

differences within the same species of pinworm give clues to human movements. It turns out that the pinworms that accompanied people who migrated across the Bering land bridge to North America show genetic differences from those that accompanied other migrants. These differences aren't enough to consider the pinworms different species, but they do indicate that people traveled to the New World by multiple routes—some by land from Asia and some apparently by boat from Micronesia and beyond.

Many other parasites migrated with early humans from their origin in Africa to other regions, including the American tropics. Early archaeological sites in the Western Hemisphere reveal evidence of several parasites, including the large nematode *Ascaris lumbricoides* and the whipworm *Trichuris trichiura*. One species in particular—the human hookworm, *Ancylostoma duodenale*—is choosy about where it lives and reproduces, since its eggs and larvae don't tolerate a cold and dry climate. These worms probably accompanied ancient settlers who arrived in Latin America via other routes than the Bering land bridge, because it is unlikely the free-living stage of the juveniles could have survived through the Siberian cold.

Some parasite species are particular about having only humans as their definitive host. Others are opportunistic and settle for any large mammal. Of the 400 or so parasite species that infect people, most—as many as 70%—use humans only as incidental hosts. The fluke *Schistosoma mansoni* is an example of a parasite that uses humans incidentally, since it also readily infects chimpanzees, baboons, and rats. Dog and cat hookworms can be passed to humans—the tiny juveniles burrow into skin and cause infections—but fortunately the parasites don't reproduce inside people.

As people migrated, they carried parasites from their homelands, and during their travels, they picked up new ones. As they put down roots in larger and larger settlements, both kinds of parasites—those specific to human hosts and those acquired from other animals—were offered

new opportunities for transmission. The settling of human populations into large stable aggregations allowed for more robust transmission of infectious diseases caused by viruses and bacteria, and it also enabled parasites to have more lasting and sometimes deadly impacts.

Human migrations have occurred throughout history. Sometimes invaders set out to distant lands to extract resources by conquering peoples, like the Spanish conquistadors in the sixteenth century, overpowering locals with their germs and weapons. But most people migrate because they are displaced—by war, by the collapse of their food supply, by infectious disease, and sometimes by racism and prejudice. The 300 years beginning in the 1600s mark an especially dark period in human history as more than 7 million people were forcibly sent from their homes in Africa to serve as slaves in the New World. The Portuguese, English, French, Spanish, Dutch, and Danish built slave economies throughout the Americas and other parts of the globe. People were captured from vast regions across Africa: first from what is now Senegal, Gambia, Angola, and Congo, and then from Togo, Benin, Nigeria, Mozambique, and Madagascar, and across the continent. From inhuman conditions on transport ships, slaves disembarked in the West Indies, Mexico, Colombia, and Brazil, and then were forced to work in forests, fields, mines, and homes.

Slave traders created inhuman conditions that enabled the movement of parasites with enslaved Africans. The parasitic protists that cause malaria, such as *Plasmodium falciparum*, probably originated in Africa, since they are closely related to those that infect other primates there. Throughout the course of the slave trade, different species and various lineages of *Plasmodium* from throughout Africa were introduced to the Americas. But Africans weren't the only source of the parasite. Analysis of DNA from at least three South American tribes suggests that there were earlier migrations to the New World from Australasia, since these tribes appear to share ancestry with Indigenous populations from Australia and Melanesia. One can imagine that at least one form of the

malaria parasite could have arrived at South America before the European-driven slave trade.

The first enslaved Africans to arrive in the English colonies in Virginia may have been kidnapped from a Portuguese slave ship at around 1619. During the next years, hundreds of thousands of people from Africa were sold and traded to work on plantations. In the American colonies, enslaved Africans were highly prized in malaria-prone regions because they seemed to tolerate the disease better than Europeans. Some, in fact, carried a genetic mutation from their African homeland that limited the survival of the malaria-causing parasites by changing the configuration of hemoglobin in red blood cells. This mutation is called sickle cell disease, and it has been passed on through generations of survivors. The mutation still occurs in modern people living in areas where malaria no longer occurs; the mutation causes blood cells to reduce the amount of oxygen they carry, and under certain conditions the disease can be fatal.

