2013

2 OF 2

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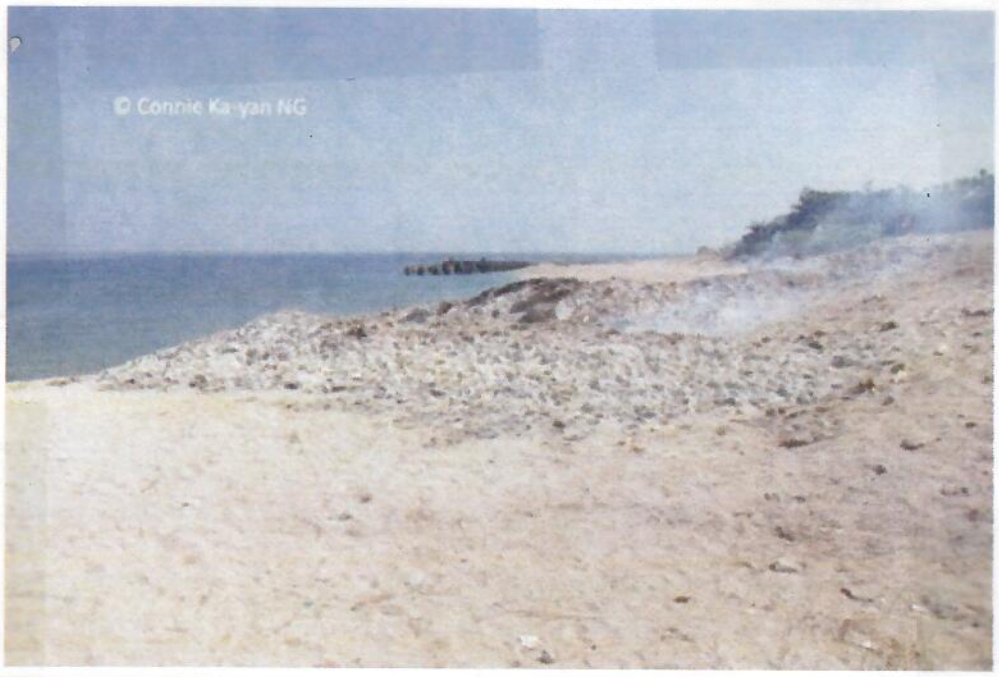
2013

Wide Ruled | 100 Sheets | 9.75 in x 7.5 in (24.7 cm x 19 cm)



Picture 9. Burning of the Wangye boat with paper money

圖9. 火燒王爺船及紙幣

Picture 19. Foraging green turtles

圖19. 覓食中的綠海龜

Picture 23. George, Ka-yan and Tien (from left to right) at Vase Rock, end of the snorkeling trip
圖23. 佐治、家恩和阿添 (由左至右) 在花瓶石，浮潛圓滿結束

Picture 22. A blue plastic tag, with algae overgrown, on the right forelimb of a large female green turtle
圖22. 雌性綠海龜右前肢附有一個長滿藻類的藍色塑料標籤

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FORESEEING RED: LEE KUAN YEW ON CHINA

Singapore's elder statesman offers insights and predictions on China and the world, in a new volume exclusively adapted here

TIME 2/4/13

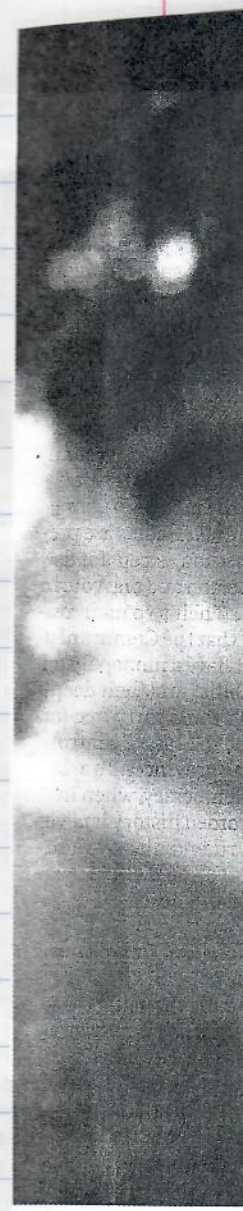
LEE KUAN YEW HAILS FROM A VERY SMALL country, but, for decades, he has been a very big man—at home and on the world stage. During more than a half-century of public life, including some 30 years as Prime Minister, Lee transformed Singapore from a simple trader of commodities into a sophisticated hub of finance and technology—The Little Red Dot, as many of its people affectionately call it.

A stern, patriarchal figure, Lee realized his ambitions for Singapore through the sheer force of his personality, buttressed by an unapologetic conviction that he knew best. The same qualities that influenced his finer policies affected his worse ones too. Single-mindedness, for example, could become heavy-handedness. The stain on Lee's standing is that, in the controlled experiment of molding a society in his own severe image, he marginalized social liberties both sacred and mundane: from expressing dissent to chewing gum.

That dark side will undoubtedly color Lee's legacy. Yet he has always had too much vision to be limited to tiny Singapore, or to be your run-of-the-mill strongman. Lee possesses an ability to interpret the past, understand the present and divine the future. The more enduring, and endearing, part of him is the globalist long sought out by national leaders and corporate titans for his counsel on the way of the world.

Lee's powerful intellect is captured in a new book, *Lee Kuan Yew: The Grand Master's Insights on China, the United States, and the World.* It's a collection of interviews with him by Harvard University professor Graham Allison, Council on Foreign Relations senior fellow Robert Blackwill and Harvard's Belfer Center researcher Ali Wyne, while also drawing on other selected and cited writings by and about Lee. Now 89, officially retired and somewhat frail, Lee has mellowed with age—not unlike his creation Singapore, governed today with a lighter touch even as its citizens grow more vocal. Yet, as the book, and the adaptation here of the China chapter, reveal, Lee is as sharp, direct and prescient as ever. Though the volume was completed before China's current territorial tensions with its neighbors, it helps expose, and explain, Beijing's hardball mind-set.

Over the years Lee has been called many things—unflattering as well as admiring. But perhaps the single most fitting description is: The Man Who Saw Tomorrow. —ZOHER ABDOOLCARIM



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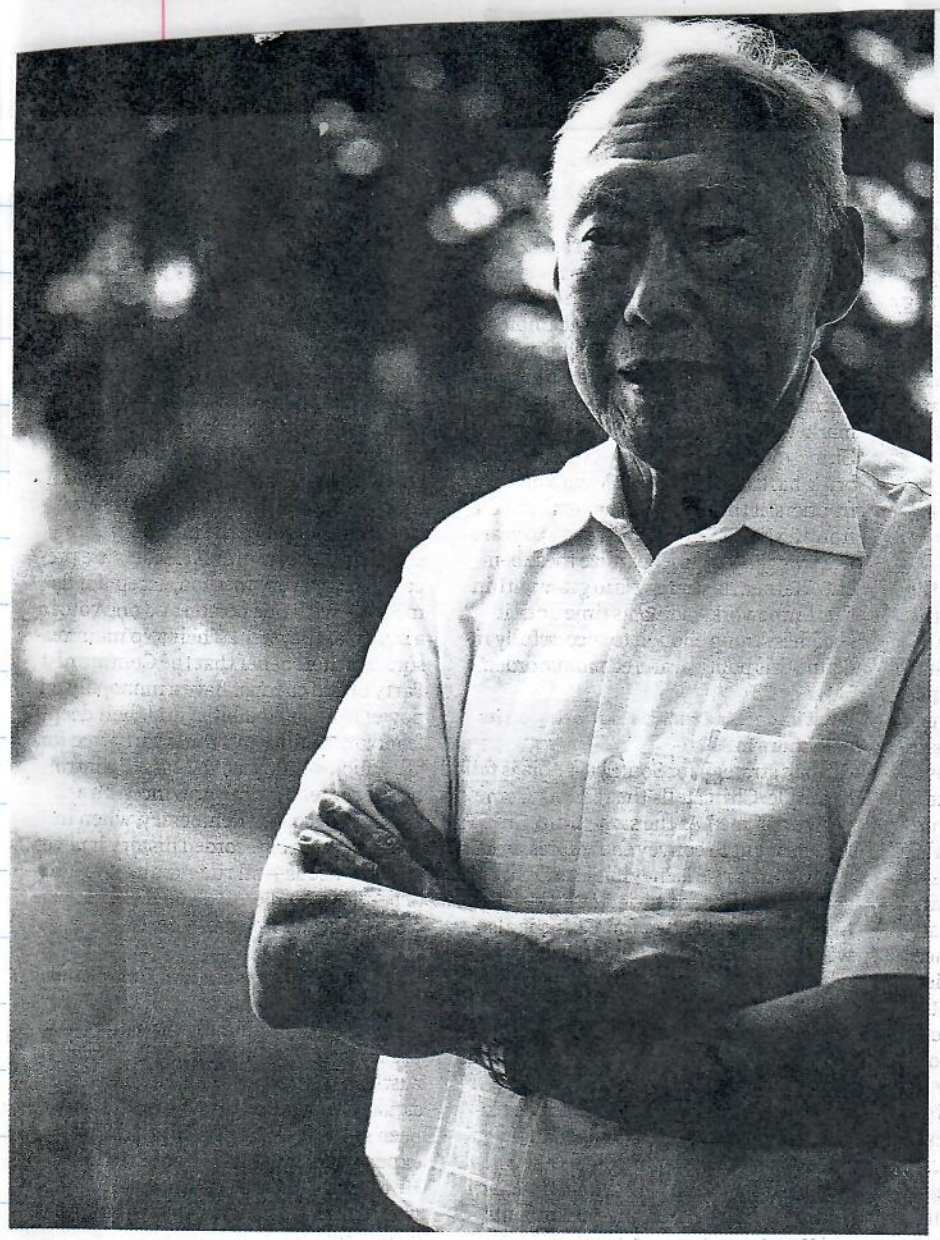

The sage of Singapore *Lee's steely micromanagement of the Lion City brought out some of the worst in him; his geopolitical thought—incisive, prescient and at times brilliantly framed—some of the best*

Are Chinese leaders serious about displacing the U.S. as the No. 1 power in Asia and, eventually, the world?
Of course. They have transformed a poor society by an economic miracle to become now the second largest economy in the world—on track to become the world's largest economy. They have followed the American lead in putting people in space and shooting down satellites with missiles. Theirs is a culture 4,000 years old, with 1.3 billion people, with a huge and very talented pool to draw from. How could they not aspire to be No. 1 in Asia, and in time the world? The Chinese people have raised their expectations and aspirations. Every Chinese wants a strong and rich China, a nation as prosperous, advanced and technologically competent as America, Europe and Japan. This reawakened sense of destiny is an overpowering force. The Chinese will want to share this century as co-equals with the U.S.

How will China's behavior toward other countries change if China becomes the dominant Asian power?
At the core of their mind-set is their world before colonization and the exploitation and humiliation that brought. In Chinese, *China* means *Middle Kingdom*, recalling a world in which they were dominant in the region, when other states related to them as supplicants to a superior and vassals came to Beijing bearing tribute. Will an industrialized and strong China be as benign to Southeast Asia as the U.S. has been since 1945? Singapore is not sure. Neither is Brunei, Indonesia, Malaysia, the Philippines, Thailand or Vietnam. We already see a China more self-assured and willing to take tough positions. The concern of America is what kind of world they will face when China is able to contest their pre-eminence. Many medium and small countries in Asia are also concerned. They are uneasy that China may want to resume the imperial status it had in earlier centuries and have misgivings about being treated as vassal states having to send tribute to China as they used to in past centuries. [The Chinese] tell us that countries big or small are equal; [that they] are not a hegemon. But when we do something they do not like, they say you have made 1.3 billion people unhappy. So please know your place.

What is China's strategy for becoming No. 1?
The Chinese have concluded that their best strategy is to build a strong and prosperous future, and use their huge and increasingly highly skilled and educated workers to outsell and outbuild all others. The Chinese have calculated that they need 30 to 40—maybe 50—years of peace and quiet to catch up, build up their system, and change it from the communist system to the market system. They must avoid the mistakes made by Germany and Japan. Their

competition for power, influence and resources led in the last century to two terrible wars. The Russian mistake was that they put so much into military expenditure and so little into civilian technology that their economy collapsed. I believe the Chinese leadership has learned that if you compete with America in armaments, you will lose. You will bankrupt yourself. So, keep your head down, and smile for 40 or 50 years.

What are the major hurdles in executing that strategy?

There will be enormous stresses because of the size of the country and the intractable nature of the problems: the poor infrastructure, the weak institutions, the wrong systems that they have installed. Straight-line extrapolations from [China's] remarkable record are not realistic. China has more handicaps going forward and more obstacles to overcome than most observers recognize. Chief among these are their problems of governance: the absence of the rule of law, which in today's China is closer to the rule of the emperor; a huge country in which little emperors across a vast expanse exercise great local influence; cultural habits that limit imagination and creativity, rewarding conformity; a language that is exceedingly difficult for foreigners to learn sufficiently to embrace China and be embraced by its society; and severe constraints on its ability to attract and assimilate talent from other [countries].

China will inevitably catch up to the U.S. in absolute GDP. But its creativity may never match America's because its culture does not permit a free exchange and contest of ideas. How else to explain how a country with four times as many people as America—and presumably four times as many talented people—does not come up with technological breakthroughs?

Technology is going to make their system of governance obsolete. By 2030, 70% or maybe 75% of their people will be in cities, small towns, big towns, megabig towns. They are going to have cell phones, Internet, satellite TV. They are going to be well informed; they can organize themselves. You cannot govern them the way you are governing them now where you just placate and monitor a few people because the numbers will be so large.

How do China's leaders see the U.S. role in Asia changing as China becomes No. 1?

The leadership recognizes that as the leading power in the region for the seven decades since World War II, the U.S. has provided a stability that allowed unprecedented growth for many nations including Japan, the Asian tigers and China itself. China knows that it needs access to U.S. markets, U.S. technology, opportunities for Chinese students to study in the U.S. and to bring back to China new ideas about new frontiers. It therefore sees no profit in confronting the U.S. in the next 20 to 30 years in a way that could jeopardize these benefits. Rather, its strategy is to grow within this framework, biding its time until it becomes strong enough to successfully redefine this political and economic order.

What impact is China's rise having on its neighbors in Asia?

China's strategy for Southeast Asia is fairly simple: China tells the region, "Come grow with me." At the same time, China's leaders want to convey the impression that China's rise is inevitable and that countries will need to decide if they want to be China's friend or foe. China is also willing to calibrate its engagement to get what it wants or express its displeasure.

Will China become a democracy?

No, China is not going to become a liberal democracy; if it did, it would collapse. Of that I am quite sure, and the Chinese intelligentsia also understands that. If you believe that there is going to be a revolution of some sort in China for democracy, you are wrong. Where are the students of Tiananmen now? They are irrelevant. The Chinese people want a revived China. Can it be a parliamentary democracy? This is a possibility in the villages and small towns. The Chinese fear chaos and will always err on the side of caution. It will be a long evolutionary process, but it is possible to contemplate such changes. Transportation and communications have become so much faster and cheaper. The Chinese people will be exposed to other systems and cultures and know other societies through travel, through the Internet and through smart phones. One thing is for sure: the present system will not remain unchanged for the next 50 years. To achieve the modernization of China, her communist leaders are prepared to try every method, except for democracy with one person and one vote in a multiparty system. Their two main reasons are their belief that the Communist Party of China must have a monopoly on power to ensure stability and their deep fear of instability in a multiparty free-for-all, which would lead to a loss of control by the center over the provinces. To ask China to become a democracy, when in its 5,000 years of recorded history it never counted heads—all rulers ruled by right of being the emperor; if you disagree, you chop off heads, not count heads.

How should one assess new Communist Party chief Xi Jinping?

He has had a tougher life than [his predecessor] Hu Jintao. His father was rusticated, and so was he. He took it in stride, and worked his way up. It has not been smooth sailing for him. His life experiences must have hardened him. He is reserved—not in the sense that he will not talk to you, but in the sense that he will not betray his likes and dislikes. There is always a pleasant smile on his face, whether or not you have said something that annoyed him. He has iron in his soul, more than Hu Jintao, who ascended the ranks without experiencing the trials and tribulations that Xi endured. He is a person with enormous emotional stability who does not allow his personal misfortunes or sufferings to affect his judgment. He is impressive.

'[CHINA'S] CREATIVITY MAY NEVER MATCH AMERICA'S BECAUSE ITS CULTURE DOES NOT PERMIT A FREE EXCHANGE AND CONTEST OF IDEAS.'

—FROM *LEE KUAN YEW: THE GRAND MASTER'S INSIGHTS ON CHINA, THE UNITED STATES, AND THE WORLD*

Adapted from Lee Kuan Yew: The Grand Master's Insights on China, the United States, and the World. *Interviews and selections by Graham Allison and Robert D. Blackwill, with Ali Wyne. To be published by The MIT Press, February 2013.*

CHINA SPECIAL REPORT

Two Steps Forward, One Step Back

China's economic liberalization is foundering on a lack of political reform

6/18/2013 Time

YU HUA

I HEARD A STORY ONCE. IN BEIJING, IN the small hours of June 4, 1989, as the tanks and troops surged into Tiananmen Square, students and citizens went to block their way. Among them was a university student who dashed forward and hurled a stone at soldiers in a military vehicle. They replied with a fusillade of bullets, and he died in a pool of blood. His body was left among a pile of corpses, waiting to be claimed by relatives.

Several days later, his father, who happened to be a colonel in the People's Liberation Army, arrived and wailed at the sight of his son's body. A sympathetic army captain asked him softly, "Was he a victim of friendly fire? Or was he a rioter?" In the political environment of the times, if the son was a victim of friendly fire, there would be no impact on the colonel's army career. But if the son was deemed a rioter, the colonel's promotion prospects would suffer. Wiping away his tears, the colonel declared firmly, "He was a rioter." Attributing the killing to friendly fire would be an insult to his son's memory. The father hoped that one day his child would be rehabilitated as a hero.

Why am I telling a story from more than 20 years ago? It's because Tiananmen has had a profound impact on China since. Before Tiananmen, China had been going down the track of "reform and opening up" for 11 years. The reforms were not only economic but also political. Political change may not have kept pace with economic liberalization, but it was in progress. After Tiananmen, however, high-level cadres realized that political openness posed a threat to the rule of the Communist Party. Political reform was halted while economic reform accelerated.

Despite its opaque political system, China has given birth to a remarkable economic miracle. During the 1990s in particular, people were brimming with optimism as the nation went through boom times of high growth and low inflation. A few supporters of the 1989 protests even professed a grudging sympathy with the official response to Tiananmen, conceding that the blood of a few hundred students was the price of material progress for a billion-strong society.

Yet behind the veneer of prosperity, crises are lurking. Since the beginning of the 21st century, China has paid a terrible price for its lopsided development as its widening wealth gap, environmental degradation and ubiquitous corruption intensify social conflict. The authoritarian development model has proved to be highly efficient in the short term but extremely problematic for the long run.

