

From Traditional Culture to Science - Exploratory Trips for Sea Turtles in Taiwan

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In continuation of the article “Exciting Observations of Numerous Green Turtles Foraging in Coastal Waters of Liuqiu Island, Taiwan” we wrote in January 2013, we visited different parts of Taiwan in February 2013 to experience and understand more of the traditional culture and conservation relating to sea turtles through our professional research partners and personal friends.

On February 20 and 21, 2013, Dr. Tsung-Hsien LI (李宗賢獸醫師) of National Museum of Marine Biology and Aquarium (NMMBA, in Chinese 國立海洋生物博物館) at Pingtung County, southern Taiwan (Map 1) introduced to us his rehabilitation programme of sea turtles in the facility and we spent a couple of hours touring around NMMBA. The sea turtles were received from government officials and public in southern Taiwan, including Liuqiu Island. He demonstrated several cases of injuries of sea turtles and the corresponding treatments, e.g. entanglement with fishing net, ingestion of crude oil. Rehabilitated turtles under treatment were kept in separate tanks for intensive care and observation, while other turtles in good health condition ready for release were kept in a large concrete tank. At the time of our visit, an olive ridley turtle of 49cm CCL and a green turtle of 40cm CCL were retained in two separate tanks and the large tank held five green turtles and two hawksbill turtles, ranging from juveniles to adults. One juvenile green turtle lost half of its left forelimb due to entanglement with fishing net. These turtles were fed daily by squid, fish and seaweed such as *Caulerpa* spp. present in the local waters. *Caulerpa* spp. were seen growing in an outdoor pond used to rear reef fish. The rehabilitated olive ridley turtle was subsequently released with a satellite transmitter from a sandy beach (後灣) at NMMBA on April 13. According to the tracking result (Annex), the turtle travelled for some 500km in 1-month time offshore from southern Taiwan, indicating its good physical condition after rehabilitation and the pelagic nature of the species. The relevant news can be found at the website of NMMBA: <http://www.nmmba.gov.tw/NewsDetailC12.aspx?Cond=6a697abd-8d99-401c-8c75-34146a2c3337>,

<http://www.nmmba.gov.tw/NewsDetailC53.aspx?Cond=cc9de029-33d6-410a-b765-e291c500be48>. Details of sea turtle rehabilitation programme at NMMBA are available at <http://www.nmmba.gov.tw/english/NewsListE54.aspx?urlName=ResearchA>.

We then visited the conservationists Tien (添), Sophia (靜儒) their newborn baby girl Hoi-yan, and Jian-wei (建偉) on Liuqiu Island (小琉球) (Map 1) for three days. On February 22, 2013, we toured around the island to look for foraging ground(s) of green turtles. In the early afternoon, at Geban Bay (蛤板灣沙灘) in the west of Liuqiu, we observed from a high spot and found a large green turtle foraging in the shallow flat waters. There was a freshwater stream running across the beach to the ocean. Several species of seaweed were washed ashore on the Bay, they are *Sargassum* spp. and *Hypnea* spp. Both are known to be consumed by green turtles. Incidentally, as advised by the local conservationists, nestings of green turtles occurred in the sandy beach of the Bay in 2012. In the late afternoon, we observed the shallow sea area from a high cliff at Duozaiping (肚仔坪潮間帶) in the west of Liuqiu. The site is a gently sloped intertidal zone thriving with macroalgae, at the time of observation the area was submerged in seawater during high tide. At least 40 green turtles, predominately adult-sized individuals, were seen foraging in the area. Afterwards, close to sunset, we visited the Dafu Port (大福漁港) in the east of Liuqiu to observe any foraging or resting activities of green turtles. One sub-adult green turtle entered into the Port, presumably for resting in the much calm sea. Based on the observations of several visits, it appears that the coastal waters around the Liuqiu Island nurtures and hosts high numbers of foraging green turtles and thus serves as an important developmental habitat for green turtles. Further studies are warranted to quantify the status.

After the trip on Liuqiu Island, we then visited Penghu Islands (澎湖群島) (Maps 1 and 2) for deep respect of a traditional cultural event in relation to sea turtles (元宵萬龜祈福). Penghu Islands are an archipelago off the western coast of Taiwan in the Taiwan Strait consisting of 64 small islands and islets covering an area of 141 square kilometers. Most of the islands are coral-fringed, with tidal difference of 3m.

