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w 7⅛ ins x h 10½ ins
Extent 656 pages | 140,000 words
hardback

A life-size guide to six hundred species from around the world

More than one fifth of all known life forms on this planet are beetles. They are extraordinarily visually diverse: renowned British geneticist JBS Haldane, when asked what could be inferred about God from a study of His works, replied, "An inordinate fondness for beetles." *The Book of Beetles* uncovers 600 significant examples, selected as part of a genome program. They are shown in glorious photographs, life size and in detail, alongside an engraving offering a side or open-winged view. Each profile includes a population distribution map, a table of essential information, and a commentary revealing notable characteristics, related species, and a diagnosis of the specimen's importance in terms of taxonomy, rarity, behavior, and scientific significance. Arranged taxonomically, this essential reference reveals the variety and importance of beetles for the first time.

Patrice Bouchard is research scientist and curator of Coleoptera at the Canadian National Collection of Insects, Arachnids, and Nematodes. Co-author of four books including the 1,000-page *Family-group names in Coleoptera* and the award-winning *Tenebrionid Beetles of Australia*, Bouchard is also on the editorial board of *The Canadian Entomologist, ZooKeys,* and *Zoological Bibliography*.

Arthur V. Evans is an author, lecturer, and broadcaster. He is research associate at the Smithsonian, and adjunct professor at VCU, University of Richmond and Randolph-Macon College. Evans has published over 40 scientific papers and more than 100 popular articles and books on insects, spiders, and other arthropods, for a variety of university press publishers.

Stéphane Le Tirant is curator of the Montreal Insectarium. A much published scientist, he has six species named after him. Le Tirant was the entomological advisor for the acclaimed television series "Insectia."

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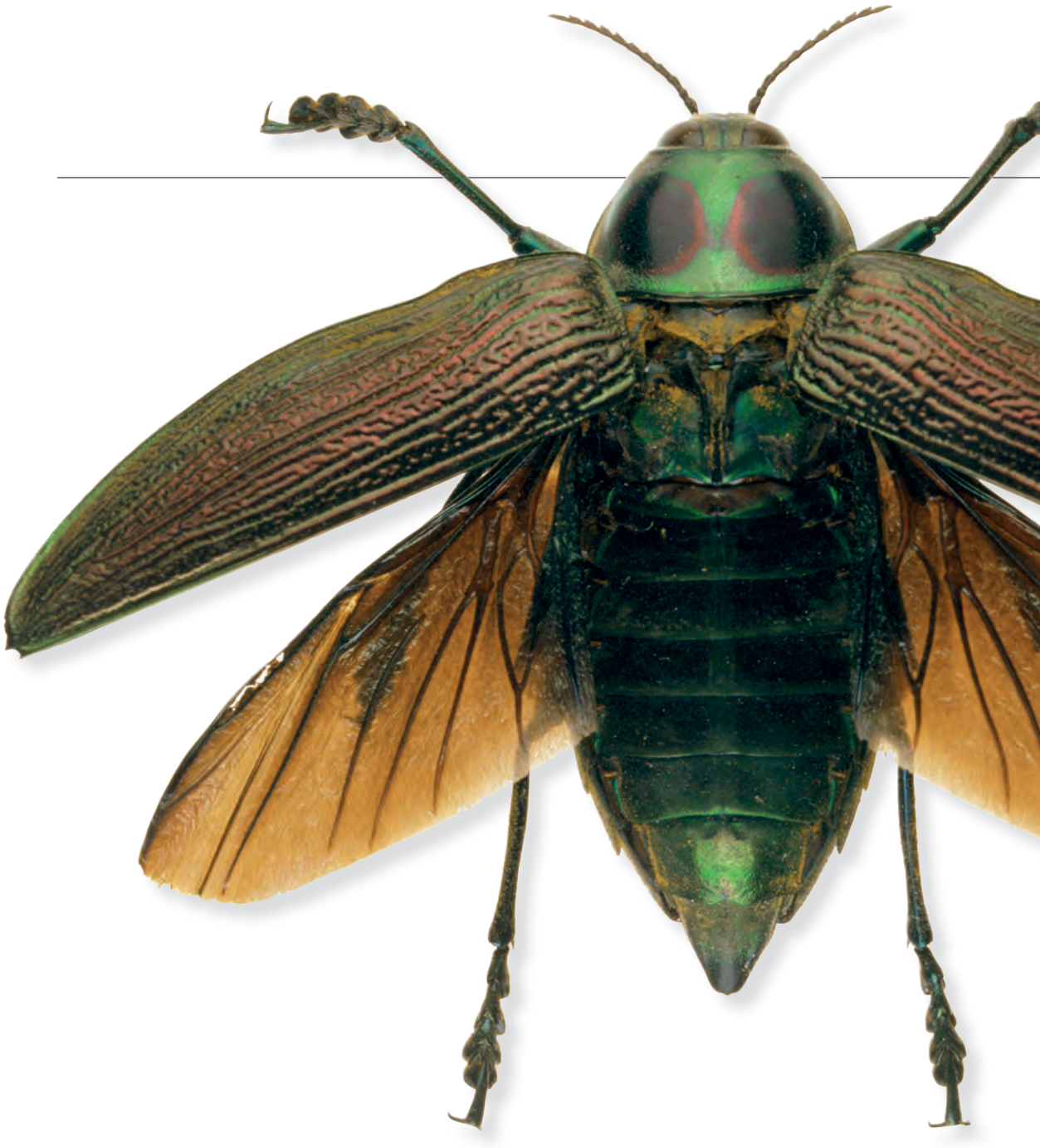
THE BOOK OF BEETLES

