

# 賴廷奇自序

Foreword by Jonathan Lai

↓ 愛花蠅雌蟲。很可惜地，原名亞種 *R. t. terminatus* 已於多年前絕種。35 mm。1998  
Female Delhi Sands flower-loving fly. Sadly, the nominate subspecies has not been sighted for decades and is presumed to be extinct.



不管是動物或是植物，大家總是先注意到大型的種類。記得很小的時候，動物園裡總是看不見節肢動物、小型鳥類，或是小型哺乳類，但是大象、老虎、斑馬、駝鳥、孔雀、老鷹等大型動物卻總是少不了。除了動物園的收藏外，保護野生動物也是一樣的情形。一定是鯨魚、犀牛、大象等最大型的動物優先受到保護，之後才是鮭魚、水獺、鸚鵡等中型動物。除了較大型的生物優先受到重視外，比較美麗的也優先受到保護。

在現今的二十一世紀，幾乎所有需要保護的中大型動物都已受到國際級的保護。接下來就只剩下小型動物了。於是，焦點終於往牠們身上轉移。昆蟲終於有史以來第一次被列入保育！想一想，時代真的變了。現在的動物園裡幾乎都有展示以前相當冷門的節肢動物、爬蟲類、兩棲類等。雖然如此，但老現象還是沒變：現在動物園裡展示的都是大型或美麗的節肢動物，例如大兜蟲、大型的锹形蟲、大蜈蚣、大馬陸、鳳蝶等等。但這不是重點。重點是昆蟲終於開始受到非害蟲性的重視。

People pay attention to large organisms first. When I was very young, zoos had no arthropods, small birds, or small mammals on display. But large animals, such as elephants, tigers, zebras, ostriches, peacocks, eagles, etc. were always present. Wildlife conservation reflects the same trend. Large animals such as whales and rhinoceros are the first to be protected, while medium animals such as salmon, otters, and macaws come later. Along with the larger ones, the prettier ones also receive priority.

In the 21st century, all the large and medium organisms that need to be protected are protected under international laws. With those studied and listed, attention started to shift to the smaller organisms. In both the United States and Taiwan, insects are listed as endangered or protected species for the first time in human history. We are in a new era. In today's zoos, arthropods, small reptiles, amphibians, etc., once so unpopular, are displayed. Although most zoos now have an arthropod collection, the underlying core remains unchanged: only the large or beautiful arthropods (giant rhinoceros beetles, giant stag beetles, giant centipedes, swallow-tail butterflies, etc.) are kept. But that is not



✓達爾哈沙愛花蠅 (Delhi Sands flower-loving fly, *Rhaphiomidas terminatus abdominalis*) 為美國第一個被列入保育的飛蠅。據調查此蟲的棲地因商業開發只剩原有的5%左右，目前隨時有可能絕種。圖為雄蟲。35 mm。1998

In 1993, the Delhi Sands flower-loving fly *Rhaphiomidas terminatus abdominalis* became the first fly to be listed under the Endangered Species Act. Due to various kinds of land development and use, 95% of the fly's original habitat has been lost. This fly is on the verge of extinction. Pictured is a male.



毛大象大兜蟲人工飼育個體。2006。活體林秀玲提供  
Captive-bred *Megasoma elephas*. Live specimens  
provided by Lin Shio-lin

動物園的用意是什麼？最早可能只是為了讓大眾能夠隨時見到異鄉的動物。但現在可不同了。現在動物園的第一宗旨可以說是為了確保某些動物不會從地球上消失。那要如何達到此目的呢？答案是人工繁殖。

如果只計算動物園裡的個體，有許多物種的族群數量是相當有限的。但是如果把民間飼養的個體一併納入計算，數量則相當可觀。我所知道最好的例子為金剛鸚鵡及陸龜。這二類動物在美國的動物園中數量並不多，但是在民間的數量卻相當龐大，透過網路便可買到溫馴的人工飼育個體。日本大锹形蟲也是一樣的情形。日本民間所飼育的個體直逼野外族群的數量！美國知名養鳥雜誌「鳥語」(Bird Talk) 多次提及民間所飼養的各種鸚鵡也許是牠們種類唯一不滅絕的希望。由此可見民間飼育野生動物扮演著重要的角色(當然了，個體數已經非常稀少的種類應由政府來繁殖)。我相當贊成民間飼育兜蟲或锹形蟲。如此一來，如果那天牠們開始從野外消失，一切都還不太遲。

the point. What is important is that insects are starting to receive non-pest attention.