The cultural event took place in Magong City (馬公市) and the major villages, namely, Huxi (湖西), Baisha (白沙) and Xiyu (西嶼), and Suoguangang (鎖港里) on February 25 and 26 following the Chinese Lantern Festival (i.e. the Chinese lunar date January 15). The event was warmly celebrated by the local and foreign tourists to receive family blessings from Chinese Gods. As sea turtles are symbols of longevity and good luck in Chinese culture, sea turtles are recognized as Chinese Gods to protect the sea and people on Penghu Islands. Sea turtles in a variety of forms, from

bakery to thousands of kilograms of rice, and even to pure gold, were made to symbolize blessings from gods. This year, a 6-kg gold turtle was newly hand-crafted for the celebration. After communicating with the Chinese Gods, followers with the highest level of promise from Gods can take home with the rice or gold turtles in return of a considerable amount of donations to the temples.

In addition to the cultural event, in the accompaniment of our local friend Lititia and her family, we paid visit to a local temple named Dayi Temple 大義宮 where they reared several sea turtles in two in-house ponds as ‘wish fountain’ for followers. Five green turtles, ranging from sub-adults to adults, one loggerhead and two hawksbill turtles were kept there. The turtles were in general good body shape. We were told by a local resident that 70 years ago, by-catch sea turtles, including green turtles, hawksbills, loggerheads and olive ridleys, were regularly released by a Buddhist temple (in Chinese 澄源堂) in the religious belief of setting life free. Such release practice was no longer in place since 30 years ago when sea turtles were protected by law, under which no provision is made to continue the tradition.

Moreover, we attended to a fisheries research institute (水產試驗所) in Shihli of Magong City (馬公市蒔裡里) managed by Mr. Chung-kang Kevin Hsu (許鐘鋼先生) of Penghu Marine Biology Research Centre (澎湖海洋生物研究中心). The primary research focus of the institute was to develop techniques in the aquaculture of marine resources of economic and conservation values, such as grouper, seahorse and horseshoe crab. The institute also undertook a rehabilitation facility of sea turtles received as stranded individuals from coastal waters of Penghu. At the time of our visit, the facility housed a total of seven green turtles, two olive ridley turtles and two hawksbill turtles; predominately subadults with some yearlings and adults. Among these turtles, one olive ridley and one hawksbill encountered floating problems. The rest were in good physical condition. The institute regularly hosted release event of rehabilitated sea turtles every May and August in Lintou (林投). In connection with the institute, a number of rehabilitated sea turtles were exhibited at Penghu Aquarium for public education. We spent a couple of hours learning and appreciating the facility at the aquarium.

We recognize the deeply-rooted traditional linkage of sea turtles with people in Taiwan and their daily life. In particular, we are thrilled by the respect of marine lives and efforts in conservation of sea turtles by the locals there. We plan to visit Taiwan again soon to learn more about sea turtles from the cultural and scientific perspectives. We are sincerely thankful for the hospitality and friendship of all the wonderful

people we met in Taiwan, especially Lititia (翁秀琪), Dr. Li (李宗賢獸醫師), Yaru (蔡雅如), Kevin (許鐘綱), Natasha (小雨), Tien (添), Sophia (靜儒), Jian-wei (建偉) and Yao-wen (耀文). The following images give views of the wonderful experiences we had at NMMBA, Liuqiu and Penghu involving green turtles, local people, and their rich culture. You can find more images at <http://akepa.hpa.edu/~mrice/st.htm>.

從傳統文化到科學 – 探索台灣海龜之旅

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延續我們寫於 2013 年 1 月令人興奮的文章“在台灣小琉球沿岸觀賞綠海龜覓食”，我們在 2013 年 2 月走訪了台灣各地，透過研究夥伴和當地朋友體驗和了解更多有關海龜的傳統文化及保育狀況。

