

that eat holes in clothing. Moths and butterflies are grouped together in the Order *Lepidoptera* (scaly wings), which makes up about 7 percent of all life on Earth. Much discussion and debate on the taxonomic classification of butterflies and moths continues, with some butterfly families including species that are intermediate in form. An interesting exposition of the etymology of scientific names for moths uncovers some fascinating reasons for their nomenclature.

There is an appealing diversity of moths in size, shape, colors, wing spans (0.2–30 cm), and wing patterns. Some moths are pests—the brightly colored, poisonous day-flying moth, moths whose larvae devour fruit, and the clothes moth larvae that can digest keratin found in hair, wool, and skin. One group of moths, the silkworm moths, has been domesticated for the production of silk fibers.

Historical writings on moths go back more than 2300 years to Aristotle's *Historia animalium*, which includes several moth species. Through the centuries, other written works on insects (including moths) by notable scientists and naturalists including Malpighi, Swammerdam, Redi, Réaumur, and others demonstrate the international roots of our knowledge of these creatures. Accompanying the descriptions of these significant works are beautifully detailed illustrations from the works themselves.

The author includes detailed discussions of moth diversity, life cycles, physiology, and behavior. An interesting story involves French entomologist Jean-Henri Fabre's first observation of the effects of moth pheromones and wondering whether they had a hidden form of communication. Recently, there has developed a concern regarding a drop

in moth diversity because of ecological threats from habitat destruction as a result of agriculture, tourism, climate change, and other ecological challenges.

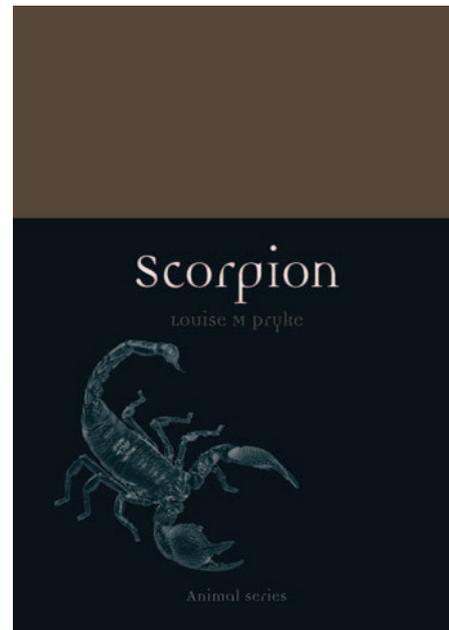
Moths are widely used as subjects and symbols in literature and the arts, and a significant portion of the book showcases a variety of examples. As the author acknowledges, "Moths seem to flit between the arts and the sciences." References to moths are found in the biblical books of Isaiah and St. Matthew, and they also make appearances in Shakespeare's *Coriolanus* and *Merchant of Venice*. A book of essays by Virginia Woolf is titled *The Death of the Moth*. The painting *Moth and Candle* (Louis Busman) and the drawing *A Moth Trap in the Woods* (K.A. Doktor-Sargent) are examples of visual art, and Sir Harrison Birtwistle's *The Moth Requiem* is a musical piece written for eleven female voices, three harps, and an alto flute. Many works of art and literature revolve around the attraction of moths to flames. Goethe's poem *Ecstatic Longing*, for example, depicts the moth refusing to recognize the hazards involved in moving toward a flame.

There is much more to be found in this captivating volume. For example, in some countries caterpillars are important sources of human nutrition. And Eri, one unique form of silk, is manufactured by the *Ailanthus Silk Moth*, the production of which varies from other silks. Often referred to as the "fabric of peace," it is used by religious denominations that do not want to kill insects. Also, scientists are now using DNA barcoding of short genetic sequences instead of morphological differences to untangle some of the moth taxonomic problems. Carefully researched, this book presents a provocative and stirring view of moths as living organisms with many fascinating biological features and cultural connections.