A life-size guide to six hundred species from around the world

Patrice Bouchard, Arthur V. Evans & Stéphane Le Tirant



CONTENTS

FAMILY	Carabidae
DISTRIBUTION	Eastern North America
MACROHABITAT	Deciduous hardwood forest and mixed woodland
MICROHABITAT	Sunny, open forest floors, roadways, and trails
FEEDING HABITS	Preys on ground-dwelling insects
NOTE	One of the first beetles described by Johann Fabricius
CONSERVATION STATUS	Least concern

ADULT MALE LENGTH
⅜ to ½ in
(10 to 14 mm)

ADULT FEMALE LENGTH
⅜ to ½ in
(10 to 14 mm)

CICINDELA SEXGUTTATA

SIX-SPOTTED TIGER BEETLE

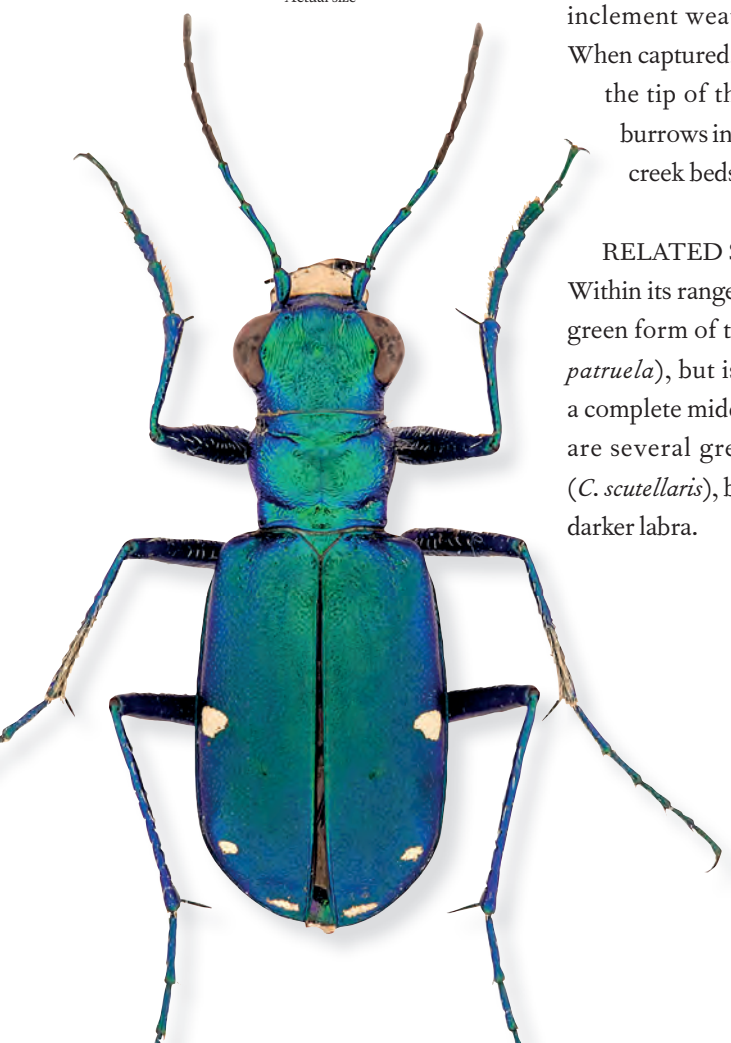
FABRICIUS, 1775

Actual size

This normally solitary and familiar beetle is active in spring and early summer; individuals and small groups are encountered only rarely in the fall. They occupy the forest floor early in the season, but as the trees leaf out, they move to sunlit areas along roads, trails, and woodland edges to hunt for insects and find mates. Individuals seek shelter during inclement weather and overwinter under loose tree bark. When captured, they secrete a volatile and burning fluid from the tip of their abdomen. The larvae dig their vertical burrows in sandy, clay, or loamy soils along roads and dry creek beds.

RELATED SPECIES

Within its range, the Six-Spotted Tiger Beetle is similar to the green form of the Northern Barrens Tiger Beetle (*Cicindela patruela*), but is brighter green than that species, and lacks a complete middle line across the middle of the elytra. There are several green subspecies of the Festive Tiger Beetle (*C. scutellaris*), but they are duller overall and the females have darker labra.



The Six-Spotted Tiger Beetle is brilliant metallic green, with or without a bluish tinge on both the dorsal and ventral surfaces, with six white spots on the apical half of the elytra; some individuals or populations have four, two, or no spots. Sculpting of the upper surface consists of small, flat bumps. The labrum is almost white. The underside and legs are bristling with scattered long white setae.

