Bats are among the world's most fascinating, beneficial and likeable animals. Yet, we easily misunderstand and often fear and persecute them. Nearly a thousand kinds comprise almost a quarter of all mammal species. They live in all but the most extreme desert and polar regions... but bats like this are disappearing rapidly, victims of human ignorance. They come in an enormous variety, from crested bats to... epauletted bats, from big eyes to... tiny eyes and from funnel ears... to rabbit ears. Some have... strange faces, but even these are beautiful to scientists who study the sophistication of bat navigation. The echolocation systems of bats like... this, surpass current scientific understanding and are far more efficient than any similar system developed by human beings. Using special flaps and nose leaves, bats can use sound alone to detect obstacles as fine as a human hair and can see everything but color on the darkest night. They also have eyes, and no bats are blind. The world's smallest mammal, the bumblebee bat (Craseonycteris thonglongyai) of Thailand, weighs less than a penny, while... giant flying foxes have wingspans of three to six feet (1-2 m.). Most people refer to bats as though they were all alike, yet these bats are less related to each other than a tiger is to a sea otter! In reality, even bats like this are more closely related to people than to the mice with which they are frequently compared.
16. Lyle’s flying fox (*Pteropus lylei*) backlit in flight

Bats belong to the order Chiroptera, meaning “hand-wing.” A bat’s wing is just an expanded hand, with long fingers connected by a thin, sturdy membrane.

17. Yellow-winged bat (*Lavia frons*) in flight

Some, such as the yellow-winged bat (*Lavia frons*) from Africa, are exceptionally colorful.

18. Indian flying fox (*Pteropus giganteus*) roosting with wings folded

Contrary to what most people think, bats are among the world’s most naturally gentle animals. Like dolphins, many are...

19. Long-tongued dawn fruit bat (*Eonycteris spelaea*) approaching Tuttle’s hand

highly intelligent and easily trained, each with its own unique personality.

20. Leschenault’s rousette fruit bat (*Rousettus leschenaulti*) licking lips

Like dogs and cats, bats get excited at mealtime. They certainly are not dirty or scary, and some...

21. Wahlberg’s epauletted fruit bat (*Epomophorus wahlbergi*) with full cheek pouches

are real characters! They do not become entangled in people’s hair, and frightening tales of bats as carriers of rabies and other dread diseases are grossly exaggerated.

22. Brown big-eared bat (*Plecotus auritas*) in hand

Most bats are harmless and highly beneficial. Nevertheless, only experts should attempt to handle them, because any bat that you can catch is more likely than others to be sick.

23. Silver-haired bat (*Lasionycteris noctivagans*) roosting

When people are bitten, it is normally because they have picked up a grounded bat that bites in self-defense. Simply leave bats alone and they are happy to return the favor!

24. Hoary bat (*Lasiurus cinereus*) roosting in tree

Fewer than half of one percent of bats contract rabies, and even those individuals rarely become aggressive. Mortality statistics show that our own pet dogs are far more dangerous!

25. Little brown myotis (*Myotis lucifugus*) roosting in building

Ironically, the most serious health hazards involving bats are those created when poisons are used to get rid of them. The only safe, permanent way to evict unwanted bats is...

26. Plugging roost entry in building to exclude them by plugging entry holes after their twilight departure to feed. Any bats trapped inside can be allowed to escape at sundown the next evening.

27. Baby Mexican free-tailed bats (*Tadarida brasiliensis*) in roost

Evictions should not be made from early- to mid-summer, when flightless young may be trapped and starve.

28. Little brown myotis (*Myotis lucifugus*) in flight

Mouse-eared bats, the ones most commonly found in buildings in North America and Europe, can catch up to 500 or more insects, including many mosquitoes, in a single hour.
29. D'Orbigny's round-eared bat (*Tonatia sylvicola*) carrying katydid

Seventy percent of bats are insectivorous, and they are the only major predators of night-flying insects.

30. Heart-nosed bat (*Cardioderma cor*) catching beetle

This African heart-nosed bat (*Cardioderma cor*) is about to catch a beetle, and ...

