

Index

A

- Academy of Natural Sciences of Drexel University 45, 77, 89, 111, 151, 178, 198, 247, 276. *See also* Academy of Natural Sciences of Philadelphia
- Academy of Natural Sciences of Philadelphia 2, 35, 48, 53, 68, 78, 87, 111, 118, 155, 164, 168, 179, 206, 208, 212, 216, 230, 300
- Acanalonia conica* 228
- Acanthocephala 168–170
- “An Account of the Crustacea of the United States” 164
- Acer* 78
- acerifolia*, *Platanus* 5
- Acer negundo* 314
- Acer palmatum* 41
- Acer platanoides* 247
- acid rain 299
- Acrelius, Israel 128, 130
- adventitium*, *Bipalium* 136
- Aedes aegypti* 307
- Aedes albopictus* 307
- aegypti*, *Aedes* 307
- Aesculus* sp. 16
- Ageratina altissima* 55
- aggregation behavior
- agricultural pests 274, 275. *See also* specific pests
- Ailanthus altissima* 48, 49, 57, 62, 181, 182
- ailanthus silkmoth 45–52, 316
- ailanthus tree 20, 28, 46–47, 50, 53, 57, 62, 63, 64, 65–66, 181, 182, 307, 317
- ailanthus webworm moth 55–64, 81
- protective traits 62–63
- survival in Pennsylvania 65
- vs. cynthia moth 58
- air pollution 179, 243, 245–246, 249, 298–300
- abatement of 245
- liverworts and 244–245
- mosses and 244–245
- recovery of tree moss after abatement of 246–247
- refuges from 248
- Air Pollution Control Board 245
- Aix sponsa* 269
- alba*, *Ardea* 224
- alba*, *Melilotus* 282
- Alberta, Canada 142, 214
- albicollis*, *Zonotrichia* 257
- albo-atrum*, *Verticillium* 63
- albopictus*, *Aedes* 307
- album*, *Chenopodium* 85, 180, 184, 214, 313
- algae 191, 223
- alkaloids 293
- Allee effects 178, 179
- Allee, Warder Clyde 172, 178
- Allegheny River 301
- Allentown, Pennsylvania 271, 272, 274
- altissima*, *Ageratina* 55
- altissima*, *Ailanthus* 48, 49, 57, 62, 181, 182
- Amaranthus* 26
- Amaranthus hybridus* 184
- Amaranthus retroflexus* 180
- Ambigolimax valentianus* 172
- Ambrosia* 26
- Ambrosia artemisiifolia* 203, 296
- Ameiurus catus* 216
- Ameiurus nebulosus* 215–226. *See also* brown bullhead catfish
- americana*, *Malacosoma* 51
- americana*, *Phytolacca* 140–142
- americana*, Setophaga [*Parula*] 67–74. *See also* parula warblers
- American Civic Association 243
- American crow 150
- American Ornithologist’s Union 70
- American Ornithology* 9, 140
- American Philosophical Society of Philadelphia 48, 174, 238
- American robin 138, 139–149, 298, 301, 303, 306
- American Spiders and Their Spinning Work* 96
- American toad 230
- americanus*, *Bufo* 230
- American Water Works Association 301
- Ampelopsis brevipedunculata* 117, 123
- Amphibia 230
- amphibians, urban dryness and 230–231
- Amphidasys betularia* 245. *See also* peppered moths
- Anas platyrhynchos* 269
- Animal Aggregations: A Study in General Sociology* 172
- annual cicada 281
- annuus*, *Erigeron* 180
- annuus*, *Helianthus* 143
- Antheraea polyphemus* 50, 77–88
- antheridea 242
- antheridium 239
- Anthropocene 298, 299
- ants 62, 118, 249
- pavement 270
- velvet ants 115
- aphids 236, 285, 293
- Aphis nerii* 236
- Apis mellifera* 175, 176
- Aporrectodea rosea* 131, 136
- aposematic coloration 58, 60, 61, 62, 65
- archegonium 238, 239
- Ardea alba* 224
- Ardea herodias* 223

- Área de Conservación Guanacaste 57
areolaris, *Climaceae* 212–213, 300
argenteum, *Bryum* 192, 193, 244, 248, 301
argus, *Channa* 226
 Arizona 143
 Arkansas 256
Armadillidium 163–171
Armadillidium nasatum 163, 171
Armadillidium vulgare 164, 165, 166, 168, 172
 Arnold, Gerald E. 301
Artemisia vulgaris 195–202, 296. *See also*
 mugwort
artemisiifolia, *Ambrosia* 203, 296
 arthropods 164, 235, 249, 286
Asclepias 62
Asclepias curassavica 60, 62, 184
Asclepias incarnata 184
Asclepias syriaca 58, 61, 173–183, 236, 285, 305,
 313. *See also* milkweed
Asclepias tuberosa 184
 Asian tiger mosquitos 307
Asplenium platyneuron 187, 305
 asters 26, 203
atalanta, *Vanessa* 51, 52
ater, *Molothrus* 146–147
 Atlantic Flyway 266
atropurpurea, *Pellaea* 185–192, 305
Atteva aurea 55–64, 81. *See also* *ailanthus*
 webworm moth
 Audubon, John James 140, 142
 aulacomnium moss 249
aurea, *Atteva* 55–64, 81
auritus, *Lepomis* 221
auritus, *Phalacrocorax* 224
Autographa precatationis 84
aviculare, *Polygonum* 180
axyridis, *Harmonia* 285–294, 297
- B**
- bacteria 191
 bagworm 33–52, 308
 eggs of 36–37
 electric lighting and 41
 mating of 35, 36, 41–42
 new enemies of 42
 nineteenth-century outbreaks 38
 termination of recent outbreaks 42
 Baily, William L. 70
 Baker, Herbert George 177–179
 Baker's Law 177–179
 bald cypresses 298
 bald eagles
 bald-faced hornets 124, 125
 Barber, H. S. 130
 Barclay, Robert M. R. 256
 Bardsley, John W. 20
 barn bats 254. *See also* bats
 Barney, Jacob 196
 barnyard grass 313
 Barrows, William Bradford 22, 23–24, 24
 Barton, Benjamin Smith 147, 174, 176, 264
 Barton, William P. C. 145, 176, 188
 Bartram, John 106, 107, 111, 116, 184, 298
 Bartram's Garden 121, 138, 154, 162, 314
 Bartram, William 147, 148, 184, 301
 bass 223
 bats
 barn 254
 big brown 254
 collections of in nineteenth-century Philadel-
 phia 254
 comparison with birds 257
 harms and benefits of overwintering in Center
 City 262
 house 254
 in a state of torpor 257, 257–260
 in Center City 254
 little brown 89
 mouse-eared 303
 rabies and 258, 261–262
 regulation of body temperature 256
 silver-haired 253–261
 tricolored 261
 white-nose syndrome and 260, 261–262
 Beatley, Timothy 317
 bedbug 166, 234
 bee fly 115
 bees 30, 118, 121, 122, 125, 154, 174, 175, 176,
 182, 183, 315
 beetles 58, 286
 lady beetles 285–294, 287, 290, 291
 soldier beetles 181, 182
 Belvidere, New Jersey 3
 Benjamin Franklin Parkway 78
 Benjamin Rush Medicinal Plant Garden 130
 Benson, Etienne 8
 Benton, Allen 120
 Berks County 9, 210
 Bermuda grass 313
 Bernhard, Karen M. 272
 berries 144–145, 149, 306. *See also* specific
 berries
Betula 78
Betula nigra 88–89
betularia, *Amphidasys* 245
betularia, *Biston* 245, 300
Bicyrtes quadrifasciatus 271–282. *See also* stink
 bug hunters
 Biddinger, David J. 274, 281
biennis, *Oenothera* 180
 big brown bat 254. *See also* bats
bimaculata, *Melissodes* 315
 biocontrol 275, 281–283
 biophilia 78
Biophilic Cities 317
Bipalium adventitium 136