What is the purpose of zoos? In the beginning zoos might have existed only to show exotic animals. But that is certainly not the case today. Today's zoos virtually have only one goal: to prevent certain species from extinction through captive breeding.

There are many species whose population would be much smaller if they had only been bred by zoos. Two great examples are macaws and tortoises. Although their numbers are limited in U.S. zoos, they are bred extensively by private hobbyists, and tame babies can be purchased easily. The "Oo-ku-wagata" (*Dorcus curvidens binodulosus*) of Japan reflects a similar trend; its population in private homes rivals that in the wild. "Bird Talk," a popular pet-bird magazine in the U.S., has many times pointed out that if certain species become extinct in the wild, captive-bred individuals will be the only hope for the continuation of those species.

Since the publication of the first edition of *For the Love of Rhinoceros and Stag Beetles* in 2001, *Phalacrognathus muelleri* has become a prime example. It used to be the world's most expensive beetle. Today, it is one of the cheapest. In the 1990's, a small dried male around 40 mm would sell for over a thousand dollars, and there was a huge demand for them. Individuals over 50 mm were sold for over two thousand dollars a piece, putting tremendous pressure on

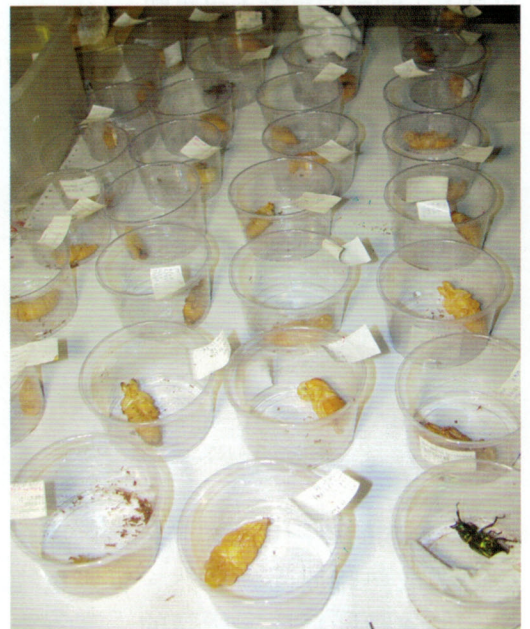
自2001年沉醉兜鍬初版以來，彩虹鍬便是最好的例子了。牠曾經是世界上最高的甲蟲，但是今天卻是世界上最便宜的甲蟲之一。在西元90年代，一隻40 mm的中小型雄性標本就要價美金一千元以上，而且供不應求，50 mm以上的個體更是要價美金兩千元以上，對野生族群造成了龐大的壓力。也因此，澳洲政府將彩虹鍬列為保育類，嚴禁採集。但是個人認為，單方面的禁止採集並不是最理想的保育方式。原因有二：1.在野外因天敵疾病等因素，幼蟲的存活率不到百分之十。但是在人工環境中，存活率卻可達百分之一百。如果採用野放人工個體的保育方式，族群則可以十倍以上的速度復原。2.越是禁止採集的種類，黑市行情往往越是高升。

在2000年時，日本首度進口了彩虹鍬活體。雖然當時是天價（一對美金五千元、一頭一齡幼蟲美金七百元），但是牠的價格很快地便往下墜，一路跌到現今的一頭一齡幼蟲只要新台幣一百五十元。彩虹鍬的價格會有如此戲劇化的轉變不外乎是：1.繁殖容易。2.單母蟲卵數破百。3.幼蟲容易飼養。4.幼蟲期只要數個月。現今彩虹鍬四處可見，價格平易近人，已經沒有人願意冒險採集野生族群，出現了雙贏的局面。亞洲龍魚也是另外一個很好的例子。1990至2001年間，台灣是完全禁止進口或是飼養受到華盛頓公約保護的亞洲龍魚的。但在

