



↘ 波麗菲夢斯花金龜。坦尚尼亞。56 mm。2005。活體至錫泰提供
Chelorrhina polyphemus, Tanzania, Live specimen provided by Wang Kun-tai

花金龜

The Flower Beetles (Cetoniidae)

By Orin McMonigle

歐倫·馬克馬尼格著



↘ 燕雀花金龜。坦尚尼亞。30 mm。2005
Amaurodes passerini, Tanzania



↘ 歐貝魯花金龜。坦尚尼亞。70 mm。2003
Mecynorrhina oberthueri, Tanzania



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除了南極以外，世界各地都有花金龜。花金龜是受歡迎的寵物，因為牠們五顏六色、充滿活力，而且又好養。花金龜飼育和生活史的細節都包含在此篇文章中，要獻給想要更進一步認識花金龜的熱衷者。

花金龜科包含了三個亞科。Trichiinae亞科 (*Osmoderma*及相關屬)、Cetoniinae亞科 (*Goliathus*及相關屬)，以及Valginae亞科 (*Valgus*及相關屬)。花金龜科、鍬形蟲科、黑豔蟲科、皮金龜科，以及一些非常獨特的甲蟲之前都是金龜科中的亞科，但是現在已經獨立出來。在這一章中，我使用「花金龜科」這個分類，因為花金龜和金龜在幼蟲、蛹室，以及翅鞘上的差異。使用這個分類法的主要原因是花金龜科裡頭的各亞科飼育方式都雷同。

花金龜之所以得其名並不是因為其外表花花綠綠有如花朵一般，而是因為牠們主要以花瓣或是花粉為食。花金龜都在白天的時候訪花。有些種類，包括*Euphoria*屬的成員，會擬態熊蜂的顏色、形狀，和聲音來避敵。許多種類都帶有綠色，這讓牠們可以和樹葉融合在一起。但也並非所有的花金龜都會訪花；一隻大王花金龜小心地降落在花朵上顯然是太誇張了。

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The Cetonidae are found on every continent except Antarctica. Flower beetles are popular pets because they are colorful, energetic, and easy to rear. Rearing and life cycle information is detailed below for the enthusiast who wants to learn more about or keep these amazing beetles.

The Family Cetonidae contains three subfamilies. The subfamilies Trichiinae (*Osmoderma* and related genera), Cetoniinae (*Goliathus* and related genera) and Valginae (*Valgus* and related genera). Cetonidae were previously listed in the Family Scarabaeidae along with the Lucanidae (stags), Passalidae (passalids), Trogidae (skin beetles), and a number of very different types of beetles that are now recognized as separate families. In this chapter, the classification Family Cetonidae is used due to the differences between flower beetle and scarab beetle larvae, pupal cell formation, and elytra structure. The main reason for using this classification is the similarity in rearing of the Cetonid subfamilies.

The common name for this family is given because a great number of species are found feeding on flowers or pollen. Cetonids fly from flower to flower during the daylight hours. Some species—including many of the Genus *Euphoria*—mimic bumblebees in color, shape, and sound in order to avoid



↑ 普雷烏希花金龜。喀麥隆。42 mm。2005
Stephanocrates preussi. Cameroon



↑ 史密斯角金龜。人工飼育個體。♂ 36 mm ♀ 26 mm。
馬克馬尼格攝
Eudicella smithi. Captive bred. Photo by McMonigle

熱帶地區擁有數量最多和體型最大的花金龜。但是每一位飼育家的週遭也都一定有美麗的原生種。巨大的大王花金龜和長有犄角的*Eudicella*屬花金龜來自於非洲熱帶。擁有強烈金屬光澤的*Jumnos*屬花金龜和*Theodosia*屬的兜形花金龜來自於東南亞的熱帶。長有絨毛

predators. Many species possess beautiful green colors that help them to blend in with the foliage. However, not all Cetonids visit flowers. The thought of a massive (100 mm) *Goliathus regius* landing delicately on a flower does seem a bit far-fetched.

The greatest variety and largest flower beetles are found in tropical areas, however, there are also some beautiful species that are found in the native land of nearly any hobbyist. Huge (120 mm), ivory and velvety black *Goliathus* and the horned, hologram colored *Eudicella* hail from tropical Africa. Bright metallic *Jumnos* and heavily armed *Theodosia* live in the tropics of Southeast Asia. Velvety green *Cotinis* and black and yellow *Gymnetis* are native to the Southern US. Even the cold climate of Northern Europe boasts the metallic green *Cetonia*.

Flower beetles make great pets for a number of reasons. Caging and feeding are much cheaper for flower beetles than for birds, fish, reptiles, cats, and dogs. Cage cleaning is seldom necessary. Care is minimal if caging is correctly set up. The Cetoniidae reproduce easily and are less likely to succumb to the terrors of earthworms, mites, and wireworms than other beetles. Unlike many other beetles that take two or more years to become adults—and subsequently only living two to three months—flower beetles spend less than a year reaching adulthood and regularly live an additional four to six months. Best of all, Cetonids look beautiful, are energetic, active during the day, and are fun to watch and play with.