- Bipalium pennsylvanicum* 135–138. *See also* flatworms
- birches 78, 88–89
- birding, recreational 9
- birds. *See also* specific birds
 decline in populations of urban 25
 electric lighting and 68–75
 polarized light and 76
- birdseye pearlwort 241, 242
- Birds of America* 140, 142
- bisselliella*, *Tineola* 89
- Biston betularia* 245, 300. *See also* peppered moths
- bittersweet 86, 144, 145
- black and yellow mud daubers 105–116, 298, 306
 as hunters 110–111
 longevity of populations of 114–115
 powers of reasoning attributed to 110
 prehistoric links to human houses 115
 spiders and 113, 114
 urban lighting and 112
- Black River 225
- blackseed plantains 32
- black swallowtails 51
- bladder ferns 305
- Blatta orientalis** 44
- Block, Timothy A. 5
- blowflies 194, 249, 251
- blue jays 62
- Boathouse Row 111, 112, 113, 116, 223, 231
- Boisselier-Dubayle, Marie-Catherine 252
- Bombus impatiens* 122
- Bombyliidae 115
- Bombyx mori* 48
- borealis*, *Epilachna* 294
- borealis*, *Lasiurus* 254
- Borrelia burgdorferi* 143, 149
- Botanicum Officinale* 196
- Botanologia* 196
- Bourletiella hortensis* 249, 250, 251
- Bowen, Daniel 79
- boxelders 314
- boxwood leaf-tier moths 83
- brachyrhynchos, *Corvus* 150
- Branta canadensis* 263–268. *See also* geese
- Branta canadensis maxima* 233, 267. *See also* giant Canada geese
- Brassicaceae 51
- Breeding Bird Survey 9, 78, 142
- brevipedunculata*, *Ampelopsis* 117, 123
- Brewer, Thomas M. 22
- bridge spiders 91–102, 302, 316
 aggression within colonies of 103
 capture of prey 94–96
 colonies of 103
 diurnal vs. nocturnal activity 94–97
 food security and 103–104
 lamp fixtures and 94–96, 97
 mud daubers and
 use of visual lures to attract prey 100–101
 webs of 97, 98–99, 100
- broad-headed sharpshooters 228
- broadleaf plantains 180
- brook trout
- Brower, Lincoln 62
- brown bullhead catfish 215–226, 300, 307, 316, 317
 abundance of in Schuylkill River 216
 charisma 227
 diet of 216–219, 219
 disappearance of 226–227
 in Schuylkill River 226–227
 pollution and 219–225, 225–226
 power plant intake pipes and
 power plant water intake pipes and 227
 tumors in 225–226
- brown lacewing 295
- brown marmorated stink bug 272–273, 281
 as agricultural pests 274–275
 theoretical ideal agent for control of 275
- Brush Electric Company 79
- bryophytes 244, 247, 248
- bryozoans 206, 212
- Bryum argenteum* 192, 193, 244, 248, 301
- bryum moss 244
- bubonic plague 14
- buckeye 32
- Bufo americanus* 230
- Bug Fest 276
- bugs 58, 276. *See also* insects
 leaf-footed 276
- bug zappers 89
- building maintenance, mud daubers and 116
- bulkheading 226–227
- bullfrog 231
- bull thistle 180
- bumblebees 122, 182
- Bureau of Boiler Inspectors 245
- burgdorferi*, *Borrelia* 143, 149
- butterflies 30, 32, 162
 monarch 58, 59, 60, 62, 184
 viceroy 58
- butterfly weed 184
- ## C
- cabbage white 51
- caementarium*, *Sceliphron* 105–116
- caespitum*, *Tetramorium* 270
- Calhoun, John C. 275
- Calliphoridae 194, 249, 251
- Callosamia promethea* 50, 87
- calycula*, *Erythroneura* 228
- Camden, New Jersey 196, 198
- Canada 190, 214, 256, 267
- Canada Department of Agriculture 180

Canada geese 233, 263–268, 307, 309, 316
 adaptations to cold 269
 breeding of 264
 domestication of 267
 local nesting of 266
 mixed populations in the winter 267–269
canadensis, Branta 263–268
canadensis, Erigeron 180
canadensis, Solidago 196
Canadian Atlas of Bird Banding 148
Candelaria concolor 104
caninus, Mutinus 249, 251
 Cantheridae 181
 Cape Cod 97
 Cape May 142
 Capitalism, *Socialism and Democracy* 316
 carcinogens 225, 226
 carcinoma 225
 cardenolide poisons 62
Cardinalis cardinalis 148, 257, 303
 cardinal 148, 257, 303
 cardui, *Vanessa* 51
 Carlisle, Pennsylvania 191
 Carolina mantids 151, 155, 156, 157, 158, 159,
 160, 162, 307
carolina, Stagmomantis 151, 155, 156, 157, 158,
 159, 160, 162
carolinensis, Sciurus 7–16
carota, Daucus 184, 282
 carpenter bees 122
Carpodacus mexicanus 303
 Carson, Rachel 9, 213
 Carter, M. E. 272
Cassinia 70
A Catalogue of Insects of Pennsylvania 288, 289
Catalpa speciosa 181
 caterpillars 31, 32. *See also* bagworms
 monarch 58, 60
 tent 51
catesbeiana, Rana 231
 Catesby, Mark 139, 140
 catfish 216, 226, 300, 317. *See also* brown bull-
 head catfish
 channel 226
 flathead 226
Catocala minuta 86
 cats 145
catus, Ameiurus 216
cecropia, Hyalophora 50
Celastrus orbiculatus 144
Celastrus scandens 86, 145
Celtis 144
 Cemetery at Old Pine Street Church 299
 Center City iv, vi, vii, 26, 42, 54, 63, 66, 90, 124
 as heat island 148, 162, 256, 262, 300–302
 as thermal refuge for bats 256
 decline in number of insects in 27–28
 ecology of 297–310
 habitats of 309–313
 light pollution in 79–80, 81
 map of v
 people in 307
 persecution in 305
 populations in 307–309
 sewage system of 311
 centipedes 235
 European 171
 Central America 143, 147
 Central Park 10
 centrarchids 221
 cestodes 221
 chalcid wasps 51, 115
Channa argus 226
 channel catfish 226, 317
 charismatic species 227
Chauliognathus marginatus 181, 182
Chenopodium 26
Chenopodium album 85, 180, 184, 214, 313
Chenopodium sp. 143
cheopis, Xenopsylla 14
 cherry trees 144
 Chesapeake Bay 267
 Chester County 135, 188, 199, 200
 Chestnut Street Bridge 92–93, 95, 305
 Chicago, Illinois 73
 chickweed 180
 chicory 122
 Chikungunya fever 307, 308
 Children's Hospital 120
 Chinatown 313
 Chinese mantid 151–160, 307
 Chironomidae 216–219
 chironomids 216–219, 223
 chlordane 223
Chordeiles minor 89
 chrysanthemum 203
 Chrysididae 115
 Chuang, Chih-Yuan 100–101
 cicada killer 281, 282
 cicadas 281, 303
Cichorium intybus 122
Cimex lectularius 166, 234
 Cincinnati, Ohio 102
cinereus, Plethodon 229–234
 Cira Centre 74
Cirsium vulgare 180
 citrus flatid planthopper 228
 City Hall 71, 74, 319
 City Hall Tower 67, 69, 70, 71, 76, 302
 “City’s New Pastime: Talon Shows” 9–10
 Clark, Christopher 50, 53
 Clean Air Act (Great Britain) 246
 Clean Air Act (U.S.) 245, 246
 Clean Water Act 210
 Cleave, Harley J. Van 168
 cliffbrake, purple-stemmed 185–192, 305

- Climacea areolaris* 212–213, 300
 climate vii
 climate warming 1–6, 148
 clones 196
 clothes moths 89
 cloud cover 81
 clover 182, 184, 282
 coal 208, 210, 299
 coal mining 210
Coccinella 286, 289. *See also specific species*
Coccinella 9 notata 291
Coccinella 20 maculata 287
Coccinella novemnotata 291
Coccinella septempunctata 290, 291
 Coccinellidae 286, 294
Coccygomimus disparis 38, 39, 42
coenia, Junonia 32
 Colinvaux, Paul 162
 College of Physicians 130
 Collegeville, Pennsylvania 136
 Collinson, Peter 106
 Colorado 148
 coloration, aposematic
 58, 60, 61, 62, 65
Columba livia 142
 Columbia railroad bridge 224
 Columbus, Ohio 148
 Comcast Center 71, 72, 74
 Committee on Entomology, Pennsylvania
 Horticultural Society 8
 common blue violets 54, 66
 common dandelions 84
 common eastern fireflies 127–133, 302
 common groundsel 90
 common looper moths 84
 common milkweed 58, 61, 173–183, 236, 285,
 292, 305, 313
 common morning glory 126
 common mullein 180
 common nightcrawlers 131, 136
 common nighthawks 89
 common pygmy woodlice 172
 common ragweed 203, 296
 common striped woodlice 172
 common tan wave moths 86
Compendium Florae Philadelphicae 145, 176
Compsilura concinnata 53
concinnata, Compsilura 53
concolor, Candelaria 104
conica, Acanalonia 228
 conifers 276
 Connecticut 143
 continental drift, liverworts and
 252
Conura maria 50
Convolvulus sp. 85
 Cooke, Wells W. 70–71
 Cooper's hawks 145
 Coppinger, Ray 62
 Coreidae 276
 cormorants 223, 224
 corn earworm moths 83
 Cornell University 118
 Insect Diagnostic Lab 272
Cornus 144
cornutus, Larinioides 112
Corvus brachyrhynchos 150
 Cottrell, Ted E. 293
 Coues, Elliott 22
 cowbirds 76, 146–147, 303
 crabapple trees 144
Crataegus 144
 creative destruction 316
Crepis sancta 233
 Cresson, Ezra Townsend 118
 crickets 29, 30, 303
 Criminal Justice Center 137
Cristatella (Pectinatella) magnifica 212
crocata, Dysdera 171
 crows 150
crus-galli, Echinochloa 313
 Crustacea 164
 crustaceans 165. *See also specific crustaceans*
 Crutzen, Paul J. 298, 299
Cryptops hortensis 171
 CSX railroad tracks 161
 cuckoo wasps 115
Culex pipiens 307
Culex restuans 307
 Culver, Delos E. 68–69
curassavica, Asclepias 60, 62, 184
Curcubita pepo 143
 cylindraceus, *Plagiorhynchus* 168–170
Cynodon dactylon 313
 cynthia moths 45–52, 62
 extinction in Philadelphia 50
 parasites and 49–50
 parasites in Philadelphia in 50–53
 vs. ailanthus webworm moths 58
cynthia, Samia 45–52, 62. *See also cynthia*
 moths
 cypress trees 38, 298
 cyprinids 221
Cystopteris 305
- ## D
- dactylon, Cynodon* 313
Danaus plexippus 58, 59, 60, 62. *See also*
 monarch butterflies
 dandelions 84, 180, 181
 seeds of 180
 Dappen, Glen E. 170
 Darby Creek 225, 307
 Darlington, William 188, 199, 203
Daucus carota 184, 282
 Davis, Harry G. 120