Tiananmen 1989 *A boom economy is not enough*

Over the past 20 years, China has produced as much pollution as the West did in the century or more since the Industrial Revolution. But environmental scandals—toxic water, poisoned crops, lethal air—hardly ever make headlines because the lack of political transparency has undermined the public's sense of entitlement. Cowed citizens have no faith in their right to be informed or even to manage their health and surroundings.

The fall of Chongqing police boss Wang Lijun and party leader Bo Xilai reveals that a sense of entitlement—to be informed and consulted—is lacking even within the party. High-level officials cannot find out about the cases of Wang and Bo through normal means and therefore resort to online rumors, just like the general public. If American politics is a soap opera, then Chinese politics is a murky, suspenseful thriller.

When economic development takes place under a murky political system, the result is widespread corruption, and the government tends to deal with it in an equally murky way—leading to yet more corruption. When a government official is detained for graft along with several businessmen involved in the case, often someone close to the prosecuting authority will visit the businessmen in prison, promising to get them released—if they agree to sell a few properties at a low price.

Today, what impedes China's development is no longer its economic system, but its political one. China's progress has become more and more difficult because every single forward movement runs the risk of hitting a stumbling block and is thus, more often than not, aborted.

A French friend of mine was told that during the Cultural Revolution, everything became its opposite—that green meant stop, and go was signified by red, the glorious color of socialism and the party. He asked me for my opinion of China today. Here is my reply: In China, both green and red lights flash at once. You can neither proceed nor halt—but are simply left to stare at the pile of June 4 dead in the rearview mirror. ■

Yu is the author of China in Ten Words

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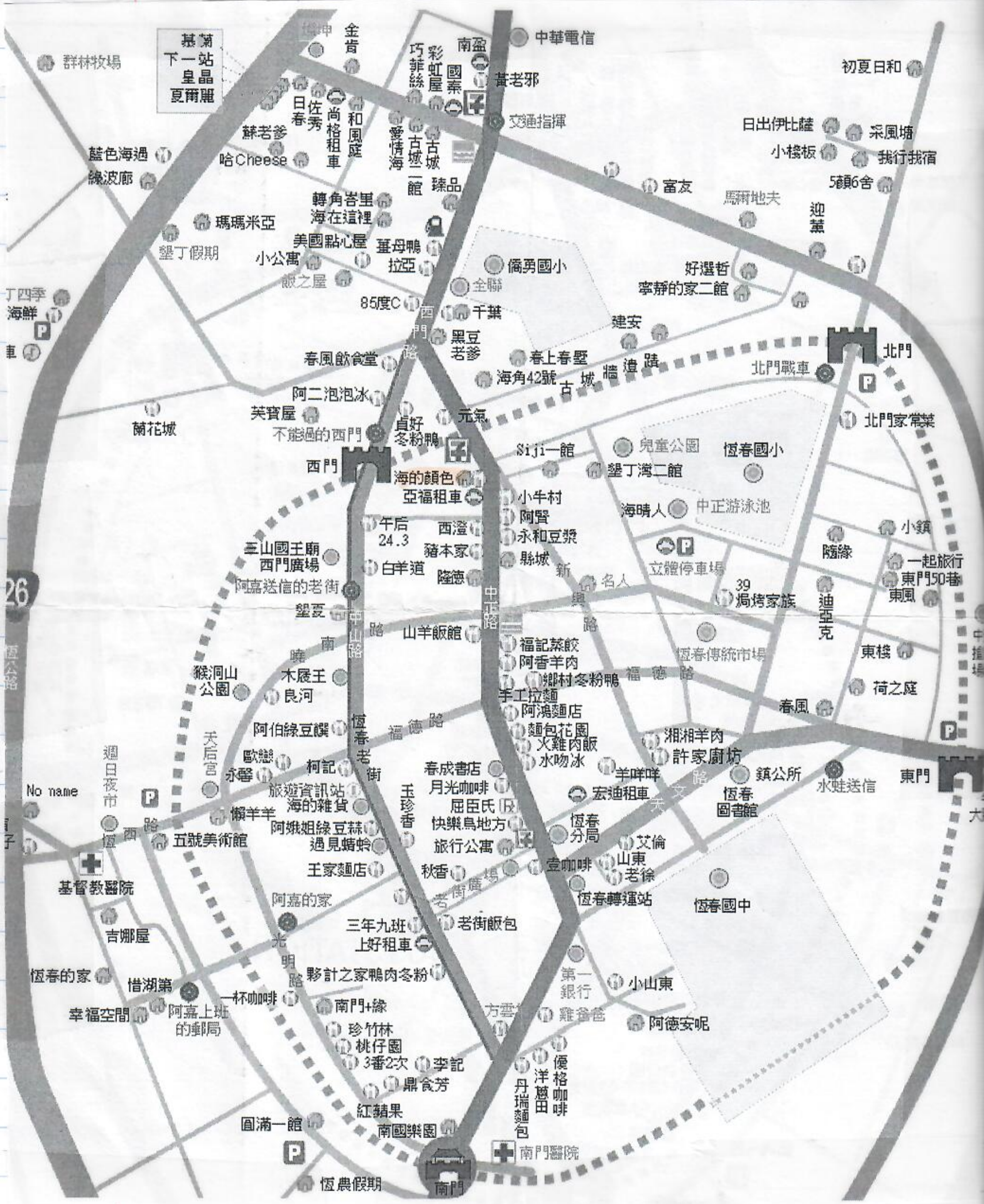
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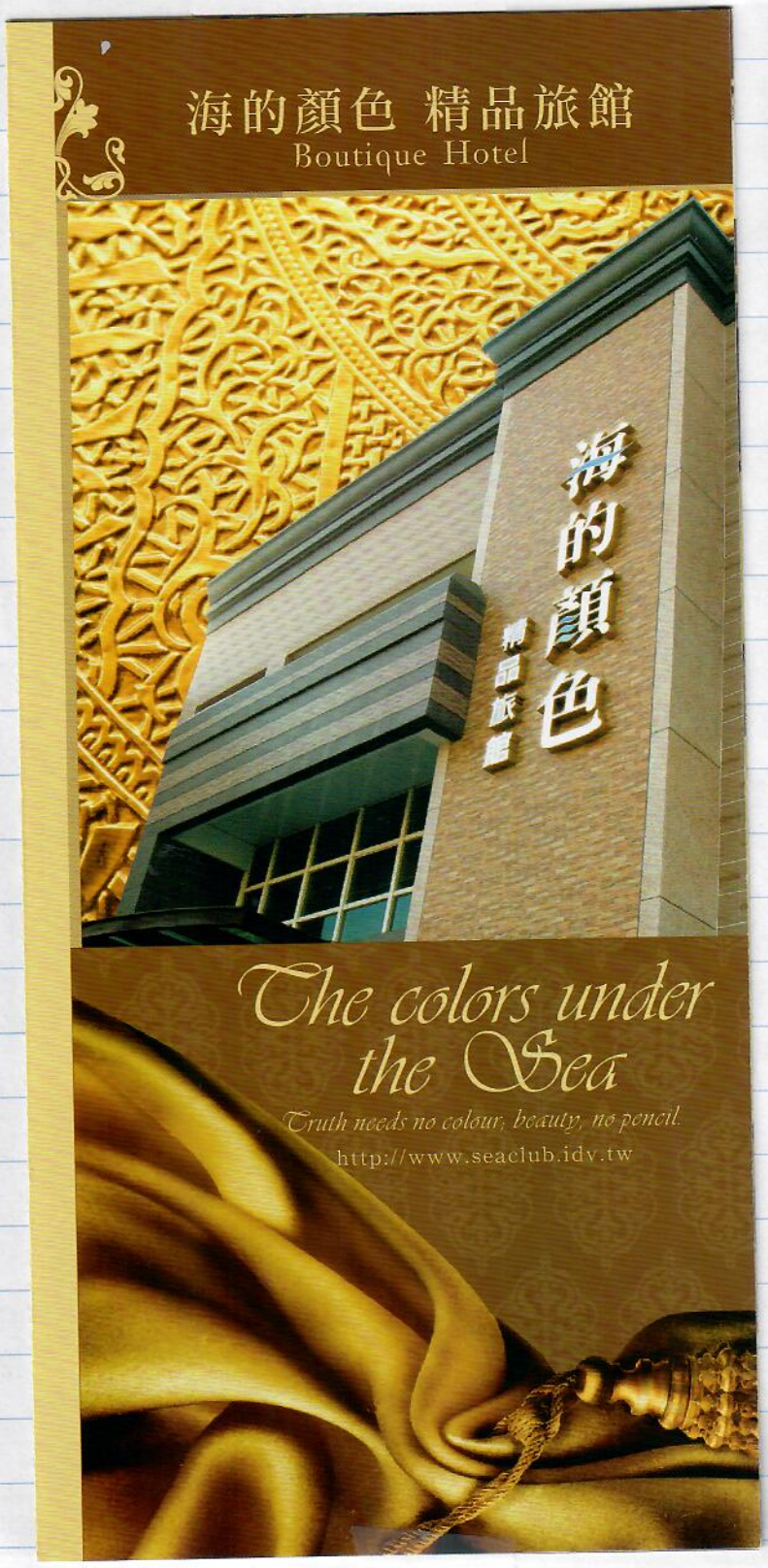

A Murky Outlook

On a plethora of issues, China's middle class isn't getting the openness it seeks

WITH RECORD AIR POLLUTION hanging over China in mid-January, it made sense for celebrity blogger Li Chengpeng to wear a face mask. But the former investigative journalist, who has racked up 6.6 million followers on Weibo, China's version of Twitter, wasn't protecting himself from the foul air. Before a book signing for his latest collection of essays, *Everyone in the World Knows*, Li was told by authorities that he could take "no questions from readers, no talking at all—not even 'happy new year' or 'thank you.'" His response to the gag order? Sartorial subversion in the form of a black face mask. "The excessive concentration of power in China has resulted in the law being controlled by the powerful," he told TIME. "If there is not even freedom of speech, then I'm not optimistic about political reform at all."

It has been just over two months since China's new leader Xi Jinping became the most powerful man in the world's most populous nation. After a decade of paralysis under Xi's predecessor Hu Jintao, hopes have proliferated that Xi—a vigorous figure whose father was a reformist Communist Party elder—might prove more receptive to political reform. But to expect Xi to suddenly tear down the Bamboo Curtain just weeks into a 10-year tenure is unrealistic. And beyond the lip service the new Chinese Communist Party chief has paid to tackling corruption and promoting the constitution, there's precious little to signal his personal commitment to liberalization. Hu talked an awful lot about democracy and rule of law when he first came to power. Nothing happened.

The Xi decade has started with a distinct chill—and not just because the country is suffering its coldest winter in nearly 30 years. Internet controls have intensified, with access to top foreign news sites blocked and rules tightened to force Chinese social-media users to reveal their true identities. Censorship has gotten so oppressive that journalists at *Southern Weekend*, one of the country's most respected newspapers, went on strike. The government's gargantuan propaganda network shows no sign of slimming down—Beijing's propaganda chief recently admitted that the city's spin-doctoring effort employs 2.06 million people.

Behind the mask *Without free speech, there can be no political reform, says writer and blogger Li Chengpeng*

Speculation that China's system of re-education through labor, or *laojiao*, will soon be abolished means little for the 60,000 people currently toiling in its work camps without trial. And regardless of whether *laojiao* disappears, so-called black jails, which operate in a shadowy sphere completely removed from China's legal system, will continue to exist. Dissidents or petitioners can disappear without a trace or be charged with ludicrous crimes. In recent days, Chinese celebrities who supported freedom of expression in their online postings have been "invited for tea," a euphemism for intimidation sessions with security agents. Kai-Fu Lee, the Taiwanese-American former head of Google China, posted a picture of a tea set on Weibo in response to the forcible cuppa he and others have endured.

It's not just prominent Chinese or the usual clique of human-rights campaigners who are speaking out. More than 10,000 people lined up in three Chinese cities to buy blogger Li's book, which details official failings, like corruption and abuse of power. A growing stratum of middle-class Chinese has more to protect and is using the Internet to police a government that appears unwilling to fulfill that task. Practically every day brings news of another wayward official brought down by an online campaign to expose his lavish property holdings or harem. Protests against environmental degradation are also organized online. "We all hope our country can be stable and wealthy," Li told TIME, shortly after a pair of mysterious men tried to attack him at his Beijing book event. "Our criticism is our expression of patriotism. We try to change, not to overthrow."

Just as Li was signing books in the capital, the pollution turned so toxic that it far surpassed the highest notch on the yardstick the U.S. uses to measure pollution—going "beyond index." Previously, Chinese authorities have underplayed the smog, referring to it as "fog" and arguing implausibly that Beijing's air has improved every year for the past 14 years. But this poisonous pall was impossible to ignore. Even *People's Daily*, the Communist Party's mouthpiece, ran a front-page story on it. One of the reasons for the noxious air is a spike in people burning coal to keep warm during this icy winter—so things should improve, if only seasonally, as the capital warms up. But a Beijing spring that brings the blue skies of political reform? Don't hold your breath. —WITH REPORTING BY CHENGCHENG JIANG/BEIJING

(153)

2/21/13 Heng Chu LAND God?

縣定古蹟

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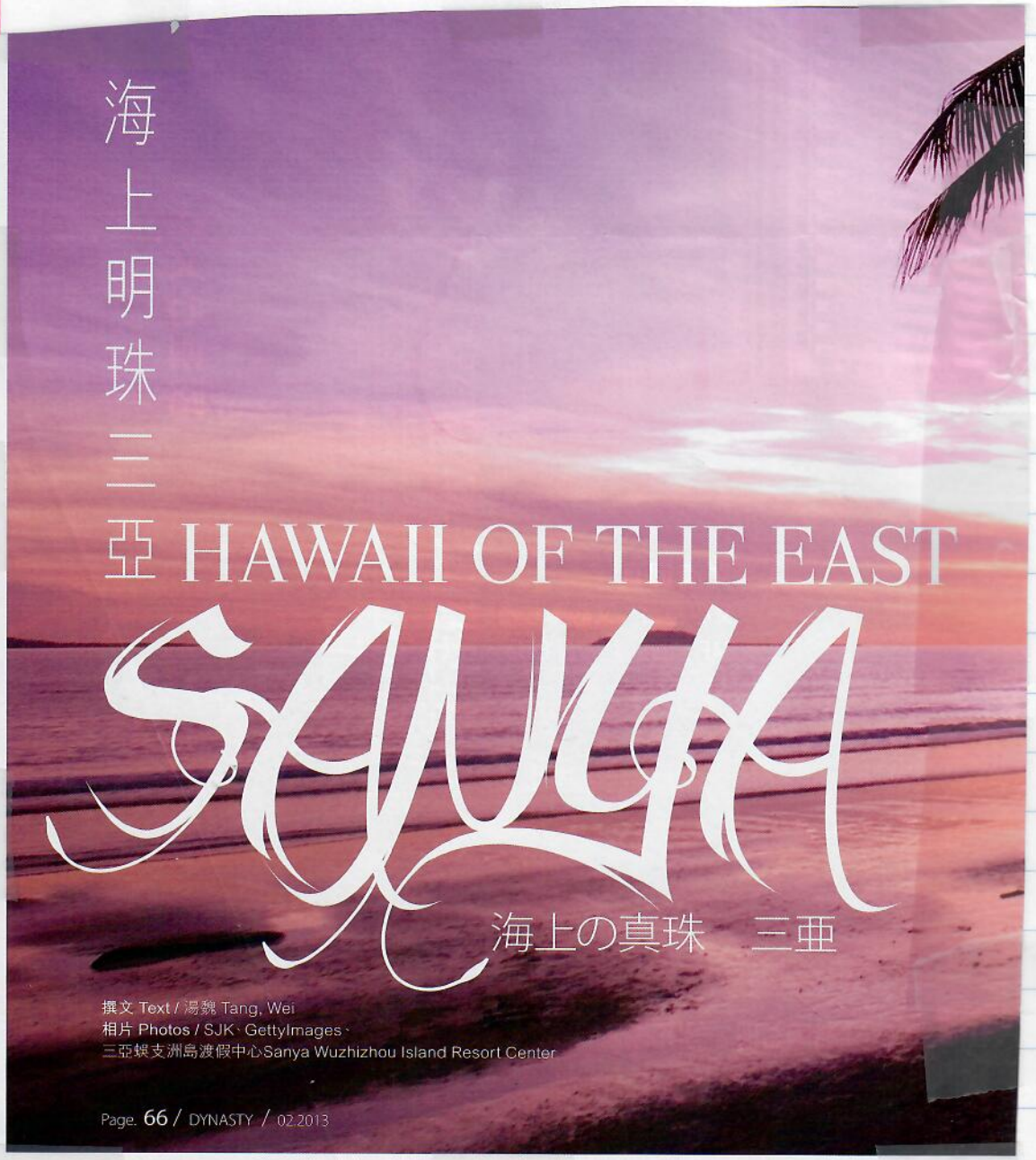


海上明珠三亞 HAWAII OF THE EAST

SANYA

海上の真珠　三亜

撰文 Text / 湯巍 Tang, Wei
相片 Photos / SJK、GettyImages、
三亞蜈支洲島渡假中心Sanya Wuzhizhou Island Resort Center

Sanya in Hainan Island is one of the most attractive tourist destinations in southern China. Beautiful beaches and a sunny tropical island atmosphere have earned it the reputation of the "Hawaii of the East".

The Island Life

Sanya is famous for its beautiful beaches. Its most popular tourist attractions include Sanya Bay, Dadonghai and Yalong Bay. In recent years, Wuzhizhou Island has also become a popular tourist destination.

Wuzhizhou Island is situated in Haitang Bay, north of Yalong Bay, just about 30 kilometers from Sanya City. Nanwan Monkey Island lies to its north. A small island, Wuzhizhou is one of the few islands around Hainan Island with abundant freshwater resources. It is home to numerous animals and more than 2,000 species of plants, many sporting a bizarre appearance associated with the island. Known as the giant panda of the plant kingdom, the rare Dracaena is a good example.

In recent years, the development of tourism has attracted a number of international hotels and restaurants to the area. As a result, it has become the water sports hub of Hainan Island. The abundance of activities such as diving, fishing, water skiing, sailing, banana boating, canoeing and parasailing, is attracting water sports enthusiasts.

Other popular attractions in Sanya include Daxiao Dongtian famous for its religious culture and the romantic Tianyahaijiao Scenic Area.

Fresh Local Delicacies

Hainan Island is famous for its delicious seafood cuisine. If you are visiting Sanya, then seafood is a must. The place is packed with seafood restaurants, especially in the area between Yuechuan Bridge in Sanya Bay and Sanya Bridge, including the well-known First Market and Spring Garden Seafood Plaza nearby. Travelers can purchase their favorite fresh seafood from the market and have it cooked at the restaurant or order food directly from the restaurant and ask the chef to cook it to their way or following the chef's recommendation. No matter how you go about it, there will be a hearty spread of delicious and inexpensive seafood dishes on the table.