→彩虹鍬形蟲人工飼育個體。2007  
Captive-bred *Phalacrognathus muelleri*.

the wild population. As a result, the Australian government put a ban on its collection. However, passive conservation may not be the most effective method. For one, larvae only have less than 10% survival rate in the wild due to disease and predation factors. But in captivity, larvae have a near 100% survival rate. If a captive breeding program is implemented and new adults are released back to the wild, the wild population can recover ten times faster. Two, bans drive up the black market value.

In 2000, Japan imported live *P. muelleri* for the first time. Each pair was priced at five thousand U.S. dollars and people fought over them. Even a first instar larva would sell for seven hundred dollars. But then, things took a sharp turn. Its price plummeted and plummeted. Today, each first instar larva is only five dollars. Factors contribut-





▲ 独角仙人工飼育個體。2006  
Captive-bred *Allomyrina dichotoma*.

段期間，走私亞洲龍魚不斷，造就了居高不下的黑市行情。所幸，由於產地人工繁殖相當成功，台灣於2002年重新開放亞洲龍魚進口。龍魚的價格不但下滑了，也帶動了龐大的水族業商機。由此可見人工飼育的貢獻不可小覷。

人為造成的物種枯竭以兩種形式發生：一是過度地採集物種。二是棲地的破壞。第二種形式幾乎是無法逆轉的。要讓毀損的環境恢復到原始的面貌，往往需要短則數十年長則數百年的時間。但在這段時間內許多物種早已滅絕。所幸，第一種形式是可以在短時間內修復的，也就是採取野放人工個體的策略。這樣的例子我們可以在世界各地的漁業放流看見。

動物園的終極目標是將部分的收藏在時機成熟時放回大自然。有些生物比其他生物好野放。所謂的「高等生物」，例如鳥類及大型哺乳類，很難成功地野放。這些生物必需經過單親或雙

ing to this dramatic phenomenon are: 1. *P. muelleri* is easy to breed. 2. Each female is capable of laying up to 100 eggs. 3. Larvae are easy to keep. 4. Larval duration is only a few months. Today, *P. muelleri* is ubiquitous. People no longer collect wild specimens, creating a win-win situation.

Population depletion of organisms takes two forms. One is excessive collection. The other is habitat destruction. The second form is almost irreversible. To restore a damaged habitat to its original state takes decades if not centuries. Many species go extinct in the meantime. Fortunately, the first form can be rectified in a relatively short period. And the best way to do so is through release of captive-bred individuals back to the wild. This is commonly practiced in fisheries around the world.

Zoos' ultimate goal is to release captive-bred individuals back to the wild when

親的努力教導，才有能力面對這弱肉強食的世界。很顯然地，人工飼育個體缺乏以上要素，而人類能教的又畢竟有限。因此，在有野放人工飼育個體的地點，人類時常需要繼續提供食物及夜晚落腳休息的場所。雖然如此，死亡率還是時常很高。但是以上的情形並不會發生在「低等生物」上。這些生物完全以本能行事，不需任何學習就能夠生存。一隻兜蟲或鍬形蟲在野外的存活率，絕對不會因為牠是人工飼育個體（突變者及近親交配者除外）而降低。因此只要將其帶到原棲息地（符合族群遺傳條件）即可野放，完全不需有事前或事後的準備。但我覺得最可怕的是棲地的破壞。一旦沒了棲地，飼育出再多的人工個體也已經為時已晚。註：在未經過生態專家評估之前，我不建議個人進行野放行為。

the time is right. Some organisms are easier to release than others. The “higher” organisms, such as birds and large mammals, are very difficult to release. These animals require a great deal of teaching from their parents in order to do well in the wild. Captive-bred individuals do not get that crucial element and what humans can teach is limited. As a result, in areas where captive-bred individuals are released, humans often times have to continue providing food and shelter. But even with that, mortality can still be high. However, the above does not apply to the “lower” organisms such as insects. These creatures operate on instincts. The survival rate of a rhinoceros or stag beetle (excluding mutants or inbred individuals) in the wild does not decrease because it is captive-bred. As a result, they are easy to release. **Note: it is not recommended that hobbyists practice release of captive-bred beetles without prior assessment by ecological experts.**

