

VERTEBRATES

Another alien has landed: the discovery of a wild population of water dragon, *Physignathus cocincinus*, in Hong Kong.

by Allen To

An apparently wild population of the water dragon, *Physignathus cocincinus*, has been discovered along a stream on Tsing Yi Island, New Territories, which runs adjacent to two housing estates. The stream has two sections, the lower section is about 30 m long with large boulders and has a wetted width of about 1 m, covered with riparian shrubs. The upper section is about 50 m long and is more densely vegetated than the first section. There are some agricultural activities along the upper section.

I am living in the housing estate next to said stream. Since water dragons were discovered there in October 2004, I have visited the stream on a bi-weekly basis. So far, at least eight individual water dragons have been recorded. Three are more than 60 cm long from head to tail; two are about 45 cm long and the last three, juveniles, are about 30 cm long (Fig. 1). The three largest water dragons are likely to be males because of the large size, triangular head and extended mid-sagittal crest (Fig. 2). The other two medium-sized individuals are possibly females (Fig. 3). The water dragons were less active in December 2004 and were not sighted again until April 2005. Hikers using the nearby hiking trail reported sightings of these 'large lizards' a few years ago. The water dragons appear to have colonized the whole of the lower section of the stream and along to the middle part of the upper section. They were observed utilizing boulders as basking spots, and the stream and tall trees as resting sites (or maybe as a sentry box for defending territories).

The water dragon, is semi-aquatic and is distributed in China, Thailand and Vietnam (Lau, 1995; Zhao & Adler, 1993). There is no known previous record of this lizard in the wild in Hong Kong (Bogadek & Lau, 1997; Karsen *et al.*, 1998). However, it is commonly available in local reptile pet shops for sale (Lau *et al.*, 1997). Thus, it is very likely that these water dragons were released by people who used to keep them at home as pets. If this population in Tsing Yi is breeding successfully and expanding, it becomes an additional naturalized exotic species in Hong Kong. However, it does not appear on the IUCN Global Invasive Species Database and is therefore not considered invasive anywhere in the world. [1]



Fig. 1. The smallest juvenile (~ 30 cm long) (Photo: Allen To).



Fig.2. An adult male (> 60 cm from head to tail) resting on a branch (Photo: Allen To).

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Fig. 3. Medium sized female (~ 45 cm long) (Photo: Allen To).

Enormous fishing pressure on the whale sharks *Rhincodon typus* in Taiwan and southern China waters

by Kenny Leung

On November 15, 2002, the whale shark *Rhincodon typus* was placed on Appendix II of CITES (Convention on International Trade in Endangered Species), a United Nations Treaty Organization which requires the member nations of CITES to monitor international trade in whale shark products and to ensure that international trade does not threaten survival of the species [1]. In many countries such as Australia, India, the Maldiv Islands, the Philippines, South Africa and United States, whale sharks are protected, and all trade in whale shark products (fins, flesh and skin) is prohibited [1].

Unfortunately, the flesh of *R. typus* is considered a delicacy by many people in China, Taiwan, Singapore, Korea and Japan, leading to overexploration in SE Asia. The whale shark is also known as the 'tofu' shark in Taiwan (or the white meat whale in Hong Kong), because of its soft white flesh, and it is now the most expensive of the shark meats available on the market. A set of four dried fins runs US \$400-500 in Taiwanese markets while the resale value of frozen whale shark flesh for export to Asian markets has reached over US \$1/kg [2]. It is therefore not surprising that significant fisheries for whale sharks have been developed in Taiwan and southern China.



Fig. 1. A young male whale shark *Rhincodon typus*.

In early July 2005, I attended a training workshop on modern fisheries, aquaculture and seafood processing in Taiwan which was organised by the Joint Committee of Hong Kong Fisher's Association and the Agriculture, Fisheries and Conservation Department of Hong Kong SAR. During the workshop, we visited several major fishing ports in Taiwan and, sadly, encountered two young males of *R. typus* (3-4 m in length) (Figs. 1 & 2). Lengths of newborn whale sharks range from 0.55 to 0.65 m while the adult can reach as long as 18 m [1]. Through interviews with fishermen, it was estimated that each shark was worth over HK\$ 150,000 (or US \$19,230).



