BOOK REVIEWS

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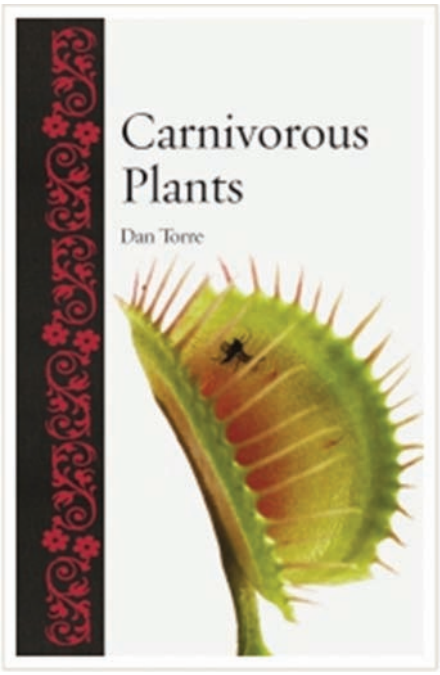

BOTANY

Carnivorous Plants. By Dan Torre. 2019. Reaktion Books. (ISBN 9781789140521). 240 pp. Hardcover, $20.53.

Carnivorous plants are not the gorgeous flowers typically seen in magazines and calendars or on Facebook, but they certainly have a kind of attractive beauty that roses, orchids, and lilies can't match. For many people, the idea of meat-eating plants doesn't fit with the usual concept of plants making their own food, and historically this idea was even difficult for scientists. This book includes a detailed story of carnivorous plants, including their evolution, growth patterns, ways of obtaining nourishment, and comparisons to non-carnivorous plants. There are over 700 species of carnivorous plants – plants with leaves that attract and consume insects and other small invertebrates. They are found throughout the Earth in numerous habitats, especially those that lack the kinds of nutrients that can be supplied by animals. Most plants absorb nutrients from the soil, many of which originate from decayed animals and their excrement, but only plants that actually capture their animal food are considered carnivorous. Although carnivorous plants can survive on their own, they will grow better if they get their meat. Some are carnivorous only part of their lives and others are even omnivorous, also consuming plant material.

Some of these captivating plants use snapping traps to capture their meals, while some manufacture sticky materials to catch theirs. Others grow receptacles that fill with water and drown their prey. A variety of additional adaptations in these plants ensure successful meal preparation. Many of these plants also have relationships with other organisms (bacteria, protozoa, and even insects and mammals) to assist them with their food getting. Author Dan Torre includes thorough descriptions of the natural history of many carnivorous plants, including the more well-known Venus flytrap, pitcher plant, sundew, and bladderwort as well as the lesser-known waterwheel plant, rainbow plant, corkscrew plant, and cobra plant.

One memorable chapter, "Attack of the Killer Plants," shows that carnivorous plants are good subjects for horror stories, from Arthur Conan Doyle's "The American's Tale" to the 1960 film "The Little Shop of Horrors." In addition to their literary appearances, these plants are also an important theme in visual art. Contemporary artist Madeline von Foerster describes her stunning paintings as "living still-lifes." Several of her exquisite images adorn the pages of this book. Other forms of carnivorous plant art include metal and glass sculptures, postage stamps, coins, a Malaysian fountain, and Nike's "Kyrie 1 Flytrap" basketball shoes.

Here are a few other thought-provoking items to look for while reading this book:

- the botanical garden display that duped visitors with giant carnivorous plants
- the extensive discussion of how the Venus flytrap functions
- the criminologist who wrote that carnivorous plants are likely the evolutionary source of human evil
- the remarkable relationship between a pitcher plant and a bat in Borneo
- the way bush fires contribute to the growth of carnivorous plants
- the surprising process by which *Roridula* gets its nourishment
- the description of a "man-eating plant," discovered by German explorer Carl Liche
- the long pathway to the discovery that some plants are carnivorous
- how and why sundews were once used as love charms
- the use of carnivorous plants as medicines for animals and humans
- the ways that the golden ant assists the pitcher plant, *Nepenthes bicalcarata*
- humorous newspaper accounts of topics such as (1) the intelligence of carnivorous plants, with the claim that Martian plants are more intelligent than Earth plants; (2) the pitcher plant devouring a bat; and (3) carnivorous plants dying of indigestion

For readers who might like to try cultivating these extraordinary plants, there is information on proper care, including the right soil, water, and light conditions, and possible difficulties that might be encountered. The conservation of these delightful plants is important, and in some places it is illegal to remove carnivorous plants from their natural environment.

Packed with fascinating information, this is a deeply researched, wonderfully written, and lavishly

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illustrated book that should appeal to book lovers interested in botany, especially that of the more unusual plants. It is appropriate for high school, college, and adult readers. In addition to an index, the book includes a time line, a detailed list of citations, a bibliography, and a list of associations and websites.