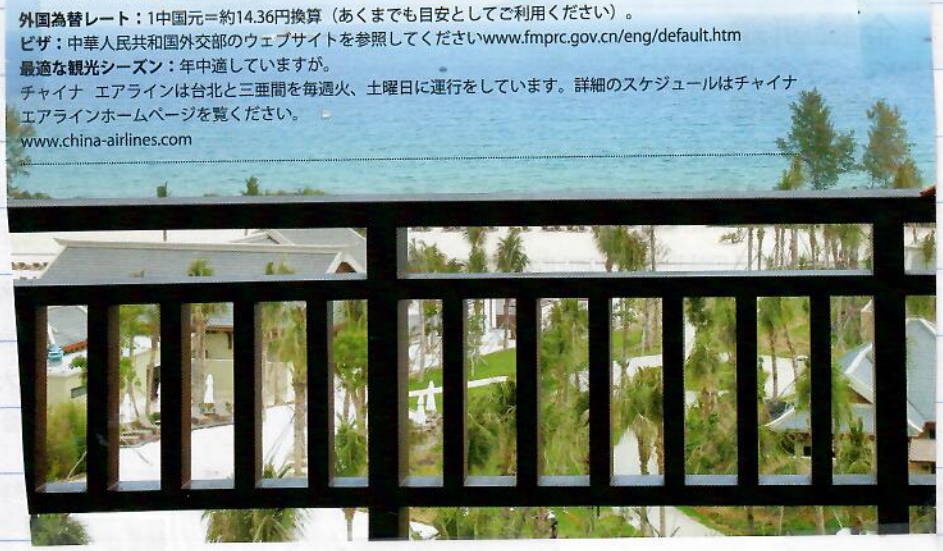
The more famous dishes of Sanya include steamed Napoleon Wrasse fish, boiled shrimps, spicy stir-fried conch, steamed crabs and oysters. Foodies can also try the Hainan specialty stir-fried Wuzhishan wild vegetables.

TRAVEL INFORMATION

EXCHANGE RATE: From RMB(CNY) 1 to USD 0.16. (For reference only)
VISA: Please refer to the website of Ministry of Foreign Affairs, the People's Republic of China: www.fmprc.gov.cn/eng/default.htm
BEST TIME TO VISIT: All year round.
China Airlines flies every Tuesday and Saturday from Taipei to Sanya. Please refer to China Airlines website for detailed schedule.
www.china-airlines.com

貨幣：人民幣，1元人民幣約 = 4.65元新臺幣（請依實際公告匯率為準）。
簽證：請參考中華人民共和國外交部網站：
big5.fmprc.gov.cn/gate/big5/www.fmprc.gov.cn/chn/gxh/tyb/
最佳旅遊季節：全年皆可。
華航每周二、六有航班從臺北飛三亞。詳細班表請參閱華航網站。
www.china-airlines.com

外国為替レート：1中国元＝約14.36円換算（あくまでも目安としてご利用ください）。
ビザ：中華人民共和国外交部のウェブサイトを参照してくださいwww.fmprc.gov.cn/eng/default.htm
最適な観光シーズン：年中適していますが。
チャイナ エアラインは台北と三亜間を毎週火、土曜日に運行をしています。詳細のスケジュールはチャイナ エアラインホームページを覧ください。
www.china-airlines.com



台新銀行 台灣高鐵

商店代號:000812070100103
端末機編號:84570029
卡別:VISA
卡號:438857******0162
交易類別:購票交易(PGW-MEGA)
日期:20130220
時間:110321
訂票編號:04203086
授權碼:09923C
EDC批號:004744
調閱編號:027046
交易序號:305103027046
金額: NT$1995

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除團體票或另有約定外，
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Refund must be made 30 minutes before train departure.
美國運通卡之收單機構

2/23/13 KAOHSIUNG → MIAOLI

聯合信用卡處理中心
National Credit Card Center

復興航空運輸股份有限公司
TRANSASIA AIRWAYS KHHKK

商店代號 0212000070
端末機代號 18212588

城市別(City)
KAOHSIUNG CITY
卡別(Card Type) 檢查碼(Check No.)
VISA 75799
卡號(Card No.)
438857******0162(S)
主機別/交易類別(Host/Trans. Type)
NCCC 00 一般交易 SALE
批次號碼(Batch No.) 授權碼(Auth Code)
089 03389C
日期/時間(Date/Time)
2013/02/23 14:09
序號(Ref. No.) 調閱編號(Inv. No.)
91258889008 000008
票號(Ticket No.)
170 2323849872

總計(Total) : NT$ 2910

持卡人存根
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商店代號 0212000070
端末機代號 18212588

城市別(City)
KAOHSIUNG CITY
卡別(Card Type) 檢查碼(Check No.)
VISA 75799
卡號(Card No.)
438857******0162(S)
主機別/交易類別(Host/Trans. Type)
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2013/02/23 14:15
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91258889009 000009
票號(Ticket No.)
170 2323849894

總計(Total) : NT$ 3580

持卡人存根
Card holder stub

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I AGREE TO PAY TOTAL AMOUNT
ACCORDING TO CARD ISSUER AGREEMENT
辦理 用卡！

Hengchun

台新銀行

海的顏色精品旅館

商店代號 000812161148252
端末機代號 64814922

卡號CARD NO. 438857******0162 M
交易類別TYPE 卡別CARD TYPE
銷售SALE VISA
批次號碼BATCH NO. 授權碼APP. CODE
000309 02397C
日期/時間DATE/TIME
13/01/17 20:14:11
調閱號TRACE NO. 序號REF.NO.
0753 301712001050

總計AMT. : NT$ 6000

持卡人存根CARDHOLDER COPY.I AGREE TO PAY
AMOUNT ACCO ISUER
AGREEMENT

Satellite tracking of post-nesting movements of green turtles *Chelomia mydas* from the Gangkou Sea Turtle National Nature Reserve, China, 2001. Marine Turtle Newsletter 97: 8-9.

Broderick, A.C., Canbolat, A.F., Catry, P., Ciccione, S., Delcroix, E., Hitipeuw, C., Luschi, P., Pet-Soede, L., Pendoley, K., Richardson, P.B., Rees, A.F,. and B.J. Godley. 2012. Global analysis of satellite tracking data shows that adult green turtles are significantly aggregated in Marine Protected Areas. Global Ecology and Biogeography 21(11): 1053-1061.

Hu, C. L. 1996. Treatment of disease in sea turtle due to temperature fluctuation. Guangdong Journal of Animal and Veterinary Science 3: 23. (in Chinese)

Gu, H. X., M. B., Ye and T. Zhou. 2006. Preliminary study on artificial raising of Lepidochelys olivacea. Sichuan Journal of Zoology 25(2): 393-394. (in Chinese with English abstract)

Gu, H. X., Z. R., Xia, P. P., Li, J. X., Duan, M. B., Ye, F. Y., Zhang, H. L., Chen and R. J. Lin. 2010. Sex identification and pivotal temperature for sex determination in hatchling green sea turtle. Chinese Journal of Zoology 45(4): 81-88. (in Chinese with English abstract)

Gu, H. X., F. Y., Zhang, P. P., Li, M. B., Ye and R. J. Lin. 2011. Comparison in blood cells morphology and hematology between healthy and sick green turtle. Chinese Journal of Veterinary Medicine 47(9): 66-67. (in Chinese)

Li, C. L., F. J., Cao, X. J., Huang, C. W., Liu and Z. W. Mai. 2008. Microstructure and identification of peripheral blood in Chelonia mydas. Journal of Guangdong Ocean University 28(3): 24-28. (in Chinese with English abstract)

Wallace, B.P., DiMatteo, A.D., Bolten, A.B., Chaloupka, M.Y., Hutchinson, B.J., Abreu-Grobois, F.A., Mortimer, J.A., Seminoff, J.A., Amorocho, D., Bjorndal, K.A., Bourjea, J., Bower, B.W., Due□as, R.B., Casale, P., Choudhury, B.C., Costa, A., Dutton, P.H., Fallabrino, A., Finkbeiner, E.M., Girard, A., Girondot, M., Hamann, M., Hurley, B.J., López-Mendilaharsu, M., Marcovaldi, M.A., Musick, J.A., Nel, R., Pilcher, N.J., Troëng, S., Witherington, B., and R.B. Mast. 2011. Global Conservation Priorities for Marine Turtles. PLos One 6(9): 1-14.

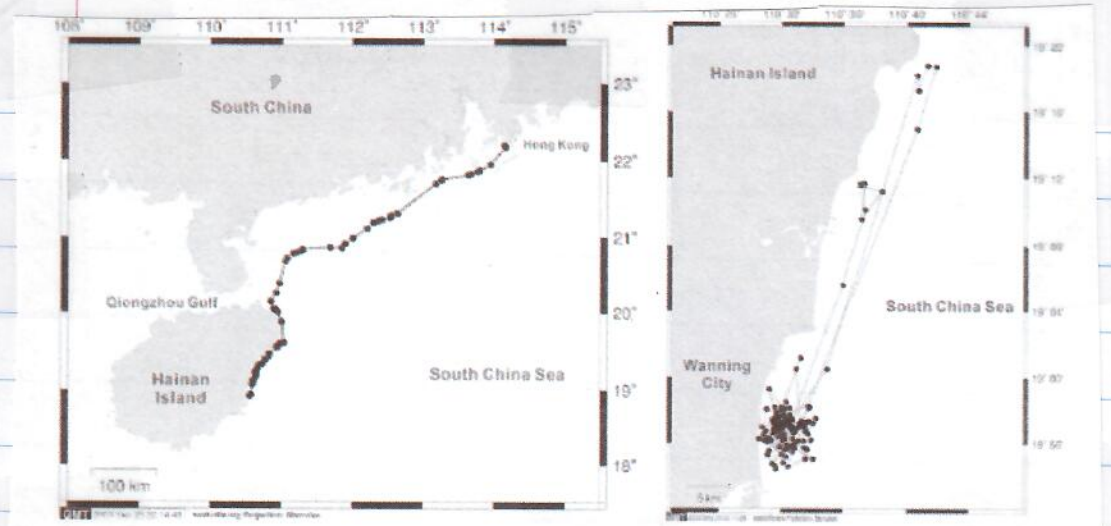
Xu, G., and M.Q. Zheng. 2003. Achievement from Sea Turtle Conservation in Nanao. Fisheries Science and Technology 4:14. (in Chinese)

Zhang, F. Y., H. X., Gu, H. L., Chen, Z. R., Xia, and P. P. Li. 2009. Blood cells morphology and hematology of *Eretmochelys imbricate* and *Chelonia mydas*. Chinese Journal of Zoology 44(6): 113-121. (in Chinese with English abstract)

Zhang, J. Q. 1996. Gangkou Sea Turtle National Nature Reserve and its green turtle nesting ecology. Man and the Biosphere 4: 3-5. (in Chinese)

Zhang, F. Y., and H. X. Gu. 2005. Artificial feeding of baby turtle of *Chelonia mydas*. Sichuan Journal of Zoology 24(3): 412-413. (in Chinese with English abstract)

Zhu, L. 2002. Studies on the behavioral biology of Loggerhead Turtle (Caretta caretta) in Captivity. Marine Sciences 26(9): 24-26. (in Chinese)

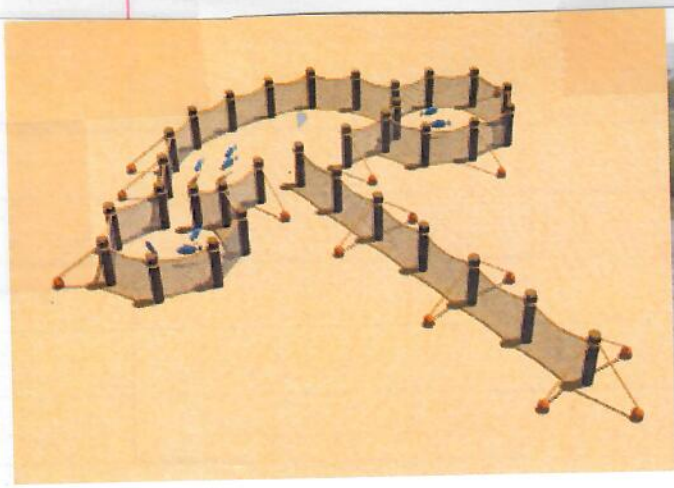


(Chan et al. 2003)

Table 1

Levels of trace elements (mg/kg, dry weight) in scute (N=58) and liver (N=9) tissues of green turtles. N>IDL represents number of samples above the instrumental detection limits (IDLs).

Element	Scute (mg/kg, dry weight)						Liver (mg/kg, dry weight)					
	N>IDL	Mean	Median	SD	Max	Min	N>IDL	Mean	Median	SD	Max	Min
As	0	<DL	<DL	n/a	n/a	n/a	0	<DL	<DL	n/a	n/a	n/a
Se	57	29.03	29.18	5.10	40.64	19.48	8	47.81	45.79	21.49	90.68	19.65
Zn	58	164.10	149.26	102.37	492.59	18.14	9	201.28	182.48	79.95	339.80	86.76
Pb	52	2.89	2.36	1.93	9.03	0.54	9	9.26	6.56	8.63	25.40	2.05
Co	1	2.4	2.4	n/a	n/a	n/a	3	3.55	2.55	2.74	6.65	1.45
Cd	11	0.64	0.51	0.42	1.81	0.37	9	44.96	41.98	41.53	121.13	1.85
Ni	56	2.95	1.31	4.60	23.92	0.12	9	1.53	1.50	0.88	3.31	0.18
Ba	5	7.55	2.02	12.70	30.22	0.83	4	9.12	1.94	15.17	31.85	0.75
Fe	58	35.46	22.50	38.80	176.73	3.58	n/a					
Mn	38	23.53	3.54	71.17	366.68	0.18	6	6.93	6.99	2.64	10.29	3.24
Cr	2	3.17	3.17	2.38	4.86	1.49	9	2.41	0.50	3.47	10.55	0.30
V	10	0.99	0.80	0.35	1.73	0.68	8	1.51	1.50	0.90	3.50	0.62
Cu	35	11.58	1.71	22.77	94.52	0.39	9	200.97	174.01	182.42	616.52	25.97
Ag	6	4.97	3.57	4.07	12.87	2.11	n/a					
Sr	43	9.06	6.10	9.79	54.57	0.82	9	6.52	5.30	5.62	18.25	0.94
Cs	12	6.44	4.51	6.18	23.78	0.17	0	<DL	<DL	n/a	n/a	n/a
Tl	38	17.57	17.39	4.06	30.22	11.03	7	21.71	22.83	4.01	25.43	14.26



Pound nets/ Set nets 定置漁网

Stake nets 椿網

Abstract

Sea turtles and Burmese pythons (*Python bivittatus*) are globally endangered and vulnerable species. Their survival is at risk as they face anthropogenic threats of all kinds, such as pollution, direct take and habitat loss, though the actual risk and these species are under-studied in the wild. Current research efforts on sea turtles in southern China focus on captivity and husbandry, hematology and blood chemistry, while the Burmese python has been studied very little in its native range. The paucity of knowledge of their ecology and biology creates a pressing need for comprehensive scientific research on these free-ranging species. The primary objective of this study is to generate essential baseline biological and ecological information for development of scientifically-sound conservation and management measures for sea turtles and Burmese pythons in Hong Kong and southern China. The study consists of three major parts: (i) Contaminant risk assessment of sea turtles and Burmese pythons, (ii) Population structure and habitat use of sea turtles (predominately green turtles) and (iii) Population genetics of green turtles. Sampling of sea turtles in southern China is performed in collaboration with the Gangkou National Sea Turtle Nature Reserve of mainland China and the National Museum of Marine Biology and Aquarium of Taiwan. Trace element levels in scute and liver tissues of the subject species were reported. Blood, liver and muscle samples will be analysed for persistent organic pollutants (POPs). A risk assessment of selected elements and POPs will be carried out. Population structure and habitat use of sea turtles will be determined by analysing a territory-wide database of live and stranded sea turtles and deployment of satellite telemetry with home range analysis. Blood and skin samples will be used in the study of population genetics of green turtles using mtDNA control regions. Based on the outcomes of this study, recommendations in the management strategies for conserving these two species will be proposed.

All Interested Are Welcome

Table 6 summarizes the progress and plan of each task in this study:

Tasks		2011	2012				2013			
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Sample & Data Collection	By-catch/ Stranded Sea Turtle in Hong Kong									
	in collaboration with Gangkou National Sea Turtle Nature Reserve, China									
	in collaboration with National Museum of Marine Biology and Aquarium, Taiwan									
	Stray Burmese Python (in Hong Kong)									
Field Survey at Sham Wan	Nesting Green Turtle									
Interview with Locals (e.g. fishermen)	Questionnaire on Sea Turtle Occurrence									
Laboratory & Data Analysis	I. Contaminant Risk Assessment (of sea turtles and Burmese pythons)		analysis of trace element and PBDEs							
	II. Population Structure (of sea turtles)		Data collection				Statistical analysis			
	II. Home Range & Tracking (of sea turtles)		Data collection				Spatial analysis			
	III. Population Genetics (of green turtles)					analysis in collaboration with SWFSC, NOAA, U.S.				