Some parasites migrate with their hosts and then move comfortably from person to person in the new environment. Others require a suitable intermediate host in order to thrive. The intermediate host doesn't have to be the same species as that from the place of origin, since a close relative can serve as suitable replacement. The parasitic trematode flatworm, *Schistosoma mansoni*, probably first arrived in the Americas in people kept in the holds of slave ships. In Brazil, these flukes found acceptable intermediate hosts in local snails closely related to those in Africa. And the parasites flourished, continuing to infect people throughout the Americas wherever the snails and people lived together. The slave ships also brought the nematode, *Onchocerca volvulus*, that causes African river blindness. The presence of a blackfly host closely related to those in Africa enabled the parasite to naturalize in the New World.

Forced migrations continue to occur throughout the world, and the inhuman conditions of slave ships have been replaced by the squalor of refugee camps. In 2021, more than 80 million people were forcibly dis-

placed from their homes. Two-thirds are currently from five countries: Syria, Afghanistan, South Sudan, Burma, and Somalia. When people from different regions are compelled to live in close quarters for long periods of time, their parasites are subjected to new intense selection pressures. By allowing the substandard sanitary conditions of refugee camps to persist, the international community empowers a witches' brew of microbes and parasites to spread well beyond the camps themselves.

When the first migrants came to the New World, they could not have known that gradual changes in climate had been reshaping the ecological landscape for millennia. The giant mammals that so dominated the Pleistocene landscape were in sharp decline. Over time, as these migrants became the first Americans, they adapted to live with the animals that remained, such as the vast herds of bison, that would sustain growing human populations in the plains. Colonialism changed all of that, first by subjugating Native peoples and then by decimating the herds of animals they had relied on. The colonists asserted their culture throughout the landscape, dominating the ecology with expansive human developments. Years later, this process has put into motion the conditions for much more rapid changes in global climate than the Earth has experienced throughout human history. And parasites are giving the first clues to how those changes will impact everyone on the planet.