在 2013 年 2 月 20 日及 21 日，位於台灣南部屏東縣國立海洋生物博物館（海生館）（圖 1）的李宗賢獸醫師向我們介紹收容及復康海龜的計劃和設施

（<http://www.nmmba.gov.tw/NewsListC53.aspx>），我們亦有幸遊覽海生館。海生館收容及復康的海龜來自台灣南部地區政府單位和公眾，包括小琉球。他展示了幾個受傷海龜的個案和相應的處理，如漁網糾纏、誤食原油等。接受康復治療的海龜被放在獨立的水缸監察，而其他健康狀況良好並準備野放的海龜被放在一個混凝土的大水池內。在我們訪問期間，一隻背甲長 49 厘米的欖蠟龜和 40 厘米的綠海龜分別放在獨立的水缸內；那混凝土製的大水池內養著未成年和成年的五隻綠海龜及兩隻玳瑁。一隻未成年綠海龜因被漁網糾纏失去了其左前肢的一半，現已康復。海生館人員每天給海龜飼餵魷魚、魚和當地水域可見的海藻，如蕨藻屬（俗稱海葡萄）。這些海葡萄生長於室外飼養珊瑚魚的池塘裡。海生館於 4 月 13 日在後灣沙灘放流成功康復的欖蠟龜“蝦米”，並配備了衛星追蹤儀。根據追蹤結果（附錄），欖蠟龜“蝦米”於 1 個月內離岸游約 500 公里，顯示其身體狀況良好和該海龜品種的遠洋性質。相關的新聞刊登在海生館的網站上：

<http://www.nmmba.gov.tw/NewsDetailC12.aspx?Cond=6a697abd-8d99-401c-8c75-34146a2c3337> 及

<http://www.nmmba.gov.tw/NewsDetailC53.aspx?Cond=cc9de029-33d6-410a-b765-e291c500be48>.

之後，我們到小琉球（圖 1）造訪三天，探望當地保育人士阿添、靜儒、他們的新生女兒海茵及建偉。在 2013 年 2 月 22 日，我們環島尋找覓食綠海龜。在午後於小琉球西邊的蛤板灣沙灘，我們從高點觀察，發現了一隻身型巨大的綠海龜在淺水區覓食。蛤板灣沙灘有淡水溪流從陸地流到大海，沙灘上有數種海藻被衝上岸邊，包括馬尾藻及沙菜屬。這兩種海藻都是綠海龜會吃的。當地保育人士表示 2012 年時蛤板灣沙灘有綠海龜上岸產卵。接著，我們到達位於小琉球西邊的肚

仔坪潮間帶，從懸崖邊觀察覓食綠海龜。肚仔坪潮間帶是一個緩坡潮間帶，海藻蓬勃發展，我們觀察期間海水漲潮淹沒該潮間帶。我們在該處看到至少 40 隻覓食中的綠海龜，主要是成年龜。接近黃昏的時候，我們到小琉球東邊的大福漁港觀察綠海龜及其行為。觀察期間，有一隻亞成年綠海龜進入港口，大概是在較平靜的環境休息。根據多次考察，似乎小琉球的沿岸水域孕育著大量覓食的綠海龜，是一個重要的綠海龜發展棲息地。為量化其棲息地的狀況，更深入詳細的研究是必需的。

小琉球島之旅後，我們遊覽澎湖群島（圖 1 和 2），及參與島上的傳統文化活動 - 元宵萬龜祈福。澎湖列島是台灣西海岸群島，位於台灣海峽，由 64 個小島組成，面積約 141 平方公里。大多數島嶼是珊瑚礁，潮差為 3 米。