Fig. 2. Young male whale shark (Photo: Kenny Leung).

As a member of CITES, the Taiwanese Government has made some efforts to control the fishing pressure on the whale shark. Recently, they have implemented legislation to restrict the allowable number of *R. typus* being caught each year (Fig. 3) Taiwan's year 94 = 2005]. The restricted quota is 65 whale sharks per year. If the quota is reached within a year (e.g. 1 Jan-31 Dec 2005), a complete prohibition of fishing *R. typus* will be applied and enforced in the remaining period of that year. To achieve such a goal, all fishermen must report their catch of whale sharks within 2 days after arrival at the fishing port and must bring the whole fish to land. The fishermen are also required to report to the Government if they have caught the basking shark *Cetorhinus maximus*, megamouth shark

Megachasma pelagios and great white shark *Carcharodon carcharias*. When the quota of *R. typus* reaches 50, all fishermen should check with the fisheries communication centre to confirm whether there is still quota available before catching more whale shark. Violating these rules will lead to prosecution; the maximum penalties include a maximum of 3 years in jail and a fine of up to NT \$150,000 (= HK \$34,567 or US \$4,455). Obviously, the fine is too small when compared with the market price of a whale shark. The two 'little' sharks I met in Taiwan already made up the quota to 52 in July this year and the market value of each of them is four times more than the maximum fine! As a matter of fact, no one can stop a Taiwanese fisherman from storing or selling sharks in other countries once the quota is filled.

Even worse, when I talked to some Hong Kong fishermen, they told me that there is a big business for catching whale sharks in the South China Sea; especially during late spring and early summer. As the sharks usually migrate along a similar route each year, experienced fishermen are able to locate them relatively easily. The whale sharks are often very friendly and many of them won't feel threatened when the fishing vessel approaches them. It was not unusual for a team of ten fishing vessels to catch more than ten whale sharks in a day during the peak season near Hoi Nan island. The fishermen all agree that they are easy to catch but very difficult to handle because of their enormous size. One of the fishermen said that he had recently caught one 6-7 m long whale shark and sold it for HK \$140,000. Such profit is equivalent to several months of hard work fishing finfish. Undoubtedly there is a huge temptation for fishermen to catch more and more whale sharks. Based on what I heard from the fishermen, there is virtually no monitoring of the number of *R. typus* being caught in China.

Most shark species breed very slowly; some take more than 20 years to reach sexual maturity, and then have only 2 pups every other year [1]. The current rate of removal of whale sharks is alarming. If such an over exploration trend carries on, *R. typus* soon will be listed as an endangered species.

What can we do to protect the vulnerable whale shark? First, we should not eat them. If everyone resists consuming them, there will be no demand for them. But it is extremely difficult to educate and change peoples' minds especially in SE Asia. Secondly, we can help fishermen to establish an eco-tourism business for watching whale sharks, or diving with them instead of killing them. Such eco-tourism has been proved to be sustainable and profitable in many places [1]. Something that you may not know, we can in fact also dive with whale sharks in waters nearby Hong Kong. Last Sunday, I watched a TV documentary made by TVB; it featured the underwater treasures in Hong Kong. In eastern waters, two professional divers found and filmed a young whale shark (5-6 m long) near a place called "Tai Ching Jum" and they certainly enjoyed swimming with this lovely creature. I would like to propose that SWIMS organize a trip for us to dive with our 'local' whale shark. Perhaps, we should also carry out some insightful scientific studies with a view to learning more about this magnificent fish.