的*Cotinis*屬花金龜和黑黃相間的*Gymnetis*屬花金龜來自於美國南部。就是連寒冷的歐洲都有閃亮的*Cetonia*屬花金龜。

有很多原因讓花金龜成為絕佳的寵物。牠們的飼養容器比鳥籠、魚缸、貓籠、狗籠都還要便宜許多。牠們的飼養容器幾乎不用清理。如果佈置良好，幾乎可以不用照顧。花金龜容易繁殖，而且不容易被蚯蚓、蟻，以及叩頭蟲幼蟲傷害。有許多甲蟲的幼生期長達2、3年，但是成蟲卻只能活2、3個月。花金龜的幼蟲不到1年就可以羽化，而且成蟲可以活4-6個月。最好的是，花金龜很漂亮、充滿活力、白天活動、又可以把玩。

花金龜的一生有四個階段。首先，卵被生下來，然後孵化成幼蟲。幼蟲會脫兩次皮。第三次的脫皮被稱為化蛹。最後，像木乃伊的蛹羽化成蟲。生活史透過成蟲產卵的方式重複。每一階段都有不同的需求。只有幼蟲和成蟲階段會進食。所有的階段都養在攝氏21-24度的環境。



↗白條綠角金龜。人工飼育個體。45 mm。馬克馬尼格攝
Dicronorrhina derbyana. Captive bred. Photo by Mc-Monigle

Flower beetles go through four stages of life. First, eggs are laid which then hatch into hungry larval feeding machines. The larvae molt twice and upon the third molt become pupae. Finally, the mummy-like pupae molt to adults. Adults begin the cycle over again by laying eggs. Each form has specific requirements and only the larva and adult stages feed. All stages are kept at room temperature (70-75 F).



→波麗菲夢斯花金龜的幼蟲。50 mm。2005
Larvae of *Chelorrhina polyphemus*.



對許多飼育者而言，最困難的就是讓成蟲產卵。因為如此，產卵用介質一定要注意。花金龜會在枯葉碎片、腐質牛糞、用過的介質，以及朽木的混合中產卵。以下所介紹的是能夠讓許多種類產卵的介質配方。

For many collectors of flower beetles the most difficult aspect of rearing is getting the adults to lay ova. For this reason, special attention must be paid to the mat used for egg laying. Cetonid species can be made to lay eggs in a mixture of crushed dead leaves, compost manure, used substrate, and rotten wood. The following list details the compo-

◆ Components of mat for egg laying:

◆ 產卵用介質配方：

1. Dried or dead hardwood leaves. Should be crushed to the size of instant potato flakes. 50% or more of the mat.

乾燥或是死亡的闊葉木樹葉。搗碎成屑狀。比例50%或是更多。

*An inch of uncrushed leaves placed on the surface of the mat will boost egg production in some species.

註：在介質表面鋪一層2.5 cm厚的完整枯葉能夠促進部分種類產卵。

2. Larval frass/substrate. Larval substrate can be refrigerated or kept at room temperature. 10% or more.

幼蟲糞便或是舊介質。舊介質可以冷藏或是室溫保存。比例10%或是更多。

3. Compost or compost manure. Can be purchased cheaply at garden suppliers. About 20% of mat.

堆肥或是腐質牛糞。可在園藝店中買到。比例大約20%。

4. Crushed rotten wood. Collected in wooded areas. About 20%.

朽木屑。比例大約20%。

*All four components should be heated to 200-250 degrees Fahrenheit for two hours to destroy unwanted and harmful organisms.

註：四種成分應該用攝氏93-121度的溫度滅蟲兩個小時。



幼蟲所釋放的蛻皮荷爾蒙扮演著重要的角色。許多花金龜的雌蟲和某些類型的擬步行蟲以及叩頭蟲只在含有此荷爾蒙的環境中產卵。蛻皮荷爾蒙可以在科學材料行買到。人工荷爾蒙和成蟲的食物混合促進產卵。幼蟲使用過的介質和幼蟲糞便都含有蛻皮荷爾蒙，也比購買荷爾蒙便宜許多。在產卵介質中混入舊介質或是幼蟲大便和餵雌蟲荷爾蒙有一樣的效果。如果沒有特別刺激雌蟲，雌蟲也是有產卵的可能，但往往沒有產卵就死去。

花金龜的卵為圓形到橢圓形，卵殼又薄又軟。被產下幾天後，卵粒會吸收周圍的水分然後膨脹50%。卵粒2-3個星期內會孵化。無授精的卵不會膨脹。卵粒有時候是白色的，不過通常是灰色、黃色，或是土色，很難從介質中發現。大部分的花金龜一次產一粒卵。但是 *Cotinis* 屬的花金龜一口氣會產10-20粒卵，並且卵粒會以幾公厘做間隔排列成



♂鹿角金龜三齡幼蟲。30 mm。1997。活體木生昆蟲館提供

Flower beetle larvae crawl on the dorsal side. Third instar *Dicranocephalus bourgoini* larva. Live specimen provided by Moku-sei Insects Museum

nents of a substrate used successfully to collect eggs from numerous species.