↓ 達爾哈沙愛花蠅的棲息地為沙漠。後方可看見林立的路燈，已經被改建成停車場。1998

The habitat of the Delhi Sands flower-loving fly is a type of desert. Street lights can be seen in the background. The area has been turned into a parking lot.



2000年時，我在一本科學雜誌上，看見生物多樣性之父愛德華威爾遜 (Edward O. Wilson) 手上拿著一隻 *Dynastes hercules ecuatorianus* 長戟大兜蟲的標本。內文中威爾遜博士提及長戟大兜蟲是面臨危機的種類。於是我以傳真的方式請教了威爾遜博士對於保育長戟大兜蟲的看法，也有幸地得到了他的回覆。以下是我的三個問題以及他的答覆：

In 2000, I came across a picture of Dr. Edward Wilson holding a *Dynastes hercules ecuatorianus* in a magazine. In the text Dr. Wilson mentioned that *D. hercules* is a threatened species and requires protection. I asked Dr. Wilson a few questions regarding the conservation of this species and was fortunate to get his replies.

為了能夠拯救面臨危機的長戟大兜蟲，您會採取什麼措施？答：保護棲地是唯一的方式。

長戟大兜蟲總共有八個亞種。您有沒對哪一個族群最有興趣？答：西印地斯群島的族群瀕臨絕種，需要密切的研究。

似乎有許多南美洲政府的介入。您建不建議鼓勵當地人繁殖長戟大兜蟲並出售部分的成果？您認為人工飼育可以保護長戟大兜蟲嗎？或是您認為保護棲地是唯一的方式？答：如果牠們可以人工繁殖，很好。但是就長遠而言，兜蟲的未來和棲地的保育息息相關。

1. In order to save the "threatened" Hercules beetle, what approach will you take? *Only habitat preservation will do it.*
2. In this species there are 8 sub-species. Some are located in small isolated area. Are there certain populations that you are particularly interested in? *The West Indian populations are the most endangered, and need close study.*
3. There appears to be many tropical governments involved. Do you recommend that local be encouraged to "farm" and sell a certain fraction of beetles which they grow as a means of conservation? Do you think captive breeding will prolong preservation of the species? Or do you favor just preserving the habitat? *If they can be farmed, good. But the key to the future of the rhinoceros beetle is habitat preservation.*

*Best wishes,  
E.O. Wilson*

At the same time that more and more forests are disappearing, I see an ever increasing number of people in the world showing interests in live rhinoceros and stag beetles. Three professional insect collectors from Ecuador and Bolivia asked me for instructions on culturing *D. hercules*, *D. neptunus*, and *D. satanas* because South American laws allow exportation of farm-raised beetles. Because I have an inordinate fondness for these creatures and hope that they receive more attention, I wrote this book.

January 6th, 2001 at Los Angeles International Airport

Revised in 2007 in Taipei, Taiwan

Jonathan Lai

這幾年，在綠地越來越少的同時，我也看見了在台灣及美國有越來越多人對兜蟲及鍬形蟲的飼育產生了興趣。也有三位來自南美洲的職業採集者分別 e-mail 我，問我如何飼育長戟、海神、及撒旦大兜蟲，因為在南美洲，人工飼育個體可合法地出口。即使他們的動機是出自商業考量，但無論如何，總比無節制地濫捕野生個體好多了。由於我熱愛這些昆蟲，希望牠們能得到更多的重視，因此我寫了這本書。