- Day, William H. 294
 DDT 9, 223
 deer 269
 deer ticks 306
 De Geer, Charles 128
 Delaware River vii, 2, 3, 128, 197, 206, 225, 226
 Delaware River basin 217
 Delaware River Basin Commission 225
 Delaware Valley 5
 Delaware Valley Ornithological Club 68–69, 70
 Delmarva Peninsula 267
 dengue 307, 308
 Denmark 214
 Denton, Sherman F. 79
Deroceras reticulatum 172
 desiccation 301
destructans, *Pseudogymnoascus* [Geomyces] 260
 Devigne, Cédric 170
 dieldrin 223
differentialis, *Melanoplus* 28
 digger bees 315
Dionaea muscipula 174
 Diptera 39, 76, 131
 Directions for Collecting and Preserving Insects 79
disparis, *Coccygomimus* 38, 39, 42
dispar, *Lymantria* 42
distichum, *Taxodium* 1–6
 dock 26
 dogs 104
 dogwood 144
Dolichovespula maculata 124
domesticus, *Passer* 19–31, 89, 142, 257, 274
dominula, *Polistes* 121, 123, 125
dominulus, *Polistes* 121, 123, 125
 Dorwaldt, Lynn 2
 double-crested cormorants 224
 doves 303
 Downing, Andrew Jackson 46, 47
 Drexel University 221. *See also* Academy of Natural Sciences of Drexel University
 Driscoll Pond 215
Drosera 174
 drought 189. *See also* desiccation
 Ducey, Peter K. 137
 ducks 269. *See also* mallards
 Dunbar, Miranda B. 256
 dung mosses 249
Dysdera crocata 171
- ## E
- eagles, bald 223
 earthworm 131, 138, 143, 219, 230, 310
 common nightcrawlers 131
 flatworms and 136, 137
 rosy-tipped 131, 136
 Eastern College 136
 eastern garter snake 194
 eastern gray squirrel 7–16, 87, 307
 eastern redbelly turtle 284
 eastern red cedar 36, 40
 Eastern State Penitentiary 185, 186–187, 188, 190
 eastern yellowjacket 117, 118
 Eberhard, William 112
 ebony spleenwort 187, 305
Echinochloa crus-galli 313
 ectoparasites 143
 egrets 224
 Eisenbeis, Gerhard 80
 Eiserer, Leonard A. 143
 Eisner, Thomas 129
 electric lighting 41, 68, 74–80, 302
 birds and 70–71
 mud daubers and 112
Eleusine indica 313
Emmelina monodactyla 85
 Empire State Building 160
 encephalitis 307
The End of Nature 316
 English ivy 144
 English plantain 32
The English Sparrow (Passer domesticus) in North America: Especially in Its Relations to Agriculture 22
 English sparrow 19–31
Entomological News and Proceedings of the Entomological Section of the Academy of Natural Sciences of Philadelphia 56
Epeira sclopetaria 96
ephemeraeformis, *Thyridopteryx* 33–52
 Ephemeroptera 76
Epilachna borealis 294
Epilachna varivestis 294
Eptesicus fuscus 254
Eragrostis pectinacea 311
Eragrostis spectabilis 311
ericoides, *Symphyotrichum* 203
Erigeron annuus 180
Erigeron canadensis 180
Erigeron philadelphicus iv
Erithacus rubecula 149, 303
Erythroneura calycula 228
 European centipede 171
 European mantid 160
 European paper wasp 121, 123, 125
 European robin 149, 303, 306
 European starling 25, 150
 Evans, Howard E. 276
 evening primrose 180
Evening Telegraph 20
 evolution 309
 Exelon Generation Company 227

F

Fairfax, Virginia 191
Fairmont Park 11
Fairmount Dam 205, 206, 210, 224, 226, 263, 268, 300
Fairmount Hill 206
Fairmount Park 28, 46, 58, 61, 117, 125, 137, 176, 181, 183, 230, 275
Fairmount Water Works 41, 111, 116, 188, 190, 191, 194, 212, 266, 305
Faroe Islands 137
fasciatus, *Oncopeltus* 58, 178
feather-legged fly 274, 275
femme fatale firefly 302
Fernald, Merritt Lyndon 196
ferns 185–192, 186, 305
 insects and 190, 191
 life cycle of 188, 192
Field Museum 73
finches 142, 204, 257, 303
Findlay, Judy N. 180
fireflies 127–133, 138, 231, 235, 302
 common eastern
 deciphering flashes of 128
 diet of 131–132
 discovery of firefly poisons 129
 femme fatale 129, 132–133
 light pollution and 132–133
 revision of taxonomy based on flashes 129–130
fish ladder 205, 210, 300
Fitch, Asa 57
Fittler Square 29, 30, 130, 229, 231, 232, 235, 282, 298
flathead catfish 226
flatworm 135–138
 barriers to observing 138
 earthworms and 136, 137
fleabane 180
flesh flies 115
flies 51, 52, 113, 194, 249, 282
 bee fly 115
 blow fly 194, 249
 feather-legged fly 274, 275
 flesh fly 115
 greenhead fly 94, 97
 moth flies 159
 tachinid 51, 53, 62
floods 2, 3, 160
Flora Cestricea 199
Flora of North America 197
Fort Drum, New York 261
four-spotted tree cricket 30
Fowler, Henry Weed 164–165, 216, 221, 230, 300
Fox, Daniel M. 20
foxtail 180, 195
fragilis, *Spongilla* [*Eunapius*] 205–212, 300

Framingham, Massachusetts 78
Franklin, Benjamin 48
Franklin Institute 10, 13
Franklin Square 78
Fregon Farms 283
frenchii, *Lespesia* 51, 52, 53
freshwater sponges 205–212
frog 231
Frost, C. A. 78
Frost, Stuart W. 179
fungi 191, 260, 293
fuscatus, *Polistes* 125
fuscus, *Eptesicus* 254

G

Gagnon, Daniel 190
Galasa nigrinodis 83
gallopavo, *Meleagris* 269
gametophytes 188
Ganter, Philip F. 166
garden ecology
garden springtail 249, 250, 251
garter snake 194
gas lamps 78–79, 93
Geer, Charles De 130
geese 233, 263–268, 307, 308, 316
 adaptations to cold 269
 breeding of 264
 commercial hunting with decoys 264
 domestication of 267
 local nesting of 266
 mixed populations in the winter 267–269
 proliferation in southeastern Pennsylvania 265
 urban 265
Gelhaus, Jon 276
gemmae 248, 249
Gentry, Thomas 22, 23–24, 26
geologic time 298
“Geometry of the Selfish Herd”
George Washington National Forest 81
Georgia 74
Gerhard, W. W. 6
germanica, *Vespula* 118, 120, 121, 125
Germantown Nursery 153
Germantown, Pennsylvania 152
German yellowjacket 118, 120, 121, 125
giant Canada geese 233, 267
giant garden slug 172
giant silkmoths 86, 87, 89
Gilbert, Oliver S. 244, 248
Gillespie, John A. 9
Ginkgo biloba 29
glaciation 3, 5, 164
glaciers 2, 3
glass facades 71–76, 302
glauca, *Setaria* 180
glauca, *Simarouba* 57, 180

