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17 Learning Tools For Your Next Outdoor Excursion

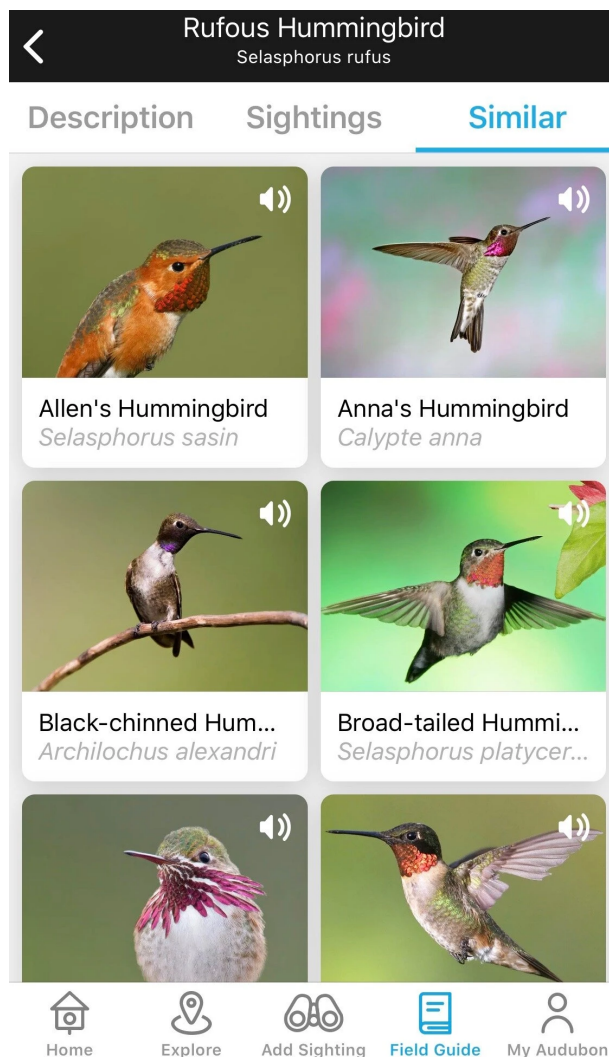
Ever wonder how underwater creatures make light? Or what a Carolina leaf-roller eats? Our list of apps, podcasts and websites will help you figure out what's going on in the great outdoors.

By Stephanie Rosenbloom

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Some of the most engaging and meaningful vacations have long been entwined with learning, be it visiting museums and libraries or touring historic properties. Nowadays, though, many vacations are outdoor excursions. Yet that doesn't mean learning is strictly about survival skills. Rather, an outdoor vacation is an opportunity to explore the wonders of ocean life, geology, botany, ornithology, zoology and astronomy — particularly with the help of some portable tools that put field guides, encyclopedias, atlases and expert research in your pocket.

Whether teaching you how to identify what you see and hear (trees, flowers, birds, bugs, stars), or explaining the features and workings of the natural world (tides, bioluminescence, migration, meteorites), these nature apps, podcasts and websites aim to help all ages roam and learn.



The Audubon Bird Guide app.

ORNITHOLOGY

Audubon Bird Guide. A striking field guide to more than 800 species of colorful North American birds, this app from the National Audubon Society uses the month, location and details you provide — like tail shape, voice and size — to help you identify the winged beauties that catch your eye. Based on your details, you'll be shown possible matches of the bird you've glimpsed. Choose one and you'll see photos and information about habitat, range and migration, diet and feeding behavior, eggs and nesting, and conservation status, as well as audio clips and whimsical descriptions of songs and calls. (The scarlet tanager's call? An "emphatic, nasal chip-bang.") Tap "explore," and a "hot spots" tab shows a map of your location and the specific birds that have been spotted nearby — a useful feature for neighborhood walks, even in small city parks. And because the best birding doesn't necessarily occur where there's Wi-Fi, you can download field-guide data and use it offline. Cost: free.

If you end up liking the app, you may also want to check out guides to specific locations, such as

Audubon Birds of Central Park and Audubon Birds of California.

iBird Guide to Birds. The handsome field-marked illustrations in this app make identifying birds easier for novices (or those with less-than-perfect sight). For example, field marks (a bird's distinguishing markings or features) shown for an adult male green-breasted mango include its green body, of course, but also deep magenta under-tail feathers, a decurved black bill and a black stripe with a blue-green border. There are details (including information about ecology, range and habitat, breeding and nesting, foraging and feeding), photos you can zoom in on and audio clips of bird songs and calls. No internet connection is required to use the app in the field. Cost: Free for the iBird Lite sampler of a few dozen species (though you can make in-app purchases, such as the "photo sleuth" feature, which enables users to identify birds through their photographs). For \$14.99 there's the pro version, which includes all species of North American birds, as well as a bird search engine so that users can filter by characteristics, like body color and bill shape. (Though you still have to pay extra for certain features, like "photo sleuth.")

