



THE INCREDIBLE
⚡ **POP-UP** ⚡
BUG

**WITH 20 FLAPS
TO LIFT AND
GIANT POP-UPS!**

BEN HOARE

JASMINE FLOYD

INVERTEBRATES RULE THE WORLD

Most animals don't have a backbone, or spine, like we do. They are called invertebrates. There is not a single bone anywhere in their body! This book looks at two kinds of these brilliant creatures: insects and arachnids (which include spiders and scorpions). One of their secret weapons is a tough outer covering, the exoskeleton, which gives them support and protection. They come in a mind-blowing variety of shapes and sizes, grow incredibly fast and eat just about anything. No wonder they are so successful.

10

QUINTILLION

10,000,000,000,000,000,000

This is the number of individual

insects thought to be alive today.

Insects outnumber us by 200 million to one!

"An insect is more complex than a star... and is a far greater challenge to understand."

Martin Rees,
Astronomer Royal

HABITATS

Insects and spiders live in almost every habitat - except in the oceans.

AIR

Lots of insects fly, and some spiders are able to parachute.

CITY

Urban areas can be great habitats for insects and spiders.

FOREST

Forests have more different species than anywhere else!

DESERT

Spiders, scorpions and a few insects can survive desert temperatures.

FRESHWATER

Insects and spiders may live underwater for all or part of their lives.

SOIL

Many insects are found in earth, either as adults or while developing.

INVERTEBRATES RULE THE WORLD

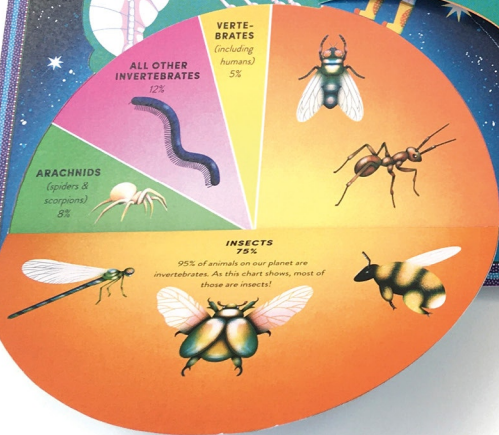
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Insects outnumber us by 200 million to one!

"An insect is more complex than a human, and it is far greater than we can understand."
—Jim Riles, author Royal

Invertebrates have a hard exoskeleton.

Invertebrates have a hard skeleton on the outside.



95% of animals on our planet are invertebrates. As this chart shows, most of those are insects!

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Many insects are found in earth, either as adults or while developing.

INSECT ANATOMY

Every insect, whatever shape or size it is, has three main body sections. These are the head, followed by the thorax, and finally the abdomen. The thorax is the part with the legs and wings (if the insect has any). The abdomen, usually the largest section, contains the organs for digesting and breathing.

HEAD

An insect's head is like a spring box - inside is a toy train the size of a full stop. At the front are the mouthparts, eyes and a pair of feelers, or antennae, which the insect uses to touch, smell and taste things. Some insects have up to three extra eyes on top of their head, though they are far smaller.



ORCHID BEE
Euglossa imperator

Eyes and parts take up much of the head's head.

THORAX



COMMON WASP
Vespa vulgaris

Wasps have a defined thorax, where the legs and wings attach.

The middle part of an insect can often seem quite small, but it's incredibly important. It is the insect's powerhouse, packed with powerful muscles to move the legs and wings. The thorax also has a feeding tube, blood vessels and nerves that connect the head and abdomen.

FIVE-HORNED INOCEROS BEETLE
Eupatorus gracilicornis

ABDOMEN

The abdomen is where an insect digests and stores its food, and produces waste products. Also here is the insect's main heart - unlike us, it has several smaller ones too, in other parts of the body! The reproductive organs are normally near the tail end of the abdomen.



FOOTBALL HOVERFLY
Megophanes pennsylvanica

Each kind of hoverfly has a different pattern on its abdomen.

LEGS

Insects always have six legs, and this is one of the easiest ways to tell if you are looking at an insect or something else. They come in stiff sections, which are linked by flexible joints, with sharp claws at the tip. Tiny hairs covering the legs help deter movement.