- glaucus*, *Papilio* 51
Gleditsia triacanthos 86
 Glenside, Pennsylvania 154
 glyphosate 184
 Godman, John Davidson 13–14
 goldenrod 26, 86, 196
 golden-yellow chalcids 50
 goosefoot 26, 143
 goose grass 313
gracilis, *Urnatella* 206, 211
 Graff, Frederick 41
 Grant, Bruce S. 246
 grasses 184, 313
 grasshoppers 28, 303
 Grauballe Man 214
 Gray, Asa 197
 gray cross spider 91–102
 Grays Ferry Crescent 280
 great blue heron 223
 Great Britain 149, 192, 245–246
 great egret 224
 green cloverworm moths 82
 Green coneheaded planthopper 228
 green foxtail 195
 greenhead flies 94, 97
 Green, Jacob 230, 231, 234
 Greenland 267
 grey field slug 172
 groundsel 90, 180
 Grout, Abel Joel 246
 Gulf of Mexico 70–71
 gypsy moth 42
- ## H
- habitats 309–313
 row house courtyards 309–310
 sidewalks 310–311
 tidal alluvial mudflat 313
 hackberry 144
 Haddonfield, New Jersey 215
Haemorrhous mexicanus 142, 204, 257. *See also* house finches
Halyomorpha halys 271, 272–273. *See also* brown marmorated stink bug
halys, *Halyomorpha* 271, 272–273
Halysidota tessellaris 179
 Hamilton, William D. 29, 49, 64, 65
 Hanton, Wilma Kane 166
 Harlan, Richard 254
Harmonia axyridis 285–294, 297. *See also* multicolored Asian lady beetle
 harmonine 293
 Harris, Thaddeus William 21
 Hartzler, Robert G. 184
 Harvard Museum of Comparative Zoology 287
 Hassall, Mark 172
 Hawk Mountain Sanctuary 9
 hawks 298
 Cooper's 145
 red-tailed 9–11, 15, 145, 317
 hawthorn 144
 heat 189. *See also* thermal pollution
 heath asters 26, 27
Hedera helix 144
 Heiling, Astrid M. 96, 97
Helianthus annuus 143
Helicoverpa zea 83
helix, *Hedera* 144
helvola, *Strophostyles*
 Hemiptera 228, 301
 hemisphaerica, *Reboulia* 237–248
 hemolymph 293
 Hentz, Nicholas Marcellus 112
 Herberstein, Marie E. 97
 herbicide 26, 184, 313
 milkweed and 184
 mugwort and 203
 herbs, medicinal 196
herodias, *Ardea* 223
 heron 223
 herringbone grasshopper 28
 Hertig, Marshall 166
Hesperomyces virescens 293
 Heteroptera 234, 276
 Hill, Ellsworth Jerome 191
 Hindermyer, Joseph 152
 Hodek, Ivo 291
 Hoebeke, E. Richard 272
 Holbrook, John Edwards 230
 Hollenback House 113
 holly 144
 Holm, Leroy G. 311, 313
 Holyoak, Marcel 80, 81
 honeybees 175, 176, 182, 183
 honey locust 86
 honeysuckle 144
 hornet, bald-faced 124
 horse chesnut 16
 horseweed 180
hortensis, *Bourletiella* 249, 250, 251
hortensis, *Cryptops* 171
 Horwitz, Richard J. 212
 Hospital of the University of Pennsylvania 119
 Hospital of the Veterinary School of the University of Pennsylvania 120
 house bats 254. *See also* bats
 house finch 142, 204, 257, 303
 house sparrow 19–31, 42, 89, 142, 257, 274, 307, 308, 313
 Howard Gittis Student Center 74
 human body lice 6
humanus humanus, *Pediculosis* 6
 hunting 264
 Hurd, Lawrence 160
Hyalophora cecropia 50, 87
hybridus, *Amaranthus* 184

hydrocarbons 179
Hydrocotyle sibirhopioides 184, 310, 316
hyemalis, *Junco* 257
Hyloniscus riparius 172
Hymenoptera 118, 121
Hypena scabra 82
Hypericum perforatum 180

I

Ichneumonidae 115
ichneumon wasps 38, 39, 41, 42, 115
Ictalurus punctatus 226
Ilex 144
Ilg, Carl 56, 57
Illinois Poison Center 121
impatiens, *Bombus* 122
implicata, *Lacinipolia* 84
implicit arches moths 84
incarnata, *Asclepias* 184
Independence Hall 4, 13, 254
Independence Mall 25
Independence National Historic Park 12
indica, *Eleusine* 313
industrial melanism 248, 300, 309
 in Great Britain 245–246
 in Philadelphia 246
Industrial Revolution 299
insecticides 41, 274, 307, 308
insects 21, 29, 30, 31, 32, 162, 303. *See also* specific insects
 declines in number of 27–28, 76
 ferns and 190, 191
 infestations of 20
insularia, *Pleuroprucha* 86
intybus, *Cichorium* 122
invasional meltdown
Ipomoea purpurea 126
isopods 163–171, 298, 310. *See also* specific
 isopod
ivy 144
Ixodes scapularis 143

J

Jacobs, Ella 152
James, Thomas Potts 246, 299
Janzen, Daniel 57, 87
Japanese honeysuckle 144
Japanese maples 41
Japanese mazus 241, 242, 311, 317, 318
japonica, *Lonicera* 144
Jason Weintraub 87
jays 303
Jesuits 196, 309
John Bartram's House 111
John Heinz National Wildlife Refuge 225, 230
Johnson, Lyndon Baines 246
Jones, Frank Morton 35
Journal of the Academy of Natural Sciences of

Philadelphia 164
jumping spider 97
Junco hyemalis 257
juncos 257
juniper 144
Juniperus 144
Juniperus virginiana 36, 40
Junonia coenia 32
Jurassic period 298
Jutland 214

K

Kaighns Point 198
kalmii, *Lygaeus* 58, 61
Kalm, Peter 8, 142
katydids 303
Kemble, Fanny 41
Kentucky 150
Kew 178
Kipling, Rudyard 133–134
Kleinteich, Anja 102
Klein, William M. 200
Klem, Daniel 73
Krakatau 190
Krakker, James J. 115

L

Lacinipolia implicata 84
lady beetle 286. *See also* multicolored Asian lady beetle
 diverse enemies of 293
 fungi and 293
 introduction at seaports 294–295
 Mexican bean beetle 294
 nine-spotted lady beetle 291
 non-predaceous 294
 predaceous 295
 seven-spotted lady beetle 290, 291
 squash lady beetle 294
 twenty-spotted lady beetle 287, 294
ladybug 286. *See also* lady beetle
Lake Erie 216
lambquarters 85, 180, 184, 214, 313
lamps, 302, 316
Lampyrus pensylvanica 128
Lancaster County, Pennsylvania 188
lanceolata, *Plantago* 32
land planarians 135–138
lapathifolium, *Polygonum* 180
largemouth bass 223
Larinioides cornutus 112
Larinioides sclopetarius 91–102, 302. *See also* bridge spiders
Lasionycteris noctivagans 253–261. *See also* silver-haired bats
Lasiurus borealis 254
Latrobe, Benjamin Henry 110
Laurent, Philip 151, 152

lawn pennywort 184, 310, 316
 leaf-footed bugs 276, 276–280
 leafhoppers 228
 Leconte, John L. 128
lectularius, *Cimex* 166, 234
Lehmannia valentiana 171–172
 Leidy, Joseph 28, 34, 35, 37, 38, 40, 41, 46, 47,
 48, 137, 206, 207, 208, 210, 212, 213, 219
 Lemon Hill mansion 46
Lepomis auritus 221
Leptoglossus occidentalis 276
 leptospirosis 15
Lespesia frenchii 51, 52, 53
leucopus, *Peromyscus* 40, 42
 Lewis, Henry Carvill 2
 Lewis, Sara 132–133
 lice, human body 6
 lichens 76, 104, 191, 246, 248
 light. *See also* electric lighting
 polarized 76
 lighthouses 70–71
 lighting, electric 302. *See* electric lighting;
 See light pollution
 light pollution 77, 78, 79–80, 302
 fireflies and 132–133
 in Center City 81
 milkweed and 179
 protective effects on moths 80–81
 robins and 149
 light traps 179
Limax maximus 172
 Limerick Nuclear Power Plant 227
Limnodrilus 219
 Lindahl, Josua 207
 Linnaeus, Carl iv, 194
 little brown bat 89, 260
 little underwing moth 86
 liverworts 237–248
 air pollution and 244–245
 continental drift and 252
 dispersal of 248–251
 in Center City 238–243
 refuges from air pollution 248
 scarcity in “civilized” habitats in the North
 243
 springtails as possible agents of dispersal 249
 livia, *Columba* 142
 Livshultz, Tatyana 178
 Lloyd Hall 94, 95
 Lloyd, James E. 129, 133
 Logan Circle 270, 271, 276–280, 282, 309
 London, England 192
 London plane tree 5
 Long, Stephen H. 275
Lonicera japonica 144
 loosestrife 313, 315
 Loss, Scott R. 78
 Louisville, Kentucky 150

lovegrasses 311
 Lozano-Hemmer, Rafael 78
 lucifugus, *Myotis* 89, 260
 Lucké, Balduin 225
Lumbricus terrestris 131, 136, 230
Lygaeus kalmii 58, 61
Lymantria dispar 42
 Lyme disease 143, 149, 307
Lythrum salicaria 313, 315