FAMILY	Carabidae
DISTRIBUTION	Coastal eastern United States
MACROHABITAT	Coastal beaches
MICROHABITAT	Open sandy beaches at and just above tide line
FEEDING HABITS	Adults prey on insects and amphipods
NOTE	Larvae take up to two years to fully develop
CONSERVATION STATUS	Threatened

ADULT MALE LENGTH
½ to ⅝ in
(13 to 15 mm)

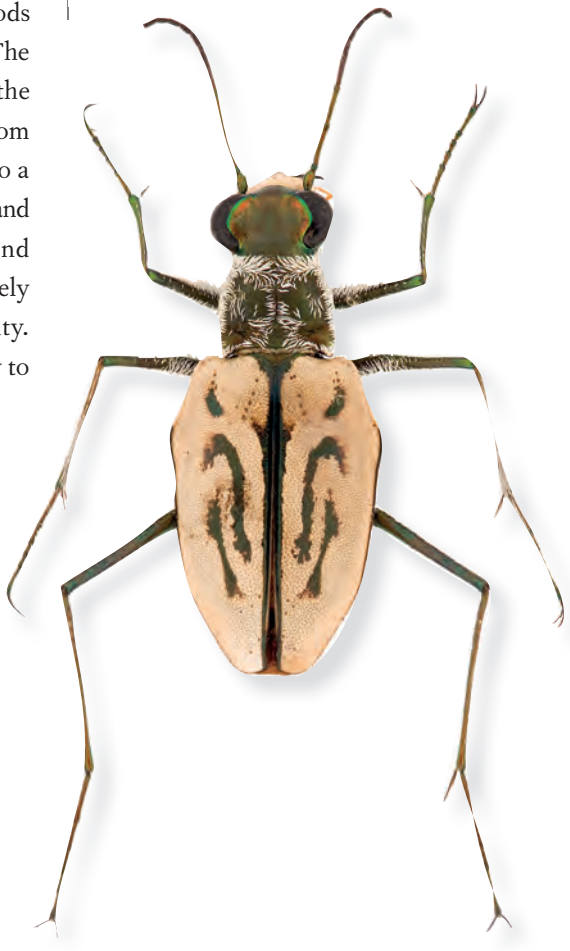
ADULT FEMALE LENGTH
½ to ⅝ in
(13 to 15 mm)

HABROSCELIMORPHA DORSALIS

NORTHEASTERN BEACH TIGER BEETLE

(SAY, 1817)

Adult Northeastern Beach Tiger Beetles hunt for amphipods and insects around the clock from June through August. The larvae dig their vertical burrows in the sand just above the high-tide line. Once distributed along the Atlantic coast from Massachusetts to Virginia, this species is now restricted to a few sites along the coast of Massachusetts and the western and eastern shores of the Chesapeake Bay in Maryland and Virginia. The dramatic decline of this species was due largely to habitat degradation from human and vehicular activity. It was declared endangered in 1990. Efforts are under way to re-establish populations within their historical range.



RELATED SPECIES

There are five distinct subspecies of *H. dorsalis* based on body size, color pattern, and differences in molecular DNA. The other subspecies, which are smaller and darker, are found along coastal beaches in southern Atlantic and Gulf Coast states, and also in Cuba.

Actual size

The Northeastern Beach Tiger Beetle is mostly white with variable bronze markings. The tips of the elytra are rounded (male) or broadly notched (female). The underside is dark bronze to blackish-green with dense white setae on the thorax. The legs have long claws and the hind femora are long, extending well beyond the body.

FAMILY	Lucanidae
DISTRIBUTION	South Africa, Western Cape Province
MACROHABITAT	Mountains, high elevations
MICROHABITAT	Under stones
FEEDING HABITS	Adults feed on various detritus in the soil
NOTE	One of the rarest stag beetles of the world
CONSERVATION STATUS	Endangered (IUCN)

ADULT MALE LENGTH
¾ to 1 in
(20 to 26.5 mm)

ADULT FEMALE LENGTH
⅝ to 1 in
(17.1 to 24 mm)

COLOPHON HAUGHTONI

CAPE STAG BEETLE

BARNARD, 1929

Actual size

The larvae of most Stag Beetles throughout the world feed on decaying wood, however species in the genus *Colophon* occur in habitats devoid of trees and shrubs. Although little is known of the lifecycle of these species, studies have shown that larvae can develop in humus-rich soil under laboratory conditions. All *Colophon* species, including *C. haughtoni*, are very rare and possibly vulnerable to the effects of global warming. These Stag Beetles are diurnal and most of them are active early in the morning. Because of their vulnerability, the capture and trade of this and other species in *Colophon* is strictly illegal.

RELATED SPECIES

Colophon is a small genus restricted to the Western Cape Province in South Africa. There are 17 species described in *Colophon* including *C. primosi*, which has long and slender yellow-orange mandibles and *C. izardi*, which shows orange spots on the prothorax in some specimens. Species in the genus are protected by CITES (Convention on the International Trade in Endangered Species of Wild Fauna and Flora).

The Cape Stag Beetle is medium sized, with a heavily sclerotized body. They are generally black or dark brown, and have teeth at the apex of their tibia that are adapted for digging. This species is flightless but short vestigial wings are found under their elytra. Mandibles in males are enlarged and are used for combat to obtain the favor of females.