Index

- Acanthocephala. *See* thorny-headed worm
- African river blindness (onchocerciasis), 8, 19, 24, 117. *See also* blackfly; *Onchocerca volvulus*, *Wolbachia*
- African sleeping sickness, 30. *See also* *Trypanosoma brucei*
- agouti (*Dasyprocta*), 107, 130, 139
- alcid, 51–52. *See also* puffin
- Amazigo, Uche Veronica, 24
- amphipod, 38, 59, 64–65, 122, 132, 139. *See also* *Gammarus lacustris*; *Hyaella azteca*
- Ancylostoma duodenale* (human hookworm), 6, 121
- Anderson, Sydney, 107
- Anisakis brevispiculata*, 61
- Anisakis simplex* (herring worm), 60, 121
- Apodemus walensis* (Ural field mouse), 77, *plate 16*
- archaea, 114, 140
- Arctic Health Research Center, 84, 113
- armadillo. *See* glyptodont; pink fairy armadillo
- Ascaris*, 6, 10–14, 16–17, 117, 122
- ivermectin, 22, 140. *See also* ivermectin
- Bactrian camel, 75, *plate 12*
- bat, 88–89, 94, 104, 127, 129
- beef tapeworm (*Taenia saginata*), 52–54, 134
- Bejarano, Gaston, 108
- Bering Sea, 51–52, 84; Bering land bridge, 3, 6, 52; Bering Strait, 85, 140; Chukotka Peninsula, 84; map, 85
- Biomphalaria*, 43, 134, *plate 7*
- blackfly (*Simulium*), 8, 21, 25, 129, 150
- blood fluke (*Schistosoma*), 6, 8, 39–43, 48, 117, 134, 150, *plate 6*
- Bolivia, 107–109, 111–112, *plate 27*, *plate 28*, *plate 29*; Lake Titicaca, 112; map, 108. *See also* tuco-tuco
- bot fly (*Gasterophilus*), 33
- Boucot, Arthur, 11
- Brazil, 7–8, 16, 25. *See also* Yanomami
- broad fish tapeworm (*Diphyllobothrium*), *plate 2*, *plate 3*
- brood parasite, 34
- Brooks, Daniel R., 113–114
- Caenorhabditis elegans*, 17
- California horn snail (*Cerithideopsis californica*), 43–44, 125
- Campbell, William C., 22
- Cardozo, Armando, 108
- castration, 43, 141
- Centers for Disease Control and Prevention (CDC), 73, 141
- cercaria, 37, 39–40, 44, 67, 122–123, 125, 127, 134, 137, 141
- Cerithideopsis californica* (California horn snail), 43–44, 125
- cestode (tapeworm), 34, 46–55, 56–59, 80–83, 86–89, 91–93, 97–98, 100, 111, 113, 141, *plate 2*, *plate 3*, *plate 15*, *plate 18*, *plate 19*, *plate 20*. *See also* *Diphyllobothrium*; *Echinococcus multilocularis*; *Hymenolepis diminuta*; *Hymenolepis lasionycteridis*; *Hymenolepis robertrauschi*; *Hymenolepis tualatinensis*; *Raillietina*; *Taenia hydatigena*; *Taenia krepkogorski*; *Taenia saginata*; *Taenia solium*; *Tetragonoporus calyptcephalus*
- Chagas disease, 30, 103–105, 136, 142. *See also* *Trypanosoma cruzi*
- Chinchorro, 104
- Christmas Bird Count, 116, 142
- cichlid (Cichlidae), 18, 142
- citizen scientist, 116, 142
- coccidia, 80, 142. *See also* *Eimeria*
- Coitocaeum parvum*, 37, 122
- colonialism, 9, 19
- commensal, xvii–xviii, 23, 118, 142, 150
- common black spot (*Uvulifer ambloplitis*), 67, 137
- common bully (*Gobiomorphus cotidianus*), 38, 122
- Congo Basin, 18–19, 21, 24, 140, 146
- coprolite, 4, 11
- corpse lily (*Rafflesia*), 31, 133
- cospeciation, 49, 51, 55