M

Macon, Georgia 74
macroura, *Zenaida* 303
maculata, *Coccinella* 20 287
maculata, *Dolichovespula* 124
maculifrons, *Vespula* 117, 118
 maggots 39, 194
magnifica, *Cristatella* (*Pectinatella*) 212
 Maine 148
 maize 143
major, *Plantago* 180
 Malinics, Brenda 254, 261
 mallard 269
Malus 144
Manayunkia speciosa 210
 Manhattan, New York 10, 73, 160
 Manitoba, Canada 256
 mantids 307. *See also* Carolina mantids; *See*
 also Chinese mantids
Mantis religiosa 160
 maple 41, 78, 253, 254
 Norway 247
 silver 20
Marchantia polymorpha 237, 241, 242, 244,
 248, 249
marginatus, *Chauliognathus* 181, 182
maria, *Conura* 50
mariae, *Spilochalcis* 50
 Maryland 143
 masonry 192
 Massachusetts 78
maxima, *Branta canadensis* 233, 267
maximus, *Limax* 172
 mayflies 76
mays mays, *Zea* 143
Mazus pumilus 241, 242, 311, 318
 McCook, Henry C. 37, 92–97, 102, 110–111
 McCormick Place 73
 McDermott, Frank Alexander 128, 129, 130
 McKibben, Bill 316
 McKinney, Michael L. 316
 McLean Library 152
media, *Stellaria* 180
 medicinal herbs 196
 Meehan’s Nursery 152
 Meehan, Thomas 153
 melanism 245–246, 248, 300, 309
Melanoplus differentialis 28

- Meleagris gallopavo* 269
Melilotus alba 282
Melissodes bimaculata 315
Melittobia 115
mellifera, *Apis* 175, 176
 Melsheimer, Frederick Valentine 286–287, 288, 291, 295
 meltdown
 Memorial Hall 11
Metcalfa pruinosa 228
 methoxyprazines 293
 Mexican bean beetle 294
mexicanus, *Carpodacus* 303
mexicanus, *Haemorrhous* 142, 204, 257
 mice, white-footed 40, 42
 Michaud, J.P. 291
 microbes 166
 microbial biofilms 191
Micromus posticus 295
 microsporidia 293
 Middle Creek Wildlife Management Area 265
 midges, nonbiting 216–219
migratorius, *Turdus* 138, 139–149, 303
 Migratory Bird Treaty Act of 1918 265
 mildew 294
 milkweed 58, 62, 173–183, 236, 285, 292, 305, 313
 air pollution and 179
 common 61
 herbicide and 184
 light pollution and 179
 persecution of 184–185
 pollination of 174
 pollinator scarcity and 180–182
 scarcity downtown 176
 scarcity of space and 182
 seeds of 178, 180
 swamp 184
 tropical 60, 184
 milkweed aphid 236
 milkweed beetle 61
 milkweed bug 61, 178
 Miller, Mark W. 149
 millipedes 301
 Miltogramminae 282
 Minnesota River 275
 minnows 221, 223
minor, *Chordeiles* 89
minuta, *Catocala* 86
 Mississippi valley 284
 mollusks 206
Molothrus ater 146–147
 monarch butterflies 58, 59, 60, 62, 184
monodactyla, *Emmelina* 85
 Monongahela River 219, 301
 Monroe, James 275
 Moore, Janice 170
mori, *Bombyx* 48
 morning glory 85, 126
 morning glory plume moth 85
 Morse, Douglass H. 174
 mortar 192
Morus 144
 mosquitoes 307
 mosses 104, 241, 242, 244, 248–249, 299, 300, 301
 air pollution and 244–245
 aulacomnium 249
 dung 249
 recovery of tree moss after abatement of air pollution 246–247
 silvergreen bryum 192, 193
 tree 246–247, 247, 248
 moth fly 159
 moths 300, 316
 ailanthus webworm 55–64
 bagworm 33–52
 boxwood leaf-tier 83
 clothes moths 89
 common looper 84
 common tan waves 86
 corn earworm 83
 cynthia 45–52
 electric lighting and 80
 flying into light in Center City 81
 green cloverworm 82
 gypsy 42
 harmful effects of light pollution on 80
 implicit arches 84
 light pollution and 80
 little underwing 86
 morning glory plume 85
 peppered 245–246
 polyphemus 77–88
 protective effects of light pollution on 80–81
 Suzuki's promalactis 85
 tussock moths 179
 mountain ash 144
 mourning doves 303
 mouse-eared bats 303
 Mt. Airy 151, 152
 mud daubers 105–116, 120, 298, 306. *See also* specific species
 black and yellow 105–114
 destructive impact of building maintenance on nests 116
 organ pipe mud daubers 106
 mudflats 313
 mugwort 195–202, 296, 309, 317
 as a medicinal herb 196
 dissemination of 199–200
 evolution in North America 196
 future of 203
 herbicide and 203
 ships' ballast and 197

Muhlenberg, Henrico 238
Muhlenberg, Henry 188
mulberry 48, 144
mullein 180
Mulligan, Gerald A. 180
multicolored Asian lady beetle 285–294
 biological arsenal of 293
 diverse enemies of 293
municipal lighting 78
muscipula, *Dionaea* 174
muscorum, *Philoscia* 172
Muséum National d’Histoire Naturelle 252
Museum of Science, Boston 133
mushrooms 249, 251
mustard family 51
Mutillidae 115
Mutinus caninus 249, 251
Myotis lucifugus 89, 260

N

Narberth, Pennsylvania 125
nasatum, *Armadillidium* 163, 171
National Audubon Society 74
National Museum of Natural History 115
Native Americans 143, 298
native plant species 41
*The Natural History of Carolina, Florida and the
 Bahama Islands* 139, 140
nebulosus, *Ameiurus* 215–226
negundo, *Acer* 314
nerii, *Aphis* 236
Neuroptera 212, 300
New England 148
New Jersey 196, 198, 215, 221
New Mexico 143
New York 49, 136, 232, 256
New York Audubon Society 73
Nickol, Brent B. 170
Nicotiana sp. 143
nighthawks 317
nigra, *Betula* 88–89
nigrinodis, *Galasa* 83
nigrovittatus, *Tabanus* 94, 97
nine-spotted lady beetle 291
nitric acid 299
nitrogen oxide 299
noctivagans, *Lasionycteris* 253–261
noise pollution 149–150
Nolan, Edward J. 49
nonbiting midges 216–219
Norris, Thaddeus 216
North Carolina 219, 301
northern cardinal 148, 257
northern catalpa 181
Northern Ireland 137
northern parula 67–74
northern snakehead 226, 317
norvegicus, *Rattus* 13–14, 15

Norway maples 247, 253, 254
Norway rat 13–14, 15, 307
notata, *Coccinella* 9 291
novemnotata, *Coccinella* 291
Nuttall, Thomas 196

O

oaks 16, 78, 86, 87, 247
Oberhauser, Karen S. 184
Obin, Martin S. 113
occidentalis, *Leptoglossus* 276
occidentalis, *Platanus* 5
O’Connor Swimming Pool 47
Odocoileus virginianus 269
Oecanthus quadripunctatus 30
Oecanthus sp. 29
Oenothera biennis 180
Official Handbook of City Hall 70
officinale, *Taraxacum* 84, 180
Ogren, Robert E. 135, 136
Ohio 148
Ohio River 301
oil lamps 78
oleander aphid 236
oleracea, *Portulaca* 180, 311, 312
oligochaetes 219, 223
olivaris, *Pyloodictis* 226
Olsen, O. Wilford 169
Oncometopia orbona 228
Oncopeltus fasciatus 58, 178
orbiculatus, *Celastrus* 144
orbona, *Oncometopia* 228
organ pipe mud dauber 106, 115, 116
oriental bittersweet 144
oriental cockroach 44
orientalis, *Blatta* 44
Orthotrichum 246, 248, 299
Orthotrichum pumilum 104, 246, 247, 299
ospreys 223
Owen, Denis F. 246
owls 9–18
ozone 179

P

painted ladies 51
Palisot de Beauvois, Baron 254
palmatum, *Acer* 41
paper wasps 118, 121, 123, 125
Papilio glaucus 51
Papilio polyxenes 51
Papilio troilus 51
papillosa, *Syntrichia* 246
paradise trees 57
parasites 293
 pillbugs and 168–170
parasitoids 274, 275
Parietaria pensylvanica 51, 53, 311
Parthenocissus quinquefolia 144