2001年1月6號撰於洛杉磯機場

2007年修於台北外雙溪

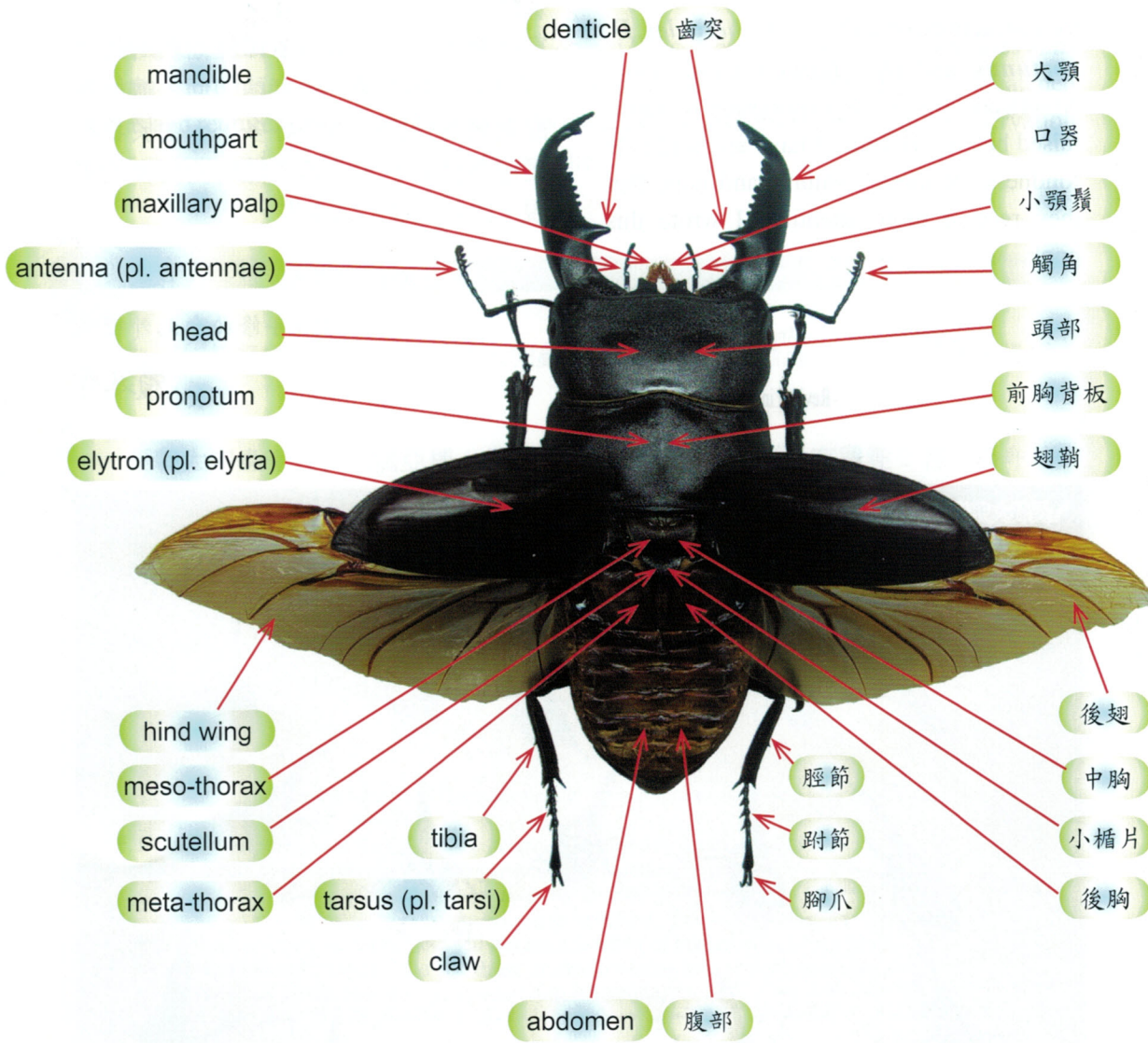
賴廷奇





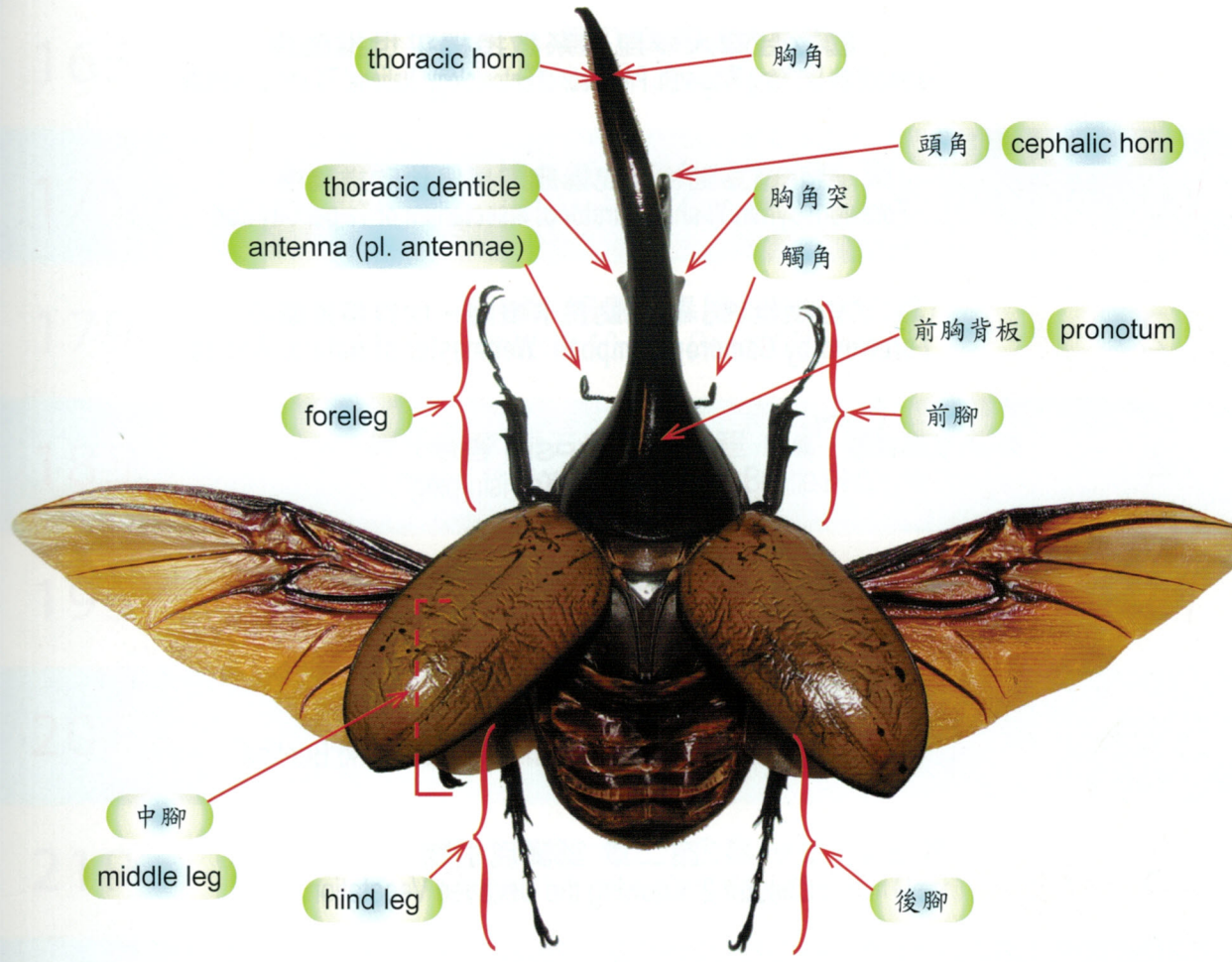


鍬形蟲的身體構造 (巴拉望巨扁鍬形蟲)  
Stag Beetle Anatomy (*Dorcus titanus palawanicus*)



兜蟲的身體構造 (赫克力士長戟大兜蟲)

Rhinoceros Beetle Anatomy (*Dynastes hercules hercules*)



頭  
口器  
觸鬚  
觸角  
面部  
前胸背板  
翅鞘

後翅  
中胸  
小楯片  
後胸

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