you!

In keeping with previous issues, **Porcupine! No. 4** contains a number of new species records for Hong Kong, re-emphasizing the astonishing diversity of the local wildlife. David Dudgeon brings us back to Earth (or, perhaps, Jupiter) with an essay on Multiple Comparisons, and "Skip" Lazell stirs up some controversy. Read and respond!

ROMER'S TREE FROG BREEDING

Young individuals of *Philautus romeri* bred in captivity last year have matured and bred this year, first in Melbourne Zoo (December 1992) and later at the University of Hong Kong (February 1993). Hence the captive breeding programme is a success. Relocation of the captive bred frogs and tadpoles will be carried out later this year.

Michael Lau

NB.

A total of five specimens of the little known *White-headed Blind Snake* (*Ramphotyphlops albiceps*), wrongly named as "*Typhlops albiceps*" in *Porcupine!* No. 3, have now been recorded for Hong Kong.

New Invertebrates

Two invertebrates new to science have been collected adjacent to WWF HK's Mai Po Nature Reserve. This makes a total of 16 animals new to science collected since 1990 from Deep Bay.

Last April, Dr. Winston Ponder identified a new genus of Gastropod in the family Amathinidae. It is parasitic on the prosobranch *Sermyla tornatella*. Professor Wu Bao-ling, of the Tsingtao Oceanographic Institute identified a new polychaete in the Pilgaridae family in the genus *Filgaris sp. nov.* during his work at the Swire Marine Lab. in January. In addition, Professor Wu noted the first probable record of the polychaete *Capitella capella* for Hong Kong. It is an indicator of biological pollution in Deep Bay.

- Steve McChesney

Government Acts To Protect Bats

In Spring 1992, a field meeting between Mr. K.S. Lai (Water Supplies Dept), Mr. P.K. Chan (AFD), Billy Hau (WWF-HK) and Gary Ades (HKU), was organized to discuss problems concerning the increased disturbance of water catchment tunnels in Tai Lam Country Park. Many animal species use these man-made structures as temporary or permanent sheltering sites. Due to increased use of the country parks by the general public these sites were under threat of being badly disturbed, a situation which might cause many animals to abandon the tunnels. Furthermore, these sites were potentially dangerous, from flooding and possible roof collapse - reasons alone for making them inaccessible to park visitors. During the meeting designs for protecting the tunnels were agreed upon and in December 1992, work was completed by the Water Supplies Dept.

Who says conservationists and government can't work together?

Mai Po Mites

Bird ringers at Mai Po have noticed scaly, crusty lesions on legs of passerines during the past few years. Of over 161 species which have been ringed only 9 species have shown evidence of this problem. The most commonly affected species (15%) is the **Tree Sparrow** (*Passer montanus*), in particular adult males.

Samples were taken and sent to a pathologist for analysis. Microscopic analysis of the skin revealed mites, specifically *Knemidocoptes sp.* These mites are related to the parasites which cause scaly face in pet Budgerigars.

Data from the last 3 years of ringing has been examined to see if the presence of mite lesions may be causing problems. To date, no difference in body weight has been seen between affected and unaffected birds. We are continuing to monitor the situation.

Muscle Weakness in Waders

During Wader ringing at Mai Po it has been noted on occasions that some birds are reluctant to walk/fly when released. The symptoms are similar to a phenomenon in mammals and birds such as Cranes and Flamingos called capture myopathy.

Last autumn, during Wader ringing sessions, blood samples were taken from birds to help establish some baseline information on blood morphology and serum chemistry. At present, no published information exists on many of these species. When interpreting the information we will have to depend on what we know from other free-ranging avian species. For example, the serum vitamin E values in Hong Kong Waders is considerably higher than that found in raptors in western Canada. Vitamin E has been implicated in muscle weakness in mammals but at this point, it does not appear to play that strong a role in the Mai Po muscle weakness problem.

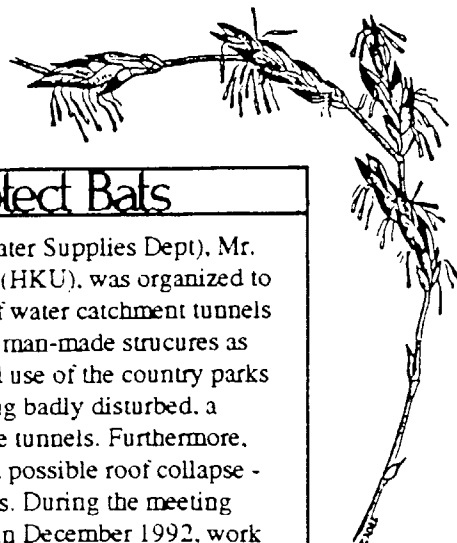
Sue Mainka

[Sue is a highly experienced Canadian veterinary surgeon who has worked extensively in China]