- Parthenolecanium quercifex* 301
 parula warblers 67–74
 collisions and 68–75
 disruption of visual cues and 70–75
 electric lighting and 68–75, 78
 glass facades and 71–76
 impact of collisions on 76, 78
 lighthouses and 70–71
 polarized light and 76
 skyscrapers and 71–76
 windows and 71, 71–76
Passer domesticus 19–31, 89, 142, 257, 274. *See also* house sparrows
 Patrick, Ruth 208
 pavement ants 270
 PCBs (polychlorinated biphenyls) 221, 223, 226, 307
 Peale, Charles Willson 254
 Peale Museum 260
 Peale, Titian Ramsay 77, 78, 79, 89, 179, 254
 pearl crescent 27
 pearlwort 241, 242
 Peck, George Wilbur
 PECO (Philadelphia Electric Company) 317
pectinacea, *Eragrostis* 311
 pedestrians 184
Pediculus humanus humanus 6
 Peigler, Richard 62
Pellaea atropurpurea 185–192, 305. *See also* purple-stemmed cliffbrake
 pellitory 51–52, 311
pennipes, *Trichopoda* 274, 275
 Penn Square 270
 Penn State University 179
 Pennsylvania 9, 135, 136, 154, 191, 209, 271, 274
 Pennsylvania Department of Agriculture 313
 Pennsylvania Department of Environmental Protection 221
 Pennsylvania Flora Database 200
 Pennsylvania Game Commission 265
 Pennsylvania Horticultural Society 8, 152
 Pennsylvania Hospital 107, 111
 Pennsylvania pellitories 51, 53, 311
 Pennsylvania State Board of Agriculture 9
 Pennsylvania state game refuge 264, 265, 267
 Pennsylvania State House 4
 Pennsylvania State University 120
pennsylvanica, *Photuris* 128
pennsylvanicum, *Bipalium* 135–138
 pennywort 184, 310, 316
pennsylvanica, *Lampyrus* 128
pennsylvanica, *Parietaria* 51, 53, 311
pennsylvanicum, *Polygonum* 180
 Pentatomidae 272, 276
 people 307
pepo, *Curcubita* 143
 peppered moths 245–246, 300
perforatum, *Hypericum* 180
 Perillo, Joseph 226
Perimyotis subflavus 261
 permafrost 164, 298
Peromyscus leucopus 40, 42
 persecution 305
persicaria, *Polygonum* 180
 pesticides 223
pestis, *Yersinia* 14
Phalacrocorax auritus 224
Phaseolus vulgaris 143
 PHAs (polycyclic aromatic hydrocarbons) 225
phellos, *Quercus* 87
 Philadelphia Alms House Infirmary 6
 Philadelphia brick clay 3–4
 Philadelphia Electric Company (PECO) 245
 Philadelphia fleabane iv
 Philadelphia Gas Works 78, 208
Philadelphia Inquirer 9–10, 272
 Philadelphia Museum of Art 205, 206, 233
 Philadelphia, Pennsylvania 151, 152. *See also* specific locations; *See also* specific locations
 Bureau of Health 14, 15
 City Councils 20, 28, 31, 34, 37, 38
 demographics of vii
 Department of Health 14
 Department of Public Health 145
 economy of vi, vii
 Water Department 222, 226, 301
 Philadelphia Water Works 110
philadelphicus, *Erigeron* iv
Philoscia muscorum 172
Philosophical Transactions 106
 Phoridae 131
Photinus 129, 138
Photinus pyralis 127–133, 231, 302. *See also* common eastern fireflies
Photuris 129, 130, 132–133, 302
Photuris pennsylvanica 128
Photuris versicolor 130
Phyciodes tharos 27
 Phylum Platyhelminthes 136
Phytolacca americana 140–142
 Pickett, Fermen Layton 188
Pieris rapae 51
 Piersol, W. H. 234
 pigeons 142
 pigweed 26, 180, 184
 pillbug hunters 171, 310
 pillbugs 163–171, 301, 310
 aggregation: avoidance of dessication 172
 aggregation: avoidance of pillbug hunters
 aggregation: vulnerability to enemies 171
 introduction of 164
 microbes and 166
 parasites and 168–170
pilosum, *Symphyotrichum* 26, 27

pipiens, *Culex* 307
 Pittman-Robertson Act 265, 269
 Pittman-Robertson Program 265
Plagiorhynchus cylindraceus 168–170
 planarians, land 135–138
 plane trees 5
Plantago 132, 184
Plantago lanceolata 32
Plantago major 180
Plantago rugelii 32
 plantains 32, 132, 184
 planthoppers 228
 plants
 exotic 29–31
 native vii
 nonnative vii
 wild vii, 305
platanoides, *Acer* 247
Platanus acerifolia 5
Platanus hybrids 5
Platanus occidentalis 5
Platydictyon undatum 97
platyneuron, *Asplenium* 187, 305
platyrhynchus, *Anas* 269
 “A Plea for the Bullhead”
 Pleasants, John M. 184
 Pleistocene 164, 298
Plethodon cinereus 229–234. *See also* red back
 salamander
 Plethodontidae 234
Pleuroprucha insularia 86
plexippus, *Danaus* 58, 59, 60, 62
 poison ivy 145
 pokeberry 140–142
 polarized light 76
Polistes dominula 121, 123, 125
Polistes dominulus 121, 123, 125
Polistes fuscatus 125
Polistes wasps 62
politum, *Trypoxylon* 106, 115, 116
 pollen baskets 183
 pollen counts 26
 pollinaria 174
 pollinators 182
 pollinator scarcity 180–182
 pollinia 174, 175, 176, 178, 179
 pollution. *See also* thermal pollution; *See also*
 also air pollution; *See also* light pollution;
 See also water pollution
 brown bullheads and 219–223, 225–226
 in Schuylkill River 207, 213, 219–223
 reduction in 210–211
 polychaete worms 206, 210
Polygonum lapathifolium 180
Polygonum aviculare 180
Polygonum pensylvanicum 180
Polygonum persicaria 180
polymorpha, *Marchantia* 237, 241, 242, 244,
 248, 249
polyphemus, *Antheraea* 50, 77–88. *See*
 also polyphemus moths
 polyphemus moths 77–88
 increase in population in Center City 89
 rarity at lamps in Center City 86–87
 polyyps 206
polyxenes, *Papilio* 51
 porcelainberry 117, 123
Porcellionides pruinosus 172
Portulaca oleracea 180, 311, 312
posticus, *Micromys* 295
 Potts, Edward 206, 213
 power plants 227, 301, 302
 praying mantis 151–160
 as beneficial or harmful 154
 egg case (ootheca) of 154–155, 156
 importation into North America 152
 means of dispersal 154–155
precautionis, *Autographa* 84
 predators 9–18, 162
 robins and 145
 used for biocontrol 281–283
 prejudice 306–307
 primrose 180
Proceedings of the Academy of Natural Sciences
 of Philadelphia 128
procumbens, *Sagina* 241, 242
Promalactis suzukiella 85
promethea, *Callosamia* 50
 propagules 248, 249
 protective legislation 9
Proteocephalus sp. 221
 prothallia 188
 protozoans 206
pruinosa, *Metcalfa* 228
pruinosis, *Porcellionides* 172
Prunus 144
Pseudemys rubriventris 284
Pseudogymnoascus [Geomyces] destructans 260
 Psychidae 35
 Psychodidae 159
Psyllobora vigintimaculata 287
pumilum, *Orthotrichum* 104, 246, 247, 299
pumilus, *Mazus* 241, 242, 311, 318
punctatus, *Ictalurus* 226
 purple loosestrife 313, 315
 purple-stemmed cliffbrake 185–192, 305
 absence of in Center City 190
 desiccation and 188–189
 distribution outside Center City 188
 drought and 188–189
 dry habitat and 188–189
 favorable ingredients in mortar and 190
 habitat loss due to property maintenance
 192–193
 insects and 190, 191

weathering required for colonization 191–192
purpurea, *Ipomoea* 126
purslane 180, 311, 312, 313
pusillus, *Trichoniscus* 172
Pyloclitidis olivaris 226
Pymatuning Lake 264, 265, 267
pyralis, *Photinus* 127–133, 231, 302

Q

quadrifasciatus, *Bicyrtes* 271–282
quadripunctatus, *Oecanthus* 30
Queen Anne's lace 184, 282
quercifex, *Parthenolecanium* 301
Quercus 16, 78
Quercus phellos 87
Quercus sp. 86, 87
quinquefolia, *Parthenocissus* 144

R

rabies
bats and 261–262
radicans, *Toxicodendron* 145
Rafinesque, Constantine Samuel 230, 231
ragweed 26, 203, 296
railroad tracks 161
Raleigh, North Carolina 301
ramets 196
Rana catesbeiana 231
rapae, *Pieris* 51
raptors 9–18, 145
rat flea 14
rat poison 14, 15–16
rat 15, 307
barriers to control 15–16
dangers to people 14–15
Norway 13, 15
Rattus norvegicus 13–14, 15
Reading Viaduct 313
rebecula, *Erithacus* 303
Reboulia hemisphaerica 237–248. *See also see*
also liverwort
red admiral 51, 52
red back salamander 229–234, 301
adaptations for an all-terrestrial life cycle
234–235
benefits of sedentary life cycles 233–234
habits adapted to urban gardens 231–233
life cycle of 230–231, 234–235
life cycles of 233–234
urban opportunity and vulnerability 235
red bat 254. *See also* bats
redbreast sunfish 221
red cedar 36, 40
red-eared slider 284
red milkweed beetle 61
red-tailed hawk 9–11, 15, 145, 298, 317
Red-Tails in Love 10
religiosa, *Mantis* 160
repens, *Trifolium* 132, 182, 183
restuans, *Culex* 307
reticulatum, *Deroceras* 172
retroflexus, *Amaranthus* 180
Rhoads, Ann Fowler 5, 200
Rhus 144
Rhynchodemus sylvaticus 137
Rice, Nathan 78
Richards, Horace G. 2
Riddick, Eric W. 293
Rigaud, Thierry 166
Riley, Charles Valentine 41, 79
Rinehart, Heather 138
riparius, *Hyloniscus* 172
Rittenhouse Square 3, 9, 12, 13, 15–18, 37, 41,
119, 130, 148, 255, 282, 283, 301
river birch 88–89
Riverfront Coliseum Sports Arena 102
rivers
rising 5
robin 138, 139–149, 298, 301, 303, 306, 310
altitude and 147–148
American
as a delicacy 140
attraction to human habitation 142–143
berries and 144–145
climate and 147–148
climate warming and 148
cowbirds and 146–147
ectoparasites and 143
eggs and 146–147
European 306
geography and 147–148
lawn mowing and 143
light pollution and 149
noise pollution and 149–150
people and 149–150
pokeberries and 140–142
precolonial contact with agriculture 143
predators and 145
shooting of 140–142
urban habitat of 142–143
viruses and 145, 149
Robinson, H. S. 81
Robinson, P. J. M. 81
Rochester, New York 232
Rocky Mountains 148
Roosevelt, Franklin Delano 265
rosea, *Aporrectodea* 131, 136
rosy-tipped earthworms 131, 136
rotifers 206
row house courtyards 309–310
Royal Botanical Gardens 178
Royal Society of London 106
rubecula, *Erithacus* 149
rubriventris [Miltogramminae], *Senotainia* 282
rubriventris, *Pseudemys* 284
rugelii, *Plantago* 32