- cowbird, 34. *See also* brood parasite
- Crassicauda boopis* (whale nematode), 61, 122
- Cretaceous, 11, 38, 96, 146
- Ctenomys* (tuco-tuco), 107, 109–112, 130, 151, *plate 27, plate 29*
- cuckoo, 34. *See also* brood parasite
- Cuscuta* (dodder), 32, 123
- cyst, 44, 52, 54, 60–61, 64, 67, 81–83, 87, 123–125, 130, 132, 135, 137, 143, 145, 150
- DAMA protocol, 115, 143. *See also* Stockholm Paradigm
- darkling beetle (*Tenebrio molitor*), 97
- Darwin, Charles, 89, 104, 115
- Darwin's finches (Galápagos finches), 93, 109
- Dasyprocta* (agouti), 107, 130, 139
- Dawkins, Richard, 68
- deer mouse (*Peromyscus maniculatus*), 73–74, 96, 105, 126
- definitive host, 6, 19, 37–38, 47, 50, 52, 61, 64, 67, 86, 93, 97, 121–137
- Dicrocoelium dendriticum* (lancet liver fluke), 67, 123, *plate 10*
- dinosaur, 11, 38, 50; *Maia-saura*, 11
- Diphyllobothrium* (broad fish tapeworm), *plate 2, plate 3*
- dodder (*Cuscuta*), 32, 123
- Dowler, Robert, 90–91
- eBird, 116, 143
- Ebola virus, 88
- Echinococcus multilocularis* (fox tapeworm), 81–82, 86, 124, *plate 15, plate 20*
- ecology, xviii, 9, 38, 45, 48–49, 55, 89, 102–103, 107, 112, 115, 117, 141, 143, 148, 150; ecological fitting, 89, 93, 143. *See also* long-term ecological research sites
- ectoparasite, 35, 49, 74, 79, 127, 144
- Eimeria*, 89, 97, 100, 111, 124, 144
- ELISA (enzyme-linked immunosorbent assay), 80, 144
- endoparasite, xviii, 35, 79, 127, 144
- endosymbiont, 23, 144. *See also* *Wolbachia*
- Enterobius vermicularis* (pinworm), 4–6, 109, 124
- eradication, 117; African sleeping sickness, 30; Chagas disease, 104; Egypt, 42; hookworm, 15; Japan, 42; schistosomes, 42
- Eubaplorchis californiensis*, 44, 125
- eukaryote, 144, 149
- extinction, xiii–xiv, 3, 10–11, 35, 39, 50, 69, 87–88, 90, 103, 113, 143, 146, 149
- fatmucket mussel (*Lampsilis siliquoides*), 32, 126
- flatworm (Platyhelminthes), xviii, 8, 33, 38–39, 42, 48. *See also* cestode; fluke, trematode
- fluke. *See* trematode
- fox, 4, 77, 81, 86, 93–94, 124
- Galápagos Islands, 89–91, 93, 106, *plate 22, plate 23*; finches, 93, 109. *See also* Dowler; *Raillietina*; rice rat (*Nesoryzomys swarthi*)
- Gammarus lacustris*, 65
- Gardner, Scott L., xiv–xv, 78, 83, 91, 107, 113, *plate 28*
- Gasterophilus* (bot fly), 33
- gastropod, 39, 145. *See also* mollusc, snail
- geohelminth, 11, 14, 16–17
- Geomys lutescens* (pocket gopher), 97, 99–102, *plate 26*
- giant whale nematode (*Placentonema gigantissima*), 60, 130
- Giardia duodenalis*, 31, 125
- glyptodont, 3, 106
- Gobiomorphus cotidianus* (common bully), 38, 122
- Gondwana, 104, 106
- gopher, 97, 99–102, 112, 113, 130, 133, *plate 25, plate 26*
- gopher nematode (*Ransomus rodentorum*), 101, 133
- grasshopper mouse, northern (*Onychomys leucogaster*), 96–97, 101–102, 126, *plate 24*
- guinea pig (*Cavia porcellus*) 16, 130, 139
- hantavirus, 73–75, 77, 80, 83, 88, 108, 129, *plate 11*
- Harold W. Manter Laboratory of Parasitology, 83, 91, 94, 97, 113
- haustorium, 32, 123, 133
- Hawaii, 88–89. *See also* hoary bat; *Hymenolepis lasionycteridis*
- hepatitis C, 42
- herring worm (*Anisakis simplex*), 60, 121
- hexacanth, 47, 145, 148
- hippo butt leech (*Placobdella loides jaegerskioeldi*), 32, 131
- HIV, 30