The molting hormone produced by larvae plays an important role in egg laying. The females of many Cetonidae—as well as certain species of Tenebrionidae and Elateridae—lay eggs only in the presence of this hormone. Molting hormone can be purchased from scientific supply houses. Artificially produced molting hormone is mixed with the adult food to induce egg laying. Substrate used by previous larvae and larval frass (solid waste) contain this hormone and are a much cheaper alternative to buying hormone. Mixing used substrate/larval frass into egg laying mat has the same effect as feeding females hormone. Without special care taken to provide this stimulus the females might lay eggs but often die without having deposited a single egg despite otherwise perfect substrate.

Flower beetle eggs are oval to spherical in shape and surrounded by a thin, soft, shell. Within a few days after being laid, the egg will expand about 50% by absorbing the surrounding moisture and then hatch within two to three weeks. Infertile eggs do not expand. Sometimes the eggs are bright white but more often are a shade of gray, yellow, or brown and can be very difficult to find in the substrate. Most Cetonids lay eggs singly, however, beetles of the Genus *Cotinis* deposit 10-20 eggs in succession in a circular formation with each ova being only a few millimeters apart. Eggs are pretty tough and are seldom damaged by being handled or by being battered around by the females as they continue to oviposit.



一個圓形。花金龜的卵粒蠻強壯的，很少會因為被觸碰或是被雌蟲在重複的產卵過程中撞擊而死亡。

花金龜的幼蟲很好分辨。所有的幼蟲，包括大王花金龜的幼蟲，都是躺著爬。幼蟲的蠕動讓牠能夠迅速地在表面或是介質中移動。這些幼蟲的足部都相當發達，讓牠們能夠把介質表面的食物拖到介質中享用。

花金龜的幼蟲會吃的東西很多。枯葉扮演著重要的角色，而朽木和堆肥讓幼蟲的飲食多樣化，並且培育出大型個體。飼養幼蟲時不需要把枯葉搗碎。但是需要將朽木搗碎，否則幼蟲會啃得很吃力。添加狗食、貂食、貓食、魚飼料等等能夠加速幼蟲的成長。以上的任何一種高蛋白食物，如果拿來當做添加物，能夠讓大部分的幼蟲長得更大，不過有時候只能夠縮短幼蟲期。幼蟲也可以用水苔、園藝土，或是帶有沙子的土壤飼養，不過會需要補充其他營養。副食品除了以上提到的動物飼料以外還可以包括萵苣、水果、堅果、打碎的玉米，以及其他種子。種子和堅果需要打碎；幼蟲無法自己把種子和堅果咬破。雖然有些花金龜的幼蟲住在泥土中，但是牠們吃的是腐植質，不會吃植物的根部。如果只給幼蟲吃活的植物根部，牠們就會餓死。

雖然有些花金龜的幼蟲任何種類的狗/貓食都會吃，但是有些種類，比如說

Cetonid larvae are easy to identify; the larvae of all the species—including the monstrous larvae of *Goliathus goliatus*—all walk on their backs. The rippling motions of the body quickly propel the active larvae about when at the surface and in the substrate. Legs of these animals are well developed and are used by the larvae for grabbing food at the surface and bringing it underground to be consumed.

Cetonid larvae will feed on many substances. Dead leaves play an important role in the diet while rotten wood and compost are helpful in that they give larvae a varied diet and help in the rearing of large adults. When feeding larvae it is unnecessary to crush dead leaves. Rotten wood, on the other hand, should be crushed since otherwise larvae will have a difficult time feeding on the wood. The addition of a kibbled food, such as dry dog food, ferret food, cat food, fish food pellets, etc., greatly speeds up the growth of the larvae. Using, as a supplement, one of the above high protein foods will increase the size of the majority of larvae but, at times, may only decrease the time necessary for larvae to become adults. Larvae can be raised in peat moss, potting soil, or sandy soil, but supplemental feeding would be necessary. Foods include the above substrate components and also can include romaine lettuce, fruits, nuts, cracked corn and other seeds. Seeds and nuts must be smashed or cracked so larvae can access the meat; they are unable to break open the hard shells on their own. Although the larvae of some flower beetle species are found naturally in the ground, they feed on decaying organic materials which they come across,



大王花金龜，只吃輕易就會發霉的狗食。使用某種品牌之前，應該要先做發霉實驗。把一些飼料埋在潮濕的介質中48-72小時。挖起來後，適合的品牌會被介質包圍，因為長滿了菌絲。不要使用沒有長大量菌絲的飼料，因為它可能含有防霉劑。除此之外，不會迅速發霉的飼料很容易導致蟻的爆發，因為蟻不吃菌絲，專門吃飼料。

如果只餵食朽木和枯葉，大王花金龜很少能夠存活。狗食讓大王花金龜的幼蟲活得很好。幼蟲也很喜歡狗食上的菌絲。在過去的經驗中，只餵堆肥、朽木，以及枯葉混合的大王花金龜幼蟲通常都會死去。少數存活下來的個體幾年才脫一次皮，並且5-6年後才羽化。一旦添加狗食，大王花金龜的幼蟲快的話6個月就會羽化！

介質的溼度也很重要。介質應該潮濕，但是放在一張紙上10秒鐘後不應該留下水跡。花金龜的幼蟲蠻韌命的。牠們可以在極乾燥和極潮濕的介質中活數個星期。偏乾的介質似乎不會影響幼蟲，但是會延長幼蟲期；在乾燥的環境中幼蟲的成長速度會變慢。但是如果介質過濕，幼蟲最後會腐爛、變黑、然後死去。不透氣的蓋子通常是用來保持水分的。如果使用的容器蓋子是玻璃或是塑膠的，由於水分蒸發不易，因此切勿過分補水。

有些花金龜幼蟲的互殘性很高。

not plant roots. Larvae will starve to death if offered only live plant roots in captivity.