Flowering Bamboo

Following my plea for sightings of flowering bamboos in the last edition of *Porcupine!* I was overjoyed to discover that there were some doing just that near Kam Tin. A group of 3 plants, probably *Bambusa textilis* (**Weavers' Bamboo**), had produced inflorescences on every growing point. Bamboos exhibit 2 forms of

Flowering growing point of *Bambusa textilis*



flowering behaviour: sporadic, irregular flowering, which involves only a few culms per clump and may occur annually, and cyclic gregarious flowering, where the whole clump flowers and usually dies as a result. The longest recorded flowering cycle belongs to *Phyllostachys bambusoides*, which flowers once every 120 years. Gregarious flowering lasts 2-4 years over a whole forest and up to 2 tons of seeds may be produced per hectare. Seeds are nutritious and may be heavily grazed by animals.

>> Andrew Benton

Positive feedback...

As a lecturer in Ecology at the Chinese University, I am writing to offer my encouragement to you with this worthy venture. I think that the **Porcupine!** newsletter is an excellent idea and I am very pleased that you have found the time to produce it. It adds significantly to ecology in Hong Kong by considerably improving communication and interactions between ecologists and thus enhancing the whole field.

We do have several "ecologists" here at the Chinese University:

Dr. P. But - Plant taxonomy;

Dr. K.H. Chu - Shrimps (ecology, genetics and evolutionary biology);

Dr. L.M. Chu - Environmental toxicology and bioconversion;

Dr. M.W.J. Crosland - Social insects (behaviour, ecology, genetics and evolutionary biology);

Dr. C.K. Wong - Plankton and marine ecology;

Dr. P.K. Wong - Environmental toxicology and pollution (bacteria).

Contributions to and involvement in **Porcupine!** will increase with my future students and as the other lecturers here gradually grasp onto its existence and considerable value. Keep up the good work.

Dr. Mike Crosland
Lecturer in Biology, CUHK

I appreciated your sending the editions of **Porcupine!** I think your publication serves a valuable role in wildlife conservation and helps to inform people, particularly biologists, of the type of work that is being

undertaken. I would be happy to contribute articles regarding the flora and fauna in Macau.

Emmet R. Easton
Director Extension Studies Prog.
University of Macau

...negative feedback

I really most strongly disapprove of your policy of releasing market Tokay geckos in Hong Kong territory! [**Porcupine!** issue number 1]. The native populations - at least on Lantau - are doing fine and virtually impossible to exterminate. Hong Kong Tokays are very dull-coloured shades of grey, not like the obvious market specimen illustrated by Karen Phillipps in *Hong Kong Animals* [Hong Kong Government Printer, 1981].

Also, the voice is completely different from that I have heard in Thailand, Indonesia and the Philippines - where I expect the market specimens are imported from.

I think you're just introducing another exotic. Please don't!

Dr. James D. Lazell
President
The Conservation Agency
Rhode Island, USA

The practice of releasing market Tokay geckos in the New Territories has, as a matter of fact, already been discontinued. Dr. Lazell's comments about the Hong Kong Tokays are most interesting. Any comments from our local herpetologists?

FREE Column

As a theoretical anthropocentrist and physical ant-trapologist I note with interest a rare case of inter-specific slavery in the central New Territories. It concerns the primates *Macaca kowloonensis* and *Homo sapiens*, both invasive tramp species known to have undergone sequential phases of allopatric divergence and partial re-convergence, the latter trend escalating between the 1960s and the present time.

In recent years individuals of *H. sapiens* have repeatedly been observed transporting collected food items from favoured foraging sites to the nest locality of *M. kowloonensis*. These workers often travel distances of several kilometres, along fixed trails, to the nest site.

The interpretation here proposed is one of cultural convergence. The two primates share a remarkable number of behavioural traits, including: (1) resource sharing; (2) formation of a rigid male power hierarchy based mainly on tenure; (3) despotism; (4) nepotism; (5) priapism (possibly rank-related); (6) facial grinning and hind-quarter grooming behaviour directed at dominant individuals; (7) displacement-scolding of subordinates; (8) dorsal-wounding of similar-ranked competitors.

The adaptive advantage of enslavement to *H. sapiens* workers is unclear; plainly some energetic cost is incurred with no obvious benefit to inclusive fitness. However, since some of the above behavioural traits may be involved in species recognition, the possibility arises that these workers are unable to distinguish between their own and the related species. Whether this postulated failure of species isolation mechanisms will translate to the additional cost of wasted reproductive effort remains to be seen.

John Fellowes

Wildlife Windows One

Leopard Cat

A Leopard Cat kitten (*Felis bengalensis*), was seen on the Cape d'Aguilar road in early March, by Carmen Anderson. It had pale cream fur with blackish brown markings.

On 20 February, Ms Phaik Hua Tan saw a Javan Mongoose (*Herpestes javanicus*) at Tsim Bei Tsui. The time was approximately 2 pm.