Scorpion. By Louise M. Pryke, 2016. Reaktion Books. (ISBN: 9781780235929). Paperback. \$19.95.

Few people would include scorpions on their top ten favorite animals list. They have a harsh reputation as creepy, mysterious, and disgusting. There are more than 1800 known species of scorpion, with many yet to be discovered and classified. They are found in numerous environments from deserts to seashores to rainforests and are part of the most successful group of animals on Earth—the arthropods. Complete fossils of scorpions are rare, but they have been found in numerous countries. They show very little change from their



prehistoric ancestors, dating back to the Silurian Period, to the present. They are the earliest terrestrial animals in the Southern Hemisphere.

Scorpions have mouthparts lined with teeth used for grabbing and crushing prey. They have four pairs of legs, as is characteristic of all arachnids. A pair of pincers extends from the front of the body, and at the end of the abdomen is a stinger. Scorpions have a long life span with some living up to 30 years. After complex courtship rituals, they give birth to living young and provide maternal care to the offspring.

Many examples of scorpions as they are represented in human thought and civilization are presented. Much Egyptian mythology involves scorpions, with the Egyptian goddess Serket originating as a deified scorpion. She is predictably depicted with a headdress shaped like a scorpion. "Scorpion" is one of the most challenging poses in yoga, requiring great strength and balance. Scorpions are often associated with weapons of war. Ancient shields and swords are often depicted with scorpions. A Nigerian Army leader called The Black Scorpion was involved in numerous deaths. There are confirmed reports of scorpions being used in biological warfare, and a Chinese realtor in 2011 allegedly used scorpions as weapons in a property dispute. The Textron Airland Scorpion is a tactical jet now being developed.

Scorpions make many appearances in the arts and literature. The oldest art works in the United States, 6000-year-old Native American cave art in Tennessee, contain drawings of scorpions. In Islamic art, scorpions can have a "positive symbolism suggesting triumph over evil." In Stanley Spencer's *Christ in the Wilderness: The Scorpion*, Jesus cradles a scorpion in his hands.

Lorenzo Bartolini sculpted a marble figure, *Nymph With a Scorpion*. Numerous films have scorpion connections, among them *Diamonds Are Forever*, *Skyfall*, and the *Scorpion King* series. An episode of *The Simpsons* featured supervillain Hank Scorpio. Scorpions appear in tattoos on 4000-year-old mummies and on many people today. The Mesopotamian *Epic of Gilgamesh*, more than 3000 years old, contains references to hybridized human-scorpion creatures called Scorpion Men. Surviving Mayan records depict a giant scorpion monster in the *Madrid Codex*. Several biblical passages mention scorpions, sometimes as symbols and other times as the actual animals. John Milton's *Paradise Lost* alludes to the scorpion, and in Lord Byron's poem *The Giaour*, the scorpion kills itself. Shakespeare's *Macbeth* laments to Lady Macbeth, "Oh, full of scorpions is my mind, dear wife." In Rudyard Kipling's short story *The Children of the Zodiac*, the scorpion kills the bull.

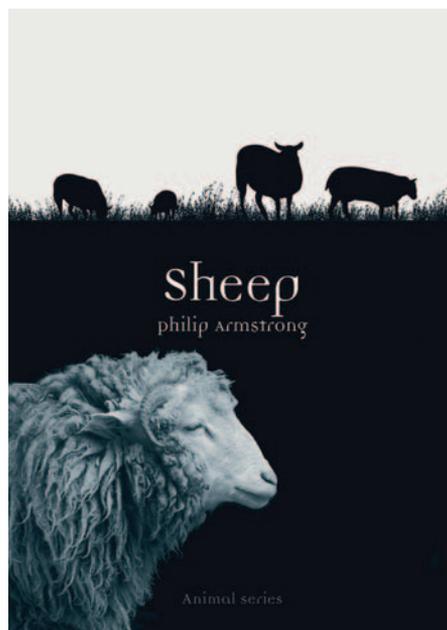
For many millennia, people have looked to the night skies, observing and telling stories of the figures they see in the stars. The astrology and mythology of many cultures include references to scorpions, and it is the eighth sign of the zodiac in Western astrology. Besides myself, people born under this sign include Whoopi Goldberg, Daniel Boone, Marie Curie, Bill Gates, and Hillary Clinton.



