

## Numbers of Hawaiian Species for 2000

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This is the sixth supplement to the earlier tabulations of species known from the Hawaiian Islands (Eldredge & Miller, 1995, 1997, 1998; Miller & Eldredge, 1996; Eldredge, 1999, 2000). Future supplements will include the year date for the compilation, rather than a supplement number itself.

The rich biodiversity of the Hawaiian Islands is comprised of nearly 24,000 species (Table 1). Hawai'i accounts for only about 0.2% of the land area of the United States, yet it has 31% of the nation's federally listed endangered species and 42% of its endangered birds. Almost 75% of the historically documented extinctions of plants and animals in the United States have occurred in the Hawaiian Islands (Allison & Miller, 2000).

Hawaii Biological Survey is continually posting species checklists in searchable interfaces for the Hawaiian biota on our web server at <http://hbs.bishopmuseum.org/>. More than 20,000 species are currently available (including terrestrial arthropods, native and alien land and freshwater snails, foraminiferans, marine invertebrates, flowering plants, fungi, amphibians, reptiles, birds, and mammals).

In the Fall of 2000, the Northwest Hawaiian Rapid Assessment and Monitoring Program (NOW-RAMP) collected extensively in all the Northwest Islands. Large numbers of new species and new records will result from the collections; these specimens are still being investigated and will be included in future updates of Hawaiian species numbers.

The total numbers for the marine invertebrates are different from previous supplements. They are taken from the checklist of the Hawaiian marine invertebrates, which includes names, describers, and principal literature to Hawaiian species:

[http://www2.bishopmuseum.org/HBS/invert/list\\_home.htm](http://www2.bishopmuseum.org/HBS/invert/list_home.htm)

[This checklist also includes non-arthropod invertebrates not covered by Nishida, 2002.] The numbers of nonindigenous marine invertebrate species are taken from a manuscript in preparation by J.T. Carlton and L.G. Eldredge: Marine bioinvasions in Hawai'i: the introduced and cryptogenic marine and brackish water animals and plants of the Hawaiian Archipelago.

### **Bacteria**

Biological surveys were conducted in Lake Kauhakō. Lake Kauhakō is situated in the crater of an extinct, late Pleistocene volcano on the Kalaupapa Peninsula on the north side of Moloka'i, Hawai'i. At 248 m deep, it is the fourth deepest lake in the United States. Filamentous cyanobacteria and "Prochlorococcus"-like autotrophs occurred only in the upper 2 m (Donachie *et al.*, 1999).

### **Fungi: Hemiascomycetes**

A new yeast species, *Pichia hawaiiensis* was described from *Charpentiera* trees on the Big Island (Phaff *et al.*, 2000).

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**Table 1.** Estimates of numbers of known species of Hawaiian biota (based on Eldredge & Miller, 1995, 1997, 1998; Miller & Eldredge, 1996; Eldredge, 1999; Eldredge, 2000, including this paper and other papers in this issue of the *Records*). Other protists, lichens and fungi, cnidarians, echinoderms, birds, and mammals remain the same as previous editions; other categories are based on updated counts.

Taxon	Total	Endemic	NIS
Algae	885	80+	18
Other protists	1128	2?	?
Fungi and Lichens	2088	240	?
Flowering plants	2264	918	1101
Other plants	766	241	47
Cnidarians	277	75	12
Insects	8427	5462	2609
Other arthropods	1191	366	735
Molluscs	1339	962	96
Annelids	388	80	56
Crustaceans	1179	68+	73+
Echinoderms	313	150	0
Other invertebrates	1846	449	112
Fishes	1216	149	73
Amphibians	8	0	8
Reptiles	27	0	23
Birds	294	63	53
Mammals	44	2	19
<b>Totals</b>	<b>23,680</b>	<b>9456</b>	<b>5073</b>

Endemic species are restricted to Hawaii; nonindigenous (= alien, = exotic, includes introduced) species do not naturally occur in Hawaii; indigenous species occur naturally in Hawaii but are not endemic. See Eldredge & Miller 1995 for additional definitions and qualifications.