FAMILY	Lucanidae
DISTRIBUTION	Australia, Queensland
MACROHABITAT	Tropical rainforest
MICROHABITAT	Tree holes, rotten logs
FEEDING HABITS	Adults feed on sap flows associated with insect damage
NOTE	The largest stag beetle of Australia
CONSERVATION STATUS	Least concern

ADULT MALE LENGTH
1 to 2¾ in
(24 to 72 mm)

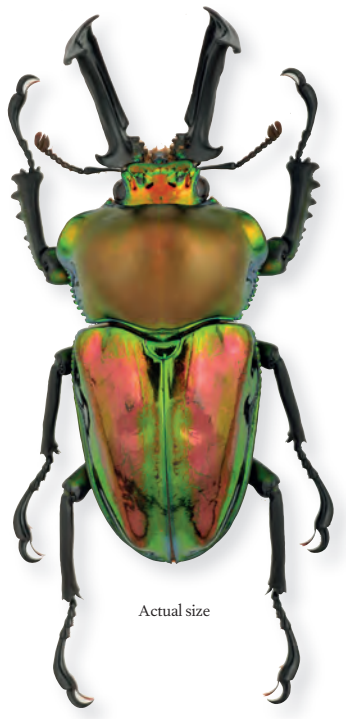
ADULT FEMALE LENGTH
1 to 1⅞ in
(23 to 46 mm)

PHALACROGNATHUS MUELLERI

KING STAG BEETLE

(MACLEAY, 1885)

The larvae of this species develop in logs attacked by white rot fungi. Larvae have been extracted from the wood of 27 tree species in 13 families. The mandibles of adult males are used to grasp or fight with other males for access to females. Very rarely, specimens with asymmetric mandibles are found. Adult specimens have been observed feeding on Eucalyptus tree blossoms and various fruits. Although generally secretive in nature, adults are known to fly to lights at night. This highly prized species among beetle collectors is bred in captivity around the world.



Actual size

RELATED SPECIES

This is the only species known in the genus *Phalacrognathus*. *P. muelleri* has been erroneously recorded as being from New Guinea. In 1885, Sir William Macleay initially described this species as new in the related genus *Lamprima*. At that time, he had only one female in his possession. Females of *Phalacrognathus* may look like females of the genus *Lamprima* that also occur in Australia.

The King Stag Beetle is a hansomely large, iridescent, metallic beetle with reflections of various colors from green to purple. Rare examples of blue specimens have been reported. The legs are mostly black. Males have long jaws with forked tips. Male mandibles vary from 19 to 32 percent of the total length of the beetle. Females are less iridescent and have smaller jaws.

FAMILY	Scarabaeidae
DISTRIBUTION	Eastern North America
MACROHABITAT	Deciduous hardwood forest and mixed woodland
MICROHABITAT	Adults found on flowering trees and shrubs
FEEDING HABITS	Adults feed on pollen
NOTE	Widespread, seldom encountered, with poorly known biology
CONSERVATION STATUS	Least concern

ADULT MALE LENGTH
½ to ⅝ in
(11 to 16 mm)

ADULT FEMALE LENGTH
½ to ⅝ in
(11 to 16 mm)

GNORIMELLA MACULOSA

(KNOCH, 1801)

Actual size

Little is known about the biology of this conspicuous, yet seldom seen species. Adults are usually encountered in small numbers in wooded habitats on hot days in May and June. Strong fliers, they resemble bees as they buzz among the flowers. They prefer the blooms of dogwood (*Cornus*) and viburnum (*Viburnum*), but will also visit those of other deciduous hardwoods, including blackberry (*Rubus*), hawthorn (*Crataegus*), tuliptree (*Liriodendon*), apple (*Malus*), and maple (*Acer*). The only published record of the larvae is that they develop in rotten trunks of eastern redbud (*Cercis canadensis*), although it is likely that they utilize other sources of decaying wood.

RELATED SPECIES

The genus *Gnorimella* is restricted to the Nearctic realm and includes only one species. Its nearest relative is the *Palearctic Gnorimus* that includes species in Europe and Asia. Two other closely related genera are found in the Nearctic, including *Trichiotinus* (eight species) and *Trigonopeltastes* (two species). All species in both genera are regular visitors of flowers in late spring and early summer.

Gnorimella maculosa is black with mottled brown and black elytra, with the rest of the body variably marked with cream or yellowish-orange spots. The elytra are bare, but the body and underside are clothed with long pale or yellowish setae. Males have strongly curved middle tibiae, while those of the female are straight. Northern populations are darker overall with fewer and smaller markings.

FAMILY	Scarabaeidae
DISTRIBUTION	Eastern North America
MACROHABITAT	Deciduous hardwood forest and mixed woodland
MICROHABITAT	Tree holes, rotten logs, and sapping ash branches
FEEDING HABITS	Adults imbibe sap laden with microorganisms, also fruit
NOTE	One of the largest horned beetles of North America
CONSERVATION STATUS	Least concern

ADULT MALE LENGTH
1½ to 2½ in
(40 to 60 mm)

ADULT FEMALE LENGTH
1½ to 2½ in
(40 to 60 mm)

DYNASTES TITYUS

EASTERN HERCULES BEETLE

(LINNAEUS, 1763)

Larvae develop in rotting hardwoods, including oak (*Quercus*), cherry (*Prunus*), black locust (*Robinia*), and willow (*Salix*); they will also occasionally use pine (*Pinus*). Two years are required to complete the lifecycle. Pupation takes place in late summer inside a cell constructed from larval fecal pellets. Adults emerge in several weeks, but remain in the cell until the following summer. Both males and females are found at larval breeding sites and are attracted to lights at night. Males guard sapping wounds on ash trees that will attract females and use their forceps-like horns to grapple with rival males.

RELATED SPECIES

Dynastes is restricted to the Nearctic and Neotropical realms and includes seven species. *Dynastes granti*, the only other species in the United States, is restricted to the Southwest. *Dynastes hyllus* and *maya* occur in Mexico and Central America, while *D. neptunus* and *D. satanas* are found only in South America. The Hercules beetle, *D. hercules*, occurs from southern Mexico to South America, including the Lesser Antilles.