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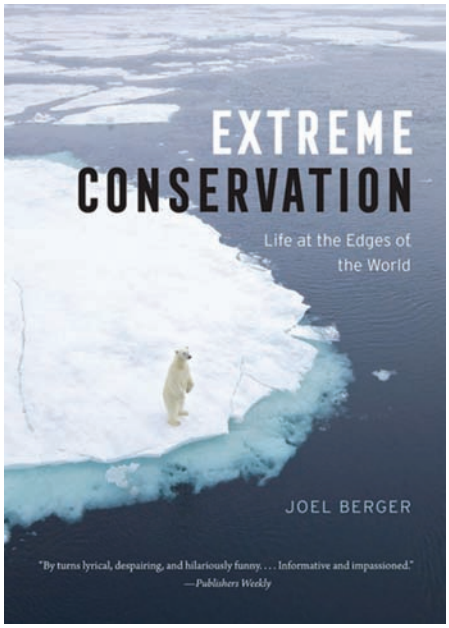

ECOLOGY & CONSERVATION

Extreme Conservation: Life at the Edges of the World. By Joel Berger. 2018. University of Chicago Press. (ISBN 9780226366265). 376 pp. Hardcover, $30.00.

Finding several orphaned musk oxen less than one year old in the days following the discovery of a slaughtered herd underscores the lack of knowledge relating to these animals. The adults were beheaded, but it is unknown who did it or for what purpose. What will happen to the juveniles without adults to protect them or teach them how to survive in the Arctic tundra? Joel Berger takes the reader to unfamiliar territories – both in terrain and in conservation efforts – throughout the world as he emphasizes the challenge of studying in habitats that are inhospitable to humans but rapidly evolving due to climate change.

John Muir, noted naturalist and the "Father of the National Parks," commented that "observation is what science is all about." But observation is anything but easy in the environments inhabited by the species Berger chooses to study. Lack of accessibility to modern conveniences means that creativity and stamina are required to overcome the obstacles to obtaining a decent vantage point. There are no easy roads to the wild musk ox territories in Alaska, and using noisy machines such as snowmobiles and helicopters to approach them would alter their behaviors. Hiking in on foot leaves the human observer vulnerable to other dangers, such as frostbite or becoming the target of a charging male ox that weighs as much as 800 pounds. Berger discovers there are very few places to run and hide in the tundra once a male notices him in his polar bear costume collecting observational data. His quick thinking saves him when he pulls off his costume head and tosses it away from himself. The confused musk ox comes to a halt trying to process what just happened. Before he can figure it out, Berger's colleagues swoop in to rescue him in their helicopter.

One reason Berger seeks to learn about these animals in their native habitat is to study the effects of humans, particularly on large mammals. The disappearance of large mammals since the mid-1800s aligns with the increased use of firearms for hunting around the world. Some noted effects on populations due to hunting include an increase in the numbers of elephants born without tusks in Zambia in the last century (from 10% of births to 38%). Likewise, a significant decrease in the average size of horns on bighorn sheep has been noted and attributed to hunting. Sheep with smaller horns are less likely to be hunted and therefore live longer and breed more.

Observations of animal behavior have led to some interesting inferences, but Berger is quick to point out the need for – and often lack of – sufficient data before reaching conclusions. It has been observed that baboons prefer to hang out around people. Is this behavior due to increased opportunities for food, or better protection from predators, or something else entirely? Female zebras and giraffes have been observed lingering near train tracks prior to and shortly after giving birth. Moose have been observed preferring to calve near roads in the Tetons. These observations raise questions that can only be answered by further study.

Berger's approach to environmental conservation relies on gaining support from the local community, often a daunting task. "When can we shoot them?" is a common question from residents at community meetings in Alaska regarding the conservation of the musk ox, whose range became part of the national park system relatively recently – in 1980, without input from the residents whose families have lived there thousands of years. This caused resentment among the community members, making it difficult to gain their support. Economic concerns also need to be taken into account in such cases. For example, the wild yak competes with herds of domestic animals in the Tibetan Plateau for food and water that are becoming scarcer as the environment gets warmer each year. Farmers are understandably more focused on protecting grazing land for their herds than on the survival of yaks.

Clearly, Berger takes his mission to study how animals adapt to extreme environments very seriously, but he writes with humor and empathy. His storytelling is compelling. He leaves the reader amused, alarmed, and fascinated by his adventures. The need to study and protect extreme environments and the animals living there is well documented. Be glad that someone like Berger is willing to do it.

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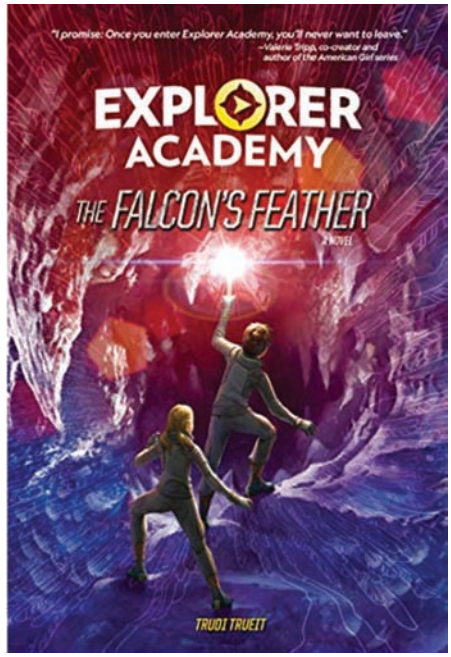

FOR THE YOUNGER AUDIENCE (TWEEN SCIENTIFIC FICTION)

Explorer Academy: The Falcon's Feather (Book 2). By Trudi Trueit. 2019. National Geographic Partners. (ISBN 9781426333040). 216 pp. Hardcover, $16.99.

The Falcon's Feather is the second book in the Explorer Academy series from National Geographic,