### Flowering Plants

A review of the *Bruguiera* mangrove taxa from Hawai'i shows only one (*B. sexangula*) to occur, the other two (*B. gymnorhiza* and *B. exaristata*) have been misidentified (Allen *et al.*, 2000). One new species of *Tetraplasandra* (*T. flynni* Lowry & Wood) from Kaua'i described and conservation status indicated (Lowry & Wood, 2000). Analysis of rDNA on the woody *Viola* species in Hawai'i show their origin to probably be Arctic (Ballard & Sytsma, 2000).

### Porifera

The new species, *Tethya ornata*, was described from a floating dock at Coconut Island (Sara *et al.*, 2000).

### Acanthocephala

New record, *Acanthocephalus bufonis* (Shiple), reported from the toad *Bufo marinus* (Barton & Pichelin, 1999).

### Nematoda

The nematodes *Atractis scelopori* (Gedoelst) and *Atractis squmatae* Harwood are reported for the first time in Hawai'i as parasites of the introduced brown anole, *Anolis sagrei*; these

parasites most likely entered Hawai'i with introduced brown anoles (Goldberg & Bursey, 2000).

#### **Platyhelminthes**

The acoeel flatworm subspecies *Notoscelis gullmarensis maculata* Karing, Mack-Fira & Dorjes raised to species level as *Notoscelis maculata* (Kozloff, 2000).

#### **Rotifera**

Two new species of rotifers, smaller varieties of the s-type, *Brachionus rotundiformis* and *Brachionus calyciflorus*, have been obtained for aquaculture (Tamaru, 2000).

#### **Phoronida**

Five *Phoronis* species are noted from Hawaiian waters, three have been previously reported, but two, *Phoronis muelleri* Selys-Longchamps, and *Phoronis pallida* Silen are new records (Bailey-Brock & Emig, 2000).

#### **Annelida**

The spionid polychaete *Boccardia proboscidea* Hartman, 1940, was reported as having been introduced to an oyster culture farm at Keāhole, Hawai'i, with a shipment of *Ostrea edulis* from Maine (Bailey-Brock, 2000). One new species of dorvilleid polychaete (*Ophyrotrocha adherens* Paavo, Bailey-Brock & Akesson) cultured in Sweden in 1971, known since 1993 from Māmala Bay and Barbers Point on O'ahu (Paavo *et al.*, 2000), associated with sewage outfalls.

#### **Mollusca**

The smooth shelled blue mussel, *Mytilus galloprovincialis* Lamarck, arrived in Pearl Harbor, O'ahu, Hawai'i on 22 June 1998, as a member of the fouling community of the USS *Missouri* and spawning activity was observed; small mussels were collected on 30 September 1998 in a submarine ballast tank in Pearl Harbor (Apte *et al.*, 2000). Two newly reported freshwater clams, *Musculium partumeium* (Say) and *Pisidium casertanum* (Poli) [Sphaeriidae] were reported from an ancient, continuously cultivated taro pond complex and are thought to have been initially introduced by the earliest Hawaiian settlers with moist taro stock (Burky *et al.*, 2000).

#### **Arthropoda: Acari**

Review of the Hawaiian raphignathoid family Camerobiidae with three new species: *Neophyllobius bisetalis* Bolland & Swift, *N. mamaneae* Bolland & Swift, *Tycherobius hawaiiensis* Bolland & Swift (Bolland & Swift, 2000).

#### **Arthropoda: Insecta: Coleoptera**

A monographic revision of Hawaiian carabid beetles of the genus *Blackburnia* includes one new subgenus (*Procaccus* Liebherr & Zimmerman), 33 new species, and 12 new synonymies (Liebherr & Zimmerman, 2000). The Hawaiian dermestid genus *Labrocerus* revised resulting in 3 new species (*L. auratus* Beal, *L. argyroxiphii* Beal, *L. producens* Beal), eight new synonymies, and *Argocerus depressus* Sharp now *Labrocerus depressus* (Sharp); *Argocerus similis* Sharp now *L. similis* (Sharp) (Beal, 2000).