The Eastern Hercules Beetle is large, olive, yellow-green, or gray, with irregular black or mahogany spots. Well-hydrated individuals may have one or both elytra completely dark. Males have a single curved horn on their head and one long and two sort horns on the pronotum. Females have a single tubercle on the head, while their pronotum lacks any adornment.

Actual size

FAMILY	Cerambycidae (Prioninae)
DISTRIBUTION	South America, southward up to approx. 30°S
MACROHABITAT	Tropical rainforest
MICROHABITAT	Often found on "Balata" palm trees
FEEDING HABITS	Adults do not feed at all
NOTE	One of the longest beetle species of the world
CONSERVATION STATUS	Vulnerable (IUCN)

ADULT MALE LENGTH
2½ to 7 in
(59 to 177 mm)

ADULT FEMALE LENGTH
2½ to 4½ in
(60 to 115 mm)

MACRODONTIA CERVICORNIS

GIANT JAWED SAWYER

(LINNAEUS, 1758)

Actual size

Macrodontia cervicornis is the largest of all *Macrodontia* and is the most common species of the genus. Adults are nocturnal and rarely come to light. Specimens are often found on "Balata" palm trees, which are a foodplant. The morphology of the larvae is unique with thoracic and abdominal segments covered with velvet-like setae. Larvae create extensive galleries in the heart of dead and dying softwood trees such as the coconut palm (*Cocos*) but also *Attalea*, *Ceiba*, and *Jessenia*. Larvae can reach up to 8¼ in (21 cm) in length and are a source of food for the native people of Brazil.

RELATED SPECIES

Macrodontia is restricted to the Neotropical region and includes eleven species—*Macrodontia zischkai*, *M. jolyi*, *M. iatyensis*, *M. dejeani*, *M. mathani*, *M. marechali*, *M. crenata*, and *M. flavipennis*. These species are restricted to South America while *M. batesi* and the recently described species *M. castroi* occur in Central America. Some species have broad geographic ranges while others are known only from one country.

The Giant Jawed Sawyer Beetle is a very large beetle with a brown and black patterned prothorax. The head, legs, and jaws are very irregular and the incurved mandibles possess internal teeth. The body of this species is flattened. Specimens show a large variety of size and some are considered giants of the subfamily Prioninae. Large specimens have huge dentate mandibles.

FAMILY	Cerambycidae (Prioninae)
DISTRIBUTION	South America
MACROHABITAT	Tropical rainforest
MICROHABITAT	Tree branches
FEEDING HABITS	Adults do not feed at all
NOTE	One of the largest long-horned beetles of the world
CONSERVATION STATUS	Least concern

ADULT MALE LENGTH
3¾ to 6½ in
(95-167 mm)

ADULT FEMALE LENGTH
4½ to 6 in
(124 to 150 mm)

TITANUS GIGANTEUS

TITAN BEETLE

(LINNAEUS, 1771)

This species has a reputation of being the largest insect in the world. Although rumors of specimens perhaps as long as 8 in (200 mm) to 9 in (230 mm) have been reported, this is thought to be a myth since the largest-known specimens reach a maximum of 6½ in (167 mm). For a long time *Titanus giganteus* was considered to be one of the rarest beetles in existence. Recently, male specimens have been collected in relatively large numbers, attracted by bright artificial lights. Females are not attracted to lights. Larvae probably develop in decomposing logs and presumably require several years to reach the adult stage. The host tree for this species is unknown.

RELATED SPECIES

Titanus giganteus is the only species within the genus, however the genus *Titanus* formerly included two subgenera: *Titanus* and *Braderochus*. *Braderochus* is now recognized as a separate genus within the tribe *Prionini* and includes nine species. Specimens of *Braderochus* are quite rare and females are difficult to identify. *Ctenoscelis* is a similar genus from South America that includes eight species and subspecies.

The Titan Beetle is a large, dark brown to black beetle. The elytra are lightly ridged longitudinally. It is easy to differentiate the females from the males because the former have no denticulations on the tibia. Their antennae are shorter, and the scape less globular. The adults defend themselves by hissing in warning, and have sharp spines as well as strong jaws.

Actual size

Specification
656 pages
h 270 mm x w 180 mm
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Estimated Content
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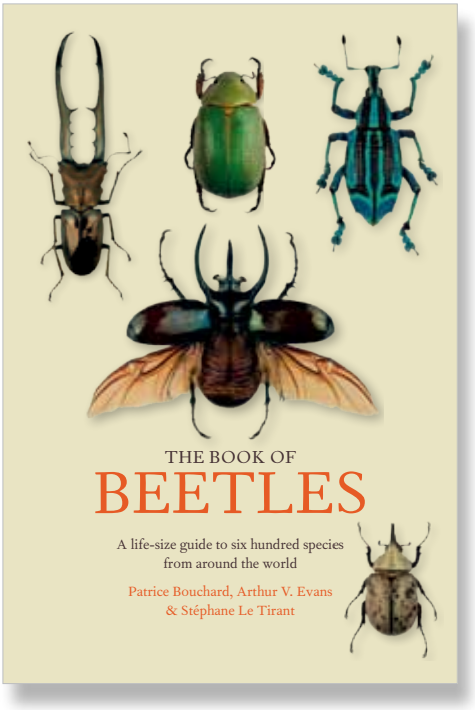
Category
Natural History