Fig. 3. Information on protective legislation (Photo: Kenny Leung)

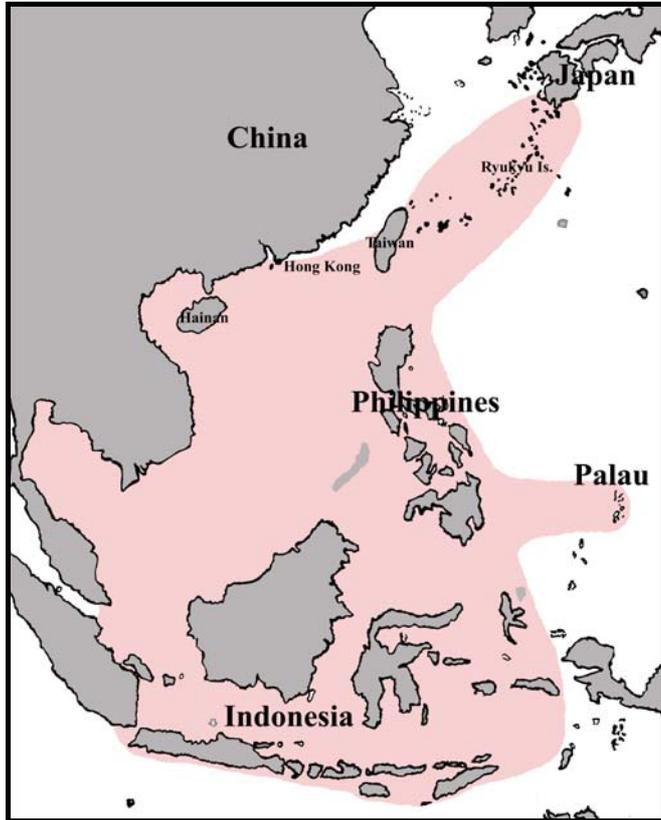
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- [1] http://sharks.org/whalesharks_questions.htm
 [2] <http://www.caske2000.org/sharks/sharkwhale.htm>

First sighting of the pearl scale butterflyfish in eastern Hong Kong waters

by Liu Min and Valerie Ho

The pearl scale butterflyfish (*Chaetodon xanthurus*) has been recorded in the western Pacific, from Indonesia, Palau and the Philippines to the Ryukyu Islands (Map 1). Along coastal waters of China, the species has been noted in Hainan and Taiwan, and also in surrounding waters of Hong Kong, such as the Lema Islands. A pearl scale butterflyfish in eastern Hong Kong waters was first spotted at Bluff Island (Ung Kong Wan) on the 2 October 2005 during the Big Fish Count (see p.11), organized by the World Wide Fund for Nature Hong Kong; it was a single individual of 7 – 9 cm total length, swimming around stag-horn corals (*Acropora sp.*) at the depth of 4 m.



Map 1. Global distribution of the pearlscale butterflyfish (*Chaetodon xanthurus*).

The pearlscale butterflyfish can be readily distinguished from other members of the genus *Chaetodon* by the cross-hatched pattern on body sides due to black scale margins (Fig. 1). The recorded maximum size of the species is approximately 14 cm standard length. Juveniles are particularly restricted to live coral areas and remain close to shelter; adults can be found in outer reef slopes and drop-offs to a depth of 50 m (Allen *et al* 1998). Fish usually occur singly or in pairs and are active during daylight hours feeding on small benthic invertebrates and algae. Little is known about the biology of this species.

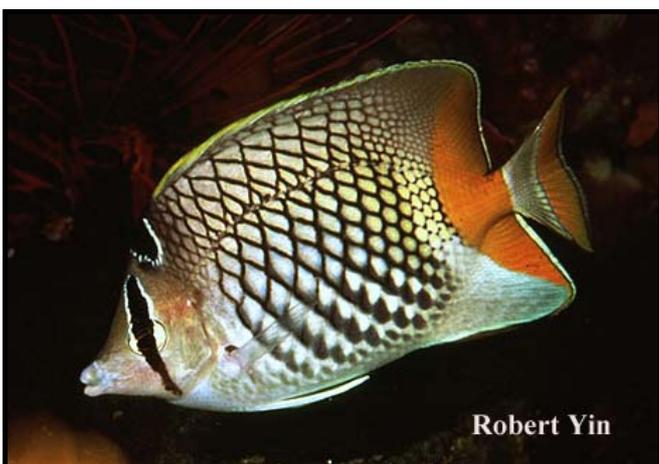


Fig. 1. The pearlscale butterflyfish (*Chaetodon xanthurus*) (Photo: Robert Yin).