Barking Deer

Further sightings of Barking Deer (*Muntiacus reevesi*) were made since the last edition of Porcupine! KARC appears to be a strong hold for these large mammals but it would be interesting to hear of territory wide sightings.

On 3 February while walking up the hill path behind KARC I was astonished to see a young deer run across in front of me. This occurred at 10 am and I have also heard deer calling in the evenings recently.

>> Andrew Benton <<

A large adult Barking Deer was seen running along the access road to KARC at 7.30 pm on 4 February.

>> Gary Ades <<

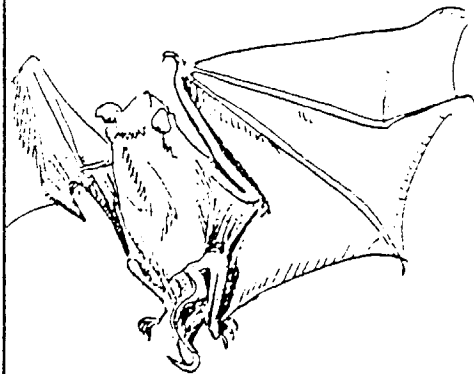
Cold-induced Fish Kill

Carmen Anderson reports that several days after the cold spell in early February, a large fish kill occurred in Pak Sha Wan, Sai Kung. A similar event was reported by Peter Collinson at Hoi Ha Wan, where crustaceans were also killed and corals were bleached. At both sites all sizes of fish seemed to be affected. Species were not identified due to their advanced state of decomposition. Keith Wilson of AFD reported extensive fish kills in the AFD mariculture pens at the same time. This coincided with sea surface temperatures dropping to around 14 degrees C, for an unprecedented 2 week period.

Red tides were seen in Lobster Bay and off the beach at Shek O during February. Peter Collinson

An unidentified Civet sp. was seen at ~ 2pm on 13 February in Tai Lam Country Park by Tim Woodward.

The bat illustrated below was found dead in a house on Lantau during August 1992. It is probably a specimen of the Japanese Pipistrelle (*Pipistrellus abramus*). - Sally Bunker



Porcupines (*Hystrix brachyura*) are living on the Peak! Two adults and one young were seen on Barker Road on 24 December 1992, at 9pm.

- K.N. Houghton

Sherrie Heyse saw a Porcupine-like animal foraging on the bank of Tai Tam Reservoir near the main bridge, at 5.45 pm on 24 January.

LANTAU TREEPIES

There seems to be a long-time resident population of *Crypsirina formosae* on Lantau. We see them regularly along the road from a few hundred metres beyond the Mui Wo ferry pier over the hump almost to Pui O. Nam Shan turnoff is a good area to look. My attention was first called to them in 1990. At that time Karen Phillips told me that treepies had been seen in this same area over a period of many years. This could be a good area to study a genuinely little-known species.

- James "Skip" Lazell

At the beginning of February, in Tai Long Wan, Sai Kung, I saw a rare Blue-ringed Octopus (*Octopus* sp.).

- Peter Collinson

Mai Po Corner

Deep Bay Wintering Water Birds - Since 1979, the Hong Kong Bird Watching Society have been making annual counts (in mid-January), of the number of wintering waterbirds using the wetlands around Deep Bay and Mai Po. This year's count managed to break the 50,000 mark, with a total of 53,000 waterbirds altogether. This included ducks, gulls, herons, cormorants etc. This number is pretty spectacular considering that only around 16,000 waterbirds were counted in the first count, 14 years ago. Numbers have generally been increasing each year.

Amongst this huge number of waterbirds, are a number of internationally threatened species such as 73 Black-faced Spoonbill (*Platalea minor*) 24% of the world population, 15 Dalmation Pelicans (*Pelecanus crispus*), 13 Oriental White Stork (*Ciconia boyciana*) and a minimum of 107 Saunders' gulls (*Larus saundersi*). Reasons for the increase over recent years may be a combination of increased protection of the Mai Po area and habitat loss along the coast adjacent to the Pearl Estuary.

Lew Young

Wildlife Windows Two

A Common Wolf Snake

(*Lycodon aulicus*) was seen at the end of January, during the daytime by *Nick Goodyer* on Cheung Chau. This is a nocturnal snake so the sighting was quite unexpected and rather early in the year.

Wild Boar

On the 28 January at 5 pm, I saw one young Boar (*Sus scrofa*) near Ho Chung.
On the 2 February at 1 pm between Tai No and Sheung Yeung, I sighted two young boar and one adult in a wooded area.
Wild Boar are regularly seen close to Venice Villa west of Ho Chung Village, Sai Kung.
>> *Mike Haylett*

Irrawaddy Dolphin...?