**Arthropoda: Insecta: Diptera**

Two new dolichopodids; one *Sigmatineurum* from seeps on the Big Island (*S. englundii* Evenhuis) (Evenhuis, 2000b) and one *Campsicnemus* from leaf axils of a lobeloid (*C. gloriamontis* Evenhuis) from Pu'u Pukui, West Maui (Evenhuis, 2000a).

**Arthropoda: Insecta: Heteroptera / Homoptera**

A new genus and species of Miridae (*Asteliamiris johnpolhemusi* Schwartz & Polhemus) from Maui (Schwartz & Polhemus, 2000). Revision of the reduviid genus *Saicella* Usinger with descriptions of 4 new species (*S. kipahulu*, *S. lilinoe*, *S. mulli*, *S. perkinsi*) (Polhemus, 2000). A new genus of grass-feeding delphacids (*Emoloana* Asche) with two new species (*E. menehune* Asche and *E. pohakua* Asche), and transfer of 9 species-group taxa from *Kelisia* to *Emoloana* (Asche, 2000a). New name for the misidentified invasive introduced whitefly *Paraleyrodes naranjæ* = *Paraleyrodes pseudonaranjæ* Martn (Martin, 2000). The fulgorids *Syndelphax disonymus* (Kirkaldy), *Kallitaxila granulata* (Stål), and *Cedusa* sp. are new records (Asche, 2000b).

**Arthropoda: Insecta: Hymenoptera**

The fairyfly family Mymaridae was the subject of a number papers by the late John W. Beardsley. Key to genera of Mymaridae in Hawai'i and new records of species from the islands, *Acmopolynema bifasciatipennis* (Girault) misidentified, now *A. uma* Schauff; 7 undetermined spp. of *Alaptus* Westwood; *Anaphes calendrae* (Gahan); 3 undetermined species of *Camptoptera* Förster; *Chaetomymar bagicha* (Nayarayanan, Subba Rao & Kaur); *Cleruchus* sp.; *Dichopus ?psyche* Girault; *Erythmelus funicili* (Annecke & Doult) plus 3 undetermined species of *Erythmelus*; *Mymar taprobanicum* Ward; *Ooctonus* sp.; *Schizophragma bicolor* (Dozier); *Stephanodes similis* (Förster) is a misidentification for *S. reduvioli* (Perkins); *Stethynium triclavatum* Enoch and one undetermined *Stethynium*; and one undescribed new genus (Beardsley & Huber, 2000). A review of the mymarid genus *Anagrus* Haliday from Hawai'i resulted in one new species (*A. oahuensis* Triapitsyn & Beardsley), two new synonyms [*Paranagrus osborni* Fullaway and *Anagrus panicicola* Sahid now *Anagrus optabilis* (Perkins)], and 3 new records for Hawai'i: *A. ?columbi*, *A. empoascae*, *A. takeyanus* (Triapitsyn & Beardsley, 2000). A new fairyfly genus *Kikiki* Huber & Beardsley and one new species (*K. huna* Huber) from Moloka'i (Huber & Beardsley, 2000b). Review of the genus *Gonatocerus* with *G. capitatus* Gahan, *G. pygmaeus* Girault plus 4 undetermined species as new records (Huber & Beardsley, 2000a).

The family Mymaromattidae is recorded as new from Hawai'i, represented by an undetermined species of *Palaeomymar* Meunier (Beardsley *et al.*, 2000). One new introduced fig wasp (*Josephiella microcarpae* Beardsley & Rasplus), probably originating from Asia (Beardsley & Rasplus, 2000). A eulophid wasp, *Aprostocetus* sp. from *Eucalyptus* galls is recorded as new (Beardsley & Perreira, 2000).

**Arthropoda: Insecta: Isoptera**

The Indomalaysian and Australian termite *Cryptotermes cynocephalus* Light is a new record and may indicate pest status (Scheffrahn *et al.*, 2000).