There are another two species in the genus *Chaetodon* which share a similar appearance with the pearlscale butterflyfish;

the atoll butterflyfish (*C. mertensii*) (Fig. 2) from the Indo-west Pacific, and the Eritrean butterflyfish (*C. paucifasciatus*) (Fig. 3) from the Red Sea and neighbouring Gulf of Aden. However, neither has the strong crosshatched pattern seen in the pearlscale butterflyfish.



Fig. 2. The atoll butterflyfish (*Chaetodon mertensii*) (Photo: John E. Randall).

Temperature and salinity of nearshore waters of Hong Kong, especially in the east, are determined by three major water currents; the Kuroshio Current from the Pacific and the Taiwan Current from the East China Sea in the winter, and the Hainan Current from the South China Sea in the summer, which support subtropical and tropical marine fish species in the area. It is likely that these currents bring some unusual marine fish larvae or juveniles to settle in Hong Kong waters; however, it is not clear whether these species are able to maintain a population locally (Sadovy & Cornish 2000).



Fig. 3. The Eritrean butterflyfish (*Chaetodon paucifasciatus*) (Photo: John E. Randall).

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More information about the Big Fish Count and on butterflyfishes is available from <http://www.wwf.hk.org> and <http://www.fishbase.org>, respectively.

Some insights from Taiwanese fisheries

by Kenny Leung

I was very glad to attend a training workshop on “Modern Fisheries, Aquaculture and Seafood Processing” at National Taiwan Ocean University (NTOU) in Taiwan during early July 2005. It was co-organised by the Joint Committee of Hong Kong Fisher’s Association and the Agriculture, Fisheries and Conservation Department of Hong Kong SAR. During the workshop, we attended 3 days of intensive lectures at NTOU located in Keelung and then spent 3 days visiting different fisheries organisations and ports, aquaculture facilities as well as seafood processing plants in Taiwan. We travelled from the north to south of Taiwan, passing through Taipei, Suao, Hualian, Kaohsiung etc. Here, I would like to share some of my experiences and photos taken from this trip with readers of *Porcupine!*

In total, there are 300,000 fishermen in Taiwan and at least 1,000 vessels over 100 tonnes. According to the President of Overseas Fisheries Development Council of The Republic of China, Mr. Peter Ho, fisheries production contributed NT \$ 97 billion or 0.54% of GDP in Taiwan in 2003 (equivalent to 1.5 million metric tonnes). Obviously, the scale of Taiwanese fisheries is many times greater than that in Hong Kong. However, like Hong Kong and other parts of the world, Taiwan is also facing problems associated with a significant drop in available fisheries resources, especially in coastal and offshore areas. Many traditional coastal fishermen cannot make ends meet and some can no longer fish. To resolve these problems, since 1980s the Government and fisheries organisations have been making huge efforts to transform the entire fishery industry. The components of such transformations include the development of distant water fisheries, establishment of eco-tourism (e.g. dolphin and whale watch, diving), deployment of artificial reefs for both conservation and eco-tourism (i.e. diving business), enhancement of aquaculture yield and improvement of marketing seafood products as well as implementation of fishing moratorium incentive schemes (Fig. 1). Based on my observations, Taiwanese fishermen are very united and well organised, and many of them are well educated, i.e. university graduates. These transformations create many job opportunities and improve the living standards of people within the fishery community. But it is not clear whether the fisheries are improving.

Taiwan has been heavily subsidising the fishery industries. Due to the significant decline in coastal and offshore fisheries, the government has been promoting and helping the development of distant water fishing. So far, there are 30 advanced vessels in Taiwan (like the one shown in Fig. 2) which can be operated in deep-waters for catching high value



Fig 1. An official poster announcing the fishing moratorium incentive schemes. There are two schemes:

- (1) *Voluntary no-fishing – active coastal and offshore vessels must stop fishing and park at the port for at least 120 and 100 days, respectively. The period of ‘no fishing’ can be freely selected between 1 May and 31 October each year.*
- (2) *Official moratorium – all vessels must follow the suggested period given by the fisheries organisation and park their vessels at the port for at least 60 days.*

fish such as tunas. Each of these vessels costs three billion NT dollars (= HK \$0.7 billion); fishermen can’t afford this without the support from the government and private investors. In 2003, distant water fisheries contributed 58.5% of total fisheries production in Taiwan, whereas coastal fisheries only accounted for 4.2%. Nonetheless, I am concerned that many tunas, swordfish, sharks, tooth (or oily) fish, moonfish and sunfish have already been seriously over-exploited by such powerful fishing vessels. As I believe that pictures can speak better themselves, I have selected some photos (Fig. 3-11) to show some of these species (I must confess that I am not a good photographer). Although Taiwanese fishermen must follow the international quota system, the FAO Code of Conduct for Responsible Fishing [1] and international plans of action, the current trend of increasing effort in distant water fisheries will certainly do more harm to such fragile ocean ecosystems because many of these oceanic species grow slowly, reach sexual maturity at old age and have low reproduction rates. From discussions with fishermen and lecturers at NTOU and from the catch data, it is clear that even with increasing fishing effort, the yield of some key species such as blue-fin tuna *Thunnus thynnus*, and albacore tuna *T. alalunga* have declined

substantially and fishermen have switched to catch more bigeye tuna *T. obesus* and yellow-fin tuna *T. albacares* which will be eventually depleted as well. We do need to ask what is the sustainable harvest rate or yield in the ocean?



Fig. 2. Example of an advanced fishing vessel used for distant water fisheries with a 1.2 km long purse seine that can cover an area of 400 m². It is equipped with a helicopter that can facilitate searching for tuna, and with a deep freezer to preserve the tuna at < -60°C.

Different sizes of vessels will be awarded with different amounts of money from the Government to compensate their loss during the moratorium. For example, vessels of 60-70 tonnes will be paid NT \$30,000 for option (1) or NT \$ 133,000 per 60 days for option (2). The schemes are incentive-driven and very flexible when compared with the one in P.R. China.



Fig. 3. Price negotiation between fishermen and buyers on the blue-fin tunas *Thunnus thynnus*. This was an exciting event in the port with many people watching and engaging in the negotiation.



Fig. 4. Tens of yellow-fin tunas *Thunnus albacares* were displayed awaiting deals between the seller and buyer.



Fig. 5. Vessels using long-lines or long purse seines often catch many different fish species including sunfish, moonfish and many different shark species.

Let's talk about the bright side. I was delighted to see that some fisheries organisations have incorporated 'green education' in their eco-tours. During our visit, the word 'sustainability' has been mentioned many times by the presidents, directors, managers and fishermen in various fishery organisations, indicating that they do understand that marine resources are limited, and will be seriously depleted without proper management and enforcement. At least, it

sounds optimistic and environmentally friendly. I hope they will achieve 'sustainable fisheries' through practice.



Fig. 6. Toothfish (or oily fish), *Dissostichus* species are also common in the offshore and distant water catches of Taiwanese fishermen.



Fig. 7. Hundreds of various sizes of swordfish with their sword removed. Many of them were over two meters in length.



Fig. 8. Dorado fish, *Coryphaena hippurus*, are commonly caught by vessels using long-lines.



Fig. 10. Taiwanese fishermen argue that they never conduct 'finning practices' on sharks and that Taiwanese use every single part of the shark for consumption. They also believe that many shark stocks are still very healthy and that no quota should be implemented for sharks. But, as you can see this picture, just a tip of an iceberg, thousands of sharks are killed everyday.



Fig. 9. Many fishes, such as sharks and sunfish, are dissected onboard and their muscle and internal organs separately frozen. The same method can be used to process whale sharks to evade the quota monitoring system.



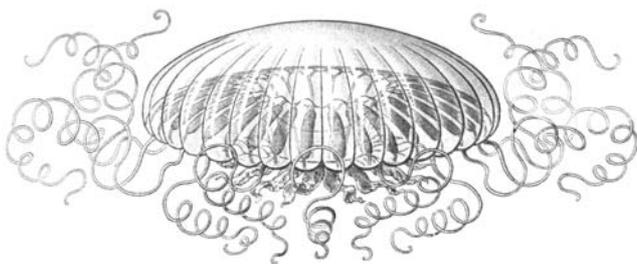
Fig. 11. Every single bit of the shark fin is removed and processed immediately after landing. There is a huge demand for shark fins regardless of the shark species, or their size, throughout SE Asia.