On the same trip as seeing Grey Phalaropes, *Clive Viney* observed two pods (each with 4-5 individuals) of dark grey, blunt-nosed dolphins with small, curved dorsal fins which could be Hong Kong's first (unconfirmed) record for the Irrawaddy Dolphin, *Orcaella brevirostris irrawaddy*.

MACAU OTTER

A Common Otter (*Lutra lutra chinensis*) was sighted by *Mr. Llovi Brown*, along the causeway between the islands of Taipa and Coloane during the autumn. Extensive mangrove has developed in this area during recent years.
- *Dr. Emmett Easton*

A 2m long Indo-chinese Rat Snake (*Coluber "Pivas" korros*) was sighted at Robin's Nest on a scrubby hill-slope in November 1992.

Robert Davison (member, Int'l Soc. of Cryptozoology)

I noticed that the Mangrove (*Excoecaria agallocha*) was flowering in early February at Pak Sha Wan (northern end of the bay).
Carmen Anderson

The KARC Kestrel (*Falco tinnunculus*) reported in the last edition of Porcupine! was seen regularly around the centre during January and February. This female bird has been using one of the car park lamp posts as a night-time roosting perch.
Gary Ades

Night Herons, where are you?

During early February all Night Herons (*Nycticorax nycticorax*) disappeared from Pak Sha Wan. There is usually a population of approximately 100 birds that feed around the bay and possibly roost in the nearby mangrove and woodland. The birds moved on during the cold spell in February.
>> *Carmen Anderson*

In mid-February at Hoi Ha Wan, *Peter Collinson* saw a pair of Trigger Fish engaged in courtship behaviour.

Grey Phalarope

On 23 February, *Clive Viney* & friends saw 4 Grey Phalaropes (*Phalaropus fulicarius*) flying with a group of Red-necked Phalaropes (*P. lobatus*) south of the Ninepins. This is the first record of *P. fulicarius* for Hong Kong, and only the second for China. It is also unusual to see *P. lobatus* so early in the year.

Sherrie Heyse reports seeing a dead Seven-banded Civet (*Viverricula indica*) on Tai Tam Road in autumn 1992. The tail was 8-10 inches long, and raccoon-like.

Koels in Palm fruit shock

One of the few tree species in fruit in late January and February is the Chinese Fan Palm (*Livistona chinensis*). However the fruits are too large (2.6 x 1.6 x 1.6 cm) to be swallowed by any of the common frugivores and the flesh is too hard for most birds to peck bits off. The flesh is relatively dry (65% water), fibrous and lipid rich (25% of dry weight). In January and February this year, only two bird species were regular visitors to the palm trees on the Hong Kong University campus. The most conspicuous were the Sulphur-Crested Cockatoos (*Cacatua sulphurea*), which removed the flesh with their powerful beaks and dropped the seeds undamaged. More surprising visitors were the Koels (*Eudynamis scolopacea*) - up to six at a time - which swallowed 3-4 fruits whole before flying off to nearby trees. Under these trees are numerous, clean palm seeds, apparently regurgitated by the Koels. This is interesting because Koels are not usually considered to be very frugivorous, yet the ability to swallow and process large, lipid-rich fruits is a characteristic of specialist frugivores. If these birds similarly process other large fruits they may be important seed-dispersal agents. I have also seen Magpies, Blue Magpies and Blackbirds in the palm trees but could not see how they process the fruits. I would welcome reports of other observations!

RICHARD CORLETT

**List of Marine Mammals
recorded from Hong Kong territorial waters**

ORDER CETACEA - Dolphins, Porpoises and Whales

Family Delphinidae - Dolphins and Porpoises

Delphinus delphis Common Dolphin

Grampus griseus Grey Dolphin

Neophocanea phocanoides Black Finless Porpoise

Sousa chinensis Indo-pacific Humpback or Chinese White Dolphin

Stenella attenuata Spotted Dolphin

Stenella coeruleoalba Striped Dolphin

Stenella euthrosyne Spinner Dolphin

Steno bredanensis Rough-toothed Dolphin

Tursiops truncatus Bottle-nosed Dolphin

Pseudorca crassidens False Killer Whale

Family Balaenopteridae - Rorquals

Balaenoptera acutorostrata Minke Whale

Balaenoptera physalus Fin Whale

Family Physeteridae - Sperm Whales

Kogia breviceps Pygmy Sperm Whale

*Information kindly supplied by Mr Keith Wilson,
Agriculture and Fisheries Department,
and Ms Jo Ruxton,
World Wide Fund for Nature, Hong Kong.*

Hong Kong's vanishing freshwater fishes (cont'd from front page)

Eleven indigenous fishes in Hong Kong are threatened with extinction or may be locally extinct already. All are either primary freshwater or amphidromous species which seem to be confined to lowland rivers and streams. One of them, the minnow *Aphyocypris lini*, is endemic to Hong Kong. Urgent action is needed for this and other indigenous freshwater fishes (e.g. *Rasbora steineri*, *Rasborinus formosae*, *Pseudorasbora parva*, *Rhodeus ocellatus*, *Acanthorhodeus macropterus*, *Acrossocheilus* [*Lissochilichthys*] *wenchowensis beijiagensis* and *Cobitis sinensis*).