Merlin Bird ID by Cornell Lab. Part of a collaboration involving the celebrated Cornell Lab of Ornithology, this app aims to help you identify birds around the world simply by snapping a photograph or, if you prefer, answering a few questions. Take a photo, or pick one from your camera roll, and the app will suggest an identification. Alternatively, you can respond to questions about where and when you spotted the bird, its size, main colors and what it was doing when you saw it — swimming? soaring? perching on a fence? — and then see a list of possible birds matching your description. Choose one and view photos, listen to sounds and learn more about it. Cost: free.

Should you wish to take your pursuits to the next level, there's the Cornell Lab of Ornithology's **Bird Academy**, which offers online courses such as "Think Like a Bird: Understanding Bird Behavior" (\$59.99), and the university-level course (more than 100 hours to complete), "Ornithology: Comprehensive Bird Biology" (\$239.99).



White-tailed Deer

Odocoileus virginianus



An image of a white-tailed deer on the Seek app.

INSECTS, ELEPHANTS, BROWN RATS AND MORE

Picture Insect: Bug Identifier. Like bird identification apps, Picture Insect analyzes your photo to determine the insect you've spotted. When the app suggests an answer, you can check out additional photos, learn about the bug's size and habitat, and read answers to frequently asked questions like "What does Carolina leaf-roller eat?" Spoiler: plants and other insects. Cost: free; \$19.99 a year (after a seven-day free trial) for the premium version with features like unlimited insect identifications.

National Wildlife Federation Nature Guides. One of the nation's largest wildlife conservation education organizations, the Federation has a variety of field guide apps to teach you more about the living things you may encounter on your outdoor adventures: birds, mammals, reptiles, amphibians, butterflies, mushrooms, trees, insects and spiders. Available for iOS only. Cost: From \$9.99 for one app to \$49.99 for the six-app Ultimate Wildlife Bundle: North America. Other app bundles are also available.

Seek. You'll be surprised by just how many creatures you can find, once you really begin looking. And this entertaining app from iNaturalist, an initiative of the California Academy of Sciences and the National Geographic Society, encourages users to do just that. Take a photograph with your phone, or choose one from your library, and Seek will use it to instantly identify animals, plants and fungi — and applaud you if you observe a particular creature through the app for the first time. (Observations also earn you virtual badges.) During a nature walk in New York's Central Park, this reporter snapped a photograph of something as it emerged from the underbrush and up popped a message on Seek: "You observed a new species! Brown Rat. *Rattus norvegicus*." The app also noted, somewhat unsettlingly, that another 283 brown rats had been observed nearby. Moments later, after taking a photograph of a small orange-winged butterfly, Seek identified it as an eastern comma. According to the app, there were far fewer eastern commas observed in the vicinity than brown rats. Cost: free.

WWF Together. Swipe through photographs and get bite-size stats on big creatures like elephants and other endangered animals (giant pandas, tigers, sea turtles) with this app from the World Wildlife Fund. You can also learn about conservation efforts and get news about wildlife. Available for iOS only. Cost: free. (The Fund also offers a free online biodiversity tool kit to help students learn about the connections among all living things.

TREES, PLANTS AND FLOWERS

PictureThis. This app is terrific at identifying in real time the plants, flowers and trees you photograph. Recently, shots of a day lily, cup-plant, white wood aster, sweet gum, even trichaptum fungus on a log, were identified in less time than it took to say "I know what this is!" The app also provides additional photos, descriptions, facts, the story behind the name and the symbolism of the things you photograph, adding a touch of romanticism to the practice of plant identification. Cost: free; annual subscriptions for a premium version, which includes features such as unlimited plant identifications, are also available.

PlantSnap is another plant identification app that also allows users to take or upload photos. There's an augmented reality option, too, so that you can just aim your phone at the plant and receive suggestions. And if you know what you're looking at, but want to learn a little more, you can type, say, "French rose" to search the app's plants database for details. Cost: free; premium ad-free subscriptions that include additional features, like access to botanists, are available.