Title:

Speaker

Date:

Time:

Venue:

Supe

Stud

Rep

Rep

Sub

香港城市大學
City University of Hong Kong

165

Postgraduate Seminar (Environmental Science)

Organized by
Department of Biology and Chemistry

Title: **Conservation Biology of Globally Endangered Sea Turtles and Burmese Pythons in Hong Kong and southern China**

Speaker: **NG Ka-yan, Connie**
PhD Student

= 11 March 2013 5:30pm

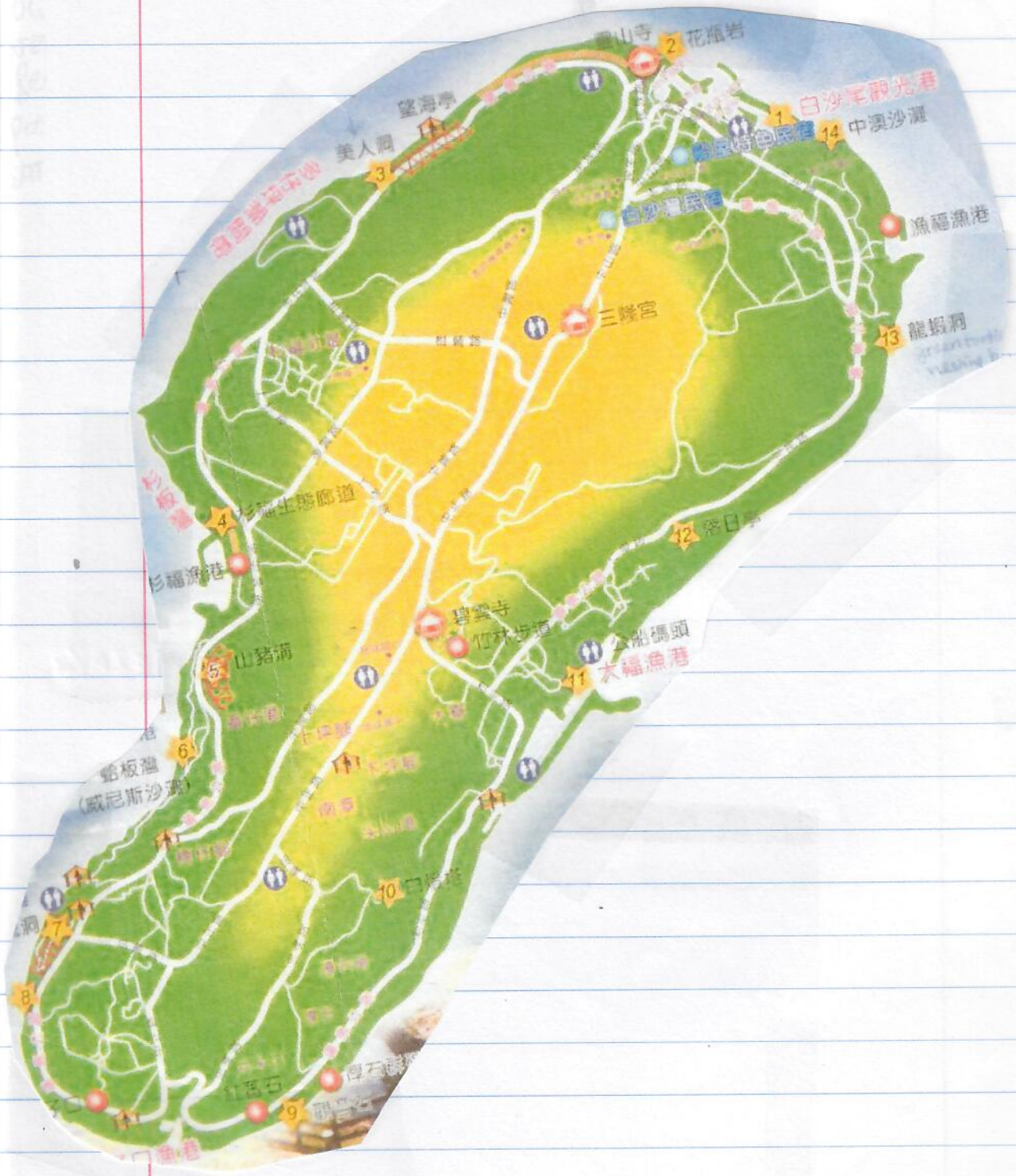
Date: **12 March 2013 (Tuesday)**

Time: **11:30 am – 12:00 noon** 30min

Venue: **1601 (AC-2)**

Supervisor: Dr. Margaret B. MURPHY
Student Name (Student No.): Connie Ka-yan NG (52451299)
Report Type: Qualifying Report
Reporting Period: 1 September 2011 – 31 August 2013

Submission Date: 15 Feb 2013


2 花瓶岩
望海亭
美人洞
3
1 白沙灣觀光港
14 中澳沙灘
白沙灣民宿
漁福漁港
三隆宮
13 龍蝦洞
4 杉福生態廊道
杉福漁港
12 落日亭
碧雲寺
竹林步道
公船碼頭
5 山豬洞
11 大福漁港
6
(威尼斯沙灘)
10
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9

㊤「羊城晩報」が報じたウミガメ=提供・金羊網(中国のニュースサイト)
㊦小笠原・父島に上陸したウミガメ。甲羅に彫られた文字が中国で報じられたものと一致した=NPO法人エバーラスティング・ネイチャー提供

同センターの山口真名美所長によると、メスのアオウミガメで、甲羅の長さは約90センチ、体重は120キロ余り。父島・二見湾内の砂浜に14日夜、上陸した。翌日も同じ場所に上陸したが、砂が少なく産卵できない浜だったため保護したところ、16日に77個の卵を産んだ。

小笠原では、アオウミガメが漁業の対象になっているが、カメ漁師に捕まることもなかった。

甲羅には「広東」「普善庵」「徐聞」などの漢字が赤く彫り込まれていた。山口さんは、知人で北海道大大学院に留学中の中国人女性、任敏儀さん(23)に相談した。任さんがインターネットで調べたところ、中国の現地紙「羊城晩報」が今年1月中旬、広東省徐聞県にある普善庵という寺の僧侶がウミガメを助けて海にもどしたという記事を掲載していた。

同紙によると、商人がウミガメをレストランに売ろうとしているのを知った僧侶が4500元(約7万2千円)で買い取り、地名や日付などを甲羅に記して翌日海に放した。

朝日新聞が任さんに問い合わせてもらったところ、カメを救ったのは尼僧の釈さんと分かった。寺関係者の話では、同寺はウミガメを何頭も救ってきたが、今回は特別に大きく、みなでお金を集めて買い取り、寺で一晩保護したうえ、海に返した。放流してもウミガメは何回か岸に戻ってきたが、やがて海に消えた。放流地の港では、数百人の群衆が沖へ向かうカメを見守り、お祭り騒ぎだったという。

山口さんは「中国本土で放されたウミガメが小笠原まで泳いできたこと自体、非常に珍しい。しばらくセンター内で保護してさらに産卵を見守り、8月上旬をめどに海に返したい」と話している。

2006
BONIN
OGASAWARA
TESTING
Recovery t
POST-WWII
SAT TAG

(175)

中国で命拾い 日本で産卵

「食用」寸前 僧侶助ける

海ガメはるばる3000キロ

中国・広東省で危うく食用になるところを地元の僧侶に救われ、海に返されたウミガメが今月中旬、小笠原諸島（東京都小笠原村）の父島に上陸し、産卵した。NPO法人エバーラスティング・ネイチャー（本部・横浜市）が運営する小笠原海洋センターが、カメの甲羅に書かれた地名や日付をもとに確認した。放流地とは直線距離で約3千キロ離れており、カメを救った尼僧の釈文敬（シーウェンジン）さん(82)は「カメが日本で無事でいることが分かって、とてもうれしい」と話している。

（山本智之）

新年おめでとうございます。

2013年
元旦

　またまた、蛇の年です。
　徹底して蛇を避けてきた人生ですが、世の中皮肉なもので、周りには結構ヘビがいます。2011年の春には、須磨水で飼育を開始したオオアナコンダが、４５匹も子供を産みました。しかも、大部分がすくすくと成長しています。
　ウミガメに比べあまりにも世間で冷遇されているウミヘビの権利を確立しようとして、つくったラティコウダ・タンク。琉球石灰岩を模した擬岩の穴の中で、楽しそうにしています。*Laticauda*というのはエラブウミヘビ達の属名です。
　昨年の夏は学生が捕ってきたシマヘビのお腹をしごくと何とミドリガメが・・。
何だかんだと言いながらも、蛇と関わりのある人生です。めでたい。めでたい。今年もよろしくお願いたします。

658-0064 神戸市東灘区鴨子ヶ原１－８－１　亀崎直樹・由美子・青沙(京都)・南帆(堺)
電話 078－202－2016

from NAOKI KAMEZAKI

Taiwan
THE HEART OF ASIA

2013 台灣燈會

The world's most amazing lantern festival

Taiwan Lantern Festival

Zhubei High Speed Rail Special District, Hsinchu County

2/24~3/10

Sponsoring agency:
Ministry of Transportation and Communications

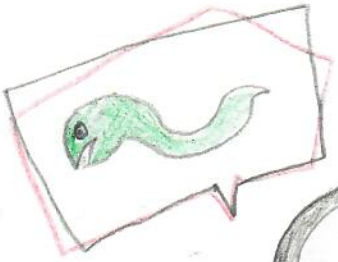
Organizers:
Taiwan Tourism Bureau
Hsinchu County Government

Sponsors:
Chunghwa Telecom
Chinese Artistic Lantern Association

http://www.taiwan.net.tw/2013taiwanlantern

A HAPPY NEW YEAR!!

2013



This is the Year of the Shake in Chinese astrology.

We are fine thank you

by Kurumi

A HAPPY NEW YEAR

2013

Wishing you a very happy and reproductive new year!!

Look forward to meeting you soon !!

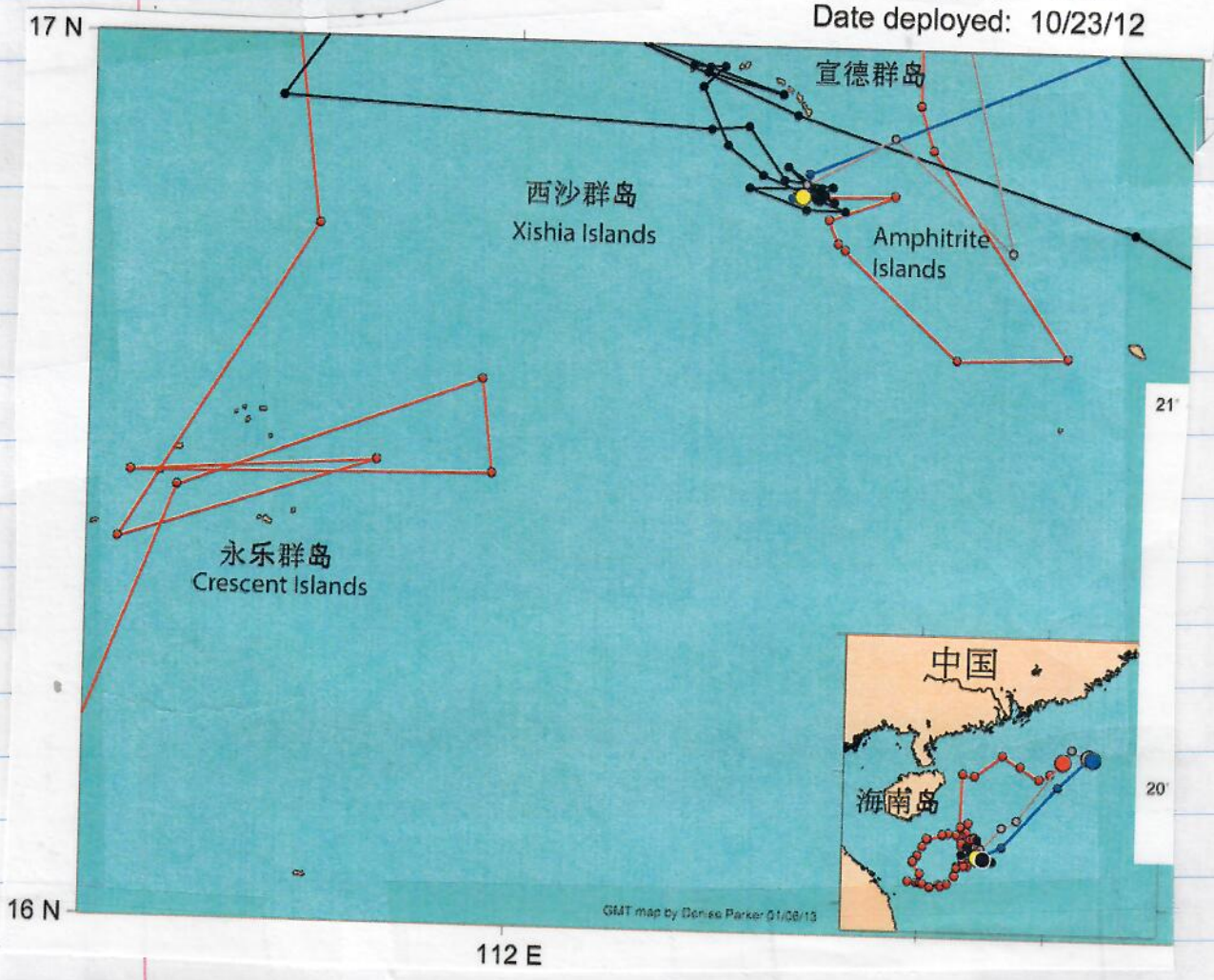
明けましておめでとうございます
旧年中は大変お世話になりました
本年もよろしくお願いいたします

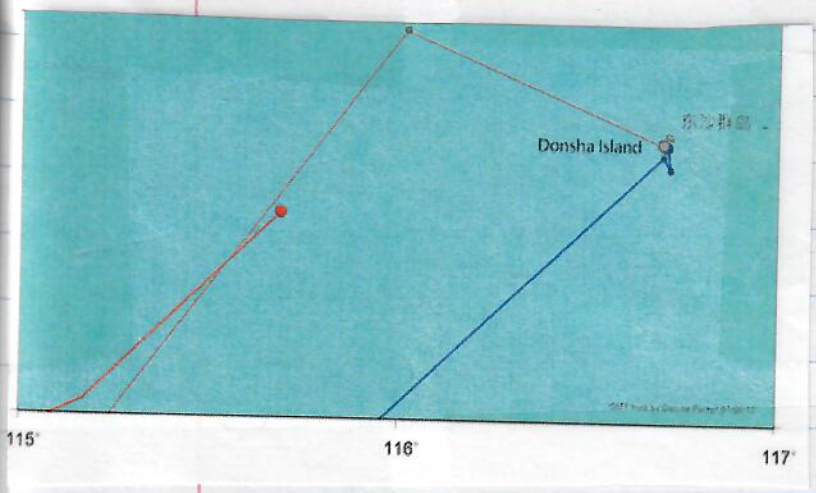
引越しました ⇒ 〒780-0911
高知市新屋敷2丁目4-6 TEL 088-855-4099
斉藤知己・麻実・来未・遥海・允視
Tomomi, Asami, Kurumi, Harumi, Masami

Tomomi SAITO
SAITO'S FAMILY
2-4-6 Shin-Yashiki
Kochi 780-0911


Pratas Island
DONGSHA
ID 52698 LC 1
End 11/13/12
ID 50149 LC B
End 12/31/12

2012 movement of adult green turtles
TAM-2639 6/24
Date deployed: 10/23/12





- 50141; End 1/1/2013, 70 days
- 50149; End 12/31/12, 69 days
- 52696: End 12/9/12, 47 days
- 52698; End 11/13/12, 21 days
- 71913; End 10/23/12, 1 day

USA TODAY
FRIDAY, FEBRUARY 8, 2013

WORLD

Chinese fireworks have explosive messages

This new year, inflammatory names are hot

Calum MacLeod
USA TODAY

BEIJING In America, fireworks tend to be named for the noise they make. In China, people buy them according to the message they want to send skyward.

To greet the Year of the Snake, the nation that invented fireworks will explode this Saturday night with missiles that carry themes. "I want a rich, pale beauty" and "Bomb my boss to heaven" are among the brand names at stalls.

Millions of Chinese will spend a lot on brightly decorated packages of powerful, multirocket fireworks to celebrate the Lunar New Year. And in Communist-run China, even fireworks do not escape the politicizing of everyday life and activities.

"I love the Diaoyu Islands," is a popular seller, a reference to widespread Chinese hatred of Japan and a dispute over a rocky outcrop that China claims and Japan controls as the Senkaku Islands.

The most inflammatory new brand, "Tokyo Big Explosions," selling for up to $55, has become harder to find in recent days after the company started withdrawing the brand and police confiscated it from several stores.

The crackdown is a somewhat contradictory sign that Chinese authorities are aware of the dangers of fanning Tokyo's anger even as Beijing continues to send ships and planes into Japanese waters and airspace to contest atolls that Japan says China had no interest in until a survey found oil and gas may lie underneath.

"I volunteer to go to the front line; we will overthrow the 'little Japanese,' " said Chen Guangyi, 27, a fireworks salesman from Sichuan province. He said "I love the Diaoyu Islands" is the best seller at his central Beijing street-side stall.

Profits, not patriotism, are behind the naming of the fireworks, according to the Beijing Doudou Fireworks Company.

"At first, we just wanted to give new kinds of fireworks new names to attract customers; we didn't expect these two would become hot sellers," said the Beijing market manager of the company, who gave his name as Yang. "All Chinese people love our motherland. The territorial issues are very important to us, and the Diaoyu Islands belong to China. That's our indisputable principle."

Fears that fireworks will worsen Beijing's heavy smog have prompted the government's brand new "firework index," issued twice a day. The index advises when conditions are OK for igniting fireworks.

"I wish there is peace, not war, between China and Japan. I think the fireworks' name is only a joke."

Wang Chengjun, fireworks vendor

The environmental concerns have hurt sales, said Yang Mei, manager of Chen Guangyi's stall.

"Each year, sales are falling as the government reduces firework outlets and the public better understands environmental concepts," she said.

Their stall still sells fireworks modeled on Japan's cartoon hero Ultraman. Members of the sales staff said those products are given away for free with larger purchases. "Let's blow up and kill Ultraman!" chorused four salespeople.

Not all Chinese are so belligerent toward Japan.

"Personally I don't hate Japanese; they are also human beings," said Wang Chengjun, a vendor at a Doudou fireworks stall beside Beijing Capital Stadium. "I wish there is peace, not war, between China and Japan. I think the fireworks' name is only a joke."

Contributing: Sunny Yang

Date: Sun, 17 Feb 2013 20:52:22 +0800 (CST)
From: feiyan_zhang <feiyan_zhang@126.com>
To: Connie Ng <kayan.ng.connie@gmail.com>
Cc: "[UTF-8] George H. Balazs H _ S O A I"
<gbalazs@honlab.nmfs.hawaii.edu>
Subject: Re:Re: Postal address

Dear Connie:
How is your vocation? We start to work today.
I have a news to tell you. I will start my new job in Huizhou city this month. Though I like to work for sea turtles in the reserve, I have to take care of my boy. It has good education resource in Huizhou city. My new organization is Administration of Ocean and fisheries of Huizhou Municipality. I will still work for turtle conservation as a volunteer.
My new address:

Administration of Ocean and fisheries of Huizhou Municipality ,No.2, MaiAn Road, HuiCheng Area, Huizhou city, Guangdong Province

± ~A ^ B ~N ~@ 2 ~_

postal code: 516008

Best wishes,

Feiyan

International Nature

By AMY QIN

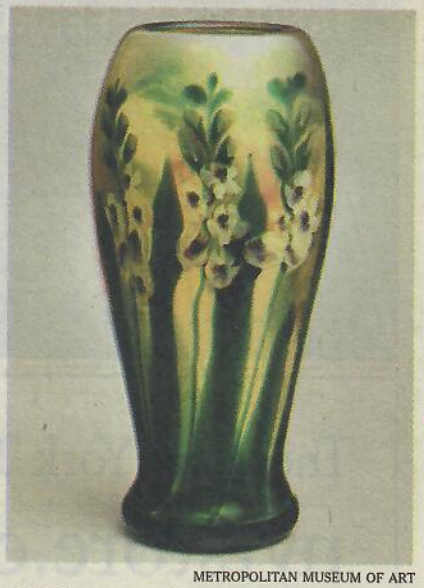
BEIJING

THE NATIONAL MUSEUM OF CHINA, which opened two years ago to much fanfare as the Communist Party unveiled this mammoth showpiece to project its cultural ambitions, has now taken another step in trying to establish its legitimacy in the art world.