- hoary bat, Hawaiian (*Lasiurus cinereus semotus*), 88–89
- Hoberg, Eric P., 46, 48–52, 54–55, 113–114, *plate 4*
- Homo erectus*, 39, 54–55
- hookworm, 6, 14–16, 117; dispensary, *plate 1*; eradication, 15. See also *Ancylostoma duodenale*; geohelminth; *Necator americanus*; Rockefeller Sanitary Commission for the Eradication of Hookworm Disease; Stiles, Charles Wardell
- horsehair worm, Old World (*Paragordius tricuspidatus*), 67, 130
- host, 6, 8, 10–11, 19, 22, 36–38, 44–45, 47, 49–50, 52, 57, 61, 63–65, 67, 81, 86, 89, 93, 97, 121–137, *plate 7*; specificity, xviii, 4, 6, 45, 80, 102–103
- host switching, 11, 16, 50–51, 55, 80, 89, 91, 93, 102–103, 111–113, 116–117, 145
- Hyalella azteca*, *plate 8*
- hydatid disease, 87
- Hymenolepis diminuta* (rat tapeworm), 97, 125
- Hymenolepis lasionycteridis*, 88
- Hymenolepis robertrauschi* (grasshopper mouse tapeworm), 97–98, 126
- Hymenolepis tualatinensis*, 113
- iguanodon, 11
- islands. See Galápagos; Hawaii; St. Lawrence isopod, 33, 65, 131
- ivermectin, 22–23, 25, 140, 146
- Kaminski, Jeff, 73
- killifish, 44, 67, 69, 94, 125
- kissing bug (Reduviidae), 103–105, 136, 142, 142. See also Chagas disease
- Korea, 16; Hantan River, 74
- Lambhead, John P., 59
- Lampsilis siliquoidea* (fatmucket clam), 32, 126
- lancet liver fluke (*Dicrocoelium dendriticum*), 67, 123, *plate 10*
- large human nematode (*Ascaris lumbricoides*), 6, 10–14, 16–17, 117, 122
- Lasiurus cinereus semotus* (hoary bat, Hawaiian), 88–89
- leech. See hippo butt leech; *Placobdelloides jaegerskioeldi*
- Leishmania*, 30, 126
- Leucochloridium variae*, 67, 127
- life cycle illustrations, 5, 12, 20, 41, 53, 58, 66, 82, 92, 98, 110
- Linnaeus, Carl, 114
- Litomosoides*, 127
- long-term ecological research site, 74, 78–79
- MacArthur, Robert H., 87
- Maiasaura, 11
- malaria, 7–8, 25, 29–30, 131, 149. See also mosquito (*Anopheles*); *Plasmodium*; sickle cell disease
- mange, 100, 146
- Manter Lab. See Harold W. Manter Laboratory of Parasitology
- Meriones unguiculatus* (Mongolian gerbil), *plate 17*
- microfilaria, 19, 21, 24, 127, 129. See also *Onchocerca volvulus*; African river blindness
- Microtus limnophilus* (lacustrine vole), 81, *plate 14*, *plate 15*
- migration, 11, 78, 88, 113, 143
- miracidium, 37, 39, 67, 122, 147
- mistletoe, European (*Viscum album*), 32, 137
- mites, 22, 33, 77, 100, 127, 140, 146; *Varroa*, 33. See also mange
- mitochondria, 34, 148
- mollusc, 39, 145, 147
- Mongolia, 74–81, 83, *plate 12*, *plate 13*; Altangerel Tsogtsaikhan Dursahinhan, 83; Batsaikhan Nyamsuren, 77–78, 83; Ganzorig Sumiya, 78, 83; map, 76
- Moniliformis moniliformis*, 64, 128
- mosquito, 23; *Anopheles*, 29, 131
- multituberculate, 11
- mummy, 16, 105. See also Chinchorro; Ötzi
- mutualism, xvii–xviii, 23, 147, 150. See also endosymbiont
- Myxobolus cerebralis*, 32, 128. See also whirling disease
- National Parasite Collection, 48
- National Science Foundation, 74, 107
- natural selection, 44, 68–69
- Nebraska Sandhills, 94–97, 99–102, *plate 25*; map, 95
- Necator americanus* (New World hookworm), 14, 128