- Rumex* 26
 Russell, Keith 74
Rynchodemus sylvaticus 137
- S**
- Saffron, Inga 9–10
Sagina 241
Sagina procumbens 241, 242
 salamanders 229–234, 301
salicaria, *Lythrum* 313, 315
Salix 78
 Salmon, William 196
Samia cynthia 45–52, 62. *See also* cynthia moths
sancta, *Crepis* 233
 sand wasp 271–282. *See also* stink bug hunter
 Sarcophagidae 115
 saturniids 78, 89
 saxifrage 192
 Say, Thomas 164, 165, 275, 287, 288
scabra, *Hypena* 82
 “Scalp Act” 9
scandens, *Celastrus* 86, 145
scapularis, *Ixodes* 143
Sceliphron caementarium 105–116
 Schall, Mark 63
 Schlumberger, Hans G. 225
 Schmidt, Gerald D. 169
 Schneider, Jutta M. 102
 Schumpeter, Joseph A. 316
 Schuster, Rudolf M. 243
 Schuyler, Alfred Ernest 29
 “Schuylkill cat” 216
 Schuylkill County 149
 Schuylkill Expressway 303
 Schuylkill Park 130, 132, 155, 160
 Schuylkill River vi, vii, 3, 5, 15, 26, 54, 74, 78, 94–96, 100, 102, 137, 147, 173, 176–177, 206–209, 213, 217, 225, 227, 244, 268–270, 284, 300–302, 313–314, 317
 brown bullheads in 216, 226–227
 pollution in 207, 210–211, 213, 219–223
 Schuylkill River Desilting Project 209–210
 Schuylkill River Park 42, 132, 138, 303
 Schuylkill River Project 209–210
 Schuylkill River Trail 36, 39, 40, 42, 43, 56, 98, 105, 251, 265
 Schuylkill Wildlife Rehabilitation Clinic 254
Sciurus carolinensis 7–16. *See also* eastern gray squirrel
sclopetaria, *Epeira* 96
sclopetarius, *Larinioides* 91–102, 302
scripta elegans, *Trachemys* 284
 sea level, rising 5
 seeds
 dispersing vs. nondispersing 233
 wild 26
Senecio vulgaris 90, 180
Senotainia rubriventris [Miltogramminae] 282
Senotainia trilineata 282
septempunctata, *Coccinella* 290, 291
Setaria glauca 180
Setaria viridis 180, 195
Setophaga [Parula] americana 67–74. *See also* parula warblers
 seven-spotted lady beetle 290, 291, 292
 sewage
 brown bullhead and 219
 sewage system 311
 sewage treatment plants 210
 shad 300
 shade trees 47. *See also* specific trees
 bagworms and 33–52
 outbreaks of pests in 274
 Shapiro, Arthur M. 30, 49–50
 sharpshooter 228
 Sheffield, England 149
 Sheldon, Joseph K. 135, 136
 Shultz, Benjamin 142
sibthorpioides, *Hydrocotyle* 184, 310, 316
 sidewalks 310–311
Silent Spring 9, 213
 silk industry 48–49
 silkmoths 78, 86–87, 89, 316
 silkworms 48, 49
 silvergreen bryum moss 192, 193, 244, 301
 silver-haired bat 253–261
 comparison with birds 257
 harms and benefits of overwintering in Center City 262
 in Center City 254, 256
 in North America 254, 256
 regulation of body temperature 256
 silver maple 20
 Simaroubaceae 57
Simarouba glauca 57
 Simberloff, Daniel
 Simon, Roger 120
sinensis, *Tenodera* 151–159
 Sinitsin, D. T. 168–169
sirtalis, *Thamnophis* 194
 skyscrapers 71–76
 slate-colored junco 257
 slugs 172, 301
 smartweeds 180
 Smithsonian Institution 79, 115, 154
 Smithsonian Migratory Bird Center 78
 snails 223
 snakehead 226, 317
 snakes 145, 194
 soldier beetle 181, 182
Solidago 26
Solidago canadensis 196
Solidago sp. 86
 songbirds 149. *See also* specific birds
Sorbus 144

- sororia*, *Viola* 54, 66
 sound (noise) pollution 303
 South Carolina
 South Square Market 248
 South Street Bridge 26, 27
 sparrows 19–31, 89, 257, 274, 307, 308, 313
 decline in abundance of 24
 decline in supply of wild seeds and 26
 exotic plants and 29–31
 house 42, 142, 274
 in Center City 31
 methods to control population explosion 23–24
 proliferation of 22
 “sparrow wars” 22
 white-throated 257
 “sparrow wars” 22
speciosa, *Catalpa* 181
speciosa, *Manayunkia* 210
speciosus, *Sphecius* 281, 282
spectabilis, *Eragrostis* 311
Sphecius speciosus 281, 282
 spicebush swallowtail 51
 spiders 171, 235, 310, 316. *See also* specific spider
 bridge 91–102, 302
 gray cross 91–102, 96
 jumping 97
 mud daubers and 113, 114
 triangulate cobweb 297
Spilochalcis mariae 50
 spiny-headed worms 168
 spleenwort 187, 305
 sponges 300
 freshwater 205–212
 on Fairmount Dam, 1887 206
Spongilla [Eunapius] fragilis 205–212, 300.
 spongillafly 212–213, 300
 Spongillidae 212–213
sponsa, *Aix* 269
 spore banks 191
 spores 249
 Spring City 135
 Spring Garden Street Bridge 268, 284
 springtail 249, 250, 251
 squamous cell carcinoma 225
 squash 143
 squash lady beetle 294
 squirrels 7–16, 307
 affection for 8–10
 bounties for 8
 dangers from rat poisons and 14
 eastern gray 7–16
 end of safe haven for 9–18
 feeding of 17
 gray 87
 predators and 11–18
 protection from rat poison 16
 resilience of populations of 11–18
 save haven from predators 9–18
 survival in Rittenhouse Square 16–18
 threat from Norway rats 13
Stagmomantis carolina 151, 155, 156, 157, 158, 159, 160, 162
 starling 142, 145, 150
 European 25
 St. Davids 136
Steatoda triangulosa 297
 Steil, William Nicholas 188
Stellaria media 180
 Stewardson, Thomas 48–49
 Steyermark, Anthony C. 221
 stink bug hunter 271–282
 at work in Logan Circle 276–280
 discovery of 275–276
 stink bug 271, 272, 276, 281, 309
 brown marmorated 272–273
 stinkhorn mushroom 249, 251
 St. John’s wort 180
 Stone, Hugh E. 199
 Stone, Witmer 142
 Stoops, James 4
 Stouds Ferry 210
 St. Peters River 275
Strophostyles helvola 103
Sturnus vulgaris 25, 142, 145, 150
subflavus, *Perimyotis* 261
 Subway Tree 1–6, 298
 sulfur dioxide 248, 299
 sulfuric acid 299
 sumac 144
 sundews 174
 sunfish 221
 sunflowers 143
 Surrendi, Dennis C. 266
suzukiella, *Promalactis* 85
 Suzuki’s promalactis moth 85
 swallowtails 51
 swamp milkweed 184
 Swedish Commission 207
 sycamore hybrid 5
sylvaticus, *Rhynchodemus* 137
Symphytotrichum ericoides 203
Symphytotrichum pilosum 26, 27
Syntrichia papillosa 246
syriaca, *Asclepias* 58, 61, 173–183, 236, 285, 305, 313
- ## T
- Tabanus nigrovittatus* 94, 97
 Tabernacle Presbyterian Church 96
 tachinid fly 51, 52, 53, 62
 Tachnidae 131
 Taichung 100
 Taiwan 100
 Takeda, Naokuni 172

