

that is, they require that what happens to one replicate is not influenced by what happens to the others. In practice, independence can usually be ensured in ecological experiments by separating the replicates by enough space (or, in some cases, enough time) so that they are unlikely to affect each other. Non-independence is less likely to be a problem with randomized experiments, because the spacing between replicates will be variable and so less likely to consistently bias the results in one direction. Non-independence can, however, be a huge problem with non-randomized or non-experimental studies, particularly if we either do not know how much separation is enough or – and this is very common in terrestrial ecology – adequate separation is impractical. As part of his PhD study, Kwok Hon Kai compared the bird communities in a natural secondary forest and an exotic plantation. He sampled birds at four points in each forest type, but the points in each type were inside the same forest patch and only 80 metres apart. Clearly these points are not independent and cannot be considered as true replicates. He therefore published the study without any statistical comparison between the forest types, but with additional information from other studies about the ecology of the bird species for which densities differed between forest types (Kwok & Corlett, 2000). The alternative would have been to leave this important question unstudied, since there are not enough similar forest patches in Hong Kong for truly independent replicates and, even if there were, it would be logistically impossible to visit widely separated sites the sixty or more times needed to get an adequate estimate of bird densities.

To summarize: randomized experiments with independent replicates allow you to make full use of the power of statistics to separate the effects of the treatment from chance variation. Observational studies – including natural and unplanned experiments – are more difficult to analyze, since additional information is needed to account for the effects of confounding variables. Careful sampling design and the use of multivariate methods can mitigate, but never eliminate, this problem. Known confounding variables can be measured and accounted for statistically, but situations in which all potential confounding variables are known and can be measured are rare in ecology, if they occur at all. However, observational studies are the only realistic way of investigating a whole host of interesting ecological questions, including most of those of practical importance. We need more and better observational studies in ecology, but we must not pretend that they are experiments.

Bibliography and further reading

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Kadoorie Farm & Botanic Garden - Wildlife Updates & Sightings

by Gary Ades, Roger Kendrick, Paul Crow, Amanda Haig & Louis Cheung

Wildlife recording, surveys and rehabilitation at Kadoorie Farm & Botanic Garden (KFBG) have produced a number of interesting and unusual records since May 2004. In this report, KFBG Fauna staff provide some of the highlights of their findings.

General wildlife sightings are posted on the KFBG Wildlife Sightings Board on a fortnightly basis, with records provided by staff and visitors. Many records are generated by the Security team on night shifts.

(1) The following notable sighting records from Kwun Yum Shan (KYS) were posted between May 2004 and January 2005:

May 2004

9 May, Masked Palm Civet near Twin Pavilion.

13 May, two Barking Deer at Sign Post Corner.

16 May, three Fruit Bats at Administrative Office.

21 May, two Malayan Porcupines near Upper Canteen.

26 May, Wild Boar at Magnolia Falls.

July 04

28 July, two Velvet Fronted Nuthatch outside Conservation Building.

31 July, Himalayan Leaf-nosed Bat, Chestnut Spiny Rat, HK Newt & Fireflies at Magnolia Reservoir; Collared Scops Owl calling at Post Office Pillars & Misha's Bungalow.

August 04

24 August, Birdwing Butterfly at Reception & Conservation Bldg; Indian Fritillary at Amenities Bldg; Tawny Rajah at Upper Canteen.

28 August, Malayan Porcupine at TS Woo Memorial Pavilion; Green Cascade Frog seen below Apiary; Chinese Cobra near Rainbow Pavilion.

September 04

5 September, Leopard Cat, Ferret Badger at West Prospect & Kwun Yum Shan.

7 September, Birdwing Butterfly at Organic Terrace.

8 September, Birdwing Butterflies at Butterfly Garden.

13 September, Anderson's Stream Snake & Big Headed Turtle above Magnolia Reservoir.

15 September, Eurasian Woodcock near Post Office Pillars.

17 September, Wild Boar at Bridge by Convent Garden; Dollarbird at Butterfly Garden.

19 September, Black-naped Oriole at T.S.Wu Pavilion; Striated Heron at Magnolia Falls.

21 September, two Barking Deer below Upper Canteen.

24 September, Rhesus Macaque near Orchid Haven.

26 September, Bonelli's Eagle flying near Kwun Yum Shan.

28 September, Wild Boar with five Piglets at KARC Road.

October 04

6 October, Lanceolated Warbler near Main Gate; King Cobra beside Conservation Building.

11 October, Great Barbet below the summit of Kwun Yum Shan; Emerald Dove near Conservation Building.

16 October, King Cobra near no 3 Reservoir; Barking Deer on the slope opposite signpost corner; Malayan Porcupine between Upper Canteen & Post Office Pillars.