Bibliography

[1] <http://www.fao.org/fi/agreem/codecond/ficonde.asp>

[2] <http://www.afcd.gov.hk/fisheries/eng/capture.htm>

Epilogue: on the one hand, ecologists and conservationists would like to see reduction in fishing efforts, and stock recovery; on the other, governments have to consider the social side and living conditions of fishermen by allowing and facilitating them to fish more. It seems a true dilemma in fisheries management. As we all know, the fishery industry in Hong Kong is somewhat getting close to its 'sunset'. In 2004, there were only 9,500 fishermen (0.14% of 6.7 million of people) in Hong Kong [2]. In my opinion, our fishermen are less united and not as well-organised as Taiwanese fishermen; hence any transformation of the industry is rather difficult. Although our Government has been supporting and subsidising the fishermen for many years, our fishery development is still far behind counterparts like Taiwan. In Hong Kong, it is a bit late to develop distant water fisheries. So far, there is only one company directly engaged in distant water fishing. Building advanced vessels will require a large amount of money (@ billions \$) while the operators must be well-educated in both ocean science and engineering. Probably, it is not a viable option for the traditional fishermen in Hong Kong. What is the way forward for our fishermen? This is an important but a difficult question for the Government, fishermen, politicians and academics. The Taiwanese model may offer us some useful insights.



SWIMS tidings....

It has been a very busy time at SWIMS since the last *Porcupine!* hit the press. In March we had the pleasure of a visit by Sir John Swire. Sir John was the driving influence at the Swire Group behind the establishment of SWIMS and officiated at both the opening ceremonies of the Swire Marine Laboratory in 1990 and of the Swire Institute of Marine Science in 1994. It was therefore a great pleasure to show Sir John around the renovated facilities and to update him on SWIMS development and future directions. Sir John, and his brother Sir Adrian, always make the effort to visit SWIMS and chat with staff and students when they are in Hong Kong reaffirming their support and commitment to SWIMS.

SWIMS has been a pretty full house over the summer – with student Research Assistants helping projects at Hoi Ha Wan and on fish larval surveys, as well as the normal variety of student projects. We are extremely grateful to all the cheerful volunteers, too numerous to mention, who populated SWIMS in the summer. We also had our fair share of student visitors, including Tilly Thoreson and Tom Gallagher (Bangor University UK) who joined Olivia Stark (Oldendorf, Germany). Olivia has been working at SWIMS for the last year on the impacts of fishing on sea urchin populations. We also welcomed visiting scientists, including Dr Giacomo Santini (Firenze University Italy) who worked with Avis Ngan on limpet behavioural modeling and Ryan Hechinger (University of California Santa Barbara, USA) who investigated parasites in mud snails. Dr Santini gave a seminar at SWIMS, as did Prof Mike Kingsford (James Cook University, Australia).

The most recent SWIMS event was a special Symposium on the Physiology of Marine Organisms (SEMO) attended by over 60 delegates and held in September. The ecophysiology of marine organisms is a research area that which we are developing at SWIMS and this symposium attracted speakers from all major tertiary institutions in Hong Kong, as well as colleagues from the UK, Italy and Brunei. The talks were very well received and achieved their aim of stimulating collaboration and links among participants. Following the Symposium, Drs David Morritt (London University, UK) and Maui de Pirro (Firenze, Italy) stayed on to work on the impact of summer monsoons on intertidal organisms with staff at SWIMS.

Finally – congratulations to ex-SWIMS colleagues Dr Andy Cornish, who has recently become the Director of Conservation at World Wide Fund for Nature HK, and Dr Benny Chan recently appointed as an Assistant Professor at the Research Centre for Biodiversity, Academia Sinica, in Taiwan – we look forward to collaborating with both Andy and Benny in the future!

Gray A. Williams
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