The museum, reinvented from past incarnations and criticized by some for its party-approved depictions of modern Chinese history, on Friday will open an exhibition of nature-theme works from the Metropolitan Museum of Art in New York. It is the first large-scale exhibition that the National Museum has put on with the Met, and it is being hailed by both sides as a major expression of the growing cultural exchange between China and the United States.

"Never before has an exhibition of this scope and theme, drawn entirely from the Met's holdings, traveled to China,"

Continued on Page 28



METROPOLITAN MUSEUM OF ART

A Tiffany vase from around 1909 is in the show "Earth, Sea, and Sky" at the National Museum of China.

THE XUNLIAO GUANGDONG PROVINCE EXPERIENCE: RELEASING SEA TURTLES FOR RESTOCKING AND CONSERVATION AWARENESS IN CHINA

George BALAZS[1]
Ka-yan NG[2]
He-Xiang GU[3]
Feiyan ZHANG[3]

[1]Pacific Islands Fisheries Science Center NOAA, Hawaii USA
[2]City University of Hong Kong, Hong Kong SAR PRChina
[3]Huidong Gangkou Sea Turtle National Nature Reserve, PRChina

There is widespread global and historic multi-cultural interest in releasing or returning sea turtles to the sea for restocking efforts, conservation awareness, government-sponsored activities, and even for religious purposes. Sources of these turtles have included hatchlings from artificial hatcheries, captive rearing projects, captive breeding, fishery by-catch, and turtle rehabilitation facilities. Often the turtles are released in considerable numbers with advance publicity attracting many adult and child spectators filled with excitement and interest. The mass release of sea turtles for restocking and conservation awareness in Mainland China occurs periodically but not predictably as to date and location. Very little information in English has been reported outside of China about internal turtle release events. These activities usually include the release of other marine life such as fish, shrimp, and crabs obtained from aquaculture facilities. On June 6, 2012 the authors were honored to participate in the release of 134 turtles and an array of other marine life at Xunliao, Oceania Point Resort, in Guangdong Province, Peoples Republic of China. The event marked the government's seasonal closure prohibiting the use of certain fishing gear in the South China Sea, including Guangdong Province. Thirty-four of the turtles released were from fishery by-catch turned in to the authorities by fishermen. These turtles ranged up to 99 cm carapace length and included 33 green turtles and one loggerhead all obtained from the coastal waters of Guangdong Province, such as Daya Bay. In addition, 100 others were captive-reared green turtles estimated to be 45cm carapace length. All turtles appeared to be healthy, active, and in excellent body condition. This presentation explores and photographically illustrates some of the unique aspects of China's spectacular sea turtle release phenomenon, as witnessed at Xunliao. Ideas are set forth for the possibility of enhanced conservation study involving both cultural and biological science perspectives. The Peoples Republic of China has vigorous and growing sea turtle conservation and research programs that deserve praise and partnership to improve the status of regional stocks.

Date: Fri, 18 Jan 2013 23:36:28 -1000 (HST)
From: George H. Balazs <gbalazs@honlab.nmfs.hawaii.edu>
To: George Balazs <gbalazs@honlab.nmfs.hawaii.edu>
Subject: Re: George and golden turtles (fwd)Chinese inscription translation

Book

---------- Forwarded message ----------
Date: Wed, 14 Mar 2007 17:35:51 +0800
From: ks_cheung@afcd.gov.hk
To: George H. Balazs <gbalazs@honlab.nmfs.hawaii.edu>
Cc: Simon Chan <kf_chan@afcd.gov.hk>
Subject: Re: George and golden turtles

You know what the Chinese inscription says? "Wealth coming like splash"!
Your sweat is money.

Date: Thu, 17 Jan 2013 20:19:00 -1000 (HST)
From: George H. Balazs <gbalazs@honlab.nmfs.hawaii.edu>
To: George Balazs <gbalazs@honlab.nmfs.hawaii.edu>
Subject: 2009. Opening ceremony of the reintroduction and release of living marine resources in the Beibu Gulf 2009. Color booklet. (fwd)

Title of the event: Opening Ceremony of the reintroduction and release of living marine resources in the Beibu Gulf in the year 2009 (in Chinese 2009¦~¥_³¡ ®

Southern China Sea is China's largest area of ocean. Its unique natural conditions gave birth to a wide variety of marine species. With nearly two thousands of marine organisms living here, it's one of China's richest biodiversity waters. However, with the increasing intensity of development in the Southern China Sea, the marine biological resources are facing the situation that the habitats are diverted, the spawning grounds are destroyed, and the population reproduction is suppressed.

In order to reverse this situation and to strengthen the protection to the Southern China Sea living marine resources, the Ministry of Agriculture Bureau of Fisheries, Chinese fishery command center, the Southern China Sea Bureau of Fisheries, the Marine and Fishery Department of Hainan, and Sanya People's Government jointly organized a living marine resources proliferation and release event with the theme of "construct Hainan ecological civilization, promote fisheries science development " at the Phoenix Island in Sanya, Hainan on 29 June 2009. Some Key protected or rare aquatic wildlife, including whale sharks and sea turtles, and high-value economic species, such as red snapper, purplish red snapper, black tiger shrimp, pearl oysters, and scallops, were released to the ocean. Whale sharks (the Southern China Sea No. 1 and the Southern China Sea No. 2) satellite tracking, turtles, red snapper tagging and releasing, as well as the exploration of aquatic wildlife protection and conservation strategies for the international endangered species were also carried out at the same time.

Understand Whale Sharks

Whale sharks live in mid-upper layer of the warm temperate pelagic ocean, mainly distributed in tropical and temperate sea areas. In China, they are more commonly seen in the southern China Sea, Taiwan Strait, the Eastern China Sea, and the south of the Yellow Sea.

Protect whale sharks

Whale sharks are enlisted as threatened species by the International Union for Conservation of Nature (IUCN) Red list, belonging to Vulnerable (UV) levels. In addition, they are enlisted in the International Trade in Endangered Species Appendix II, and are referenced as the national secondary focused animals in the implementation of protection in China.

Rescue "Sammy"

The whale shark "Sammy" was captured in August 2008, and illegal traded in as ornamental fish, trapped in a giant aquarium in Dubai Atlantis Hotel. In order to allow Sammy to return to the sea, Dubai daily Gulf News first criticized the behavior of imprisoning whale shark as "unimaginable cruelty", then launched the Rescue Sammy Action: children wore the badge of rescue Sammy; distributed leaflets; pasted bumper stickers to support rescue activities; Dubai 92 radio created a "Rescue Sammy" song. Dubai people also launched a rescue operation on the social networking site "Facebook". More than 8,000 people signed in support. Finally, the Rescue Sammy Action alerted the United Arab Emirates government. In October, the government ordered to restore the freedom of "Sammy".

Such a case of rescue Sammy and that environmentalists overcome business developers is rare, but in any way, it gave us confidence and hope, encouraging us to participate in the cause of environmental protection.

Treat whale sharks

Fishermen sometimes accidentally caught whale shark in the water near the south of Hainan. From the end of April to early May this year, there were two whale shark incidental takes in the waters along the Wanning to Sanya. After the treatments by fishery organizations and other sectors, both whale sharks were able to recover, and are now going to be returned to the sea.

Study whale sharks

In order to further increase the protection efforts for whale sharks and other rare and endangered marine species, the Ministry of Agriculture Fisheries Bureau of Hainan Province jointed Hong Kang Ocean Park, Fisheries Research Institute of Hainan Province and many other related sectors to carry out the whale shark satellite tracking system in the country for the first time.

Two whale sharks released this time are named "the Southern China Sea No. 1" and "the Southern China Sea No. 2".

The Southern China Sea No. 1: Body length about 6.3M, weight 1200~1250KG, male, about 8 years old.

The Southern China Sea No. 2: Body length about 4.3M, weight 500~550KG, male, about 5 years old.

Legend whale shark

The whale shark is known as spiritual. There has been a legendary story about whale sharks for generations. According to the legend, there was a scholar named Bangxiang Wang in the Ya County during the late Ming and early Qing dynasties. He went to take an exam in the capital by ship. On his way, the ship suddenly encountered a whale shark, which was several meters long and repeatedly swam crossed the bow of the ship, trying to stop the ship from moving forward. Everyone on the ship was terrified. According to the tradition, every person aboard should take off his head scarf and through in the water. The person, whose head scarf was picked up by the whale shark, should throw himself into the sea to die for feeding the fish, so that other people could be saved. The shark picked Bangxiang's headscarf, so Bangxiang had nothing to do but jumped into the sea with tears. The shark immediately swam to him. However, instead of eating him, the shark carried him on its back and swam away after going around the ship several times. Shortly after, the ship encountered a large whirlpool that tuned over the ship and killed everyone. The shark carried Bangxiang to Nanshang Ling Bay. Bangxiang was saved, however, the shark stranded and died due to the lack of time to return to the sea. The people in Ya County called the

whale shark as a "god whale shark" and worshiped it every time before they went out to the sea for safety during the trip.

Understand Sea Turtles

There are eight kinds of sea turtles existing in the world. Our country has five of them, including green sea turtles, loggerhead turtles, hawksbill turtles, Ridley turtles, and leatherback turtles. Among them, green turtles and hawksbill are more in abundance than other three kinds of turtles.

Hawksbill turtles

Hawksbill turtles (*Eretmochelys imbricata*) are national secondary focus on the protection of aquatic wildlife.

Hawksbill turtles are well-known as the "protection" and symbol of good luck by fishermen over generations. In addition, they are widely appreciated and artistically valuable due to their shell texture and charm color. They are important in Chinese medicines with multiple effects. Hawksbill turtles are most popular in Xisha, Nansha islands and near Hainan Island. They have certain distribution in Guangdong, Taiwan, Fujian, Zhejiang, Jiangsu, and Shandong as well. Hawksbill turtles were often seen near Sanya Bay before mid-1990s, but rarely seen after 2000.

Green Sea Turtle

Green sea turtles, also called sea turtles, are the national secondary focus on the protection of aquatic wildlife. Due to excessive hunting, coupled with water pollution and damages to spawning grounds along the coastal areas, the green turtles abundance has been decreasing globally in recent years. If this situation does not improve, the green turtles will be extinct within 20-30 year. The world has called for action to protect the green turtles.

Sea turtles are widely distributed in China, from Shandong coast in the north to Beibu Gulf in the south. Among these areas, sea turtles are most popular in Xisha, Nansha islands and near Hainan Island. In recent years, the number of green turtles in Hainan waters has sharply declined and there is urgent need to strengthen the protection. Prior to the 1990s, sea turtles are often seen near Xisha islands and Sanya Bay area, however, this has rarely occurred since 2000.

Protect Sea Turtles

The survival of sea turtles is facing an unprecedented threat - the development of the beach greatly reduces sea turtle nesting place: human activity, noise and garbage block the path of sea turtles; turtles mistakenly eat beach garbage and die. The artificial lighting of the beach not only makes sea turtles miss the incubation time, but also makes baby turtles lose their direction to the sea. At the same time, turtles are facing many hunters' hunting. We need to act together to protect sea turtles. China has enacted a special law enforcement action to protect sea turtles.

Dearest GEORGIE and HAPPY FAMILY ♡

Wish You the Year of Snake
filled with Joy & Peace, Love,
health & Wisdom !

Pooh Pooh the 2nd
Sends her best regards

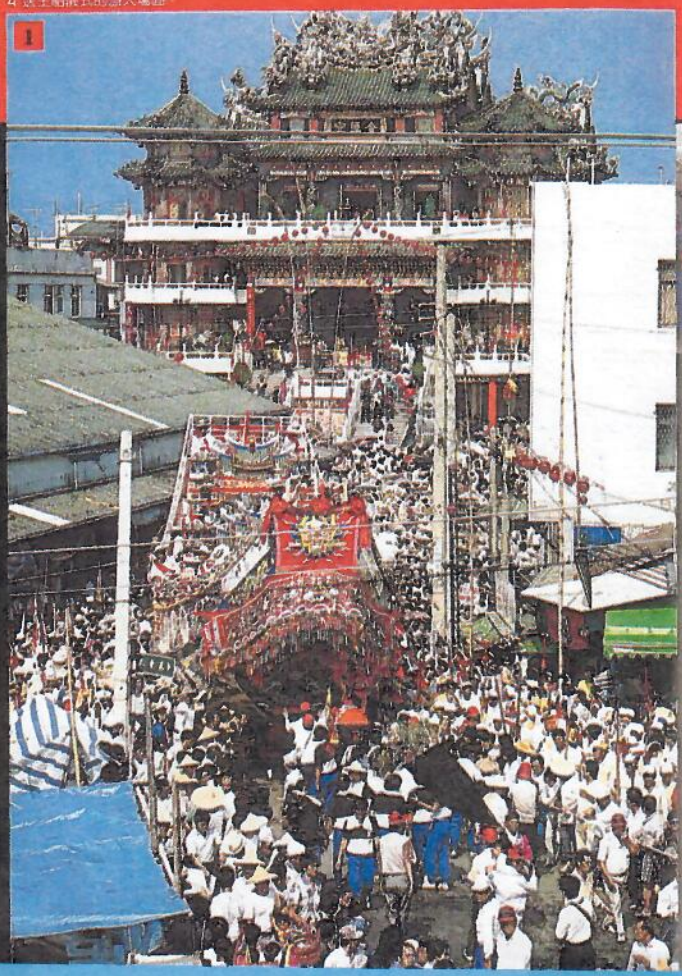
FROM NG FAMILY

高雄茄定 金鑾宮

舉辦盛大王醮儀式的媽祖廟

金鑾宮為下茄定的信仰中心，乾隆年間，此地靠海維生的漁民們每當夜晚時分迷失方向，常有火光指引，化險為夷，為感念媽祖庇佑，遂開始建廟奉祀媽祖。金鑾宮供奉媽祖為軟身媽祖，歷史悠久，面貌已有些斑駁，卻仍不減其威嚴之氣，每年媽祖香期都有許多信眾前來進香。另外，金鑾宮也會做「王醮」，精心準備的供奉祭品與儀式場面，皆精彩好看。

1 牽引王船的熱鬧場面，背景即為金鑾宮。
2 各家爐主在廟前祭拜。
3 用紙紮成的王爺御安。
4 送王船儀式的盛大場面。



跟著媽祖去旅行

Kaohsiung County / Xie-ding / Jin-luan Temple

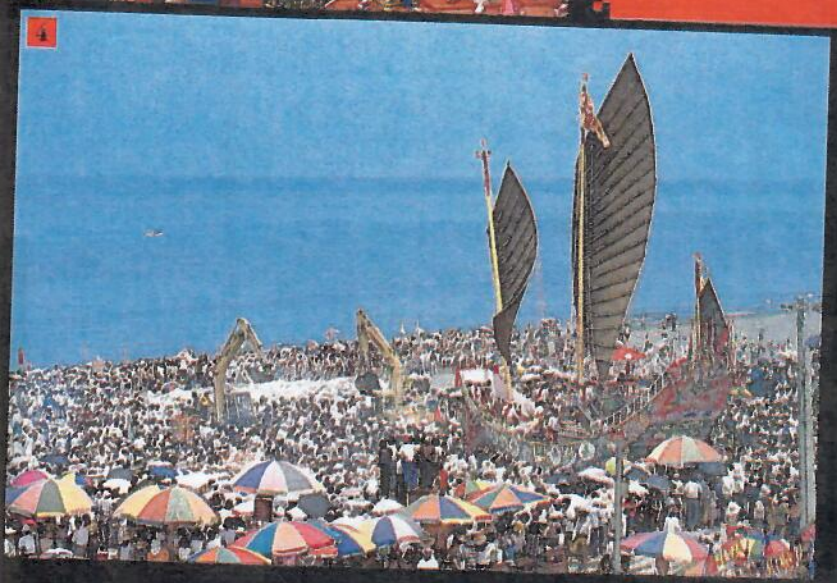
高雄茄定 金鑾宮

高雄縣茄萣鄉茄萣路1段70號

(07)691-2048

沿西濱公路至茄定地區，轉進中華北路，再往右17線中華巴路，至記錦路右轉，接行明興路，過南建橋後接行白沙崙白沙路，再行仁愛路右轉，抵港東街即達。

台灣西南沿海的居民，大多以捕魚為生，面對險惡難測的大海，精神上必須依靠神明的庇佑，廟內大多供奉媽祖和王爺為主神，因而產生媽祖繞境會與行船大王祭的有趣現象。



OCEAN BLUE

CinQiu

2/13


台灣
伍家恩


賀年
【新春如意】
招進財
招進財

Dear George:

Happy New Year!

That is a special salt!

It can't eat, but it could

bring the good luck and keep your

health & happiness.

Hope you Love it!

Best regard

Yaru and 協詠

↑

my husband's name

2013.01.04.

Dear George:

Happy New Year!

That is a special salt!

It can't eat, but it could bring the good luck and keep your health & happiness.

Hope you Love it!