18 October, Malayan Porcupine nearby Magnolia Reservoir.

23 October, Mountain Water Snake near Great Falls.

26 October, Juvenile Malayan Porcupine near Misha's Bungalow.

29 & 30 October, three Malayan Porcupine between Fern Walk & Butterfly Garden.

30 October, Fire Flies (50~100) main stream between Fern Walk & Convent Garden.

November 04

1 November, Chinese Cobra at Lower Farm Bridge.

4 November, Barking Deer at Post Office Pillars.

11 November, Pallas' Squirrel near Wild Boar Enclosure.

13 November, Malayan Porcupine at Misha's Bungalow.

17 November, three HK Newts at Lotus Pond.

23 November, Glassy Tiger, Common Indian Crow, Staff Sergeant, Common Grass yellow, Indian Cabbage White, Painted Jezebel & Chinese Peacock (Butterflies) at Lower Farm.

27 November, two Malayan Porcupines at Orchid Haven.

January 05

10 January, Chestnut-bellied Rock Thrush *Monticola rufiventris* at Conservation Bldg (present to at least 20 Feb); 29th Golden Emperor Moth at Butterfly Garden; *Aethis bispurca* (HK endemic moth) at Misha's & Butterfly Garden; Malayan Porcupine at Upper Canteen; Barking Deer at Great Falls; Collared Scops Owl at Orchid Haven.

February 05

15 February, Mountain Pit Viper near Fern Walk - at 11.30 am KFBG Fauna volunteers Kris Watson and Ben Seebohm, conducting routine turtle survey work, came across the Farm's third known record of a Mountain Pit Viper. It was out in daylight when the air temperature was only 18°C. It was at a fairly low altitude (~350m a.s.l.) with the animal being discovered along the stream course in the area of Fern walk.

26 February, three Malayan Porcupine between Upper Canteen and Post Office Pillars, and one more by the Raptor Sanctuary.



Fig. 1. Mountain Pit Viper at KFBG's Fern Walk, 15 Feb. 2005. (Photo: Kris Watson)

(2) Fauna Conservation Department Project News:

The monthly moth survey [RK] has continued unabated. Between July 2004 and December 2004 a rather low total of 492 species was recorded. Results from 29 January 2005 have not been fully processed yet. None the less, a good night's

recording yielded an estimated 150 species, including: *Biston marginata* (Geometridae, Ennominae), new to Hong Kong; the second Hong Kong record of *Acrodontis hunana* (Geometridae, Ennominae), the third HK record of *Sugitania lepida* (Noctuidae, Cuculliinae) and the first record since 1998 of *Aethis bispurca* Galsworthy, 1997 (Noctuidae, Hadeninae), a species endemic to Hong Kong and only previously recorded from Kadoorie Agricultural Research Centre and once each from KFBG and Shan Liu Road, Plover Cove. The species reported in the last *Porcupine!* (Ades *et al.*, 2004) as new to Hong Kong, *Tirathaba ruptilinea*, was a mis-identification of *Tirathaba mundella* Walker, 1864 (M.J. Sterling, pers. comm.).

Romer's Tree Frog [LC]

The monthly nocturnal survey on KFBG's hillside continues. From March to October 2003, a total of 513 tadpoles were counted in the different breeding pots. But from June to September 2004, only 68 tadpoles were spotted. In addition, there were no eggs found in the 2004 surveys but the presence of tadpoles showed breeding activity is still happening. Most breeding pots and the habitats around were found to have naturally dried out by September 2004; one artificial breeding pot was found totally dried out in July 2004. July was the peak breeding time in 2003, and in September 2003 male frogs were still actively calling next to the breeding pots for courtship. But in September 2004, we couldn't spot any adult frogs or hear any calls. Long periods of low rainfall from July may explain why there was so little activity later in the wet season.

Unfortunately, several breeding pots were found upside down in July, possibly because someone thought the pots were utilised by mosquito larvae that might spread Dengue Fever. (The Hong Kong Government started promoting the prevention programme on mosquito to prevent the spread of the fever during that period). The human disturbance and low rainfall during the breeding season may have contributed to the lower number of offspring observed in 2004.

(3) Wild Animal Rescue Centre (WARC) – update

The last eight months saw a decrease in the overall number of birds received at the WARC. This is a first since the set-up of the centre in 1994. It is suspected the generally 'mild' favourable weather this year (to early February) is a contributing factor.

However, as usual, we have been busy with a number of reptile related issues including confiscations, relocation & captive breeding.

The famous Yuen Long Crocodile, "Pui Pui", finished her quarantine and was moved to the large outdoor enclosure, where her anxious public could see her. She has since returned to her warm indoor environment to wait out the cold weather.