While more data are needed, the information at hand allows us to identify some streams which support high biodiversity and should therefore receive priority conservation action. Tung Chung Stream and Tai Ho Stream on north Lantau Island are two such sites. These streams are the only known locations for *Acrossocheilus* (*Lissochilichthys*) *wenchowensis beijiagensis* (pictured on the front page) and *Plecoglossus altivilis* (respectively) in the Territory. Collections for Tai Ho Stream have yielded a total of 40 species, including some marine vagrants recorded from nowhere else in Hong Kong, while observational records have been made of 7 additional species plus an unidentified eel bringing the total for Tai Ho Stream to 47. Moreover, 23 species have been collected in Tung Chung Stream.

The combined species total for these two north Lantau streams is 53 (excluding the unidentified eel), comprising over half of the indigenous freshwater fishes in Hong Kong. Both habitats will be affected significantly by the proposed port and airport development scheme because New Towns will be located in Tung Chung and Tai Ho Valleys. It is significant that, despite its greater size and flow volume, Tung Chung Stream supports fewer fish species than Tai Ho Stream. This may reflect the fact that Tung Chung Stream has been channelized over much of its flood-plain, and flow is diverted from the stream into water catchment tunnels, so reducing discharge volumes in the lower course.

DAVID DUDGEON

Taxonomic composition of the indigenous fish fauna of Hong Kong freshwaters:
(no. families / no. genera / no. species)

Clupeiformes	1 / 3 / 3	Salmoniformes	1 / 1 / 1
Anguilliformes	2 / 2 / 4	Cypriniformes	3 / 20 / 22
Cyprinodontiformes	1 / 1 / 1	Siluriformes	3 / 3 / 4
Synbranchiformes	1 / 1 / 1	Beloniformes	2 / 2 / 2
Pleuronectiformes	1 / 1 / 1	Mugiliformes	1 / 3 / 4
Tetraodontiformes	1 / 1 / 1	Perciformes	17 / 36 / 52

Information courtesy of David Dudgeon and Chong Dee-hwa

Snakes of Shek Kwu Chau

I noted with amusement the sighting of two bamboo vipers on Shek Kwu Chau on 26 August (Porcupine! No. 1). This species is incredibly abundant on that island, with dozens of museum specimens in hand. Sightings of fewer than 20 per day are not noteworthy. This is the only place I know where bamboo vipers are more common than common blind snakes. On 27 August, for example, I recorded three vipers (a lousy day) but only one blind snake. Steve Karsen found that sole blind snake. Michael Lau was busy puzzling over tadpoles that turned out to be *Rana macrodactyla*. And that night, Steve and Michael nailed the very first Shek Kwu Chau record for that rare and elusive species *Bufo melanostictus* [common toad].

Back to snakes. Shek Kwu Chau is loaded, and there are at least two that probably represent undescribed forms. So, if you visit this happy isle of sun and fun, please keep an eye peeled for:

Bronzeback (*Dendrelaphis* cf. *pictus*): a long, slender striped snake that moves fast. Typically on the ground or in low bushes, often in hot sun.

Vine snake (*Ahaetulla* cf. *prasina*): an extremely long, slender green snake with a lanceolate head. Likes to hang motionless in trees, usually in shady places.

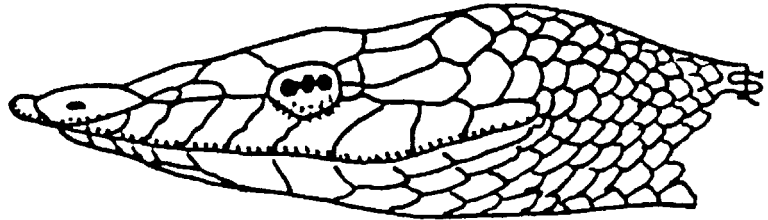
Details of the distinctive characters of the few Shek Kwu Chau specimens of these snakes known (the only representatives of their genera known from all Hong Kong territory) are given in Lazell and Lu, 1990, *Asiatic Herpetological Research* 3: 64-66.

At present 12 species of snakes are known from Shek Kwu Chau on the basis of actual specimens. In addition to the four noted above, these are:

Python (*P. molurus*): common. We have found everything from hatchlings to big adults, so they truly live here and are not just visitors. They get big enough to eat goats, and one in 1992 is said to have eaten 17 chickens in one meal.

"Skip" Lazell

The vine snake, genus *Ahaetulla*, one of two probably new forms known from Shek Kwu Chau on the basis of only two specimens. Note the characteristic triple-aperture iris. Sketch: "Skip" Lazell



Copperhead ratsnake [or - racer] (*Elaphe radiata*): rare. Known from a single 1992 hatchling so far.

