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# Eye on DOI



For Volunteers of the Department of Invertebrates

Vol. II No. 2

## Spineless Tales Pollinators with a Spine: Hummingbirds

by Michael Spaner

*"...no bigger than the end of a man's thumb...and of such swiftness in flight that you cannot see the movements of their wings... and with a bill as delicate as a fine needle... They are hardy yet so little I would not dare tell of it if others had not seen them also..."*

— by Gonzalo Fernandez de Oviedo y Valdes  
16th Century Spaniard

The hummingbird is, without a doubt, a fascinating and extraordinary creature. For centuries humans have been fascinated with these birds, portraying them in art and legends. The bird was important to the Native Americans who lived in the New World — so important that it was forbidden by many tribes to kill or eat one. The Aztecs believed that warriors who died in battle would change into hummingbirds. The Hopi Indians believed that the bird was a powerful spirit sent by the sun to teach them how to make fire. Cherokee Indians believed that it was the hummingbird that first brought tobacco to their people.

Hummingbirds are known as "flying jewels" because their feathers glitter like polished gems. Many hummers are named after jewels (e.g. Ruby Throated, Green Tailed Emerald, Berylline, etc.) In zoos

throughout the world, hummingbird aviaries are called "jewel rooms."

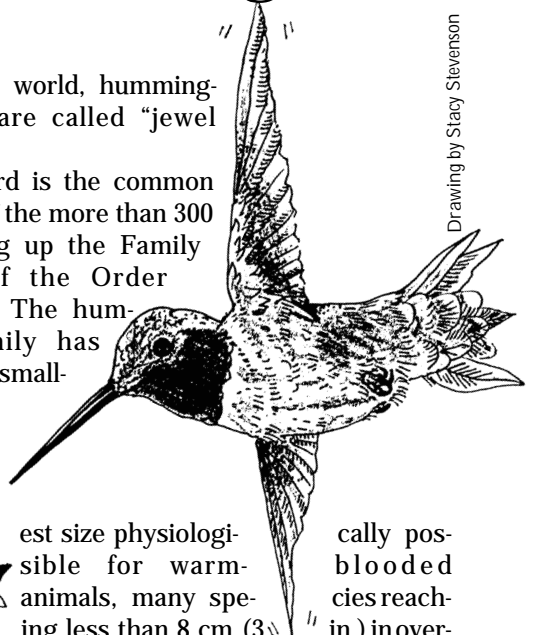
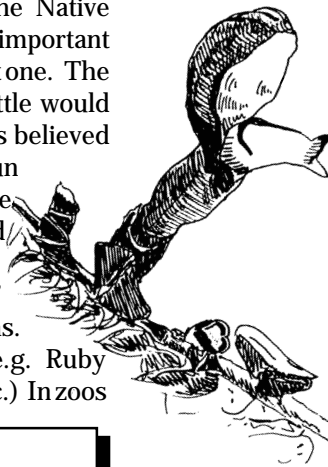
Hummingbird is the common name for any of the more than 300 species making up the Family Trochilidae, of the Order Apodiformes. The hummingbird family has evolved to the small-

est size physiologically possible for warm-blooded animals, many species reaching less than 8 cm (3 in.) in overall length. The smallest species is the bee hummingbird (*Mellisuga helenae*) of Cuba. Males are slightly smaller than the females, weighing only 1.95 g (about 0.07 oz.) and measuring about 5.5 cm (about 2.17 in.). In spite of their tiny size, many hummingbirds are fiercely territorial.

Hummingbirds inhabit every portion of the Americas, from Tierra del Fuego, at the southern tip of South America, almost to the Arctic Circle, but the majority of species inhabit tropical South America. Only about two dozen species have been found in the United States, and of these, only one, the ruby-throated hummingbird (*Archilochus colubris*), nests east of the Mississippi River. These hummingbirds are notable for their long-distance migration, annually flying

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Drawing by Stacy Stevenson



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## Consider This. . .