Best regard

Yaru and 協諺
↑
my husband's name

2013.01.04.

kevin

SPECIAL REPORT 特別報導

澎湖海龜救護收容及野放

許鐘錮、黃金峰、劉素華、陳岳川、蘇勰忠、蔡萬生

水產試驗所澎湖海洋生物研究中心

前言

全世界的海龜有 2 科 7 種，分別為蠵龜科的綠蠵龜、赤蠵龜、玳瑁、欖蠵龜、肯氏龜、平背龜及革龜科的革龜等。上述除了肯氏龜及平背龜外，均曾出現於台灣海域中。海龜目前已全部被列入瀕臨絕種野生動物名錄中 (CITES 附錄 I)，行政院農業委員會亦公告未經主管機關許可不得騷擾、虐待、獵捕、宰殺、買賣、陳列、展示、持有、輸入、輸出或飼養、繁殖 (野生動物保育法)，藉以紓解海龜面臨的重大生存危機。澎湖地區每年皆有海龜洄游或上岸產卵，為澎湖地區重要的生態特色之一。然而近年來由於人為干擾、誤食垃圾、誤觸漁網受傷、遭受天敵攻擊或疾病等的緣故，致使海域或潮間帶偶而可見受傷或染病的海龜等待救援。為珍惜海域生態資源，提高海龜意外傷病治療之活存率，本所澎湖海洋生物研究中心 (以下簡稱本中心) 於 1997 年 7 月 14 日奉准設立「澎湖海龜救護收容工作站」，以進行傷病及無主海龜的救護收容，希望以更積極的態度來落實野生動物之保育。

目的

本中心成立「澎湖海龜救護收容工作站」之目的：(1)棄龜收容：提供被原飼主棄養或被主管機關依法沒入之海龜臨時或長期收容之場所；(2)傷龜救護：提供民眾誤捕或拾獲之海龜臨時或長期收容之場所；(3)教育解說：合法申請作為科學研究或教育展示之海龜，透過解說，使民眾得以充份瞭解海龜之生態習性，同時宣導保育海龜之觀念；(4)學術研究：收容的海龜在有計畫的追蹤記錄及監測後，可提供研究者有關營養、成長、疾病、棲所、生殖、行為及其他各方面之資訊，可作為學術研究之基礎；(5)野放追蹤：救傷收容之海龜俟健康狀況良好，經相關單位及主管機關評估同意進行標識註記後野放，可評估及建立海龜資源量調查及洄游路徑等生物基礎資料。

救護收容設施

「澎湖海龜救護收容工作站」係位於本中心青灣種原庫區內，全區之供水係由海域直接抽取，經高效率石英砂快速過濾後導入使用，供水量最高可達 750 m^3/h。蓄養池有獨立之水處理系統，包括物理、生物過濾、紫外線殺菌及供氣設施，在海域水質驟變或疾病隔離時可以單獨操作，維持水質最佳狀態。另本中心有一個大型室外生態池，藉由水生植物及陽光曝曬可以將海龜之排泄物及殘餌進行分解及硝化處理，避免排放水直接排入海域中。此外救護收容蓄養池尚包含：

(1)20 噸 FRP 桶共 10 個，可供海龜隔離觀察、蓄養及馴餌等，所有 FRP 桶均可以全流水或密閉式循環進行供水；(2)12 噸隔離觀察 FRP 桶共 6 個，有獨立之供水及排水系統以隔離海龜救治後之藥物或排泄物，可避免病菌之交叉感染，並有視窗供觀察記錄；(3)生態池 1 個，內有多種魚類及海藻，使海龜能逐漸恢復並適應野外的生活模式，以利日後之海龜野放。

救護收容方法及步驟

一、救護通報

不論日、夜間或例假日，「澎湖海龜救護收容工作站」均有人員負責海龜救護收容之聯繫，可立即知會相關人員並通報主管機關，並在最短時間內由相關人員攜帶擔架、救護器材及記錄工具等趕赴現場，視狀況進行適當的處理。

二、現場救護

若遇海龜狀況不明，須於現場留置觀察並進行必要之處置。觀察海龜活力良好且檢視無受傷狀況，可在妥適處理後立即野放；若海龜傷病情況較重者，則運回「澎湖海龜救護收容工作站」進行深入的檢查及治療。

三、檢查登錄

凡進入「澎湖海龜救護收容工作站」救護收容蓄養之海龜，不論長短期救傷或寄養，均須按下列手續完成登錄作業：(1)來源：詳實記錄海龜救護相關之人、時、地，並由經手人員負責確認；(2)狀況：記錄海龜基本資料如海龜種類、背甲長寬、體重、性別、特徵及健康狀況等；(3)編號建檔：分類編號後，存入電腦檔案以利日後管理追蹤；(4)申請備查：將紀錄表傳送至主管機關備查。

四、收容分配

登錄後之海龜按體型及健康狀況分配蓄養如下：(1)隔離治療：狀況不明或有明顯傷病之海龜蓄養在 12 噸 FRP 桶隔離觀察接受治療；(2)蓄養觀察：經過初步治療或狀況穩定之海龜，可蓄養於 20 噸之 FRP 桶中進行觀察；(3)野放觀察：健康狀況良好且攝餌正常之海龜則移入生態池中進一步觀察，並使之逐步適應野外生活環境。

五、日常照料

蓄養海龜之日常工作項目包括每日上、下午之巡視、餌料處理、投餌、殘餌清理、狀況記錄、水質監測等。

六、疾病治療

進入「澎湖海龜救護收容工作站」之海龜可能已有傷病，而收容救護期間也可能有各種疾病產生，除針對病原改善蓄養環境及提升餌料品質外，由本中心技術人員會同澎湖家畜疾病防治所獸醫師群共同會診，以決定採取藥浴、口投、針劑或是進行手術等醫療措施。所有醫療之過程及藥劑種類用量均應詳實記錄於病歷表中，併入檔案備查。

終止收容

一、野放

配合研究計畫結束或海龜已完全康復時，經主管機關同意後野放。

二、歸還

救傷或寄養後歸還合法之原蓄養單位。

三、死亡

因傷病死亡或民眾提供之死亡海龜應於報請主管機關核准後登錄銷案，保留電腦檔案備查。已死亡之海龜除進行必要之病理解剖以開具死亡解剖書〈或死亡證明書〉外，可向主管機關申請製成骨骼或乾製標本保存，列為日後可提供展示教育之收藏管理。

歷年成果

本中心自成立「海龜救護收容工作站」以來，今 (2008) 年已邁入第 12 年。截至本年 8 月 31 日止，共計救護收容 163 隻海龜 (圖 1)，期間以 2003 年救護 29 隻數量最多，其次為 2001 年的 21 隻。

歷年來救護收容之海龜以月別論之，9 月之救護收容數量 33 隻最多 (20.25%)，其次為 1 月的 21 隻 (12.88%)，2 月 4 隻最少 (2.45%) (圖 2)。救護收容海龜種類以綠蠵龜 131 隻最多 (80.37%)，玳瑁 26 隻次之 (15.95%)，赤蠵龜、欖蠵龜及罕見的革龜均為 2 隻 (1.23%) (圖 3)。

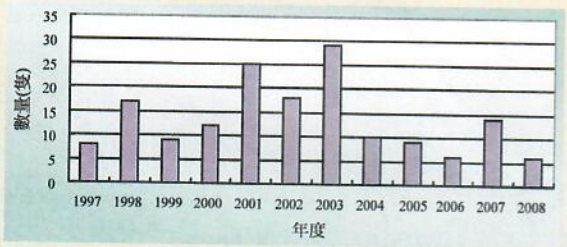


圖 1　歷年(1997-2008)海龜救護收容數量統計

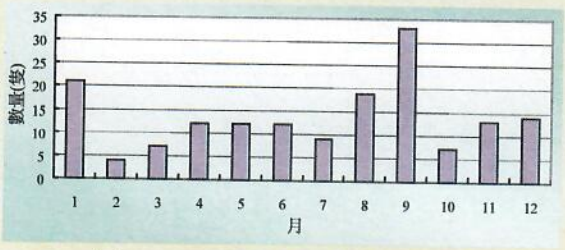


圖 2　歷年海龜救護收容月份統計

如根據海龜救護收容來源則概可分為 8 大類，其中以誤捕 94 隻最多 (57.67%)，漂游 23 隻次之 (14.11%)，棄養及寄養 1 隻最少 (0.61%) (圖 4)。

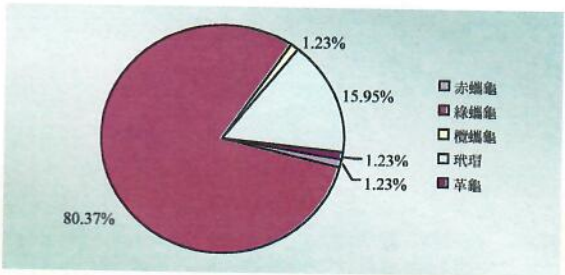


圖 3　歷年救護收容之海龜種類統計

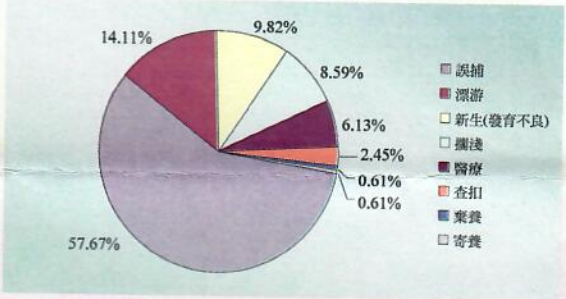


圖 4　歷年海龜救護收容來源統計

由於海龜被救護收容之原因各不相同，有些可能是爲了上岸產卵，因故而被困之母龜其體型較大，有些則是剛孵化的稚龜，其體型大小不一 (圖 5)，其中海龜背甲曲線長 40.0－49.9 cm 有 43 隻最多 (26.38%)，50.0－59.9 cm 有 22 隻次之 (13.50%)，10.0－19.9 cm 有 3 隻最少 (1.84%)。

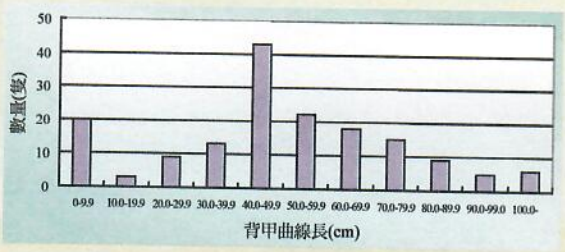


圖 5　歷年海龜救護收容體型統計

海龜救護收容期間，本中心配合地方主管機關（澎湖縣政府）總共實施了 25 次海龜野放宣導活動 (圖 6)，野放計有 5 種 107 隻海龜 (綠蠵龜 91 隻、玳瑁 12 隻、赤蠵龜 1 隻、欖蠵龜 1 隻及革龜 2 隻)，分別在 8 個不同海域野放，每一次均獲得民眾及媒體的關注，在海洋生物保育的教育宣導上成效頗大(如表)。

圖 6　本中心第 24 次海龜野放活動場景

(望安綠蠵龜保育館前方海域沙灘，左前方為蘇所長偉成、中間為日籍谷口 旭教授、右前方為望安鄉葉鄉長忠入)

結語

海龜的救護收容是需要長期持續的投入人力、物力，才能穩固的建立救護收容體系，以便隨時因應可能的突發狀況。近年來澎湖地區海龜保育的工作的確受到民眾的認同與肯定，但是海龜的救護收容是個良心工作，多年來海龜救護收容工作獲得許多默默付出的無名英雄的協助，包括熱心民眾、海巡署弟兄及前澎湖水族館志工隊等不辭日夜辛勞的運送，澎湖縣家畜疾病防治所、國立台灣海洋大學海洋生物研究所師生、署立澎湖醫院同仁及澎湖縣政府農漁局及救護收容管理工作的中心同仁們在醫療與經費上的支援，在此謹表謝忱。冀望這些努力對於增進國人對自然生態的關懷及提升我國國際聲望均能有所貢獻。

歷年(1997-2008)澎湖海龜野放一覽表

梯次	日　期	地點	野放數	說　明
1	86.08.22	林投	1	綠蠵龜1隻
2	86.10.19	林投	2	綠蠵龜2隻
3	87.06.14	北寮	3	綠蠵龜3隻
4	87.09.20	山水	1	綠蠵龜1隻
5	88.07.19	林投	5	綠蠵龜5隻
6	89.05.08	澎南海域	1	革龜1隻
7	89.05.17	林投	4	綠蠵龜3隻、赤蠵龜1隻
8	89.05.31	風櫃外海	1	革龜1隻
9	89.09.18	林投	3	綠蠵龜2隻、玳瑁1隻
10	90.08.25	林投	4	綠蠵龜2隻、玳瑁2隻
11	91.06.30	林投	6	綠蠵龜5隻、玳瑁1隻
12	91.09.27	望安	9	綠蠵龜7隻、玳瑁2隻
13	92.04.01	赤崁	3	綠蠵龜3隻
14	92.04.23	林投	4	綠蠵龜4隻
15	92.07.27	林投	6	綠蠵龜6隻
16	92.09.28	林投	6	綠蠵龜6隻
17	93.01.16	赤崁	8	綠蠵龜6隻、玳瑁2隻
18	93.08.14	林投	5	綠蠵龜4隻、玳瑁1隻
19	94.04.22	林投	11	綠蠵龜8隻、玳瑁2隻、欖蠵龜1隻
20	95.06.27	嶼裡	6	綠蠵龜6隻
21	95.11.30	嶼裡	1	綠蠵龜1隻
22	96.07.18	望安	5	綠蠵龜4隻、玳瑁1隻
23	96.08.13	嶼裡	7	綠蠵龜7隻
24	97.06.06	望安	2	綠蠵龜2隻
25	97.08.29	嶼裡	3	綠蠵龜3隻
合　計			107	綠蠵龜91隻、玳瑁12隻、赤蠵龜1隻、欖蠵龜1隻、革龜 2 隻

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I.-J. Cheng

Post-nesting migrations of green turtles (*Chelonia mydas*) at Wan-An Island, Penghu Archipelago, Taiwan

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Abstract During the summers of 1994 to 1997, eight green turtles (*Chelonia mydas*) nesting at Wan-An Island, PengHu Archipelago, Taiwan, were equipped with satellite-telemetry transmitters. Using the Argos-linked satellite system, the turtles' migration routes were tracked until the transmissions stopped. The turtles migrated widely on the continental shelf to the east of Mainland China. The migration distances ranged from 193 to 1909 km, and the migration speeds from 1.2 to 2.8 km h^{-1}. The turtles apparently utilize several coastal areas as temporal residential foraging sites, and their migrations consist of both trans-oceanic and coastal legs. The wide distribution of the foraging sites of the turtles comprising this rookery reflects the extent to which the green turtle migrates in northeast Asia; regional and international cooperation will therefore be needed to conserve this declining population.

Introduction

Green sea turtles are known to make long-distance migrations, travelling hundreds to thousands of kilometres between their nesting and foraging sites (Mortimer and Carr 1987; Liew et al. 1995; Papi et al. 1995). In some cases, the turtles manage to locate distant islands in the seemingly featureless ocean (Papi and Luschi 1996). Tagging and even helium balloons have been used to study the migrations of sea turtles (Carr 1967; Meylan 1982; Mortimer and Carr 1987; Craig 1994). However, because of high tag-loss rates and because, even at best, only release and recapture location are recorded, these methods provide but scanty information. Since the early 1980s, satellite telemetry has allowed us to study the long-distance migration behaviour of sea turtles, including migration routes and diving times (Stoneburner 1982; Timko and Kolz 1982; Byles and Keinath 1990; Balazs 1994; Balazs et al. 1994; Renaud and Carpenter 1994; Liew et al. 1995; Papi et al. 1995), of both adults and juveniles (Bolten et al. 1994; Plotkin et al. 1994; Renaud 1994).

Wan-An Island, in the PengHu Archipelago, is one of the few remaining green sea-turtle nesting sites in Taiwan. The Council of Agriculture designated the nesting beaches as a sanctuary site in December 1995 (Cheng 1995; Council of Agriculture 1995). Nesting ecology has also been studied extensively (Chen and Cheng 1995). However, little is known about the whereabouts of the nesting turtles while they are at sea. This study, therefore, used satellite telemetry to determine the post-nesting migration routes and resident foraging area of nesting green turtles of the Wan-An Island colony.

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I.-J. Cheng
Institute of Marine Biology,
National Taiwan Ocean University,
Keelung, Taiwan 202, Republic of China

Fax: 00886 2 2462 8974
e-mail: b0107@mail.ntou.edu.tw

Materials and methods

Seven adult *Chelonia mydas* were equipped with Argos-linked satellite transmitters (Telonics; Mesa, Arizona, USA) during the nesting seasons of 1994 through 1996. Three PTTs (platform terminal transmitter) were used, (ST-6, ST-3, and ST-14). The PTT ST-6 model is smaller than the ST-3 and operates over a shorter lifetime. It was used in 1994 because at that time we were not aware of its limitations. In 1995, a larger transmitter PTT ST-3, was employed, and from 1996 until 1997 another model, ST-14, analogous to ST-3. In 1997, the first turtle fitted with PTT ST-6 returned to Wan-An Island to nest. Although the PTT had been lost, she was identified by means of the Inconel tag on her right front flipper. We fitted her with a new PTT ST-14 in early August 1997.

After nesting or false crawling (crawling on beach with no nesting activity), turtles were captured before reaching the ocean and held in rectangular plywood pens in their natural prone position. Because of high humidity in the evening, PTT attachment was not carried out until the following morning. Attachment procedures followed those of Balazs et al. (1996). Briefly, Silicone Elastomer (Nephew and Nephew Rolyan Inc., Wisconsin, USA) was used to mould and mount the transmitter firmly against the carapace surface. The transmitter was then bonded to the carapace

with fibreglass strips and surfboard (polyester) mixed-resin glue. The salt-water switches were covered with small pieces of masking tape before bonding to prevent accidental sealing of the switches. For convenience, all the tagged turtles were designated by the abbreviation of their nesting island (WA) followed by a number, a dash, and year of tagging. Body size, date of capture, and date of release of the eight green turtles are listed in Table 1.

The PTT repetition rate for three types of PTT was 50. The duty cycle (i.e. transmission programme) of the ST-3 and ST-14 were 3 h on/3 h off; the ST-6 PTTs were permanently switched on. Battery power was conserved both by the timing of the duty cycle and by the salt-water switch, which stops data transmission after 10 s submersion underwater. Although data on submersion times and water temperature were also transmitted, for the purpose of the present paper we were concerned only with the location of the turtles.

The transmitted data were received and processed by the Argos system (Taillade 1992). This system consisted of two NOAA Polar Orbiting Environmental Satellites (POES), which provide coverage of a ~5000 km-diam visibility circle on the earth's surface. The number of daily passovers increases with latitude, and can attain ~28 passovers per day at the North or South Poles (Argos 1996).

A "fix" is obtained each time a satellite receives and transmits. Based on a series of fixes, Argos then automatically calculates the location of the transmitter-turtle at levels of accuracy and confidence referred to as location classes (LC). Seven different location classes are used by Argos: Class 3 s, the most accurate location class, is calculated from at least four messages received during the satellite pass, and has an estimated accuracy of < 150 m; Class 2 is relatively less accurate, and is calculated in the same way as Class 3, with an estimated accuracy range of ≥ 150 to < 350 m; Class 1 is calculated in the same way as classes 3 and 2, with an estimated accuracy of ≥ 350 to < 1000 m; Class 0 is calculated with an estimated accuracy of > 1000 m; Class A receives three messages through Location Service Plus (auxiliary location processing in North America), with no estimated of location accuracy; Class B receives two messages through Location Service Plus, with no estimated of location accuracy; Class Z is the rejected location class, containing invalid locations (Argos 1996). To ensure a reasonable level of integrity for our data, only Location Class B or better, which provided a reasonable estimation of the migration path, were accepted; i.e. when positioning was near LC 1, 2, or 3 and the distance between the two points reasonably reflected the swimming speed of a turtle, and the location was not on land. Such positions were considered accurate and acceptable for the purposes of our study. The migration distance for each leg (i.e. distance between two locations) was calculated as a straight line between the two endpoints. Migration speed was calculated by dividing total migration distance (in km) on each trip by total migration period (h). Completion of a migration route was defined as when a tagged turtle stayed in the last location of the migration route for at least 7 d, or as the position at which the PTT battery ceased transmission.

Results

Individual migratory journies of *Chelonia mydas*

Turtle WA1-94

The magnetic bar was removed and the PTT ST-6 deployed at 06:30 h TST (Taiwan Standard Time) on 27 August 1994 on Wan-An Island (23°22′N; 119°30′E), PengHu Archipelago. This turtle left Wan-an Island on her post-nesting migration 2 d after tag deployment (Table 1). She arrived at Koshiki (31°46′N; 129°47′E), Japan, on 25 October 1994 (Fig. 1). The turtle travelled 190 km (1184 statute miles) at a calculated speed of 33.4 km d^{-1}, i.e. 1.39 km h^{-1} (Table 2). The last transmission and reliable position were from Koshiki on 28 October 1994 with the LC B (3 d after arrival). The total number of transmissions (all LC Zs included) was 208: 3% with LC 1, 16% with LC 0, 25% with LC A, 55% with LC B, and 1% with LC Z. The PTT transmitted 77 positions, with 5 instances of rejected data (6%).