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- **Reveals the beauty and diversity of 600 of the planet's largest group of life forms, life-size and in detail**
- **Featuring a selection of significant beetles that will be genetically sequenced as part of the i5k Genome Initiative**
- **Written by world-class experts, at the forefront of their field**

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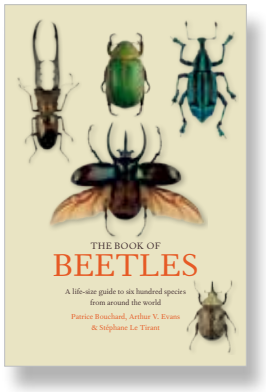

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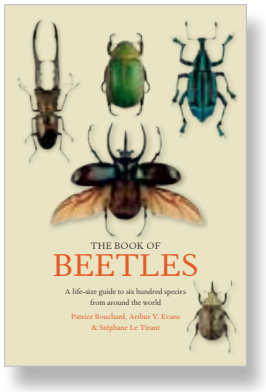

Participant Biographies

Consultant editor and co-author: Patrice Bouchard
Co-author: Dr. Arthur V. Evans
Co-author: Stéphane Le Tirant

Patrice Bouchard is research scientist and curator of Coleoptera at the Canadian National Collection of Insects, Arachnids, and Nematodes. He specializes in the study of two of the most diverse groups of beetles, weevils and darkling beetles. He is the co-author of four books including the 1000-page *Family-group names in Coleoptera* and the award-winning *Tenebrionid Beetles of Australia: Descriptions of tribes, keys to genera, catalogue of species*. He is on the editorial board of *The Canadian Entomologist*, *ZooKeys*, and *Zoological Bibliography*. He is currently involved as entomological advisor in the development of a new natural history television series focusing on insects and their relatives.

Dr. Arthur V. Evans is an author, photographer, lecturer, and broadcaster. He is a Research Associate at the Smithsonian Institution, Virginia Natural History Museum, and Virginia Commonwealth University (VCU), as well as adjunct professor at VCU, University of Richmond, and Randolph-Macon College. Evans has published over 40 scientific papers on the systematics, biology, and identification of scarab beetles and other insects, as well as more than 100 popular articles and books on insects, spiders, and other arthropods. He was an advisory editor and contributing writer to *Insects of the World* (2002, Marshall Cavendish), *Volume 3. Insects, Grzimek's Animal Life Encyclopedia* (2003, Thomson Gale), and author of the two invertebrate volumes of Grzimek's *Student Animal Life Resource* (2005, Thomson Gale). He has co-authored three beetle books with the University of California Press, including *An Inordinate Fondness for Beetles* (2002, with Charles Bellamy), *An Introduction to Beetles of California* (2004, with James Hogue), and *Field Guide to California Beetles* (2006, with James Hogue). His latest books include the *National Wildlife Foundation Field Guide to Insects and Spider of North America* (2007, Sterling) and *What's Bugging You? A fond look at animals we love to hate* (2008, University of Virginia). He is currently working on two more books, *Beetles of Eastern North America* (Princeton University Press) and *Introduction to Insects of Virginia and the Carolinas* (University of Virginia Press).

Stéphane Le Tirant is curator of the Montreal Insectarium, one of the world's largest museums devoted entirely to insects. He is an expert in Scarabaeidae (scarab beetles) and their sub-families Dynastinae and Euchirinae. He is the author of numerous papers on insects and the co-author of *Papillons et chenilles du Québec et des Maritimes*, a book on the butterflies and caterpillars

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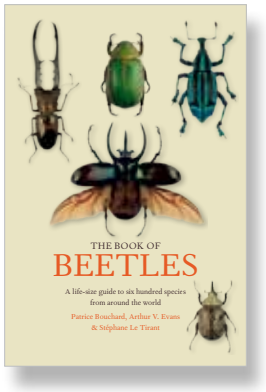

of Quebec and the Maritimes. Le Tirant has served as an international consultant for many projects including the Shanghai, Hong Kong, Newfoundland, and Audubon insectariums. He has helped to create more than 12 butterfly houses around the world. He was the entomological advisor for the acclaimed series *Insectia*, which was purchased by the National Geographic and Discovery channels. Six species have been named after him.

Authors' Rationale

In 1871, Charles Darwin noted that "If we could imagine a male *Chalcosoma* with its polished, bronzed coat of mail, and vast complex horns, magnified to the size of a horse or even of a dog, it would be one of the most imposing animals in the world." In terms of size, beetles, like most other insects, are at somewhat of a disadvantage, at least in terms of our ability to see and appreciate them. They live all around us, yet they largely go about their lives unseen and unappreciated by most people. *The Book of Beetles* dramatically breaks down this barrier to awaken the beetle enthusiast in us all by presenting these amazing animals and their lives within a framework that is easily accessible.

With over 385,000 species of beetles worldwide, it is impossible for any book to adequately cover even one per cent of the world's fauna. However, the 600 species included in *The Book of Beetles* were specifically selected to provide a unique taxonomic survey of the majority of beetle families from around the world. Visually stunning, engagingly written, and scientifically accurate, *The Book of Beetles* presents images of meticulously prepared specimens from some of the world's most important natural history museums, research institutions, and private collections.