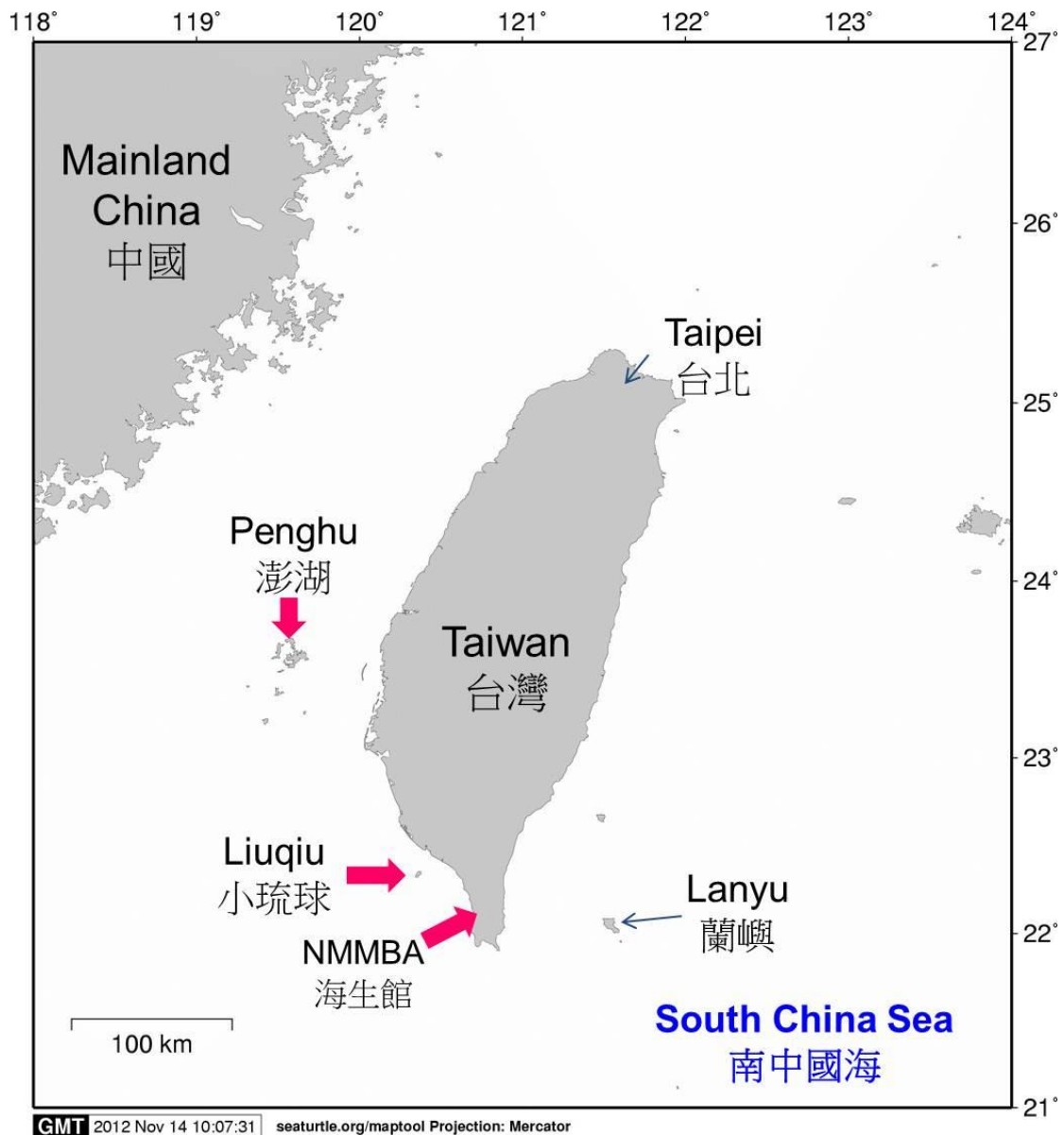
元宵萬龜祈福活動於 2 月 25 和 26 日，即中國元宵節（即農曆 1 月 15 日）之後，在馬公市及主要村莊，即湖西、白沙、西嶼和鎖港里舉行。該傳統文化活動吸引當地和外國遊客，各人熱烈慶祝及接受神的祝福。海龜在中國文化中象徵長壽、吉祥和好運，被認為是保護海洋和澎湖大眾的神。當地人用不同的物料造成各種形式的海龜，從麵包到幾千公斤大米，甚至純黃金，以象徵神的祝福。2013 年，當地人更特意手工製作 6 公斤的黃金龜。得到神明認可的信徒可把米龜或黃金龜帶回家，並向寺廟捐贈香油。

我們有幸跟隨當地朋友秀琪及其家人朋友，參觀當地寺廟大義宮，那裡有兩個室內的“許願池”飼養海龜。當中有五隻亞成年和成年綠海龜、一隻赤蠟龜及兩隻玳瑁。牠們的身體狀況良好。有一位當地居民告訴我們，70 多年前，他們定期在一所佛教寺廟澄源堂野放誤捕海龜，包括綠海龜、玳瑁、赤蠟龜及欖蠟龜。自 30 年前海龜受法律保護後，因法例無條款允許類似的傳統活動，野放活動已停辦。