Turtle WA2-94

The magnetic bar was removed and the PTT ST-6 deployed at 06:30 h TST on 28 August 1994 TST. The turtle left Wan-An Island for her post-nesting migration 17 d after tag deployment (Table 1). She arrived at a nearshore coral reef of coastal Taipei (25°13′N; 121°19′E), Taiwan, on 21 September 1994 (Fig. 2). The turtle travelled 323 km (201 statute miles) at a calculated speed of 46.14 km d^{-1}, i.e. 1.92 km h^{-1} (Table 2). The last transmission was on 27 March 1995 (187 d after arrival). However, the last reliable position was off the coast of Taipei on 16 March 1995 with the LC A (176 d after arrival). The total number of transmissions was 216: 3% with LC 1, 5% with LC 0, 18% with LC A, 69% with LC B, and 5% with LC Z. The PTT transmitted 83 positions, with 31 instances of rejected data (37%).

Table 1 *Chelonia mydas*. Date of capture, tagging, and release; and duration of tracks recorded by platform terminal transmitter (PTT) attached to green turtles nesting at Wan-An (WA) Island, PengHu Archipelago, Taiwan, between 1994 and 1997 (*CCL* curved carapace length; *SCL* straight carapace length)

	Turtle WA:							
	1-94	2-94	3-95	4-95	5-95	6-96	7-96	1-2-97
PTT	ST-6	ST-6	ST-3	ST-3	ST-3	ST-14	ST-14	ST-14
Body size (mm)								
CCL	96	111	94.5	99	106	97	100	99
SCL	93	106	92.5	92	101	91	97	97
Capture								
year	1994	1994	1995	1995	1995	1996	1996	1997
(day/month)	27/8	28/8	4/8	6/8	9/8	8/8	9/8	5/8
Tagged/released								
(day/month)	28/8	29/8	5/8	7/8	10/8	9/8	10/8	6/8
Track duration								
(d)	62	211	277	298	403	134	34	91

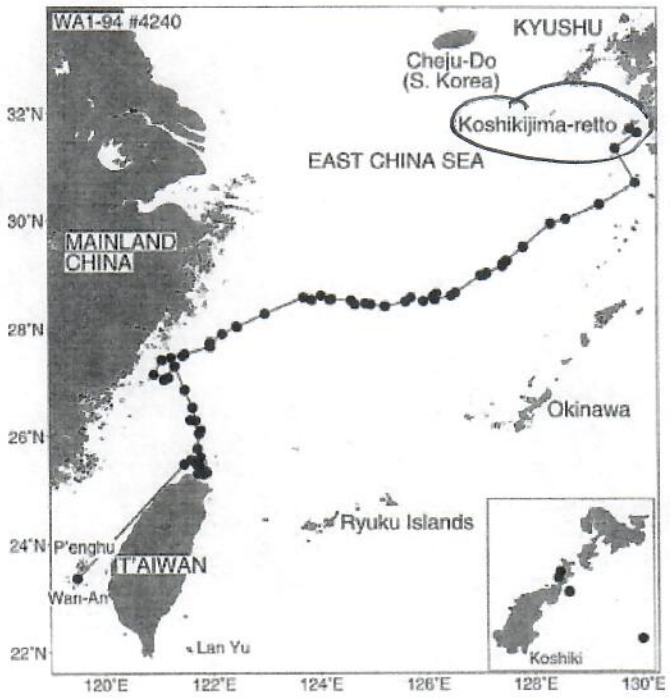

Fig. 1 *Chelonia mydas*. Track of Turtle WA1-94. Platform Terminal Transmitter (PTT) ST-6 was deployed on 27 August 1994; departure date of post-nesting migration was 29 August; estimated travel distance was 1904 km; arrival date at Koshiki, Japan was 25 October 1994

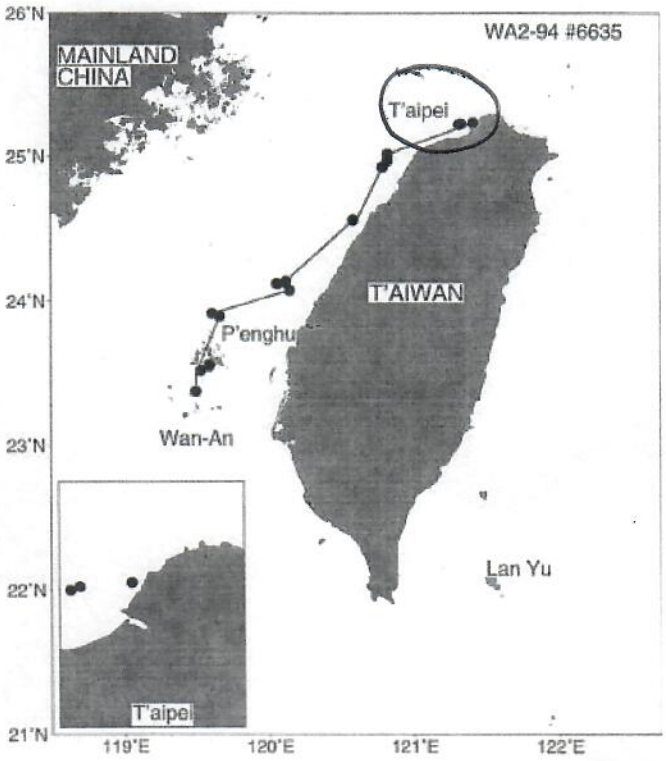

Fig. 2 *Chelonia mydas*. Track of Turtle WA2-94. PTT ST-6 deployed on 28 August 1994; departure date of post-nesting migration was 14 September; estimated travel distance was 323 km; arrival date at coastal Taipei, Taiwan, was 21 September 1994

Table 2 *Chelonia mydas*. Post-nesting migration distance, travelling duration, and swimming speed of green turtles nesting at Wan-An Island, PengHu Archipelago, Taiwan, between 1994 and 1997

Turtle Ref. No.	Distance (km)	Duration (d)	Speed (km h^{-1})
WA1-94	1904	57	1.39
WA2-94	323	7	1.92
WA3-95	1270	42	1.24
WA4-95	407	9	1.88
WA5-95	1130	17	2.77
WA6-95	1909	40	1.99
WA7-96	702	15	1.95
WA1-2-97	193	7	1.15

Turtle WA3-95

The magnetic bar was removed and the PTT ST-14 deployed at 06:00 h TST on 6 August 1995. The turtle left Wan-An Island for her post-nesting migration 2 d after tag deployment (Table 1). She arrived at a nearshore coral reef of the Hainan Dao (19°7′N; 110°37′E), Mainland China, on September 19, 1995 (Fig. 3). The turtle travelled 1270 km (790 statute miles) at a calculated speed of 30.24 km d^{-1}, i.e. 1.24 km h^{-1} (Table 2). The last transmission was on 10 May 1996 (233 d after arrival). However, the last reliable position was at Hainan Dao on 19 September 1995 with the LC A (3 d after arrival). The total number of transmissions was 231: 2% with LC 3, 3% with LC 2, 7% with LC 1, 6% with LC 0, 24% with LC A, 52% with LC B, and 6% with LC Z. The PTT transmitted 123 positions, with 33 instances of rejected data (27%).

Turtle WA4-95

The magnetic bar was removed and the PTT ST-14 deployed at 06:00 h TST on 7 August 1995. The turtle left Wan-An Island for her post-nesting migration 34 d after tag deployment (Table 1). She arrived at Qinpeng Dao (23°13′N; 117°16′E), Mainland China, on 18 September 1995 (Fig. 4). The turtle travelled 407 km (253 statute miles) at a calculated speed of 45.22 km d^{-1}, i.e. 1.88 km h^{-1} (Table 2). The last transmission was on 31 May 1996 (255 d after arrival). However, the last reliable position was at Qinpeng Dao on 30 January 1996 with the LC 1 (134 d after arrival). The total number of transmissions was 151: 7% with LC 3, 5% with LC 2, 9% with LC 1, 3% with LC 0, 18% with LC A, and 58% with LC B. The PTT transmitted 98 positions with 9 instances of rejected data (9%).

Turtle WA5-95

The magnetic bar was removed and the PTT ST-14 deployed at 06:00 h TST on 10 August 1995. The turtle left Wan-An Island for her post-nesting migration 49 d after

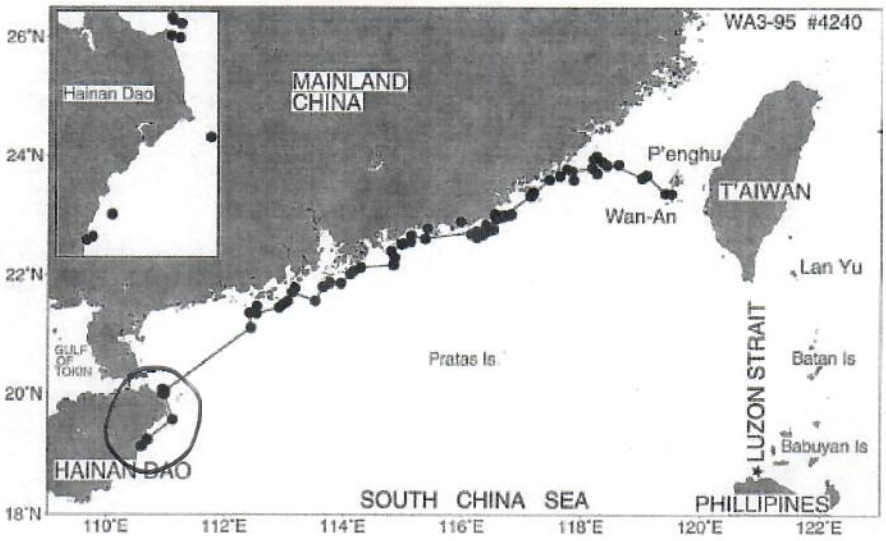

Fig. 3 *Chelonia mydas*. Track of Turtle WA3-95. PTT ST-14 deployed on 6 August 1995; departure date of post-nesting migration was 8 August; estimated travel distance was 1270 km; arrival date at Hainan Dao, Mainland China was on 19 September 1995 (*Star* site where Inconel-tagged turtle was caught in waters north of Philippines)

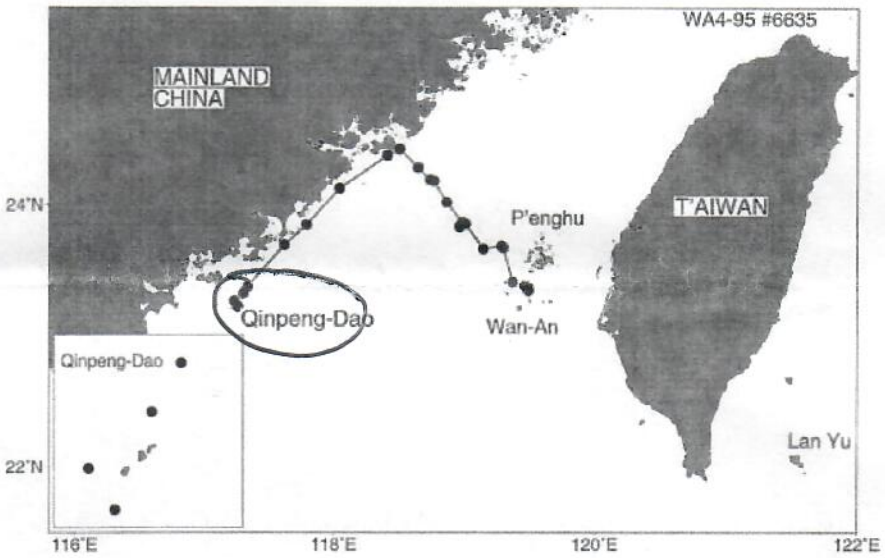

Fig. 4 *Chelonia mydas*. Track of Turtle WA4-95. PTT ST-14 deployed on 7 August 1995; departure date of post-nesting migration was 9 September; estimated travel distance was 407 km; arrival date at Qinpeng Dao, Mainland China, was 18 September 1995

tag deployment (Table 1). She arrived at Okinawa (26°31′N; 128°3′E) Japan on 15 October 1995 (Fig. 5). The turtle travelled 1130 km (702 statute miles) at a calculated speed of 66.47 km d^{-1} i.e. 2.77 km h^{-1}. The last transmission was on 18 September 1996 (337 d after arrival). However, the last reliable position was at Okinawa on 21 October 1996 with the LC B (6 d after arrival). The total number of transmissions was 240: 4% with LC 3, 5% with LC 2, 6% with LC 1, < 1% with LC 0, 25% with LC A, 58% with LC B, and 2% with LC Z. The PTT transmitted 123 positions, with 7 instances of rejected data (6%).

Turtle WA6-96

The magnetic bar was removed and the PTT ST-14 deployed at 06:30 h TST on 7 August 1996. The turtle left Wan-An Island for her post-nesting migration 67 d after tag deployment (Table 1). She arrived at Ishigaki-shima (24°38′N; 124°23′E), Ryukyu Archipelago, Japan, on 13 November 1996 (Fig. 6). The turtle travelled 1909 km (1186 statute miles) at a calculated speed of 47.73 km d^{-1}, i.e. 1.99 km h^{-1} (Table 2). The last transmission was on 19 December 1996 (27 d after arrival). However, the last reliable position was at Ishigaki-shima on 13 November 1996 with the LC 2 (0 d after arrival). The total number of transmissions was 188: 8% with LC 3, 4% with LC 2, 4% with LC 1, 1% with LC 0, 27% with LC A, 55% with LC B, 1% with LC Z. The PTT transmitted 93 positions with 13 instances of rejected data (14%).

Turtle WA7-96

The magnetic bar was removed and the PTT ST-14 deployed at 06:30 h TST on 9 August 1996. The turtle left Wan-An Island for her post-nesting migration 19 d after tag deployment (Table 1). She arrived at Dangan Liedao/Po Toi (22°5′N; 114°9′E), Mainland China, on 12 September 1996 (Fig. 7). The turtle travelled 702 km

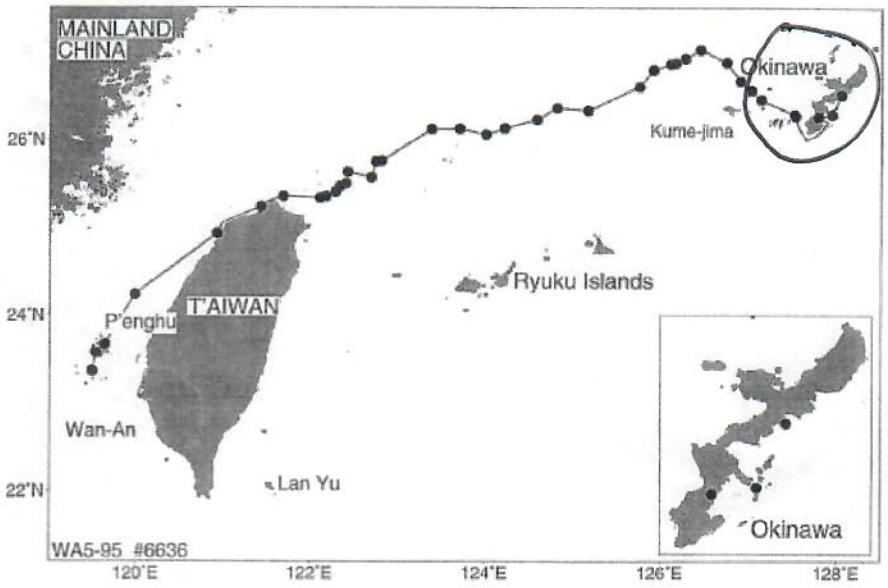

Fig. 5 *Chelonia mydas*. Track of Turtle WA5-95. PTT ST-14 was deployed on 9 August 1995; departure date of post-nesting migration was 28 September; estimated travel distance was 1130 km; arrival date at Okinawa, Japan was 15 October 1995

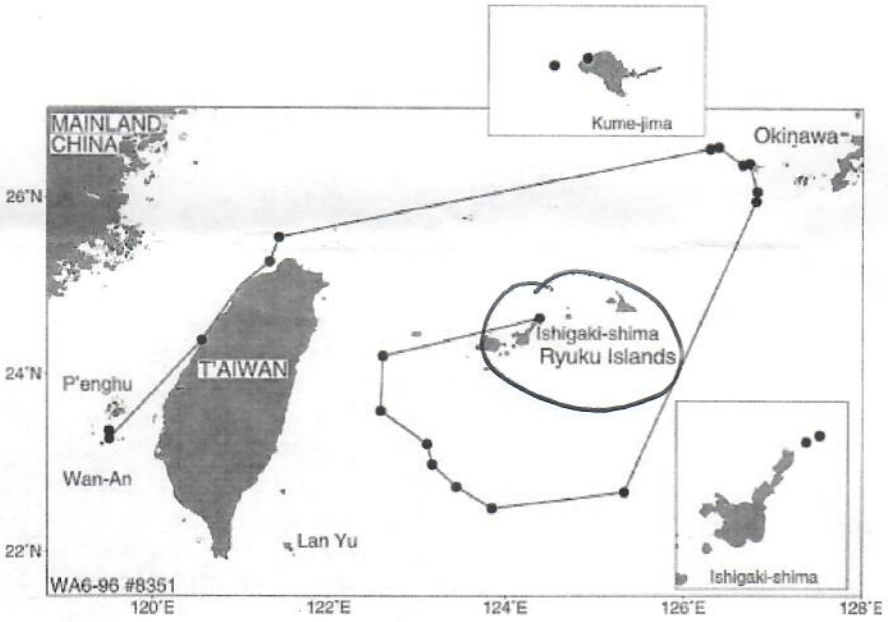

Fig. 6 *Chelonia mydas*. Track of Turtle WA6-96. PTT ST-14 deployed on 7 August 1996; departure date of post-nesting migration was 13 October; estimated travel distance was 1909 km; arrival date at Ishigaki-shima, Ryukyu, Japan, was 22 November 1996

(436 statute miles) at a calculated speed of 46.8 km d^{-1}, i.e. 1.95 km h^{-1} (Table 2). The last transmission and reliable position were at Dangan Liedao/Po Toi on 12 September 1996 (0 d after arrival). The total number of transmissions was 90: 3% with LC 3, 12% with LC 2, 2% with LC 1, 8% with LC 0, 21% with LC A, 51% with LC B, and 3% with LC Z. The PTT transmitted 61 positions with 3 instances of rejected data (5%).

Turtle WA1-2-97

The magnetic bar was removed and the PTT ST-14 deployed at 05:30 h TST on 7 August 1997. The turtle left Wan-An Island for her post-nesting migration 46 d after tag deployment (Table 1). The estimated departure date was 26 September. The PTT transit 7 d, and the turtle arrived at coastal Chunan County (24°40′N; 120°49′E), Taiwan on 3 October 1997 (Fig. 8). The turtle travelled 193 km (120 statute miles) at a calculated speed of 27.57 km d^{-1}, i.e. 1.15 km h^{-1} (Table 2). The last transmission was on 8 November 1997 (35 d after arrival). However, the last reliable position was on 31 October 1997 with the LC B (28 d after arrival). The total number of transmissions was 67: 11% with LC 3, 6% with LC 2, 6% with LC 0, 11% with LC A, and 72% with LC B. The PTT transmitted 19 positions with 6 instances of rejected data (32%).