31. Red bat (*Lasiurus borealis*) in flight

This American red bat (*Lasiurus borealis*) is an important predator of moths, including agricultural pests such as cutworm and corn borer moths.

32. Mexican free-tailed bat (*Tadarida brasiliensis*) emergence

One colony of 20 million free-tailed bats (*Tadarida brasiliensis*) can eat more than a quarter of a million pounds (113 metric tonnes) of insects nightly. That's the equivalent weight of 23 Asian elephants!

33. Guano mining in Thailand

Countless tons of droppings produced by insectivorous bats continue to be mined as one of the world's most valued fertilizers.

34. Measuring guano deposit in a U.S. cave

In the United States, guano from a single cave sold for more than $6 million. Where large colonies have been protected, sales continue.

35. Greater bulldog bat (*Noctilio leporinus*) fishing*

A few bats are carnivores. Some use their large feet and claws to snatch minnows.

36. Fringe-lipped bat (*Trachops cirrhosus*) catching frog

Others even catch frogs. These bats use the frog's mating calls to identify and locate their prey. Only 3 of nearly a thousand bat species...

37. Common vampire bat (*Desmodus rotundus*) feeding on chicken foot

Eating blood, and these live only in parts of Latin America.

38. Common vampire bat (*Desmodus rotundus*) “walking”

But, zoos, the news media and even natural history books often emphasize them as though they were typical. This bias leads many people to equate all types of bats with vampires.

39. Panamanian rain forest

In truth, even in the rain forests where vampires live, the vast majority of bats are extremely beneficial, so much so that these forests might not be able to survive without them.

40. Pallas’ long-tongued nectar bat (*Glossophaga soricina*) pollinating *Tricanthera gigantea* flower

Hundreds of kinds of fruit- and nectar-eating bats pollinate flowers and...

41. Hammer-headed fruit bat (*Hypsignathus monstrosus*) approaching a rose apple (*Eugenia jambos*)

Disperse seeds. Their activities are vital to rain forests and to many of the world's most economically important plants.

42. Gambian epauletted fruit bat (*Epomophorus gambianus*) removing fig

Most bats prefer to carry fruit away from the tree before eating, apparently to avoid predators.
43. Gambian epauletted fruit bat (*Epomophorus gambianus*) carrying fig

Over a period of several nights bats may carry more than a ton of seeds from a single wild fig tree. This dramatically increases the number of seedlings that will survive in new locations.

44. Angolan rousette fruit bat (*Rousettus angolensis*) eating fig

Even when fruit is eaten at the tree, bats still are exceptionally efficient seed dispersers.

45. Peters’ dwarf epauletted fruit bat (*Micropteropus pusillus*) eating fig

This dwarf epauletted bat (*Micropteropus pusillus*), for example, may eat two and a half times its body weight in a single night. It digests entire meals in only 15 minutes, eliminating large quantities of seeds as it flies between feeding sites.

46. Cleared land in Africa

Such bats do not hesitate to cross cleared areas and sometimes travel up to 50 km (30 miles) or more in a single night. In Africa, up to 95 percent of forest regrowth on cleared land comes from seeds dropped...

47. Gambian epauletted fruit bat (*Epomophorus gambianus*) in flight

by bats like this. In contrast, birds and other animals drop seeds mostly beneath existing trees.

48. Straw-colored fruit bats (*Eidolon helvum*) roosting

Straw-colored flying foxes (*Eidolon helvum*) illustrate the vital ecological and economic role played by many flying foxes.

49. Straw-colored fruit bat (*Eidolon helvum*) roost

Only a few breeding colonies of these bats are known in all of West Africa, but each contains up to a million or more individuals.

50. Straw-colored fruit bat (*Eidolon helvum*) eating guava

Bats from just one of these colonies pollinate flowers and disperse seeds for thousands of trees nightly, covering vast areas...

51. Straw-colored fruit bat (*Eidolon helvum*) leaving roost at dusk

in annual migrations. Many African tree species rely on them. Just one, the Iroko tree, produces an annual timber harvest valued at roughly $100 million.