Common ratsnake (*Coluber* "Ptyas" *mucosus*): common. The genus "Ptyas" was formally sunk by Lazell, et al. 1991, *Pacific Science* 45 (4): 355-361.

Taiwan kukri snake (*Oligodon formosanus*): frequently encountered; more common on Shek Kwu Chau than, for example, on big Lantau.

Common wolf snake (*Lycodon aulicus capucinus*): pretty common, in fact. As above, more frequently encountered here than on most islands.

Large-spotted cat snake (*Boiga multimaclata*): common. Known from a large series here long before the first voucher specimen was obtained.

Mock viper (*Psammodynastes pulverulentus*): rare; only a couple of specimens in hand. Likes shady places, often close to streams.

Many-banded krait (*Bungarus multicinctus*): common. We have plenty of specimens. Do not even think about collecting one that is not already stone-dead. Back off a live one quickly; these guys are mean....

Other species may well occur. John

Romer published a claim for checkered keelback (*Natrix "Xenochropis" piscator*), but - as with so many Romer records - there is no specimen.

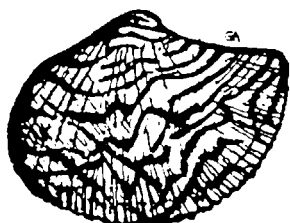
How is it that we know so much and have so many specimens of Shek Kwu Chau snakes? Dr. Barrie Hollinrake, who runs the place, pickled anything that bit anyone on the island between 1971 and 1984. A medical doctor, he reasoned that should the victim develop severe symptoms, treatment would depend on correct identification of the biter. Exactly so!

Amazingly, no one ever did develop symptoms, and Dr. Hollinrake was about to dispose of his collection in 1988 when I heard about it. The centipedes and spiders went to the Smithsonian (USNM), but jars and jars and dozens and dozens of vipers, kraits, and all those others - including the amazing, probably novel, rarities - are now safely at the Museum of Comparative Zoology. Some day, bet on it, there will be a *Somethingus hollinrakei*. Ah, the gulf of distinction between those who save specimens and those who tell stories....

Dr. James "Skip" Lazell is an Associate of the Harvard Museum of Comparative Zoology.

The Delicious Shellfish of Hong Kong by Deborah Ota

If you go to any seafood restaurant or market you will probably see my study animal, *Tapes philippinarum*, which is a sandy shore clam with irregular patterns on the shell. It is delicious, especially fried with garlic, pepper and black bean. However, I haven't dined on this bivalve since starting my PhD project. As with other local shellfish on sale in Hong Kong, *T. philippinarum* is collected from some very polluted habitats. Individuals contain high amounts of the bacterium *E. coli*, and trace metals. Moreover, around 5-6% of these bivalves may contain several hundred parasites in a single animal.



Tapes philippinarum

Marine pollution in Hong Kong has resulted in the decline or disappearance of many coastal invertebrates, and the pollution-tolerant *T. philippinarum* now dominates coastal habitats, especially in Tolo Harbour. It is mainly distributed within the lower intertidal, on soft shores or the substrate between boulders on rocky shores.

The original aim of my project was to study predation effects on the *T. philippinarum* population. However, its major predator, *Philine orientalis*, could no longer be found by the time I started my project due, probably, to increased pollution. Since *T. philippinarum* appears to be such a pollution-tolerant species, I was interested to know whether this species, like the green mussel *Perna viridis*, can be used as a good biological indicator for coastal pollution. Accordingly I changed my project to concentrate on studying the bivalve itself.

During the last three years, I have collected data on the population dynamics, reproduction, seasonal change in energy budget and accumulation of trace metal content of *T. philippinarum* in relation to the hydrology of Tolo Harbour. Additionally, I set up laboratory and field experiments to investigate the effects of physical and biotic factors on the distribution of this bivalve. So far results of this study suggest that *T. philippinarum* thrives in eutrophic environments and can adjust itself physiologically to fit the changing environment. Its long life and filter feeding habit, with its potential for accumulating trace metals in its organs, are all showing that this species can act as an indicator of coastal pollution.

Fire & Flora — Lawrence Chau

With not very much training in botany, I joined the Government Herbarium as an assistant after I graduated from the Baptist College. It was at the herbarium that I was exposed to, and hence became more familiar with the local flora. I also became aware of many different aspects of flora conservation in Hong Kong while at the herbarium. Subsequently I became more concerned for nature conservation and felt that I could take a more active part in this respect. Meanwhile I understood that I knew very little about the subject so I left the herbarium and went to Aberdeen (in Scotland) to take a course in ecology.

I was impressed by the way that, in general, British people cared very much for the environment. They were enthusiastic about nature and usually knowledgeable about plants and animals. On the other hand, the general public then in Hong Kong showed little concern for the environment. Britain has a long history of ecological studies but in Hong Kong the ecology of many habitats, communities and species were little known. So I decided to carry out research work in this field in Hong Kong.