Migratory patterns from 1994 to 1997

PTTs lasted from just > 1 mo (34 d: Turtle WA7-96) to > 13 mo (403 d: Turtle WA5-95) (Table 1). All but two

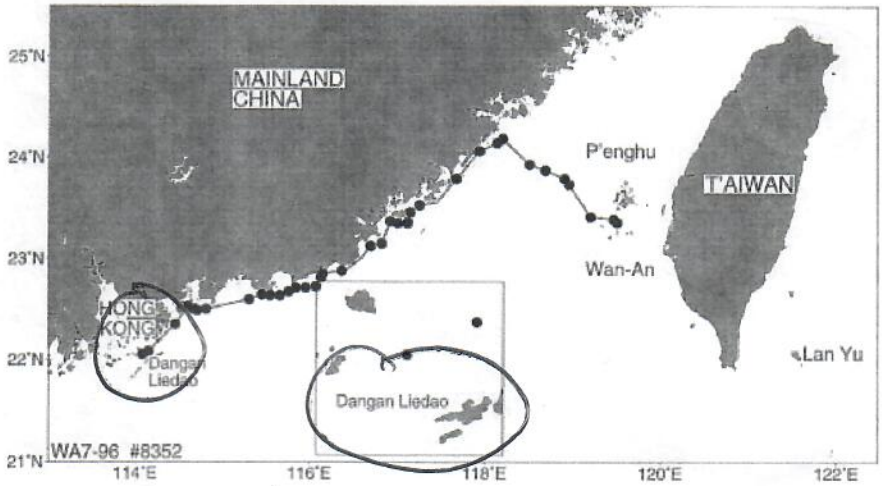

Fig. 7 *Chelonia mydas*. Track of Turtle WA7-96. PTT ST-14 deployed on 9 August 1996; departure date for of post-nesting migration was 28 August; estimated travel distance was 702 km; arrival date at Dangan Liedao/Po Toi, Mainland China was 12 September 1996

units (Turtle WA1-94 and Turtle WA7-96) operated for <3 mo, and provided enough information to reveal post-nesting migrations. The transmitter on Turtle WA1-94 transmitted for only 60 d, but still provided sufficient locations to enable the migration route to be tracked. However, we were not able to determine if the last location of this tracking was the turtle's permanent foraging site, because the PTT ceased transmission after the second day of her arrival. Turtle WA7-96 stopped transmission abruptly 15 d after nesting.

Five of the eight turtles migrated to the northeast, the others to the southwest of Wan-An Island. Migration distances ranged from 193 km (WA1-2-97) to 1904 km (WA1-94), and migration periods from 7 d (WA1-2-97) to 57 d (WA1-94). The turtles' estimated swimming speeds ranged from 1.15 km (WA1-2-94) to 2.77 km (WA5-95) per hour (Table 2). Migratory paths consisted of two stages. In the first stage, the turtles swam across the ocean from one nearshore zone to the other; in the second stage, they swam southward or northward along the coast.

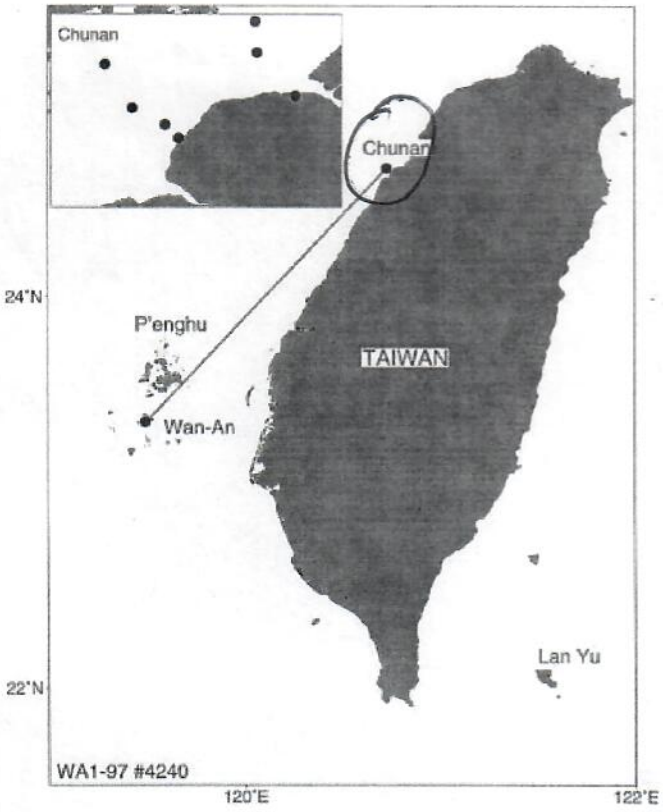

Fig. 8 *Chelonia mydas*. Track of Turtle WA1-2-97. PTT ST-14 deployed on 7 August 1997; departure date of post-nesting migration was 26 September; estimated travel distance was 1904 km; arrival date at coastal Chunan County, Taiwan was 3 October 1997

Discussion

Migratory behavior of the green turtle in Taiwan

Some sea turtles are known to make trans-oceanic migrations (Mortimer and Carr 1987; Bowen et al. 1995), while others migrate on local (e.g. Balazs 1994) or regional (e.g. Carr and Carr 1972; Papi et al. 1995) scales. The results of the present study on *Chelonia mydas* is the first to investigate post-nesting migrations of green turtles in northeast Asia, and our results suggest that they migrate from Wan-An Island to various locations on the continental shelf east of mainland China.

Migration speeds ranged from 1.15 to 2.77 km h^{-1} (mean value of 1.79 km h^{-1}: Table 2). These values are comparable to those found in other studies (Spring 1990; Balazs 1993; Keinath and Musick 1993; Balazs et al. 1994; Craig 1994; Papi et al. 1995).

We consider that the green turtles we tracked had two-stage migration patterns–oceanic and coastal. From their nesting sites, they migrated either to the northeast or to the southwest, i.e. swam across the Taiwan Straits (an oceanic leg) either towards Taiwan or mainland China, respectively; they then moved broadly northeast or southwest (a coastal leg) until they either reached their final destinations (e.g. WA2-94 and WA4-95), or

made another trans-oceanic migration (e.g. WA1-94, WA3-95, WA5-95, WA6-96).

All turtles except WA6-96 migrated entirely over the continental shelf. Nonetheless, the routes they followed were rarely the shortest distances between Wan-An Island and their final foraging ground (Fig. 1). They apparently preferred to migrate through coastal rather than oceanic waters, even when this involved detours that increased the overall migration distance. In term of fitness strategy, detours in an animal's migration path may result in excess energy expenditure and increased mortality risk (Sibly and Calow 1986). However, for animals undertaking long-distance migration with a low mortality risk as adults (Crouse et al. 1987; Heppell et al. 1996), and with infrequent breeding cycles such as the sea turtle, such constraints may not be as critical as other factors such as nesting- and foraging-site fidelity. Irrespective of how the turtles "remember" or "recognize" these routes (Luschi et al. 1996; Papi et al. 1997), the possibility of detour migration could be related to the fact that the turtles take advantage of the coastal waters as temporary foraging grounds in which they can "refuel" on their way to their permanent foraging sites.

Some turtles, such as WA2-94 and WA5-95 and even WA6-95, were able to pinpoint their target area after a long oceanic journey. How could the turtles recognize their final target areas with so many habitable coastal areas nearby? It is possible that isoclines and isodynamics of the magnetic field in the target area form a grid, allowing magnetic navigation of the green turtles (Lokmann 1992; Lokmann and Lokmann 1996). The same mechanism may also apply to a turtle that "refuels" in coastal waters, such as WA4-95 (who was also able to reach her target area after post-nesting migration).

One detour was inconsistent with this hypothesis: WA6-96 detoured into the Pacific near the Kume-jima, Ryukyu Archipelago, on 30 October 1996 for 14 d and then re-entered the East China Sea. Liu and Cheng (2000) found that during this part of her migration, this turtle changed her speed and direction under the influence of the Kuroshio current and impinging ocean eddies. Her migration speed over these 14 d ranged from 0.93 to 2.1 km h^{-1}, i.e. it did not differ from her speed at any other period of her post-nesting migration.

Since 1994, Turtle WA1-94 has returned to Wan-An Island to nest again – in 1997. However, her second migratory journey was not quite the same as her first (cf Figs. 1 and 7). Based on the study of Balazs (1983) and Limpus et al. (1992), Papi et al. (1995) suggested that green turtles have a high fidelity to both nesting and feeding grounds, and possess a two-way migration pattern. We did not observe this in the present study. WA1-94 migrated to coastal Chunan, Taiwan and stayed there for >1 mo in 1997 (in 1994 she migrated to Koshiki, Japan). This PTT stopped transmitting after 7 November 1997; thus we do not know if she continued to migrate northwards to Koshiki, Japan, after this date.

Although not formally part of this study, tag data from another turtle indicate that she also may have left the continental shelf. This turtle was tagged at the Wan-An nesting site with two Inconel tags (Tag No. TW064 on the right-front flipper and TW065 on the left-front flipper) in summer 1994. One month later she was caught by a fisherman in offshore waters north of the Philippines (location marked with star in Fig. 3), retagged by a conservation officer, and released. Unfortunately, her exact migration route could not be determined.

Genetic mtDNA analysis has shown that the turtles comprising the Wan-An rookery are distinct from those in other rookeries examined to date in the Pacific, including Japan, Hawaii, and Australia (P. Dutton personal communication). Several genetic and tag-return studies have shown the high fidelity of other green turtles towards their nesting and foraging grounds (Meylan 1982; Limpus et al. 1992; Allard et al. 1994; Bowen and Avis 1994). Thus, trips to the site from which the last transmitted data from each tagged turtle were should received clarify whether or not the putative end-points of the migrations of the turtles we studied do in fact constitute their adult foraging sites. Such "fact-finding trips" would also provide additional validation of the remote telemetry methods used in the present study.

Conservation implications

The present study has clearly demonstrated that green turtles nesting at Wan-An Island constitute an international resource. As they are dispersed throughout the waters of the Philippines, Japan, Taiwan, mainland China, and the Ryukyu Archipelago, conservation of the Wan-An rookery clearly cannot be the sole responsibility of PengHu County or indeed of Taiwan. Other satellite-tracking studies have also shown that turtles nesting in the same rookery disperse towards different feeding grounds (Balazs et al. 1994; Liew et al. 1995; Morreale et al. 1996). The widespread dispersal over the continental shelf also suggests that conservation of the marine habitat is at least as important as the nesting beaches themselves to the survival of sea turtle populations. Thus, a regional programme and strategy for long-term research on and the conservation of green turtles and their habitats are urgently needed to save this endangered species (IUCN 1995).

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References

Allard MW, Miyamoto MM, Bjorndal KA, Bolten AB, Bowen BW (1994) Support for natal homing in green turtles from mitochondrial DNA sequences. Copeia 1994: 34–41

Argos (1996) User's manual. Version 1.0. January 1996. Service Argos, Inc., Toulouse, France

Balazs GH (1993) Satellite used to study the oceanic migrations of Hawaii's green sea turtles. Mar Turtle Newsl 61: 7–9

Balazs GH (1994) Homeward bound: satellite tracking of Hawaiian green turtles from nesting beaches to foraging pastures. In: Schroeder BA, Witherington BE (Compilers) Proceedings of 13th Annual Symposium on Sea Turtle Biology and Conservation. NOAA natn mar Fish tech Mem US Dep Commerce SEFSC-341: 205–208

Balazs GH, Craig P, Winton BR, Miya RK (1994) Satellite telemetry of green turtles nesting at French Frigate Shoals, Hawaii and Rose Atoll, American Saoma. In: Bjorndal KA, Bolten AB, Johnson DA, Eliazar PJ (Compilers) Proceedings of 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA natn mar Fish Serv tech Memo US Dep Commerce SEFSC-351: 184–187

Balazs GH, Miya RK, Beaver SC (1996) Procedures to attach a satellite transmitter to the carapace of an adult green turtle, *Chelonia mydas*. In: Keinath JA, Barnard DE, Musick JA, Bell BA (Compilers) Proceedings of 15th Annual Symposium on Sea Turtle Biology and Conservation. NOAA natn mar Fish Serv tech Memo US Dep Commerce SEFSC-387: 39–40

Bolten B, Bjorndal KA, Martins HR, Balazs GH (1994) Satellite telemetry of pelagic stage juvenile loggerheads in the Eastern Atlantic. In: Keinath JA, Barnard DE, Musick JA, Bell BA (Compilers) Proceedings of 15th Annual Symposium on Sea Turtle Biology and Conservation. NOAA natn mar Fish serv tech Memo US Dep Commerce-SEFSC-387: 39–40

Bowen BW, Abreu-Grobois FA, Balazs GH, Kamezaki N, Limpus CL, Ferl RJ (1995) Trans-Pacific migrations of the loggerhead turtle (*Caretta caretta*) demonstrated with mitochondrial DNA markers. Proc natn Acad Sci USA 92: 3731–3734

Bowen BW, Avise JC (1994) Tracking turtles through time. Nat Hist Mag 12: 36–43

Byles RA, Keinath JA (1990) Satellite monitoring sea turtles. In: Richardson TH, Richardson JI, Donnelly M (Compilers) Proceedings of the 10th Annual Symposium on Sea Turtle Biology and Conservation. NOAA natn mar Fish Serv tech Memo US Dep Commerce-SEFSC-278: 73–75

Carr A (1967) So excellent a fish. Natural History Press, New York

Carr A, Carr MH (1972) Site fixity in the Caribbean green turtle. Ecology 53: 425–429

Chen TH, Cheng IJ (1995) Breeding biology of the green turtle, *Chelonia mydas* (Reptilia: Cheloniidae) at Wan-An Island, Peng-Hu Archipelago, Taiwan. I. Nesting ecology. Mar Biol 124: 9–15

Cheng IJ (1995) Sea turtles status and research in Taiwan. In: Devaux B (ed) Proceedings of the International Congress of Chelonian Conservation. SOPTOM, Gonfaron, France, pp 87–88

Council of Agriculture (1995) The Taiwan green turtle, *Chelonia mydas*. Council of Agriculture, Taipei, Taiwan, R.O.C

Craig P (1994) Sea turtles migrate from American Samoa to Fiji. Mar Turtle Newsl 66: 7–8

Crouse DT, Crowder LB, Caswell H (1987) A stage-based population model for loggerhead sea turtles and implications for conservation. Ecology 68: 1412–1413

Heppell SS, Limpus CJ, Crouse DT, Frazer NB, Crowder LD (1996) Population model analysis for the loggerhead sea turtle *Caretta caretta*, in Queensland. Wildl Res Bull 23: 143–159

IUCN (International Union for Conservation of Nature and natural Resources) (1995) A global strategy for the conservation of marine turtles. IUCN Publications Service Unit, Cambridge, England

Keinath JA, Musick JA (1993) Movements and diving behavior of a leatherback turtle, *Dermochelys coriacea*. Copeia 1993: 1010–1017

Liew HC, Chan EH, Lushci P, Papi F (1995) Satellite tracking data on Malaysian green turtle migration. Atti Accad naz Lincei Rc (Sci Fis Nat) 6: 239–246

Limpus CJ, Miller JD, Parmenter CJ, Reimer D, McLachland N, Webb R (1992) Migration of green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) turtles to and from eastern Australian rookeries. Wildl Res Bull 19: 347–358

Liu CT, Cheng IJ (2000) The influence of Kuroshio and open-ocean eddies to the migration of green turtle that nest at Wan-An Island, PengHu Archipelago, Taiwan (In preparation)

Lokmann KJ (1992) How sea turtles navigate. Scient Am 266: 100–106

Lokmann KJ, Lokmann CMF (1996) Orientation and open-sea navigation in sea turtles. J exp mar Biol Ecol 73: 73–84

Luschi P, Papi F, Liew HC, Chan EH, Bonadonna F (1996) Long-distance migration and homing after displacement in the green turtle (*Chelonia mydas*): a satellite tracking study. J comp Physiol 178A: 447–452

Meylan A (1982) Sea turtle migration – evidence from tag returns. In: Bjorndal KA (ed) Biology and conservation of sea turtles. Smithsonian Institution Press, Washington, DC, pp 91–100

Mortimer A, Carr A (1987) Reproduction and migration of the Ascension Island green turtle (*Chelonia mydas*). Copeia 1987 (1): 103–113

Morreale SJ, Standora EA, Spotila JR, Paladino FV (1996) Migration corridor for sea turtles. Nature (Lond) 384: 319–320

Papi F, Liew HC, Luschi P, Chan EH (1995) Long-range migratory travel of a green turtle tracked by satellite: evidence for navigational ability in the open sea. Mar Biol 122: 171–175

Papi F, Luschi P (1996) Pinpointing "Isla Meta": the case of sea turtles and albatrosses. J exp Biol 199: 65–71

Papi F, Luschi P, Crosio E, Hughes GR (1997) Satellite tracking experiments on the navigational ability and migratory behaviour of the loggerhead turtle *Caretta caretta*. Mar Biol 129: 215–220

Plotkin PT, Byles RA, Owens DW (1994) Post-breeding movements of male olive ridley sea turtle, *Lepidochelys olivacea*, from a nearshore breeding area. In: Bjorndal KA, Bolten AB, Johnson DA, Eliazar PJ (Compilers) Proceedings of the 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA natn mar Fish Serv tech Memo US Dep Commerce SEFSC-351: 1–19

Renaud ML (1994) Satellite tracking of juvenile kemp's ridley sea turtles near Sabine Pass, Texas. In: Schroeder BA, Witherington BE (Compilers) Proceedings of the 13th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-341: 147

Renaud ML, Carpenter JA (1994) Movements and submergence patterns of loggerhead turtle (*Caretta caretta*) in the Gulf of Mexico determined through satellite telemetry. Bull mar Sci 55: 1–15

Sibly RM, Calow P (1986) Physiological ecology of animals. Blackwell Scientific Publications, London

Spring CS (1990) Satellite tracking of green turtles in Australia – preliminary results. In: James R (Compiler) Proceedings of the Australian marine Turtle Conservation Workshop. Queensland Department of the Environment, Heritage and Australian Natural Conservation Agency, Queensland, Australia, pp 192–197

Stoneburner DL (1982) Satellite telemetry of loggerhead sea turtle movement in the Georgia Bight. Copeia 1982: 400–408

Taillade M (1992) Chapter 21. Animal tracking by satellite. In: Priede IG, Swift SM (eds) Wildlife telemetry, remote monitoring and tracking of animals. Ellis Horwood Ltd, New York, pp 149–160

Timko RE, Kolz L (1982) Satellite sea turtle tracking. Mar Fish Rev 44: 19–24

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