52. Jamaican fruit bat (*Artibeus jamaicensis*) carrying allspice berry

This Jamaican fruit-eating bat (*Artibeus jamaicensis*) is carrying an allspice berry, one of Jamaica’s most valued export crops. Much of the harvest comes from wild trees that continue to rely on a combination of bats and birds for seed dispersal.

53. Jamaican fruit bat (*Artibeus jamaicensis*) approaching almond

Another is about to take a ripe almond. In the wild, many, if not most, economically important tropical fruits rely on bats for propagation. These include plantains, bananas, mangoes, guavas, breadfruit, avocados, dates, figs and many more.

54. Bat-dependent fruits

Other tropical products from bat-dependent plants include balsa wood for crafts and fishing lures, kapok filler for life preservers, fibers for rope, carob for drinks and candy and even agave juice for tequila liquor.
55. African long-tongued fruit bat (*Megaloglossus woermanni*) pollinating African butter and tallow tree (*Pentadesma butyracea*) flower

A seemingly endless variety of flowers open or produce nectar only at night, relying on bats for pollination.

56. Great fruit bat (*Artibeus literatus*) pollinating shaving brush flower (*Pseudobombax spp.*)

The shaving brush flower in Panama opens at dusk and falls off by morning. Like many bat-dependent flowers it is white, enabling bats to see it more easily on dark nights.

57. Short-nosed fruit bat (*Cynopterus sphinx*) pollinating wild banana flower

This short-nosed fruit bat (*Cynopterus sphinx*) in Thailand is pollinating a wild banana flower. Although cultivated bananas do not produce seeds or need pollination, wild ancestral varieties continue to rely on bats. These plants are sometimes the only source of genetic materials required to combat disease or improve the productivity of crops. Other commercially harvested fruits continue to depend on bats.

58. Long-tongued dawn fruit bat (*Eonycteris spelaea*) roosting with wings folded

The dawn bat (*Eonycteris spelaea*), a small Asian flying fox, is the only known pollinator for the durian fruit, whose annual harvest is valued at $112 million.

59. Jamaican fruit bat (*Artibeus jamaicensis*) pollinating balsa

In Latin America, balsa wood harvests also continue to rely on bats for pollination. Sadly, the great value of bats like this goes largely unnoticed. Even worse, millions of such highly beneficial bats are killed in poorly managed vampire control programs that often do irreversible harm.

60. Wrinkle-lipped free-tailed bat (*Chaerephon plicata*) emergence from cave

In just one campaign, more than 8,000 caves were poisoned or dynamited, killing entire ecosystems of unique life.

61. Wahlberg's epauletted fruit bat (*Epomophorus wahlbergi*) approaching baobab flower

Here, Africa's most famous tree, the giant baobab, is about to be pollinated. Baobab flowers open only at night and are perfectly adapted for bat pollination. Only bats approach from below...

62. Wahlberg's epauletted fruit bat (*Epomophorus wahlbergi*) pollinating baobab flower

in a manner likely to contact the flower's reproductive organs, which hang beneath the nectar-filled petals. Without its bat pollinators, the baobab might die out, triggering a chain of linked extinctions of many other plants and animals.

63. Wahlberg's epauletted fruit bat (*Epomophorus wahlbergi*) eating mango

The same bats that service baobabs and other important trees too frequently are perceived only as crop pests and are killed in mass eradication programs, sometimes even in national parks.