Although many species will feed on any dog/cat food, other species, such as *Goliathus*, will only eat dog food that grows mold readily. Before using a brand, mold growth should be determined. Bury a few pieces in moist substrate or soil and dig up in forty-eight to seventy-two hours. Brands that are suitable will be surrounded with large clumps of soil/substrate held together with white fungus hyphae. If there is little growth and pieces are removed easily from the substrate, that brand is unsuitable since it contains some form of mold inhibitor. Additionally, brands that do not grow mold quickly are much more likely to escalate existing mite problems because mites do not feed on the mold, but love to feed on the dog food.

Members of the Genus *Goliathus* seldom survive being fed only rotten wood and dead leaves as larvae. Goliath beetle grubs thrive when fed dry dog food. The mold that grows on the dog food is also eaten readily. In the past, Goliath larvae which had been fed a mixture of compost, rotten wood, and dead leaves would normally die; the few survivors would



↗哈里斯花金龜。非洲東部。50 mm。2005
Megalorrhina harrisi. Eastern Africa



↙ *Chelorrhina*屬的幼蟲互殘性極高。野蠻 (薩維吉) 花金龜。喀麥隆。60 mm。2003
Chelorrhina larvae are cannibalistic. Pictured is *C. savagei* from Cameroon.

在 *Goliathus* 屬、*Chelorrhina* 屬、*Megalorrhina* 屬，以及其他一些屬中這種情況更是嚴重。若不將以上幼蟲完全各自分開飼養將會是一個很大的錯誤。許多大型的花金龜幼蟲會捕食蟲類、軟性昆蟲，或甚至是同類。在中型和小型的種類中，例如 *Pachnoda* 屬和 *Eudicella* 屬，幼蟲只有食物或是空間不足時才會張牙舞爪。飼養中型和小型花金龜幼蟲的密度不應該超過每0.5公升1隻幼蟲。*Cotinis*、*Osmoderma*、*Rhomborrhina*，以及 *Dicronorrhina* 等屬的中型花金龜幼蟲在任意的的情況下似乎都不會相殘。

寄生真菌和寄生蟎是兩個飼育者會

take years between molts and spend five or more years before becoming adults. With the use of dog food, beetles such as *Goliathus goliatus* and *Goliathus orientalis* can now be reared to adults in as little as six months!

The moisture level of the substrate is very important. The mat should feel moist but should not leave behind water if left on a piece of paper for ten seconds and then removed. The grubs are pretty tough animals and can survive incredibly dry or even wet substrates for weeks. Drier substrate does not seem to bother the larvae but will cause more time to be taken reaching adulthood; the larvae grow much slower under dry conditions. If, however, the substrate stays extremely wet for long, the larvae will eventually rot, turn black, and die. Solid covers are normally used to keep the moisture level constant. Water should not be added to the substrate in a rearing container that has a solid glass or plastic cover since the moisture level will become too high.

Cannibalism is a problem with some flower beetle grubs. The larger species in the Genera *Goliathus*, *Chelorrhina*, *Megalorrhina*, and a few others are cannibalistic despite plenty of food and space; keeping two or more larvae together is a big mistake. Many of the larger species will feed on worms and soft insects as well as each other. Smaller and medium sized beetles such as *Pachnoda*, *Eudicella*, etc. are seldom cannibalistic but may eat one another when starved and/or overcrowded. These medium to small beetles should not be kept in densities greater than 1 larva per 1/2 liter (1/8



↗*Dicronorrhina*屬的幼蟲再怎麼樣都不會互相殘殺。圖為非洲扇角金龜。人工飼育個體。54 mm。馬克馬尼格攝

Dicronorrhina larvae are not cannibalistic under any circumstances. Pictured is captive-bred *Dicronorrhina micans*. Photo by McMonigle

遇到的問題。出現在死亡植物和動物身上的普通霉菌對幼蟲完全無害，也可以是幼蟲的食物。寄生真菌只會捕食活體昆蟲，但是飼育家遇到的機率不高。寄生真菌通常是由野生花金龜帶入的。如果不處理的話，後果不堪設想。把幼蟲養在比較乾燥的環境，並且徹底消毒養過發病幼蟲的容器，就能夠控制寄生真菌。受感染的個體也必須放入塑膠袋內然後丟棄。寄生蟎會在幼蟲身上留下深色的疤痕。一般飼育者會遇到的蟎都不是寄生蟎，只是很礙眼罷了。非寄生性的蟎也會棲息在幼蟲身上，但是牠們吃的不是幼蟲，而是幼蟲的食物。偏乾的環境能夠壓抑蟎類的生長，幾天的完全乾燥則可以殺死蟎。