### *Superorganism / Super People*

Honeybees have been an important part of life on earth for at least 40 million years. Honeybees work together for the survival of their colony in the same way that your heart, lungs, and brain work together for your survival. You and a bee are both single organisms, but a honeybee can no more survive alone than your heart can. A honeybee colony is a superorganism of roughly 20,000 to 60,000 bees, each one working for the success of the colony. Many species of animals live in this kind of society, including some bees, ants, termites, and naked mole rats.

William Morton Wheeler wrote in 1928: "Another more general problem is suggested by insect society, or colony as a whole, which... is so strikingly analogous to [a] body regarded as a colony of cells, [a] living organism as a whole, that the same very general laws must be involved... We can only regard...the colony as a whole as an expression of the fact that it is not equivalent to the sum of its individuals..."

What can we learn from the social creatures around us? Working as a team certainly involves many individuals working towards a common goal. Central to our mission at the Invertebrate Exhibit is that we provide a window into biology through the animals and plants under our care. We strive to give each person who comes through our door an opportunity to see creatures and people at work and to ask any question. A group effort results in something far greater than the outcome of our individual efforts. Each person plays a role -- no one more important than any other. Each of us seeks the chance to make a contribution and to be a part of the whole. At its finest, this is how the DOI runs. Individual volunteers and keepers work together to provide the visitor with the best possible experience. Thus we at Invertebrates have achieved a "whole as an expression of the fact that it is not equivalent to the sum of its individuals," but something far greater.

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## Hummingbirds *(continued from page 1)*

nonstop across the Gulf of Mexico, a minimum distance of 800 km (500 mi), while expending only slightly more than one gram of stored fat. Another common hummingbird of the United States is the Anna's hummingbird (*Calypte anna*), found throughout the southwest.

Relative to body size, hummers possess the highest energy output of any warm-blooded animal. A hovering hummingbird burns energy about ten times as fast as does a running man. Because of their tiny size with its unfavorable ratio of mass-to-surface area, hummingbirds also lose body heat much more rapidly than do larger animals. They must balance their energy loss by frequent feedings. In fact, because of their high metabolic rate, they must consume more than half their total body weight in food each day. If a human burned energy as fast as a hummingbird, he or she would have to eat 155,000 calories a day. That is equal to 285 pounds of hamburger, 370 pounds of potatoes, or 130 pounds of bread! For this reason, hummingbirds are very territorial and protective of their surrounding food sources. Hummingbirds feed on nectar and tiny insects found within flowers. Fruit flies (*Drosophila*) are one of their favorite insect foods.

Hummingbirds have unique adaptations for pollinating flowers. Most hummingbirds have a poor sense of smell but great visual acuity in the red wavelengths of the spectrum. Therefore, hummingbird-pollinated flowers

are often red or orange and odorless. Favorite hummingbird flowers are fuchsias, trumpet-vine, hibiscus, columbine, century plants and sage. Hummingbirds have long needlelike or hooked beaks with even longer muscular tongues. These features allow them to probe deep into the corolla tubes of flowers to collect nectar and hunt for small insects. Pollen is usually brushed off the flower's anthers onto the bird's head or breast and passed along to the stigma of the next flower.

Hummingbirds have the best flight ability of all birds and are sometimes called "nature's helicopters." The hovering ability and general maneuverability of hummingbirds provided the best design ideas for Igor Sikorsky, inventor of the helicopter. During forward flight hummingbirds' average wing speed is 50 to 70 beats per second, while during courtship they can attain a wing speed of up to 200 beats per second. Their strong wing beat is so rapid that it produces a hum, accounting for their common name. Hummingbirds can maintain these rates because they have no flexion between their wrist and forearm joints as in other birds. This allows them ease of movement, whether it is forward or backward. They are the only birds capable of flying backwards. The hummingbird's flight muscles are proportionately the largest in the animal kingdom. In the hummingbird skeleton, the sternal keel, which anchors the powerful breast muscles, is proportionately longer and deeper