I started my Ph. D. at this University with Dr. Corlett. I work on hillfire because recurrent hillfire is the major factor arresting the natural process of vegetation succession in Hong Kong. The aim of my study is to characterize hillfires in Hong Kong, investigating the immediate and long term effects of hillfire on local vegetation and the strategies displayed by individual plant species in order to survive in such an environment.

Hillfires in Hong Kong are anthropogenic rather than spontaneous. Their occurrences are highly seasonal and weather dependent. The fire season usually starts in mid autumn (late September) and ends in spring (April). After a severe fire much of the above ground plant parts would have been burnt off. Some species may die while others may survive. In the latter case buds for regeneration would have been protected from high temperature by thick bark (e.g. *Eucalyptus*), leaf scars (*Phoenix*), compact leaf stalks (*Blechnum*) or underground rhizomes (*Dicranopteris*, *Imperata*). More commonly trees and shrubs would regenerate from the base at (or near to) ground level. Grasses would usually sprout very rapidly from the turf (e.g. *Miscanthus*) or from seeds buried in the soil.

The present-day vegetation in Hong Kong is far from its potential climax (monsoon forest). If fire were excluded for a sufficient time (50 years or more) we would see the territory covered with tall, dense, subtropical forests. Could this happen? It all depends on how well we do in the future.

Beyond Pseudoreplication: Part 1

Multiple Comparisons

David Dudgeon

Most working ecologists will have read at least one of Stuart Hurlbert's papers. His analysis of pseudoreplication (*Ecol. Monogr.* 54: 187-211, 1984) has been highly influential, and was the subject of an instructive EERG seminar by Carmen Anderson some months ago (better than *Twin Peaks*, Carmen). Last autumn, I had the opportunity to hear Hurlbert speak at a conference in Barcelona. What he said was interesting and controversial, but because his remarks have yet to be published (apparently they are to appear in *Bull. Mar. Sci.*), I am going to try to pass on the gist of them here.

Hurlbert began with a restatement of pseudoreplication as described in his 1984 paper, subdivided into simple, temporal and sacrificial pseudoreplication. His original paper is clear on these matters, and I will say nothing more about them except to point out that a) pseudoreplication is common, and b) pseudoreplication refers to experimental design. Bad experimental design is easily recognised (at least in hindsight), and ecologists tend to agree on what is good and bad design. In that sense, Hurlbert's work is uncontroversial. At Barcelona, however, Hurlbert talked about statistical analysis. This subject is controversial, both among ecologists and statisticians, in that there may not be general agreement about the best analysis for a particular problem. So ... what did he say?

First: the multiple comparison problem. If one carries out k independent statistical tests with the significance level - α - for each test at (for example) 5%, then the chances of making a type I error (i.e. rejecting a null hypothesis when there is no significant difference between treatments) in an entire set of k comparisons can be calculated easily (see any standard statistics text). In the case where $\alpha = 5\%$,

the set-wise error rate is 13% if 3 comparisons are undertaken, 63% for 10 comparisons, and 92% if 20 comparisons are carried out. In other words, the more comparisons undertaken, the more likely it is that we will reject a true null hypothesis and obtain a statistically significant result. This means we have committed an error. Such errors occur frequently when multiple t -tests are carried out, as might occur subsequent to ANOVA yielding a significant F value. The solution in this case is to avoid t -tests and carry out multiple-range tests because the α value for these tests is the same as the set-wise error rate. In other words, α is the probability of encountering at least one type I error during the course of comparing all the pairs of means; it is not the probability of committing a type I error for a single comparison.

More generally, when multiple statistical tests are undertaken, the solution is to fix the set-wise error rate (also known as the experiment-wise error rate) at some acceptably low value (usually 5%), and adjust α downwards (to 1%, 0.1% or whatever) in order to achieve the necessary set-wise error rate. The Bonferroni procedure - among others - allows us to do this. The advantage of this conventional approach is that it reduces the erroneous interpretation of P values. The disadvantages are that statistical power (defined, roughly, as the probability of rejecting a false null hypothesis) is greatly decreased, and the chance of making a type II error (i.e. not rejecting a null hypothesis when it is in fact false) rises accordingly.

The real problem, according to Hurlbert, is that there is no clear definition of the scope of a set (and hence of k); after all, the set-wise error rate might be chosen on the basis of the number of statistical tests

(k) to be carried out in your lifetime! Because the scope of a set is entirely arbitrary, you could attempt to fix species-wise, table-wise, or thesis-wise type I error rates. Even worse, k will vary from set to set, and hence the criterion (α) for what constitutes acceptable evidence of an effect also varies from set to set.