製造土繭是花金龜的註冊商標之一。花金龜的土繭和其他甲蟲的蛹室比起來反而比較像是鱗翅目的繭。花金龜的土繭在完全乾燥的情況下也能夠被製造出來，因為幼蟲使用黏稠的分泌物將週遭的介質黏

gallon) in order to help prevent cannibalism. A number of the medium sized Cetonids including those of the Genera *Cotinis*, *Osmoderma*, *Rhomborrhina*, and *Dicronorrhina* are not cannibalistic under any circumstances.

Two common problems that can kill larvae are entomophagus fungi and parasitic mites. Common molds and fungi which feed on dead and decaying animal and plant matter pose no threat to larvae and, as mentioned earlier, can be excellent food sources for the larvae. Entomophagus fungi only feed on living insects and are seldom encountered by the hobbyist. This type of fungus can be introduced with wild livestock and is disastrous if left untreated. Keeping larvae under dry conditions and sterilizing the cage and mat in which any larvae or pupae have molded easily combats entomophagus fungi. Also, infected individuals must be sealed in a plastic bag and discarded. Parasitic mites leave dark scabs/discoloration on the areas where they have fed on larvae. Most mites encountered by the hobbyist are not parasitic but are annoying and unwanted. Non-parasitic mites may rest on the larvae but will feed on the larvae's food rather than the larvae. Parasitic and non-parasitic mites are controlled by dryer conditions and may be killed off entirely by a period of a few days with nearly zero moisture.

Pupal cell formation is one of the outstanding and identifying features of flower beetles. Cells are more like the cocoons of Lepidoptera than like the poorly constructed cells of other beetles. Cetonid pupal cells are able to be formed under completely dry con-



↑ 花金龜的土繭。
Pupal cells of flower beetles.

成堅硬的蛹室。在很乾的環境中，土繭可以變得幾乎和石頭一樣硬。不過在過濕的環境中也會溶解。土繭最大的缺點就是幼蟲只做一個。如果幼蟲在製作土繭的過程中被干擾，或是土繭被弄破，幼蟲死亡的機率就很高。人工蛹室或是其他幼蟲的舊蛹室可以拿來做替代品，也能夠提升土繭遭到破壞的幼蟲的存活率，但是羽化出來的往往是活不了幾天的畸形個體。

飼育者通常看不見土繭中的巨大變化。不過也是有方法能夠不把土繭破壞又判定幼蟲是否已經化蛹。如果輕輕晃動土繭，蛹便會在裡頭扭動身軀，造成震動。成蟲和幼蟲則不會震動。只有少數的種類會靠著飼養容器的牆壁做土繭，也只有這些種類的化蛹或是羽化過程能夠透過飼養容器觀察。在絕大多数的例子當中，花金龜在土繭中的動靜只



↙ 剛羽化的波麗菲夢斯花金龜。62 mm。2005
C. polyphemus right after elosion.

ditions as the larvae use pieces of surrounding matter glued together with secretions to produce a somewhat hard and thin-walled pupal cell. Under very dry conditions the walls of the cells can become nearly rock hard but will disintegrate under wet conditions. An unfortunate aspect of this type of pupal cell is that larvae only make one. If larvae are disturbed during this process or if the pupal cells are crushed and nothing is done, there is no chance for survival to adulthood. Handmade pupal cells or old pupal cells from previous beetles can be substituted, and will definitely increase their chance of surviving, but usually produce deformed adults which do not live for more than a few days.

The massive changes taking place inside the pupal cell are normally unseen by the hobbyist. It is possible to determine if a larva has pupated without seeing inside the pupal cell. When the pupal cell is lightly shaken the pupa will rattle while the adult and larva do not rattle. Only a few species



能夠透過在土繭鑽出一個小洞觀察。
註：如果鑽洞的時候幼蟲還有活動能力，幼蟲有可能鑽出土繭，最後死亡。從製作土繭到花金龜羽化需要1-3個月的時間。

雖然堅硬的土繭可以防止蚯蚓、叩頭蟲幼蟲，以及其他的危險入侵，但對於會將大部分蛹殺死的過高濕氣卻是一點用都沒有。此外，幼蟲製作土繭時身上所帶的蟎，在過濕的環境中有可能大量繁殖，最後把蛹悶死。反之，只有最乾燥的情況才可以將受到土繭保護的幼蟲乾死。有被人為鑽孔或是不小心弄破的土繭應該要放在有蓋子的容器內，並且底部應該要鋪一層2.5 cm的微濕介質，以防止蛹乾死。

只要飼養的方式正確，各種花金龜從卵到成蟲只需要1年或更短的時間。即使是在野外需要2年才會完成生活史

regularly form pupal cells against the sides of a clear container and only in these species are the changes from larva to pupa and pupa to adult visible. In most cases, the progress of the beetle can only be seen by opening a small hole in the pupal cell. Note: if the larva is still active when a hole is made it will climb out and this animal will probably not reach adulthood. These changes inside the pupal cell take from one to three months.