- Tallamy, Douglas 28, 41
 tapeworm 221, 300
Taraxacum officinale 84, 180
 Taub, Frieda B. 231
Taxodium distichum 1–6. *See also* bald cypress;
 See also Subway Tree
 Temple University 74
*Tenants of an Old Farm. Leaves from the Note
 Book of a Naturalist. Illustrations from
 Nature* 37
Tenodera sinensis 151–160. *See also* praying
 mantis
terrestris, Lumbricus 131, 136, 230
tessellaris, Halysidota 179
Tetramorium caespitum 270
Tetramorium species e 270
Tetraopes tetrophthalmus 58, 61
tetrophthalmus, Tetraopes 58, 61
 thallus 238
thapsus, Verbascum 180
tharos, Phyciodes 27
The Moss Flora of New York City and Vicinity
 246
 thermal mapping 301
 thermal pollution 300–302
 Thierolf, Walter R. 154
 Thomas Jefferson University Medical Center
 119
 Thoreau, Henry David 216
 threeband gardenslug
Thyridopteryx ephemeraeformis 33–52. *See
 also* bagworm
Tibicen tibicen 281
 ticks 306
 tidal alluvial mudflat 313
 tiger swallowtail 51
Tineola bisselliella 89
 Tinicum, Pennsylvania 225
 Titian Ramsey Peale Butterfly and Moth Collec-
 tion 77, 89, 179
 toads 230
 tobacco 143
 Toho University 172
 Tomb of the Unknown Soldier, Independence
 National Historical Park 2
 Toronto, Canada 73
 Torrey, John 197
Toxicodendron radicans 145
 Toxic Substances Control Act 226
Trachemys scripta elegans 284
*Treatise on Some of the Insects Injurious to
 Vegetation* 21
 tree crickets 29
 tree moss 247, 248, 299, 300
 recovery of after abatement of pollution
 246–247
triacanthos, Gleditsia 86
 triangulate cobweb spiders 297
triangulosa, Steatoda 297
Trichoniscus pusillus 172
Trichopoda pennipes 274, 275
 Trichoptera 76
 tricolored bats 261
Trifolium repens 132, 182, 183
trilineata, Senotainia 282
Trissolcus sp. 274
troilus, Papilio 51
 tropical milkweed 60
 trout
Trypoxylon politum 106, 115, 116
tuberosa, Asclepias 184
 Tunghai University 100
 Turbellaria 136
 turbellarians 136
Turdus migratorius 138, 139–149, 303. *See
 also* robin
 turkey 269
 turtles 284
 Tuscarora State Forest 63
 tussock moth 179
 Tutt, James William 245–246
 twenty-spotted lady beetle 287, 294
 typhus 6, 14
- ## U
- undatus, Platycryptus* 97
 United States Army Corps of Engineers 209
 United States Department of Agriculture Re-
 search Service 293
 University City vi, 302
 University of Colorado 169
 University of Delaware 41, 160
 University of East Anglia 172
 University of Hamburg 102, 103
 University of Kansas 14
 University of Michigan 246
 University of Nebraska 170
 University of New Mexico 170
 University of North Carolina 166
 University of Pennsylvania 49, 142, 154, 168
 urban dryness, amphibians and 230–231
 urban sprawl 120
Urnatella gracilis 206, 211
 Ursinus College 136
 U.S. Bureau of Sports Fisheries and Wildlife
 267
 U.S. Department of Agriculture 23–24, 40–41,
 120
 Beneficial Insects Research Laboratory 294
 U.S. Department of Health and Human Services
 120
 U.S. Environmental Protection Agency 221,
 225, 226, 245
 U.S. Fish and Wildlife Service 265
 U.S. Geological Survey 149, 227

Usnea sp. 76
U.S. Treasury 265

V

valentiana, *Lehmannia* 171-172
valentianus, *Ambigolimax* 171-172
Vanessa atalanta 51, 52
Vanessa cardui 51
varivestis, *Epilachna* 294
Vector Control unit 16
velvet ants 115
Venus flytrap 174
Verbascum thapsus 180
versicolor, *Photuris* 130
Verticillium albo-atrum 63
verticillium wilt 63, 64
Vespula germanica 118, 120, 121
Vespula maculifrons 117, 118
Vespula sp. 117-124. *See also* yellowjackets
viceroy butterflies 58
vigintimaculata, *Psyllobora* 287
Vilcinskis, Andreas 293
Vine Street Expressway 313
Viola sororia 54, 66
violets
 common blue 54, 66
virescens, *Hesperomyces* 293
Virginia 191
Virginia creeper 144
virginiana, *Juniperus* 36, 40
virginianus, *Odocoileus* 269
virginica, *Xylocopa* 122
viridis, *Setaria* 180, 195
viruses 145, 149, 307. *See also* specific viruses
vulgare, *Armadillidium* 164, 165, 166, 168, 172
vulgare, *Cirsium* 180
vulgaris, *Artemisia* 195-202, 296
vulgaris, *Phaseolus* 143
vulgaris, *Senecio* 90, 180
vulgaris, *Sturnus* 25, 142, 145, 150

W

Wagner, David L. 89
Wagner Free Institute of Science of Philadelphia. 1
Walnut Street Bridge 94, 111, 199, 313
warblers, parula 67-74
Warner Robins Air Force Base 74
Warren, Benjamin Harry 9
Washington 191
Washington, DC 191
Washington Square 18
wasps 31, 63, 118, 121, 274, 306, 308. *See also* sand wasps
 black and yellow mud daubers 105-114
 chalcid 51, 115
 cuckoo 115
 ichneumon 38, 39, 41, 42, 115

Polistes 62
 yellowjackets 117-124, 317
wasp years 125
water pollution 207-208, 213, 300, 316
 reduction in 210-211
Water Works 116
weeding 305
weeds 26, 313
Weintraub, Jason 53, 89
western conifer seed bug 276
West Nile virus 145, 149, 307
West Virginia 219
wetlands 230-231, 313
Wherry, Edgar 190
white clover 132, 182, 183, 184
white-footed mice 42
white heath aster 203
white nose syndrome 89, 260, 261-262
white snakeroot 55
white sweet clover 282
white-tailed deer 269
white-throated sparrows 257
Why Big Fierce Animals Are Rare 162
wildlife managers 264, 266
wildlife restoration, public financing of 265-266
Wild, Matthew 190
wild plants, persecution of 305
wild turkey 269
Wilkes University 136
William Hamilton 65
Williams, Francis X. 129
willow oak 87
willow 78
Wilmington, Delaware 128
Wilson, Alexander 9, 11, 70, 140, 146, 148, 149, 150, 264, 267, 306
Wind, Elke 232
windows 71-76, 302
Wing, Steven 129
Winn, Marie 10
Wiseman, Lawrence L. 246
Wissahickon Creek 137, 230
Wolbachia 166, 170
Wolbach, S. Burt 166
wood duck 269
Woodlands cemetery 64
Woodlands estate 49
Works, Fairmount Water 213
worms 219, 310. *See also* earthworm; flatworm
 polychaete 206, 210
 spiny-headed 168-170

X

Xenopsylla cheopis 14
Xylocopa virginica 122

Y

- Yela, José Luis 80, 81
- yellow fever 307
- yellowjackets 117–124, 308, 317
 - causes of decline in Center City 125
 - causes of outbreaks 120
 - colonies of 120
 - danger from 120–122
 - decline in numbers of 121, 125
 - German 118
 - medical documentation of 119–120
- Yersinia pestis* 14

Z

- zea, Helicoverpa* 83
- Zea mays mays* 143
- Zenaida macroura* 303
- Zonotrichia albicollis* 257

ECOLOGY OF CENTER CITY, PHILADELPHIA

Over two and a half centuries ago Philadelphia established itself as a center for the study of natural history. *Ecology of Center City, Philadelphia* mines early records of plants and animals in Philadelphia to explore how their populations have fared. Some have become locally extinct while others have adapted and thrived. New populations have arrived, challenging those that are established. Despite a landscape dominated by asphalt and concrete, many have shown surprising resilience. Their stories illuminate the bond between people and natural history downtown. The ecology of Center City explores this bond.

Praise from readers

“Ecology of Center City, Philadelphia lays out the story of the natural, horticultural, and cultural history of Philadelphia in a masterful way. Engaging, entertaining, and elucidating...”

—David Hewitt, *President, Philadelphia Botanical Club; Lecturer, University of Pennsylvania; Research Associate, Department of Botany, Academy of Natural Sciences*

“A wonderful compilation of information on ecology, natural history, and Philadelphia local history... everything is fascinating.”

—Joel T. Fry, *Curator, John Bartram Association*

ABOUT THE AUTHOR

Kenneth D. Frank and his wife have resided in a row house in Center City for almost four decades. A graduate of Harvard Medical School, he is a retired physician with a life-long interest in natural history. His previous publications have been on the ecological effects of outdoor lighting, the disappearance of a giant silk moth from Philadelphia, and a jumping spider's shift in hunting from day to night.



ISBN 978-0-692-50648-6