In late April 2004, 851 head of mixed species including Black Marsh Turtle (*Siebenrockiella crassicollis*), Malaysian Giant Turtle (*Orlitia borneensis*) & Malayan Flat-shelled Turtle (*Notochelys platynota*) were confiscated and received at the WARC. In mid October, 360 head of Fly River turtle (*Carettochelys insulpta*) were received.

Animal rehoming to organisations involved in captive breeding & conservation projects for those species included:

110 confiscated turtles sent to the Turtle Survival Alliance (TSA) USA & Europe collections.

201 Fly River Turtles (*Carettochelys insulpta*) were returned to their range country to Taman Aquarium, Indonesia.

2 African Spur Tortoises (*Geochelone sulcata*) and 1 Aldabra Tortoise (*Geochelone gigantea*) were sent to Singapore Zoological Garden for education and conservation purposes.

Captive breeding of the Three Banded Box Terrapin (*Cuora trifasciata*) & Vietnamese Leaf Turtle (*Mauremys annamensis*) continues. The chelonian conservation project achieved a major landmark on the 27 October, when the first ever *Cuora trifasciata* of wild HK parentage hatched.



Fig. 2. The first ever *Cuora trifasciata* of wild HK parentage successfully hatched in captivity. (Photo: Paul Crow)

Below is a list of some of the animals received since May 2004 that have been successfully rehabilitated and subsequently released.

SPECIES	LOCATION FOUND	RELEASE DATE	RELEASE LOCATION
RAPTORS			
Collared Scops Owl (<i>Otus lempiji</i>)	Chai Wan	08.06.04	KFBG
Black-eared Kite (<i>Milvus migrans</i>)	Victoria Harbour	18.06.04	KFBG
Black-eared Kite (<i>Milvus migrans</i>)	North Point	18.06.04	KFBG
Black-eared Kite (<i>Milvus migrans</i>)		12.07.04	KFBG
Crested Goshawk (<i>Accipiter trivirgatus</i>)	Tai Po Road	03.08.04	Tai Po Road
Crested Goshawk	Tai Hang Road	05.08.04	Tai Po Road

<i>(Accipiter trivirgatus)</i>			
Crested Goshawk <i>(Accipiter trivirgatus)</i>	Stanley	09.08.04	Tai Po Road
Black-eared Kite <i>(Milvus migrans)</i>		07.09.04	KFBG
Oriental Scops Owl <i>(Otus sunia)</i>	Mong Kok	04.11.04	
Brown Hawk Owl <i>(Ninox scutulata)</i>	Lai King	04.11.04	
Crested Goshawk <i>(Accipiter trivirgatus)</i>	Fortress Hill	09.11.04	
Collared Scops Owl <i>(Otus lempiji)</i>	Tai Po	13.11.04	KFBG
Black-eared Kite <i>(Milvus migrans)</i>	Tsim Sha Tsui	25.11.04	Sheung Shui
Asian Barred Owlet <i>(Glaucidium cuculoides) x 2</i>		06.12.04	KFBG
Collared Scops Owl <i>(Otus lempiji)</i>	Repulse Bay	08.12.04	Tai Po Kau
Common Buzzard <i>(Buteo buteo)</i>	Stubbs Road	21.01.05	Mai Po
OTHER BIRDS			
Emerald Dove <i>(Chalcophaps indica)</i>	KFBG	05.06.04	KFBG
Greater Coucal <i>(Centropus sinensis)</i>	Tin Shui Wai	20.08.04	Kam Tin
Little Egret <i>(Egretta garzetta)</i>	Sha Tin	13.09.04	Mai Po
Woodcock <i>(Scolopax rusticola)</i>	Pok Fu Lam	29.10.04	KFBG
Banded Rail <i>(Gallirallus striatus)</i>	Ho Man Tin	29.10.04	Mai Po
Chinese Pond Heron <i>(Ardeola bacchus)</i>	Admiralty	05.11.04	Lam Tsuen
Emerald Dove <i>(Chalcophaps indica)</i>	Mei Foo	05.11.04	KFBG
Little Swift <i>(Apus affinis)</i>	Fanling	23.11.04	KFBG

Blackbird <i>(Turdus merula)</i>	Tai Po Road	03.12.04	Tai Po Road
Savanna Nightjar <i>(Caprimulgus affinis)</i>	Sheung Shui	08.12.04	Kam Tin
Olive Backed Pipit <i>(Anthus hodgsoni)</i>	KFBG	14.01.05	KFBG
MAMMALS			
Noctule Bat <i>(Nyctalus noctula)</i>	KFBG	07.06.04	KFBG
Japanese Pipistrelle Bat <i>(Pipistrellus abramus)</i>	Mong Kok	12.06.04	KFBG
Malayan Porcupine <i>(Hystrix brachyura)</i>	Shek O	17.11.04	KFBG
Wrinkle Lipped Free Tailed Bat <i>(Chaerephon plicata)</i>	Ma On Shan	08.12.04	KFBG
Wrinkle Lipped Free Tailed Bat <i>(Chaerephon plicata)</i>		10.12.04	KFBG