The Book of Beetles features life-size photographs of each species to provide an instant visual comparison. These images are accompanied by cogently written species accounts that provide information on natural history, a brief review of similar species, and a species diagnosis that highlights features required for accurate species identification. An information table provides a quick reference to each species' family classification, distribution, macrohabitat and microhabitat preferences, feeding habits, and other notes. Each species is supplemented with an engraving-style image of the side view of the specimen, for a more complete review of its biology.

In addition to their geographic distribution and family classification, the 600 species depicted in the book were selected, in part, on the basis of several additional criteria, including those that are physically impressive, scientifically

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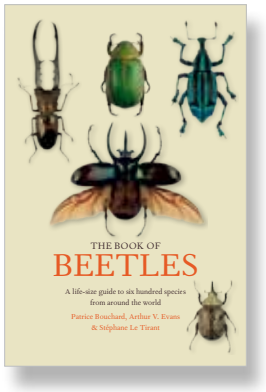

compelling, culturally significant, or economically important; as well as those with curious natural histories or a particular relevance to conservation.

The introductory sections of the book cover a range of topics, including beetle morphology, evolution, and classification; color and form; behavior; diversity and distribution; beetle study and conservation; and, beetles and human society. These topics and the detailed narratives provided throughout the text reflect the authors' own research and fieldwork, as well as the recent scientific contributions of coleopterists from around the world. The result is a book that is intended to appeal to amateur beetle enthusiasts, professional coleopterists, and budding entomologists and naturalists around the world.

Species Inclusion Criteria

These criteria combine to offer a unique taxonomic survey of the majority of beetle families from around the world:

Scientifically compelling: Subjects of focused scientific research, medicinal use, inspirations for biomimetic and technological innovation,

Curious natural histories: Unusual adaptions, ability to live in extreme habitats, interesting symbioses, engaging behaviors

Culturally significant: Mythological and religious symbols, uses in folk medicine, entomophagy

Economically important: Pest species, use as biocontrol agents, sources of products and services, role in forensic entomology

Conservation: Rare and threatened species

Physically impressive: Large, colorful, horned, exaggerated, or unusually developed legs or mouthparts. Those species with special structures involved in specific behavior that has evolved through natural selection over millions of years and thus carries interesting underlying genetic information

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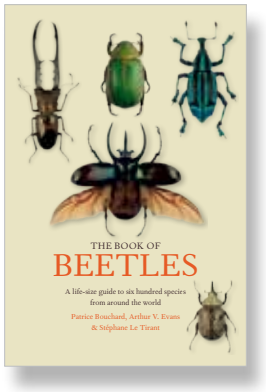

5,000 Insect and Other Arthropod Genome Initiative

The i5k initiative plans to sequence the genomes of 5,000 insect and related arthropod species over the next five years. This project will be transformative because it aims to sequence the genomes of all insect species known to be important to worldwide agriculture, food safety, medicine, and energy production; all those used as models in biology; the most abundant in world ecosystems; and representatives in every branch of insect phylogeny so as to achieve a deep understanding of arthropod evolution and phylogeny.

Author Patrice Bouchard is helping to establish a list of 500 of the world's most important beetles for the i5K initiative. The majority of the beetles selected for *The Book of Beetles* will feature on this list, since the selection criteria for the book and the i5K intiatives are broadly the same.

More information about the project can be found here:

http://arthropodgenomes.org/wiki/i5K.

Sample Introduction Text

"From the small size of insects, we are apt to undervalue their appearance. If we could imagine a male *Chalcosoma* with its polished, bronzed coat of mail, and vast complex horns, magnified to the size of a horse or even of a dog, it would be one of the most imposing animals in the world."

Charles Darwin, *The Descent of Man*

WHAT IS A BEETLE?

The armored bodies of beetles make them at once familiar and yet utterly alien animals. They are distinguished from other insects by a unique combination of characters, including biting mouthparts, protective wing covers called elytra, and complete metamorphosis. Typically small and compact, they bore, burrow, and swim through various substrates in a staggering array of terrestrial and freshwater habitats...

MORPHOLOGICAL FEATURES

Beetles display an incredible diversity of form. These physical modifications provide not only a basis for their classification and identification, but also offer clues that reveal their evolutionary history. From the smallest feather-winged beetles (0.04 cm) to one of the largest beetles of all, *Titanus giganteus* (20 cm), beetles share common characteristics that clearly identify them as insects

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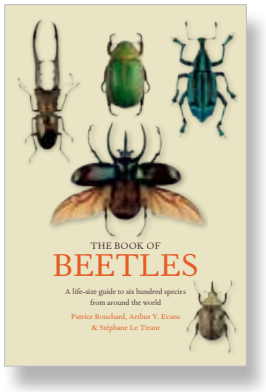

in general and beetles in particular. Their exoskeleton functions as both skeleton and skin by providing support for internal muscles and a platform for important tactile and chemosensory structures. The most conspicuous feature unique to beetles are the leathery or shell-like wing covers called elytra. Elytra help to stabilize beetles while in flight, protect the membranous flight wings and internal organs, conserve precious bodily fluids, and shield them from extreme temperatures...