此外，我們參觀了位於馬公市蒔裡里的澎湖海洋生物研究中心水產試驗所及與主管許鐘鋼先生交流

<http://www.tfrin.gov.tw/ct.asp?xItem=251289&ctNode=1211&mp=1>。水產試驗所的主要研究重點是開發水產養殖技術，對象是具有經濟和保育價值的海洋資源，如石斑、海馬和鰲。水產試驗所還收容及復康在澎湖沿海水域擱淺的海龜。我們參觀的時候，共收容了七隻綠海龜、兩隻欖蠟龜和兩隻玳瑁，主要是亞成年龜及部分成年和滿周歲的個體。當中的一隻欖蠟龜和一隻玳瑁有浮水問題，不能正常下潛；其餘的則狀態良好。水產試驗所定期在每年的 5 月和 8 月於林投等地方舉辦放流海龜活動。亦與澎湖水族館合作，展出一批康復的海龜，以宣揚公眾教育。我們參觀水族館幾個小時，學習並讚賞設施。

我們認識到台灣民眾和他們日常生活與海龜根深蒂固的傳統聯繫，特別欣賞他們為保護海龜付出的努力及對海洋生命的尊重。我們計劃很快再到台灣，從文化和科學的角度多了解人文與海龜的關係。我們衷心感謝在台灣遇到所有美妙及熱情好客的人，尤其是李宗賢獸醫師、蔡雅如、王添正、洪靜儒、曾建偉、蔡耀文、翁秀琪、許鐘綱和小雨。以下圖片記載我們在海生館、小琉球及澎湖的美好時光。請大家細心欣賞感受。大家可以於 <http://akepa.hpa.edu/~mrice/st.htm> 觀看更多相片。



Map 1 showing the location of NMMBA, Liuqiu Island and Penghu Islands, Taiwan
 圖 1 顯示台灣海生館、小琉球島及澎湖群島的位置 (Source 來源: SEATURTLE
 ORG Maptool. SEATURTLE.ORG, Inc. <http://www.seaturtle.org/maptool/>)



Map 2 showing the Penghu Islands

圖 2 台灣澎湖群島

(Source 來源: <http://club.pchome.com.tw/myclub/towa800/>)



Picture 1. A juvenile green turtle under observation at NMMBA
圖 1. 在海生館接受觀察及治療的未成年綠海龜



Picture 2. Dr. Tsung-Hsien LI and Connie Ka-yan NG at NMMBA
圖 2. 李宗賢獸醫師及伍家恩在海生館合照



Picture 3. Sea turtles under observation in a large concrete tank at NMMBA

圖 3.在海生館於一個大水池內接受觀察的海龜



Picture 4. A juvenile green turtle after recovery at NMMBA, with half of its left forelimb lost due to entanglement with fishing net

圖 4.在海生館已康復的未成年綠海龜，因漁網纏繞而失去其左前肢的一半



Picture 5. A large green turtle foraging in the shallow flat waters in Geban Bay, west of Liuqiu

圖 5. 於小琉球西邊的蛤板灣淺水區覓食的綠海龜



Picture 6. Foraging green turtles in Duozaiping, west of Liuqiu

圖 6. 於小琉球西邊的肚仔坪淺水區覓食的綠海龜



Picture 7. A sub-adult green turtle entered into the Dafu Port in east of Liuqiu, presumably for resting

圖 7. 一隻亞成年綠海龜進入小琉球東邊的大福漁港休息



Picture 8. Sea turtles in a variety of forms, from bakery to rice, and even to pure gold, were made to symbolize blessings from gods on Penghu Islands

圖 8. 在澎湖用不同物料製作的海龜 (包括麵粉、米、真金)，以象徵神的祝福



© Connie Ka-yun NG

Picture 9. A newly hand-crafted 6-kg gold turtle made for the celebration on Penghu Islands

圖 9.在澎湖特製 6 公斤的真金海龜



© Connie Ka-yun NG

Picture 10. Several sea turtles in two in-house ponds as 'wish fountain' at Dayi Temple on Penghu Islands