The tough pupal cell walls protect the pupa inside from the dangers of earthworms, wireworms (*Elateridae* larvae), desiccation, etc. However, the pupal cell walls cannot protect the pupa from high moisture levels that are fatal to most pupae. Also, under wet conditions any mites on the larva at the time the pupal cell is formed may be able to kill the pupa. Conversely, only the driest of conditions can kill the pupa while in a sealed pupal cell. Pupal cells with either manmade or accidental holes need to be kept in a sealed container and placed on an inch of slightly moist substrate in order to prevent desiccation of the pupae/larvae.

As long as the larvae are fed properly, the entire life cycle of the various *Cetoniids* from ova to adulthood is a year or less. Even species from temperate climates, which take



←只要給予的食物正確、足夠，花金龜幼蟲1年內便會羽化成蟲。圖為肥胖的鹿角金龜三齡幼蟲。30 mm。1997。活體木生昆蟲館提供

If well fed, all flower beetle larvae become adults within one year. Pictured is a full-grown, fat *Dicranocephalus bourgoini* larva. Live specimen provided by Moku-sei Insects Museum



的溫帶種類，在室溫下也只要1年就可以完成生活史。當然了，如果餵的食物不正確或是週遭溫度低於20°C，幼蟲期則會增長。如果一開始沒有好好地餵食，之後再仔細地照顧有時對幼蟲還是很有幫助的。美國西南部的一種小型花金龜，*Euphoria rufina*，從卵到成蟲只需2.5-3個月的時間。巨大的大王花金龜能夠短至6個月便羽化成蟲，然而有許多在別的亞科之中的小型金龜卻需要2-5年的時間，實在是不可思議。

產於亞洲的「四點花金龜」*Jumnos ruckeri*有時並不好養。此種幼蟲並不難養大；其飼養難在有時再老熟的幼蟲都不肯化蛹。將老熟幼蟲養於較乾燥的環境3個月，之後再將其轉移到較濕的環境能促進其化蛹。這個方法具有風險，因為在潮濕的環境中土繭相當脆弱。土繭造好後必需轉移到較乾的環境中，否則蛹容易發黑或是發霉死亡。花金龜幼蟲營養不良時也有可能拒絕化蛹。如果有別種成熟已久，但是就是不肯化蛹的花金龜幼蟲，也可以用相同的方法促進製作土繭。

化蛹幾個星期到幾個月後，蛹便會羽化成蟲。新成蟲成熟了以後便會自行從土繭爬出，除非土繭相當堅硬。若是羽化後不久便將新成蟲從土繭中取出必需格外細心，因為此時新成蟲的外殼尚未完全硬化。如果將還未完全硬化的新成蟲與已成熟的成蟲養在一起，後者很

two years in the wild, will complete their life cycles in less than a year at room temperature. Of course, if larvae are incorrectly fed or kept below room temperature the cycle can be much longer. If fed poorly from the beginning, proper feeding later on can be very helpful but does not always produce noticeable results. A small species from the Southwestern US, *Euphoria rufina*, is able to complete its entire life cycle in two and a half to three months. It is amazing that such giant Cetonidae as *Goliathus orientalis* can easily grow from ova to adults in as little as six months while tiny beetles in other families must spend two to five years to complete a single life cycle.

A very beautiful species from Asia, *Jumnos ruckeri*, can be one of the more difficult to rear. Although larvae grow quite well, even after being fully-grown they refuse to make pupal cells. A long period of dryness (about three months) followed by moistening of the substrate will induce pupal cell formation. This method is tricky because moist pupal cells are very fragile. If the pupal cells are not removed to a dry area, the pupae inside will often turn black or become moldy and die. When the larvae of other Cetonids are kept improperly (i.e. underfed, kept too dry, etc.) they may also refuse to pupate. Other species may also be induced to form pupal cells in this same fashion. This method of inducing pupation only works with mature larvae.

A few weeks to a few months after pupation, the pupa will molt to adult and the large wings will form perfectly inside the



有可能無意地將前者的腹部撕開。當然了，外殼還柔軟的新成蟲就算是從很低的地方摔到硬的物體表面都很少能夠存活。

花金龜成蟲喜愛啃食香蕉、軟桃、蘋果、水梨，以及葡萄等等。帶有硬皮的水果，例如香蕉和蘋果，餵食時一定要切片；軟皮的水果，例如軟桃，有無切片都無所謂。在沒有水果的情況下，*Eudicella*和*Dicronorrhina*屬的成蟲也會啃食柔軟的狗食。有些屬的成蟲，包括*Osmoderma*，就算是從不餵牠們都能夠正常地交配和產卵，但壽命會縮短許多。