Sheep. By Philip Armstrong, 2016. Reaktion Books. (ISBN: 9781780235936). Paperback. \$19.95.

Sheep and goats have been important to humans for 11,000 years, longer than any species except dogs. They provide food, fiber, milk products, and even their skin was used in Europe to produce parchment for documents before paper-making was introduced. Long considered unintelligent—as when people are sometimes described as behaving “like a flock of sheep”—they are actually capable of learning to respond to commands. Sheep are a part of the traditions, literature, art, and mythology of numerous world cultures, some going back thousands of years.

Sheep first appeared near the end of the Pleistocene Era, and four wild and one domestic sheep species survive today. Though referred to as five species, they are all capable of interbreeding and



producing fertile offspring, implying that there is only one. Considerable scientific research has attempted to sort out the speciation, but much conflicting information supports Charles Darwin's conclusion that the question of sheep ancestry remains in “a hopeless state of doubt.”

Almost every page reveals something new and fascinating about these animals. Most people don't realize that bonding in a flock of sheep is aided by scent trails from glands between their hooves or that wool is a natural air conditioner, insulating against cold and protecting against extreme heat. There is fascinating and unexpected information on mating practices (most wild rams are homosexual), the relationship of horn size and leadership in rams (bigger is better), and social structure of the flocks (the fundamental bonds are between ewes and lambs). Also remarkable is that sheep share with primates a brain area that gives them an extraordinary ability to recognize individual faces of sheep and other species.

A considerable amount of sheep history is incorporated into the book. An explanation of the development of wool production highlights inventor John Kaye's “Flying Shuttle” that led to an increase in the productivity of weavers, and the invention of the steam engine and its use in textile mills is examined as a major driver of the rise of industrial cities in England. Also included is the story of the breakthrough scientific experiment that gave us “Dolly,” a ewe cloned from a mammary

gland cell of another ewe, becoming the first cloned mammal.

The dark side of raising sheep is presented in an especially frank and gruesome discussion of how sheep are treated in factory farming situations. Practices of confinement, transportation, and eventual slaughter are horrendous. Especially brutal is the procedure of mulesing—flaying the skin without anesthesia for the purpose of preventing growth of matted wool.

There is much more to be found in this fascinating work. To those who might think that sheep are not much more than Mary's little lamb or Bo-Peep's lost flock, this will be an eye opener. A few examples of places where sheep appear in culture include literature (Thomas Hardy's *Far from the Madding Crowd*), poetry (William Blake's *The Lamb*), painting (Franz Marc's *The Sheep*), sculpture (Henry Moore's *Sheep Piece*), and religion (biblical use of the lamb as a symbol of Christ).

It is a well-known practice for insomniacs to count sheep until they head off into Dreamland. This book, however, does just the opposite. Carefully researched, it presents a provocative and stirring view of sheep as living organisms with many fascinating biological features and cultural connections. It definitely is not a sleep inducer.



Richard Lord, retired
Presque Isle High School
Presque Isle, ME 04769
rlord@aol.com

AMANDA L. GLAZE is Assistant Professor of Middle Grades & Secondary Science Education at Georgia Southern University in Statesboro, Georgia. In addition to science teacher education, she has taught biological science courses for grades 7–12 and undergraduate students for the last ten years. Her interests include evolutionary biology, science and religion, and the intersections of science and society—specifically where scientific understandings are deemed controversial by the public. Glaze holds degrees in science education from The University of Alabama and Jacksonville State University. Her address is Department of Teaching & Learning, Georgia Southern University, PO BOX 8134, Statesboro, GA 30458; e-mail: aglaze@georgiasouthern.edu.