64. Mango harvest in Africa

Most commercial crops, including mangoes, must be picked green for shipment. The truth is, bats do not like unripe fruits any more than we do.
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<th>Number</th>
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<tr>
<td>65.</td>
<td>Egyptian rousette fruit bat (<em>Rousettus aegyptiacus</em>) eating mango</td>
<td>Bats usually eat fruits that ripen prematurely or are missed by pickers. Such fruits are lost to the farmer whether or not bats find them. By removing these over-ripe fruits, bats actually may help farmers by reducing breeding opportunities for pests such as...</td>
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<tr>
<td>66.</td>
<td>Fruit flies on mango</td>
<td>these fruit flies. Farmers and their governments must be educated.</td>
</tr>
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<td>67.</td>
<td>Mexican free-tailed bat (<em>Tadarida brasiliensis</em>) in flight</td>
<td>Bats like this often serve as model animals for medical research. They have contributed to the development of navigational aids for the blind, birth control and artificial insemination techniques, vaccine production, drug testing and even to a better understanding of low-temperature surgical procedures. However, careless exploitation increasingly threatens their survival.</td>
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<td>68.</td>
<td>Mother Gambian epauletted fruit bat (<em>Epomophorus gambianus</em>) roosting with young</td>
<td>Bats are among the most vulnerable to extinction of any animal on earth. Most females produce only one baby each year. Others require up to five years to leave just two surviving offspring.</td>
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<td>69.</td>
<td>Iron mine entrance</td>
<td>Severe winters force many bats to migrate or hibernate. Those that hibernate spend the winter in only a few unique caves or mines where they are extremely vulnerable to human disturbance.</td>
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<td>70.</td>
<td>Gray myotis (<em>Myotis grisescens</em>) hibernating</td>
<td>These are endangered gray bats (<em>Myotis grisescens</em>). More than half of their entire species population winters in just this one cave in the southeastern United States.</td>
</tr>
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<td>71.</td>
<td>Cave with bats and caver</td>
<td>Many large colonies have been destroyed by repeated human disturbance. Educated cave explorers avoid bat hibernation caves in the winter and nursery caves in the summer, but many unknowingly continue to harm bats.</td>
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<td>72.</td>
<td>Mexican free-tailed bats (<em>Tadarida brasiliensis</em>) roosting in Bracken Cave</td>
<td>Bats form the largest and most vulnerable colonies of any warm-blooded animal. In this Texas cave some 20 million free-tailed bats (<em>Tadarida brasiliensis</em>) cover thousands of square feet of cave walls, yet they could be destroyed by a single vandalous act.</td>
</tr>
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<td>73.</td>
<td>Mexican free-tailed bat (<em>Tadarida brasiliensis</em>) emergence from Bracken Cave</td>
<td>Sights such as this are now rare and disappearing rapidly. In Europe, many bat populations are estimated to have declined by 90 percent or more in only 20 years and are now endangered.</td>
</tr>
<tr>
<td>74.</td>
<td>Greater horseshoe bat (<em>Rhinolophus ferrumequinum</em>) in cave in Great Britain</td>
<td>Greater horseshoe bats (<em>Rhinolophus ferrumequinum</em>), for example, are now extinct in many areas where they were once common. In addition to their many other problems, bats like this are often inadvertently killed when poisoned by careless use of pesticides and wood preservatives.</td>
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75. Wrinkle-lipped free-tailed bat (Chaerephon plicata) emergence from cave

In North America, the largest bat colony ever known dropped from 30 million in the 1960s to a mere 30,000 in the 1980s, a 99.9 percent decline! Disastrous losses continue worldwide, often the result of intentional eradication.

76. Lyle’s flying fox (Pteropus lylei) roost

From Asia and Africa to the South Pacific and Australia, vitally important flying foxes are declining rapidly. Several species are already extinct.

77. Lyle’s flying fox (Pteropus lylei) roost at sunrise

Once-vast populations have been decimated by poorly informed fruit growers and their governments, and by market hunters who slaughter tens of thousands...

78. Hunters preparing long-tongued dawn fruit bats (Eonycteris spelaea) for market

for restaurant delicacies and aphrodisiac potions. Loss of such bats could have disastrous, even irreversible consequences.

79. Lyle’s flying foxes (Pteropus lylei) roosting in tree

How many bats can we lose before their numbers become too few to service rain forests and other ecosystems? This program was produced by Bat Conservation International, an organization dedicated to reversing the alarming trend of bat decline and extinction.

80. Credit image

We are beginning to make progress, but we need your help. It is our hope that you will wish to join us in doing everything possible to save these long misunderstood but vitally important animals.

*Special Acknowledgments

#35: Photograph courtesy of J. S. Altenbach, University of New Mexico, Albuquerque.