花金龜擁有絕佳的飛行能力，飛行技術與蜻蜓不相上下。花金龜能夠瞬間起飛。牠們的翅鞘沒有延伸到腹部側面，因此內翅可以立刻伸出來，不需要等翅鞘打開。由於大部分的種類都能夠瞬間起飛，並且在花叢中四處竄翔，因此一旦採集者的行蹤被發現，將完全不可能捉到牠們。在戶外把玩花金龜是很不明智的舉動，因為飛走的機會極高。但是在戶內看牠們飛行卻很有趣。就算是室內燈火繁多，只要戶外有透入任何的光線牠們都會往光源處狠狠地飛去。飛行中的個體似乎都能夠迅速地發現沒有關的窗戶。展開雙翅有40-50 mm的*Cotinis texana*的飛行能力好到可以在40公升的小魚缸中騰空個幾分鐘。所有的花金龜飼育容器都需要加蓋。

tiny pupal cell. Adults will emerge on their own when mature unless the pupal cell is extremely dry and as hard as a rock. If adults are removed early from the pupal cell the new exoskeleton will still be soft and should be treated gently. If premature adults are put in with other adults they can often be killed accidentally with their abdomens being ripped open by the mature adults. Premature, soft adults will seldom survive long after even the shortest of falls onto a hard surface.

The various flower beetle adults enjoy feeding on fruits including bananas, peaches, apples, pears, and grapes. Many fruits including apples and bananas must be cut when fed to the adults but fruits with soft skin, such as peaches, are not too much of a challenge for the adult beetles to chew into on their own. In the absence of fruit, adult *Eudicella* and *Dicronorrhina* have been observed feeding on moist dog food. Adults of some genera including *Osmoderma* can mate and lay eggs if never fed but will live much shorter lives.

Flower beetles possess incredible flight capabilities. Adults are able to maneuver in flight as well as a dragonfly (Odonata). Flower beetles can take off in a fraction of a second. The elytra do not extend down the sides of the abdomen and the hind wings can be quickly spread and put into use without the need to open the elytra first. Most species are impossible to catch if the beetles detect the collector's approach because they can take off in a fraction of a second and dart between objects. It is a bad idea to play with adults outside, as they will almost certainly



飼養成蟲的容器內應該要有大塊的木頭或是其他擁有粗糙表面的物體讓成蟲攀抓，因為成蟲很容易翻倒。如果成蟲大部分的時間都是躺在介質表面，牠們當然就不會吃東西或是繁殖。如果沒有放東西讓成蟲攀抓，飼育者大部分的時間都將花在幫成蟲翻面。

花金龜的繁殖需要雄蟲和雌蟲；所有的花金龜都無法孤雌生殖。要用肉眼辨別花金龜幼蟲的性別需要好的眼力。要分辨成蟲的性別從簡單到不可能的任務都有。雄性幼蟲在腹部倒數第三節的中央部位有一個幾乎看不見的小黑點。這個小黑點在雌性幼蟲身上找不到。

Cotinis、*Pachnoda*、*Gymnetis*、*Cetonia*等屬的雄性成蟲和雌性成蟲長得幾乎一模一樣。雄蟲往往比雌蟲小些以及有些種類的雄蟲腹部有一縱向凹坑。反



有些花金龜成蟲的性別相當難判定。圖為豹紋花金龜。人工飼育個體。22 mm。馬克馬尼格攝
Sex determination in some flower beetle species can be very difficult. Pictured are captive-bred *Gymnetis pantherina*. Photo by McMonigle

be lost, but watching them fly indoors can be quite amusing. The beetles fly directly to polarized light. Despite massive lighting in a room, the adults detect even the smallest amount of polarized light leaking out from a closed shade. Open windows seem to be found with uncanny precision and speed. Adults of *Cotinis texana* with a wingspan of 40 to 50 mm can stay aloft in a 10-gallon (40 liter) aquarium with a screen lid for a few minutes bouncing up and down against the screen. Flower beetles' flying abilities necessitate the use of a lid on all cages.

The cage in which adults are kept should have large chunks of wood or other large rough objects on the surface as the adults are quite prone to getting stuck on their backs. Adults will not feed, mate, or lay eggs if all of their time is spent on their backs. Furthermore, if there is nothing for the adults to grab onto much time can be spent by the hobbyist putting the beetles right side up.

Both males and females are necessary for culturing flower beetle—none of the Cetonidae is parthenogenic. Visually determining the gender of larvae can be difficult while determining the sex of the adults can range from obvious to impossible. Male larvae possess a tiny and barely visible dark mark in the middle of the third to last ventral abdominal segment. This marking is not found on the female larvae. *Cotinis*, *Pachnoda*, *Gymnetis*, *Cetonia*, etc., contain species in which adult males and females are nearly identical. Males tend to be slightly smaller and in a few of these species the males have



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Sex determination in some flower beetle species can be very difficult. Pictured are captive-bred *Gymnetis pantherina*. Photo by McMonigle

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♂伯特隆花金龜。坦尚尼亞。36 mm。2005
Ranzania bertolonii. Tanzania



♂烏爾曼花金龜。喀麥隆。人工飼育個體。45 mm。馬克馬尼格攝
Captive-bred *Eudicella woermani*. Cameroon. Photo by McMonigle

之，也有相當多的種類雌雄外觀差異非常地明顯。*Dicranocephalus*、*Eudicella*、*Ranzania*等屬的雄蟲除了長有犄角外還有增長的前腳，有些更甚至與雌蟲異色。