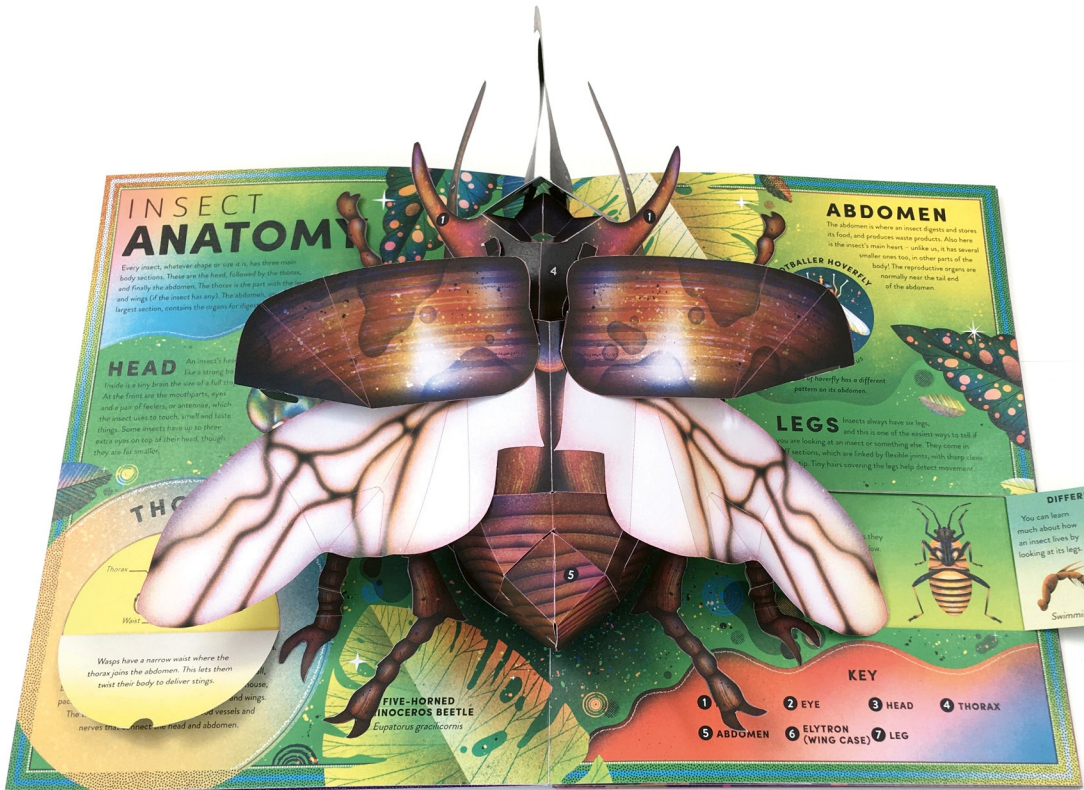
FIRE BUG
Pyrrhocoris apterus



Here we see the firebug's legs from above.

KEY

- 1 HEAD
- 2 EYE
- 3 HEAD
- 4 THORAX
- 5 ABDOMEN
- 6 ELYTRON (WING CASE)
- 7 LEG



INSECT ANATOMY

Every insect, whether larger or size it is, has three main body sections. These are the head, followed by the thorax and finally the abdomen. The thorax is the part with the legs and wings (if the insect has any). The abdomen is the largest section, containing the organs for the digestive system.

HEAD

An insect's head is usually a tiny fraction of the size of a full insect. At the front are the mouthparts, eyes and a pair of feelers, or antennae, which the insect uses to touch, smell and taste things. Some insects have up to three extra eyes on top of their head, though they are far smaller.

THORAX



Wings have a narrow waist where the thorax joins the abdomen. This lets them twist their body to deliver stings.

The thorax contains the heart, lungs, and wings. The abdomen contains the digestive system and vessels and nerves that connect the head and abdomen.

FIVE-HORNED RHINOCEROS BEETLE
Eupatorus gracicornis

ABDOMEN

The abdomen contains an insect's digestive and stores its food, and produces waste products. Also here is the insect's main heart - unlike us, it has several smaller ones too in other parts of the body. The reproductive organs are normally near the tail end of the abdomen.

TRILLER HOVERFLY
The trillier hoverfly has a different pattern on its abdomen.

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DIFFERENT TYPES OF LEGS

You can learn much about how an insect lives by looking at its legs.



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