- nematode (Nemata), xviii, 10–17, 19–24, 33, 49, 59–61, 80, 97, 100–101, 109–112, 114, 138, 140, 144, 146, 147–148.
See also *Ancylostoma duodenale*; *Anisakis brevispiculata*; *Anisakis simplex*; *Ascaris*; *Caenorhabditis elegans*; *Crassicauda boopis*; *Enterobius vermicularis*; *Litomosoides*; *Necator americanus*; *Onchocerca volvulus*; *Paraspidodera uncinata*; *Placentonema gigantissima*; *Protospirura ascaroidea*; *Ransomus rodentorum*; *Trichuris trichiura*
- Nesoryzomys* (Galapagos rice rat), 89–93, *plate 22*, *plate 23*
- New Mexico, 65, 73–74, 77–79, 97, 107, 126
- Odum, Eugene, xviii
- Ômura, Satoshi, 22
- Onchocerca volvulus* (river blindness worm), 8, 19–20, 24, 129
- onchocerciasis. *See* African river blindness
- Oncomelania*, 42
- One Health, 85
- Onychomys leucogaster* (northern grasshopper mouse), 96–97, 101–102, 126, *plate 24*
- oocyst, 30, 124, 135, 148
- opossum, 64, 94, 104, 107
- Orthohantavirus, 73, 129.
See also hantavirus
- Örtzi, 16
- paca (*Cuniculus*), 107, 130, 148
- Panama, Isthmus of, 107
- Paragordius tricuspidatus* (Old World horsehair worm), 67, 130
- parasitism, xviii, 29, 32–35, 43, 47, 68, 103, 148; definition, 68, 148; evolution, 32, 34, 47, 103. *See also* brood parasite; ectoparasite; endoparasite
- parasitologist: Hissette, Jean, 19; Moore, Janice, 65; Racz, Gabor R., xiv–xv. *See* Brooks, Daniel R.; Gardner, Scott L.; Hoberg, Eric P.; Rausch, Robert L.
- Paraspidodera uncinata*, 109–112, 130
- pentastome (tongue worm), 49, 148
- Peromyscus maniculatus* (deer mouse), 73–74, 96, 105, 126, *plate 11*
- phenotype, extended, 68
- phylogeny, 48–49, 51, 54, 148
- pinedrop, 31
- pink fairy armadillo (*Chlamyphorus truncatus*), 111–112
- pinworm (*Enterobius vermicularis*), 4–6, 109, 124
- Placentonema gigantissima* (giant whale nematode), 60, 130
- Placobdelloides jaegerskioeldi* (hippo butt leech), 32, 131
- Plagiorhynchus cylindraceus*, 65–66, 131
- Plasmodium*, 7, 29–30, 149. *See also* malaria
- Plasmodium falciparum*, 7, 131
- Platyhelminthes, xviii, 8, 33, 38–39, 42, 48; *See also* cestode; fluke; trematode
- Pleistocene, 9, 149; fauna, 4
- Poinar, George O., 11
- Polymorphus minutus*, 65, 132, *plate 9*
- pork tapeworm (*Taenia solium*), 52, 54–55
- pregnancy, 24, 135
- proglottid, 46, 57, 125, 141, 149
- protist, xvii, 29–31, 80, 97, 100, 103, 142, 144, 149.
See also *Eimeria*; *Giardia duodenalis*; *Leishmania*; *Plasmodium*; *Toxoplasma gondii*; *Trypanosoma brucei*; *Trypanosoma cruzi*
- Protospirura ascaroidea*, 132
- Pseudocorynosoma constrictum*, 64, 132, *plate 8*
- puffin, 51
- Rafflesia* (corpse lily), 31, 133
- Raillietina*, 91–93, 133
- Ransomus rodentorum* (gopher nematode), 101, 133
- Rausch, Robert L., 84–88, 97, 113
- Reduviidae (kissing bug), 103–105, 136, 142, 142. *See also* Chagas disease
- rice rat, Galapagos (*Nesoryzomys*), 89–93, *plate 22*, *plate 23*
- river blindness worm (*Onchocerca volvulus*), 8, 19–20, 24, 129
- rock cavy (*Kerodon rupestris*), 16
- Rockefeller Sanitary Commission for the Eradication of Hookworm Disease, 15, *plate 1*
- rotifer, 63
- roundworm. *See* nematode
- sand fly, 30, 126
- Sandhills. *See* Nebraska Sandhills
- sanitation, 9, 14–15, 122, 134
- SARS-CoV, 88
- schistosome (blood fluke), 39–43, 48, 117, 134, 150, *plate 6*. *See also* *Biomphalaria glabrata*; *Oncomelania*