EVOLUTION AND CLASSIFICATION

The relationship between beetles and plants is highly significant to the evolution of both groups of organisms. For millions of years beetles have been eating fungi, mosses, and algae and were thus poised to exploit a new range of vegetative tissues afforded to them with the appearance of the first flowering plants about 125 million years ago. This long and dynamic relationship with plants has contributed directly to the diversification of beetles, making them the most speciose group of animals on Earth. The accurate and consistent use of scientific names of beetles, along with the retrieval of the vast amount of data contained within such a large and diverse group of organisms, is made possible by a hierarchical system of classification that is based on shared morphological features that reveal a shared evolutionary history. The approximately 385,000 species of beetles are currently organized in 1,663 tribes contained in 541 subfamilies that are nested within 211 families, all in the order Coleoptera...

COLOR AND FORM

Beetles come in a riot of forms, colors, and patterns. Some species, males in particular, are adorned with spectacular horns or enlarged mandibles that are used in bloodless bouts with rival males of the same species. Other males have highly modified legs or feet to help them to hold on to their mates while copulating. Flattened from top to bottom with smooth outlines, the streamlined bodies of both aquatic and wood-boring beetles help to reduce resistance as they swim through water and chew through wood, respectively. Some predatory species are flat, almost paper thin, enabling them to easily hunt for prey among tight spaces in leaf litter or under bark. Boldly marked species may look less beetle-like against certain backgrounds, but in other species contrasting markings are very conspicuous and may serve to warn potential predators of noxious chemical defenses. The striking colors of many beetles are produced by pigments acquired from food or produced internally. Iridescent and metallic colors are the result of optical interference created by surface texture or the reflection and refraction of light on micro-thin layers in the exoskeleton...

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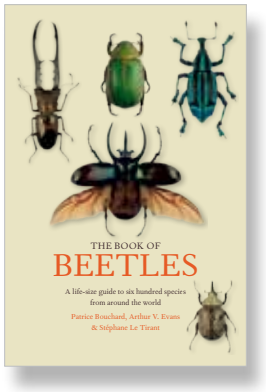

BEHAVIOR

As with all other animals, beetles must locate food, reproduce, develop, and avoid predators in order to maintain their populations. Beetles have evolved an amazing array of behaviors that enable them to receive and act upon mechanical, thermal, and chemical stimuli. They consume everything—fungi, plants, and animals—both living and dead. Nearly all species of beetles have the ability to communicate with one another through physical, chemical, or visual means. Although most species engage in sexual reproduction, some have evolved the ability to reproduce without mating. In these beetles, males are rare or unknown altogether. A few species even exhibit varying degrees of parental care. Feigning death, cryptic coloration, bold markings, mimicry, and potent chemical defenses are employed to confuse or deter predators...

DIVERSITY AND DISTRIBUTION

Approximately 385,000 kinds of beetle have been described in scientific literature over the past 254 years (compared to approximately 10,000 species of birds during the same period). Each of these species is the embodiment of millions of years of success and failure that reflect a population's continuous struggle with biotic and abiotic factors. The diversity of beetles is due largely to their small size and varied morphologies. This allows them to occupy and exploit all possible environments from rocky fell-fields on mountain peaks thousands of meters above sea level to arid deserts and tropical rainforests. Some species are broadly distributed naturally or through human activity, while others are restricted to a particular mountain range, valley, dune system, body of water, or cave. Mountains, valleys, deserts, and oceans serve as corridors of dispersal for some beetles and act as barriers to others...

BEETLE STUDY AND CONSERVATION

In most terrestrial and freshwater habitats, beetles are found virtually anywhere, anytime. An understanding of their biology and evolution provides a better understanding of the greater natural world. Studying beetles by making scientifically valuable and aesthetically pleasing collections, photographing their seemingly limitless forms and behaviors, or rearing them in captivity can provide a lifetime of exploration, discovery, and pleasure. The study of beetles has never been more critical. Urbanization, agricultural development, logging, water impoundment, persistent adverse weather, electric lights, and invasive species are just a few of the serious threats to their populations and habitats. Habitat degradation is further exacerbated by the steady decline of trained coleopterists, scientists dedicated to the study of beetles, who provide critical data for their conservation. Nevertheless, governments around the world have recognized the precariousness of some beetle populations and the need to preserve their habitats...

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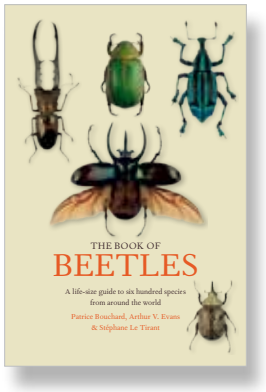

BEETLES AND HUMAN SOCIETY

The beetle–human interface is complex. Since the beginning of history, a relatively small number of beetle species have ravaged crops, ruined managed timber, sullied stored products, and destroyed valuable museum specimens. Yet their overall impact on our lives is largely positive. Beetles have played a significant role in art, crafts, literature, mythology, religion, medicine, and nutrition. They have also been transported across the globe for use as biological controls to combat invasive insects and weeds. The study of beetles has made significant contributions to our understanding of genetics, evolution, adaptation, and biogeography. More recently they have served as important inspirations for advances in technology and biomimetics.

THE BEETLES

Six hundred species—one per page, each photographed life-size—are shown alongside a distribution map, charted information, narrative text, facts on similar species, and a species diagnosis. This section is divided into four main chapters according to their classification: 1) suborder Archostemata; 2) suborder Myxophaga; 3) suborder Adephaga; and 4) suborder Polyphaga. Within each section the arrangement of species is also taxonomic, by family or subfamily.

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