## VertAlert

- Jesse Babonis has been accepted into college. She starts at University of Maine in September. Kathy Bine has a new job working for Comsys, a transportation consulting company — ask her for all the details!! Congratulations, Jesse and Kathy.
- Paul Hawkes just got back from a trip to Florida. He gathered butterfly and hummingbird information for the Pollinarium.
- Daniel Lebbin is going to Costa Rica this summer, on a trip sponsored by Duke University. Lauren McFeely is moving to North Carolina to pursue educational opportunities. Stacy Stevenson is moving to New Mexico — she and her husband have always wanted to live there, so they are packing up and going! Jenny Phillips finished her year-long program for Eleanor Roosevelt High School. She'll be starting college in the fall. We'll miss you!
- Rachel Schwartz will be spending some time learning Russian in Siberia this summer. We want pictures and details when you get back!!

# Birthdays



JULY

<p style="text-align: center;">JUNE</p> <p>7 Ann Koslosky</p> <p>12 Michelle Montion</p> <p>14 Connie Binder</p> <p>24 Joyce Bailey</p> <p>26 Diane Meyers</p> <p>27 Matt Levy</p> <p>29 Heather Diehl</p> <p>30 Lara Chapman</p>	<p>12 Jim Evans</p> <p>16 Megan Wheeler</p> <p>22 Mark Wadhams</p> <p>28 Barry Lesnik</p> <p style="text-align: center;">AUGUST</p> <p>2 Tom Ede</p> <p>3 Phil Longee</p> <p>7 Dave Case</p> <p>12 Bryan Eugenio</p> <p>21 Marianne Lester</p> <p>25 Rachel Schwartz</p> <p>28 Louise Harper</p> <p>31 Vicki Clinton</p>
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- Michael Spaner just got a promotion to Assistant Manager at the Quartermaine coffee company. Congratulations!

## Hummingbirds *(continued from page 2)*

than that of any other bird. In fact, the breast muscles accounts for 30 percent of their total body weight, and the ratio of heart size to body size is the largest of any animal on earth.

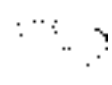
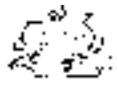
Most hummingbirds are brightly colored and iridescent, commonly metallic green. In males, the throat is often glittering red, blue, or emerald green. Surprisingly however, hummingbird feathers contain only two primitive pigments—black and brown. The brilliant appearance is caused not by pigments but by iridescence resulting from the diffraction and reflection of light through the microscopic structure of the feathers. The hue and intensity of the iridescence varies sharply with the angle of viewing and the angle of the sun's illumination. During courtship, the males usually orient themselves with the sun so that their colors are shown at their best.

Apparently, all hummingbirds are either polygamous or promiscuous. The sexes live apart except during the mating season when the male hummingbird performs aerial dives in front of the female that he is trying to attract. When the female is receptive to the male, they will face-off by hovering bill to bill while they circle around each other. These face-off encounters continue

until the female is ready to mate. At such time, she will break away from the male and land on a low perch. All courtship and copulation usually takes place within the female's territory.

Most hummingbirds build small cup-shaped nests covered with lichens, spiderwebs, and small pieces of bark, saddled on a branch. Spiderwebs are an important part of the nests, since they use the silk combined with their saliva to keep the nest together. They use lichens, moss, and other materials for camouflage. The female alone is responsible for building the nest and rearing the young. The hummingbird will usually lay two coffee bean-sized eggs 48 hours apart, commonly in the morning or afternoon. These hatch after an incubation period of 19-21 days. In three weeks, the babies are full feathered and ready to fledge. The mother hummingbird may continue to feed them for few more days, but usually after this period they are on their own.

When people understand the role birds play in nature, they are sometimes more careful to preserve their natural habitat. Hummingbirds are a wonderful gift—tiny birds that sparkle and glitter in the air like precious jewels.