OCEAN LIFE

Picture Fish — Fish Identifier. The hook is simple: Take a photograph of a fish (if you're fast enough) and this app will try to identify it. Cost: free; \$19.99 a year (after a seven-day free trial) for the ad-free premium version with features that include unlimited fish identifications and a fish encyclopedia.

Smithsonian Ocean. How do creatures make underwater light? How large can jellyfish get? This educational website, part of the Smithsonian Institution's Ocean Initiative, enables you to dip your toe into billions of years of ocean life through subjects like bioluminescence, coral reefs, sharks, sea turtles,

penguins, hurricanes, cyclones and typhoons. Cost: free.

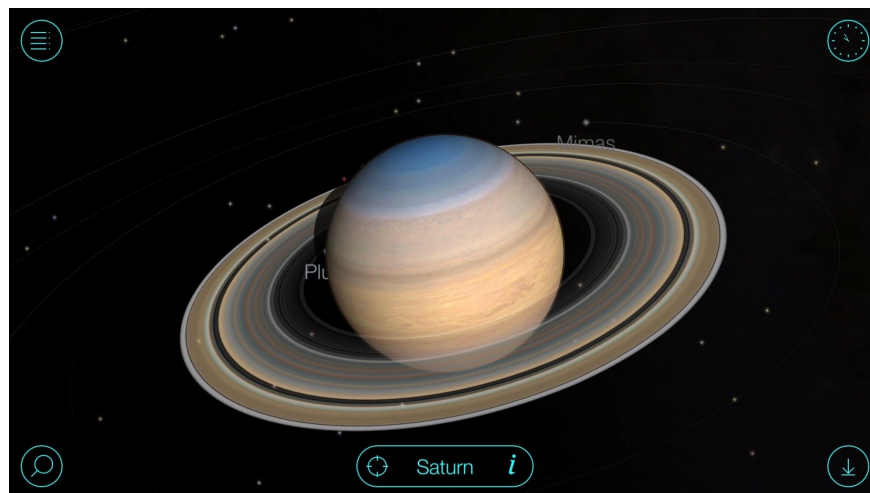
The NOAA Ocean Podcast. Spending your vacation by the shore? Next time you settle on a beach blanket, consider this podcast from the National Oceanic and Atmospheric Administration where you can learn about marine life. The Administration's website is also a good introduction to ocean-related topics like sand formation, sponges, intertidal zones and phenomena like maelstroms and waterspouts. Cost: free.

ASTRONOMY AND GEOLOGY

Khan Academy. How did the mountains you're gazing at from your Adirondack chair form? What's deep beneath your feet at the center of the earth? Among the Khan Academy's popular online educational resources you'll find videos like Introduction to Geology. Learn about the role of rocks in the exploration of the earth's history and check out related materials, like a gallery page with captions about the earth's physical processes and layers, from the crust to the inner core. Cost: free.

National Geographic Education Resource Library. The encyclopedic entries on this site are a fine place to find answers to questions about all sorts of topics that may arise during your travels through the natural world — erosion, climate change, how rainbows are made, how calderas form, the relationship between tides and the moon. Cost: free.

Peak Finder. Not sure which mountains you're looking at in the distance? Finding out can be as easy as holding up your phone. This app has a camera mode that uses augmented reality to show you — by combining the image seen through your lens with a panoramic drawing — the names of the mountains you're viewing, as well as their elevation (tap the name of a peak to see the coordinates). You can then take a high-resolution color photo of the labeled panoramic view, and save and share it. And you need not worry about connectivity in the mountains; the app works offline. Cost: \$4.99.



An image of Saturn on the Solar Walk app.

Solar Walk. With the touch of a finger you can fly through this app's striking 3-D model of the solar system accompanied by ambient music, zooming in on (and in some cases beneath the surface of) planets, the sun, moons, comets and other far-out objects. Information about celestial bodies, including their history, facts and figures like the length of a day and the average distance from the sun, are but a tap away. Our own planet, the app explains, is the only one not named after Greek and Roman gods and goddesses (Earth is an English and German name that essentially means "ground"). Note: If you want to use Solar Walk's 3-D display mode, you'll need a pair of red-and-blue 3-D glasses, which you can make at home with a few supplies. Cost: free; \$2.99 to \$4.99 for ad-free versions of Solar Walk. Extras, like high-resolution images of some of the planets' surfaces, are available as in-app purchases.

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