Clearly we have a real problem because most textbooks and articles state or imply that it is highly desirable, if not obligatory, to use procedures that fix experiment-wise error rates. This literature neglects completely the implications of the necessarily arbitrary way the value of set-wise error rates is selected and a set's scope is defined.

Is there any way out? Hurlbert proposes a rebel solution. We should distrust authority (i.e. statistics texts) and use simple procedures that do not attempt to fix set-wise error rates. This means that approaches such as multiple t -tests are okay so long as you understand the consequences of your methods for set-wise error rates and power. Few statisticians would agree with Hurlbert's recommendations, but he is in good company. R. Mead, in *The Design of Experiments: Statistical Principles for Practical Applications* (1988) states "I recommend ... that multiple comparison methods be avoided; that the ideas of experiment-wise error rates be retained but only as a general principle."

The message here is not that we should embrace Hurlbert's (or Mead's) recommendations. To do so would be to spit in the eye of many authoritative statisticians (Zar, Sokal & Rolf, etc.) and result in rejection of manuscripts and trouble with external examiners of theses. However, ecologists must lose their statistical virginity and examine some of the underlying assumptions of the statistics that we use. When we do, Hurlbert says, we will find aspects of them to be somewhat arbitrary. It is essential that we are cognisant of that. ■

Next issue: Log Transformations:
Pain or Panacea?

(.....whew!)

More postgraduates.....	Project	Supervisor(s)
Alan Chan (Zoology)	Uptake, retention and depuration of heavy metals in commercial bivalves of Hong Kong	Prof. B.S. Morton, Dr. S.Y. Lee
Choong Mei Fun (Botany)	Leaf characteristics and herbivory	Drs. R. Corlett/P. Lucas
Huang Qin (Zool.)	Polymorphism of Neritidae in Hong Kong	Prof. D.K.O. Chan, BSM
Phoebe Sze (Zool.)	Bioenergetics and accumulation of copper in the green mussel <i>Perna viridis</i> , and <i>Septifer virgatus</i>	SYL
George Walthieu (Zool.)	Wildlife habitats in the Mai Po buffer zone	Dr. D. Dudgeon

On 18 April a beach and subtidal clean-up will be held at Hoi Ha Wan, organised by WWF HK, FoE & MCS. Contact Jo Ruxton at tel. 5261011 for further details

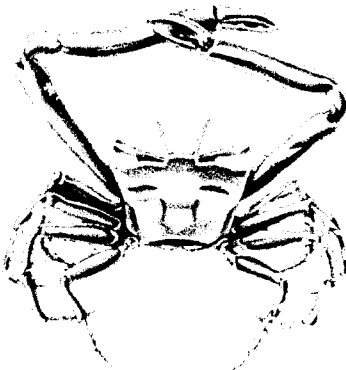
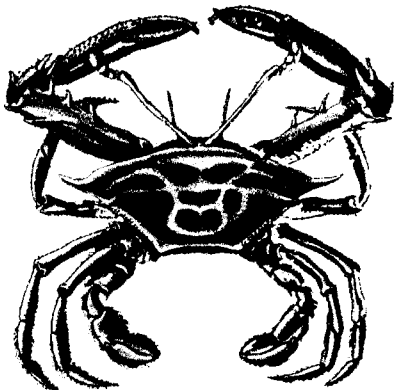
Marine Crabs Wanted

I have been working, as a long term project, on the taxonomy and biology of the local marine crab fauna. This is an arduous but most exciting task, as the total number of species present around our seas may exceed 200 (a personal guess). More than 60 species have been recorded so far from trawl samples collected during the last Marine Workshop in April, 1992.

I shall be most grateful if any crabs found during dives or shore walks which you think are interesting or rare can be sent to enrich our collection. Although both sexes are welcome, male crabs are generally more useful for identification purposes. 2 to 3 intact specimens, live or (recently) dead, will do. Let's race against the dredgers to at least know about our crab fauna.

Joe S.Y. Lee.

The Swire Marine Lab. Tel: 8592856 / 8092179. Fax: 5599114 / 8092197



Peter Collinson desperately needs help with his field work at Hoi Ha Wan this summer. The work is crucial to his study of corals in the bay and will start in late May and continue until the end of July. Any divers and non-divers who would like to help him should contact him at the Swire Marine Lab., tel. 8092179.

This year's annual Big Bird Race, organised by WWF HK to raise money for Mai Po Marshes Nature Reserve, takes place on 9-10 April. Two teams, Birdbrains and Pioneer, are made up largely of staff or postgraduates of HKU. If you haven't already sponsored one (or both) of these highly deserving teams, kindly do so with all speed!

Editors: Graham Reels & Gary Ades

Porcupine!

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Postgrads, lecturing staff and natural history enthusiasts: you are cordially invited to submit articles about your work in Hong Kong for inclusion in future issues of **Porcupine!** Articles from **Porcupine!** may be reprinted without permission, although acknowledgement of the source (and, where appropriate, author) would be appreciated.