## New in the Reading Room *by Connie Binder*

Whether you're planning an adventurous invertebrate-filled vacation or staying home and relaxing this summer, the reading room has something for you!!

Before you make travel plans, be sure to check out the "Travel" file (bottom drawer). It contains brochures and information for Florida, Virginia, Tangier Island, Bahamas, Germany, Biosphere 2, New York, L'Ametlla de Mar, dive vacations, as well as information on how not to bring back exotic pets or endangered species.

We all love to visit other zoos and aquariums when we travel, and to find some good ones read through the "Zoos and Aquariums" file (bottom drawer). You'll find articles and brochures from zoos, aquariums, gardens, and nature centers all over the world (from Laurel, Maryland to Yokohama, Japan).

You can find general travel information in several books on the shelf below the "Invertebrate Biology" shelf (Germany, including several zoo booklets, Mayan ruins, Washington, D.C.), and specific information on other shelves. Books on the Marine Biology shelf reveal the treasures of Aqaba, the Red Sea, the Pacific Northwest

Coast, and northern New England. The "Insects" shelf holds the secrets to the *Damselflies of Florida*, *Bermuda and the Bahamas*, and *Dragonflies of the Florida Peninsula*, *Bermuda and the Bahamas* for those of you headed south. And the "Butterflies/Moths" shelf has butterfly books for several regions of the U.S.

If you plan to do some scuba diving, check out the "Scuba Diving" file (bottom drawer), and the DOI Miscellany shelf — about half of it is diving magazines and information.

For those of us stay at home types, we can make use of *Observing Insect Lives*, and *The Practical Entomologist*. If you're a gardener and want advice for attracting butterflies, read over the book *Butterflies: How to Identify and Attract Them to Your Garden*, and the several articles in the Butterflies file (top drawer).

Finally, if you're not taking any trips, don't garden, and are too lazy to observe creatures around here, come on into the air-conditioned Reading Room, flop down on the couch, and read some of the fascinating stuff you can find in here (or just look at the pictures!).

## InvertAlert

### *Pollinarium News*

- On May 21st, our bees started to swarm into a tree 20 yards away. We found the queen on the ground under the hive. The queen was too heavy to follow so the bees returned to the hive.
- Bart Smith of the Department of Agriculture of Maryland came to check on the status of the hive. We found a new queen and other developing queen cells, which may have contributed to the call to swarm. A hive with two queens is not normal, but it happened. We removed the new unmated queen. On the 28th, the old queen was found dead under the hive. It is time for the colony to make another queen for keeps.
- The current hive and colony are from the Hays and Hays Bee and Burro Ranch. We appreciate the assistance and advice from the Hays as well as from Gordon Allen-Wardell from the University of Maryland.
- Plants are sprouting up everywhere in the Pollinarium. Both Paul and the plants are taking root! At the top of Nancy's mountain of responsibility, she is working on graphics for the exhibit. A special thanks to Tom Evers and his crew who volunteered their time to create the pool and waterfall.

## Careen's Corner

Thanks to everyone who volunteered at our many special events this spring. We really appreciate your help!

The June DOI volunteer meeting will be a work party held in the Pollinarium on Wednesday, June 28!

The annual Butterfly Count sponsored locally by the Audubon Naturalist Society, (301) 652-9188, ext. 3006, will take place on June 24. Details will be posted on the kitchen bulletin board. For \$25, an evening class and a Saturday field trip are offered to prepare for the Butterfly Count. Other classes offered are Bugs 101, Introduction to Dragonfly Studies, Insect Life, Butterflies and Moths, and a Magical Migrating Monarchs Workshop.

*Eye on DOI* is published quarterly for volunteers and friends of the Department of Invertebrates.

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*Smithsonian Institution, National Zoological Park, Department of Invertebrates and Friends of the National Zoo, Department of Education and Volunteer Services.*