圖 10.在澎湖大義宮內許願池的海龜



Picture 11. George and Kevin at a fisheries research institute on Penghu Islands

圖 11. 佐治及許鐘鋼先生在澎湖水產試驗所



Picture 12. Sea turtles under rehabilitation at the fisheries research institute

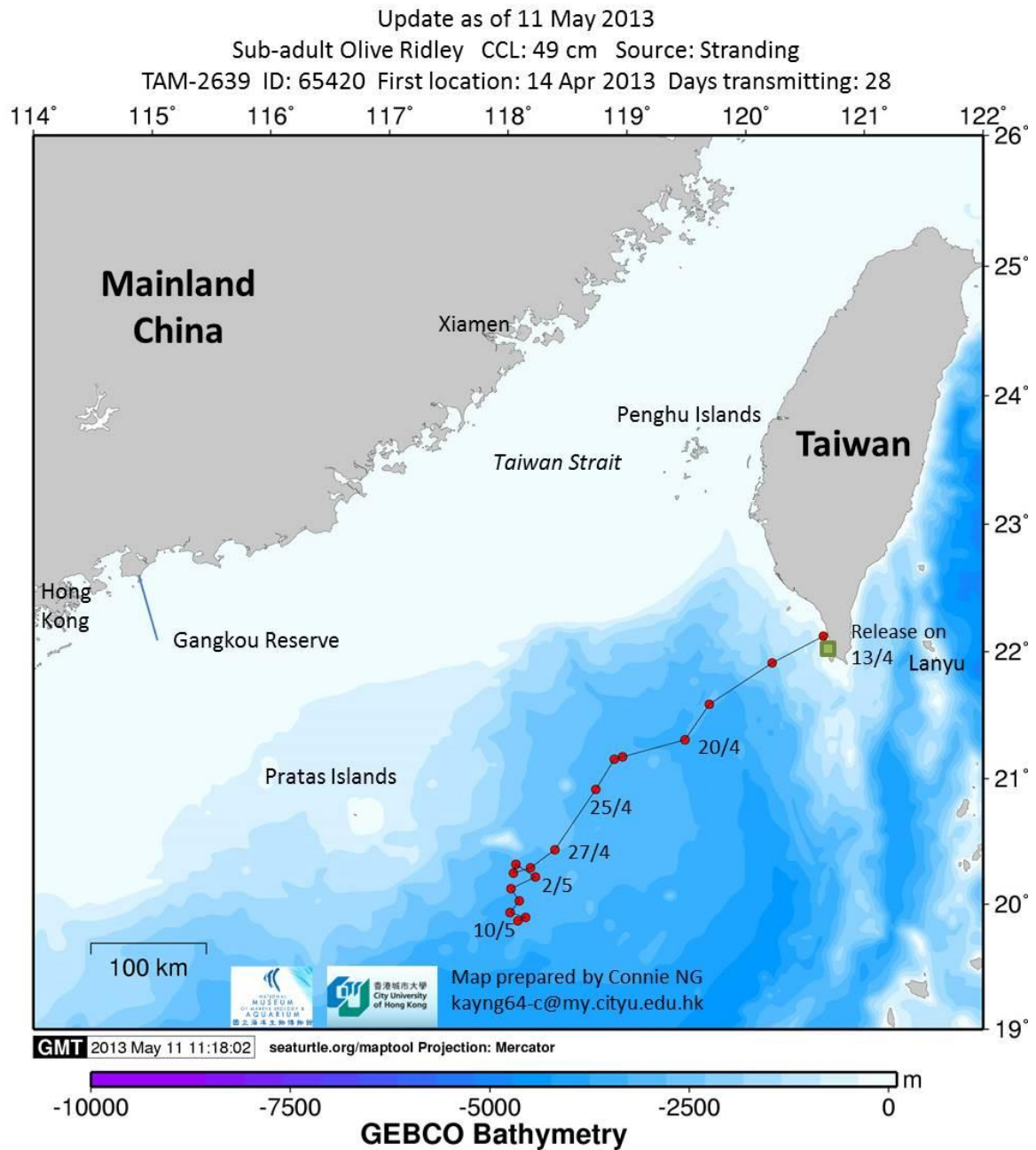
圖 12.在澎湖水產試驗所康復中的海龜



© Connie Ka-yan NG

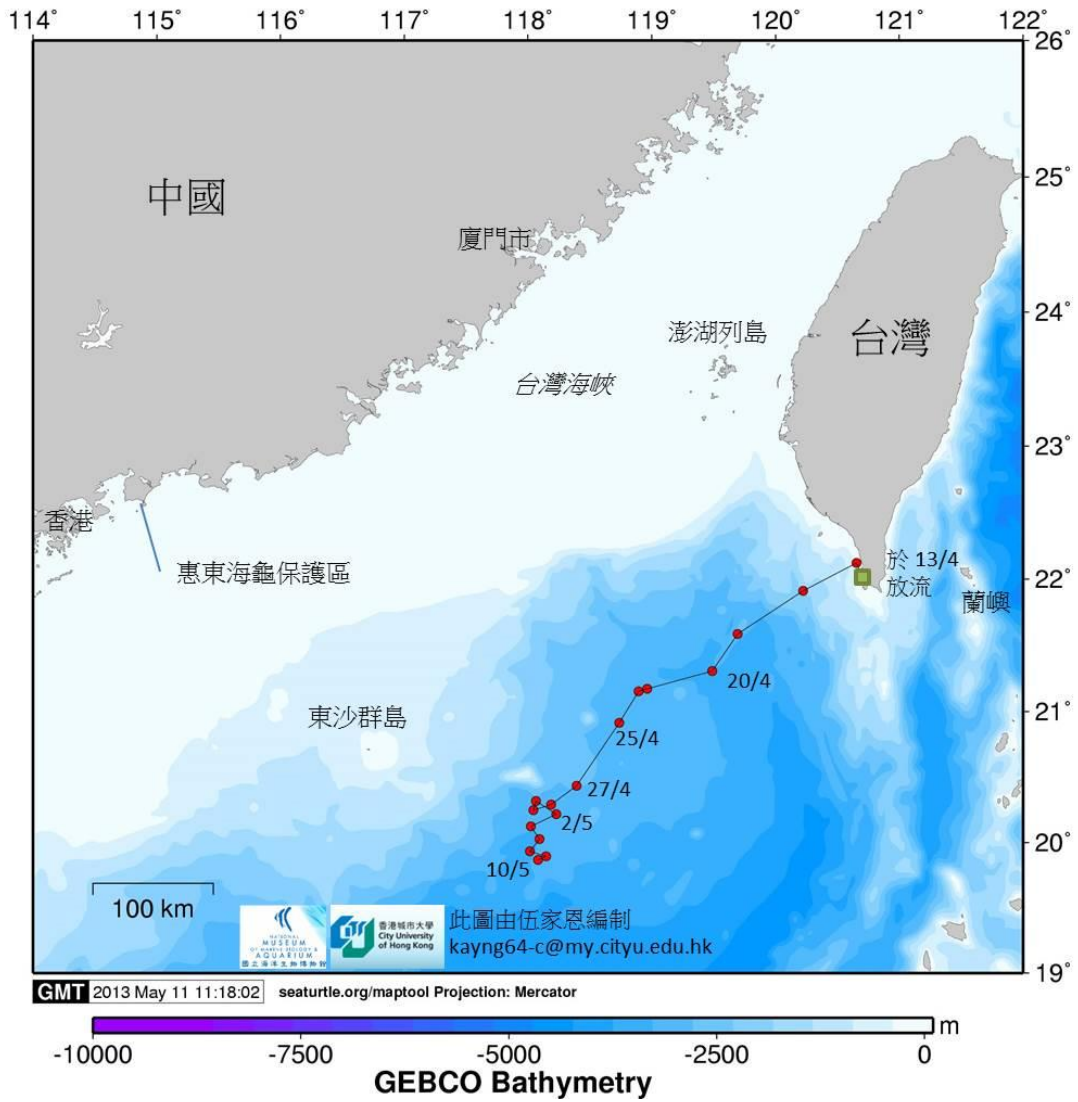
Picture 13. Rehabilitated sea turtles at Penghu Aquarium

圖 13. 在澎湖水族館展示已康復的海龜



Tracking map of a rehabilitated Olive Ridley released from NMMBA
從海生館野放的康復欖蠟龜的衛星追蹤圖 (Source 來源: SEATURTLE ORG
Maptool. SEATURTLE.ORG, Inc. <http://www.seaturtle.org/maptool/>)

至 2013 年 5 月 11 日
 亞成年欖蠟龜“蝦米” 背甲曲線長: 49 cm 來源: 擱淺
 TAM-2639 ID: 65420 首個信號: 2013 年 4 月 14 日 接收信號日數: 28



Tracking map of a rehabilitated Olive Ridley released from NMMBA
 從海生館野放的康復欖蠟龜的衛星追蹤圖 (Source 來源: SEATURTLE ORG
 Maptool. SEATURTLE.ORG, Inc. <http://www.seaturtle.org/maptool/>)

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