- Schistosoma japonicum*, 40
Schistosoma mansoni, 6, 8, 41–43, 134, *plate 6*
scolex, 46, 48, 57, 133
seabird, 49–51. *See also*
Alcidae
sex, 23, 36–38, 40, 44–45, 57, 124, 131, 134, 135, 142; asexual reproduction, 37, 44, 122–124, 142
sickle cell disease, 8, 29
Simulium (blackfly), 8, 21, 25, 129, 150
slavery, 7–8, 19, 150
Smithsonian. *See* National Parasite Collection
snail (Gastropoda), 8, 32, 36–45, 67–68, 122–123, 125, 127, 130, 134, 137, 145, 147, 149. *See also* *Biomphalaria*; *Oncomelania*; *Stagnicola elodes*
sporocyst, 37, 39, 127, 150
St. Lawrence Island, 84–88, 93, *plate 21*; map, 85
Stagnicola elodes, *plate 5*
Stiles, Charles Wardell, 15
Stockholm Paradigm, 114, 117, 150
Streptomyces avermitilis, 22
Taenia hydatigena, *plate 19*
Taenia krepkogorski, *plate 18*
Taenia saginata (beef tapeworm), 52–54, 134
Taenia solium (pork tapeworm), 52, 54–55 tapeworm. *See* cestode
Tenebrio molitor (darkling beetle), 97
Tetragonoporus calyptocephalus (whale tapeworm), 56, 58, 135
thorny-headed worm (Acanthocephala), xviii, 33–34, 63–65, 80, 100, 139, *plate 8*, *plate 9*. *See also* *Moniliformis moniliformis*; *Plagiorhynchus cylindraceus*; *Poly-morphus minutus*; *Pseudocorynosoma constrictum*
tongue worm (pentastome), 49, 148
Toxoplasma gondii, 30, 135
tree of life, xviii, 29, 33, 35
trematode, 6, 8, 34, 36–45, 48–49, 68, 80, 141, 144, 147, 150–151. *See also* *Coitocaecum parvum*; *Dicrocoelium dendriticum*; *Euhaplorchis californiensis*; *Leucochloridium variae*; *Schistosoma japonicum*; *Schistosoma mansoni*; *Uvulifer ambloplitis*
Trichuris trichiura (whipworm), 6, 14–16, 136
Trypanosoma brucei, 30. *See also* African sleeping sickness
Trypanosoma cruzi, 30, 103–105, 136, 142. *See also* Chagas disease
tsetse fly, 30. *See also* African sleeping sickness
tuco-tuco (*Ctenomys*), 107, 109–112, 130, 151, *plate 27*, *plate 29*.
See also *Paraspidodera uncinata*
Typton carneus, 33
Ural field mouse (*Apodemus uralensis*), 77, *plate 16*
University of Nebraska State Museum. *See* Harold W. Manter Laboratory of Parasitology
U.S. Department of Agriculture, 15. *See also* National Parasite Collection
Uvulifer ambloplitis (common black spot), 67, 137
Viscum album (European mistletoe), 32, 137
vole, 51, 82, 86–87, 93–94, 96, 124; lacustrine vole (*Microtus limnophilus*), 81, *plate 14*
Wallace, Alfred Russel, 59, 115
whale, 10, 47, 51, 56–62, 84. *See also* *Crassicauda boopis*; *Placentonema gigantissima*; *Tetragonoporus calyptocephalus*
whale louse, 59
whipworm (*Trichuris*), 6, 14–17, 111, 117, 136
whirling disease, 32, 128
Wolbachia, 22–24, 101, 138
xenarthran, 106
Yanomami, 25, 151
Yates, Terry L., 78, 107
Yupik, 84–85, 87