(4) Feral Dogs & Native Wildlife – further news

On 3rd February 2005 a 17.1 kg female adult barking deer was found dead at KFBG Apiary. Approximately 70% of tissue was missing from the rear legs. The deer was not pregnant. It had a severe eye ulcer, which may have been part of the reason it was caught in the first place. There was a resting site in the open nearby, with half eaten mandarin orange. There was blood around the resting site and the deer was 2-3 meters away. It appears the deer was weak, possibly suffering and unable to choose a good resting site, with fatal consequences. The style of attack and flesh removal is similar to the previously recorded instances of feral dogs killing barking deer at KFBG (Ades *et al.*, 2004). A flesh sample was taken from the deer and stored for future DNA work.

A stomach content analysis revealed the deer had been feeding on Farm produce – macadamia nuts and mandarins. There were also ferns in the stomach contents.

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Fig. 3. Barking deer carcass from feral dog kill at KFBG's Apiary, 3 Feb. 2005.

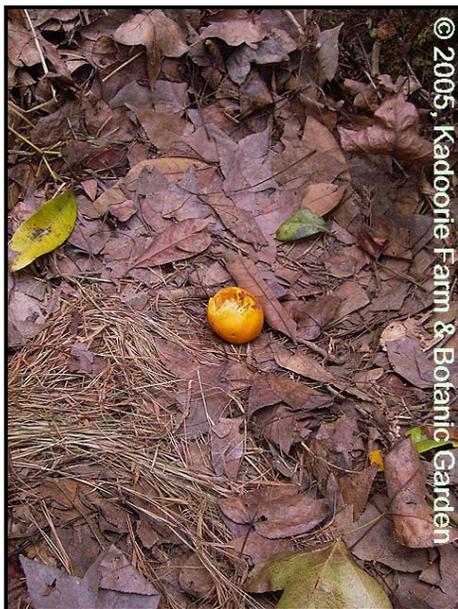
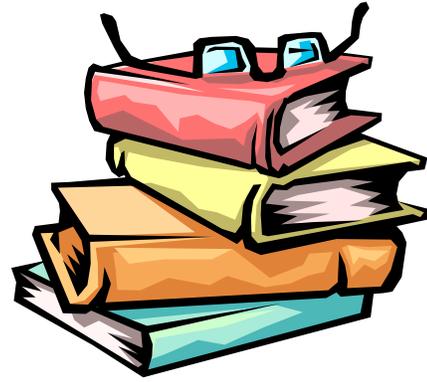


Fig. 4. Deer's resting site, with food item,



Fig. 5. Severe ulcer in eye – a possible reason why this animal was predated. (Photos: Paul Crow)



BOOK REVIEWS

Field Guide to the Dragonflies of Hong Kong 2nd Edition

by Keith D.P. Wilson, 383 pages, softcover.
Cosmos Books Ltd, Hong Kong, 2004

The first edition of this landmark field guide, which appeared in the shops late last year, went completely unremarked in *Porcupine!* That is unfortunate, since this book, now in its second edition, has set a new standard for field guides of the local fauna.

The author, Keith Wilson, worked in Hong Kong for the Agriculture, Conservation and Fisheries Department from 1991 until 2003, and it is under the auspices of AFCD that this fine field guide has been published. The book was written in collaboration with AFCD's Dragonfly Working Group, whose survey work has resulted in four new species records for Hong Kong, including one undescribed gomphid, since its establishment in 2001. However, no-one should be under any doubt that this book is first and foremost the result of one man's efforts.

Wilson's first book on the subject (*Hong Kong Dragonflies*) was published in 1995 and listed 102 species for the territory. It was a truly ground-breaking work, with no local antecedents, but its large, floppy landscape format, coupled with the fact that species descriptions rarely appeared on the same page as their photographs, made it confoundedly unwieldy, and hopeless as a field guide. This was followed in 2002 by the mystifyingly pointless *Hong Kong Flying Colour: Dragonflies* booklet - another AFCD collaboration (and I beseech them not to repeat it) - which contained photographs of most Hong Kong species, but no text. The peril of producing this kind of anti-information, with no clues on habitat associations or diagnostic features of particular species, was brought sharply into relief for me when I reviewed the results of a dragonfly survey conducted in a disturbed lowland pond and marsh mosaic by an environmental consultant who had made his identifications from the photographs in *Flying Colour*: many dragonflies look superficially similar, and the hapless consultant had included several stream specialists and many other highly