為了能夠與雌蟲交配，雄蟲會互相爭鬥；有些雄蟲為了防止雌蟲被搶走，還會花好一段時間停息在雌蟲背部。如果雄蟲沒有騎著雌蟲，或是在一旁守候著雌蟲，交配可能不會發生。雄蟲增長的前腳主要是為了交配時能夠更牢固地抱緊雌蟲，好防止其他爭著要交配的雄蟲將牠擠開或是自己被不願意交配的雌蟲推開。長有犄角的雄蟲雖然爭奪雌蟲

a longitudinal indent across the abdominal sternites. There are many other genera in which males appear very different. Male *Dicranocephalus*, *Eudicella*, *Ranzania*, etc., may have odd-shaped horns, elongated front legs or/and different coloration than the females.

Males fight over females for mating and will often be seen sitting on the females a good portion of the day. If the males are not seen sitting on or guarding the females, mating may not be taking place. The males' elongated front arms are used to hold onto the females. The female or other males may try to pry the male off. The intricate horn structures of some species—such as *Eudicella gralli*—are used for fighting over mates but do not provide the same advantage



時會用到犄角，但牠們的犄角構造並無法讓牠們能夠像兜蟲和鍬形蟲一樣將對手舉起然後甩出；唯一的特例為*Theodosia*屬內的各種雄蟲。

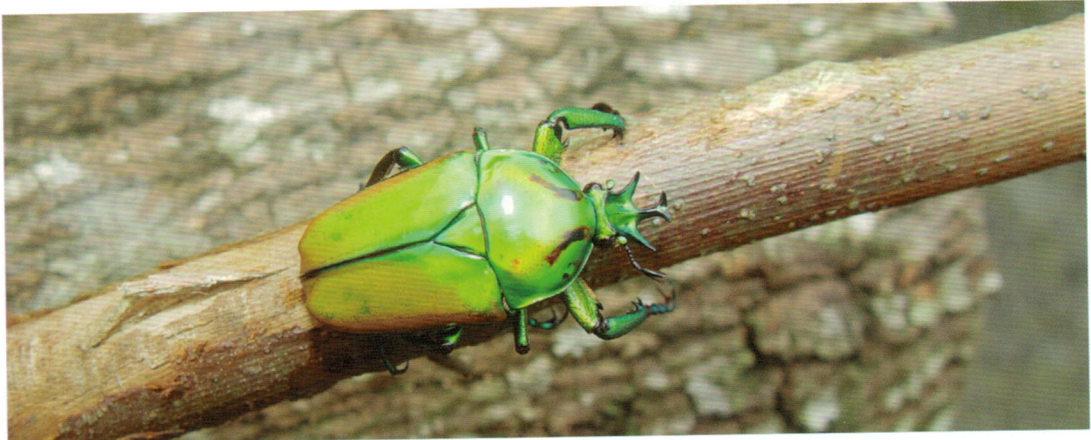
日本瘋鍬形蟲、美國喜愛兜蟲、歐洲迷戀花金龜。花金龜好動的個性和不可思議的顏色深深吸引飼育者。顏色的呈現方式包括金屬光澤、絲絨、影像重疊等，讓花金龜成為最美麗的昆蟲之一。即使是最大型的種類也可以在短時間內羽化成蟲（許多大型的兜蟲和鍬形蟲需要數年的時間）。花金龜是每一個甲蟲愛好者都應該嘗試飼育的昆蟲。

as those of Lucanidae or Dynastinae which possess opposable horns that can be used to grab, hurt, and throw the opponent. In general, Cetonids do not have opposable horns, but there are exceptions including *Theodosia westwoodi* and its relatives.

Stag beetles are the rage in Japan, rhinoceros beetles are popular in the US, and Europeans are crazy about flower beetles. It is the energetic personalities and incredible coloration of the flower beetles that catch the attention of beetle enthusiasts. The immense variety of colors—often metallic, velvety, or holographic in texture—makes a number of these incredible beetles as beautiful as any other insect including the butterflies. Even the largest species take a relatively short time to become adults (many of the large Dynastids and Lucanids take years to become adults). The flower beetles are a group that every beetle enthusiast should want to try his/ her hand at rearing.

羅氏兜形花金龜。菲律賓。30 mm。2006
Theodosia rodriguezi. Philippines





♂波呂克魯斯花金龜。坦尚尼亞。38 mm。2005
Neptunides polychrous. Tanzania



♂卡爾比花金龜雄蟲。坦尚尼亞。40 mm。2003
Male *Argyropegges kolbei*. Tanzania



♂卡爾比花金龜雌蟲。坦尚尼亞。39 mm。2003
Female *Argyropegges kolbei*. Tanzania



♂庫拉茲花金龜。喀麥隆。46 mm。2003
Chelorrhina kraatzi. Cameroon



♂古塔塔花金龜。喀麥隆。人工飼育個體。28 mm。
馬克馬尼格攝
Captive-bred *Stephanorrhina guttata*. Cameroon.
Photo by McMonigle