**Arthropoda: Insecta: Orthoptera**

Two new species of *Laupala* crickets (*L. makai* Shaw from O'ahu; *L. meleweki* Shaw from Kaua'i (Shaw, 2000).

**Arthropoda: Pseudoscorpionida**

The Chthonioidea of Hawaii are reviewed with one new genus, *Vulcanochthonius* Muchmore including *V. howarthi* (Muchmore) [transferred from *Tyrannochthonius*] plus two new species, *V. aa* Muchmore, *V. pohakuloae* Muchmore, new species *Tyrannochthonius oahuanus* Muchmore, and new records for the state *Chthonius tetrachelatus* (Preysler) and *Lechytiya sakagamii* Morikawa (Muchmore, 2000).

**Arthropoda: Crustacea: Decapoda**

Edmondson (1946, p. 226) reported a "rhizocephalan" from the Hawaiian crab *Pachycheles pisoides* as a "Sacculina-like form"; Boschma (1953) suggested that it was "obviously a lernaediscid"; Boyko & Harvey (2000) examined several hundred *P. pisoides* from Bishop Museum and found three parasitized with a cryptoniscid isopod. New genus and new species of deep-sea benthopelagic calanoid copepod, *Griceus buskeyi* Ferrari & Markhaseva, described (Ferrari & Markhaseva, 2000a). New species, *Brachycalanus flemingeri* Ferrari and Markhaseva described from specimens collected off of Kona (Ferrari & Markhaseva, 2000b).

The caridean shrimp previously identified as *Lysmata paucidens* was newly reported as *Lysmata trisetacea* (Heller) by Wicksten (2000). In family Polychelidae, *Polycheles asper* Rathbun [now *Homeryon asper* (Rathbun)], *Polycheles granulatus* Faxon [now *Pentacheles laevis* Bate], *Polycheles synderi* Rathbun [now *Pentacheles synderi* (Rathbun)], *Polycheles phosphorus* Rathbun described as new species *Polycheles surdus* Galil (Galil, 2000). A new species, *Calappa pokipoki* Ng [family Calappidae] described (Ng, 2000). The biogeography of the 6 species of trapeziid crabs in the Hawaiian Islands is detailed (Castro, 1999). The systematics of the stomatopod formerly called *Gonodactylus aloha* is redefined as *Gonactylaceus mutatus* (Lanchester) (Barber & Erdmann, 2000). The interspecific fighting between the *Lybia edmonsoni*, a small xanthid crab, and the minute sea anemone (*Triactis producta*) in each of its claws is described (Karplus *et al.*, 2000). Schubart & Ng (2000) reevaluated the status of the plagusiid crabs, *Plagusia tuberculata* formerly reported from Hawai'i is synonymized under *P. squamosa* (Herbst). The Indo-Pacific palicid crabs have been revised by Castro (2000); *Manella spinipes* is now *Crossotonotus spinipes* (DeMan), *Palicus maculatus* and *Cymopolia medipacifica* are now *Exopalicus maculatus* (Edmondson), *Cymopolia fisheri* is now *Pseudopalicus investigatoris* (Alcock), *Palicus oahuensis* is now *Pseudopalicus oahuensis* (Rathbun).

**Chordata: Pisces**

Two new species described from Hawaiian waters: *Gymnothorax polyspondylus* Bohlke & Randall and *Gymnothorax prismodon* Bohlke & Randall [Muraenidae] (Bohlke & Randall, 2000). The rare viper shark, *Trigonognathus kabeyai* Mochizuki and Ohe, 1990 was reported from the Hawaiian Islands (northwest of Kure Atoll) for the first time (Wetherbee & Kajiura, 2000). A new species, *Synchiropus hawaiiensis* Fricke, [Callionymidae] was described (Fricke, 2000).

**Chordata: Amphibia**

The acanthocephalan parasite, *Acanthocephalus bufonis*, reported from the toad *Bufo marinus* in Hawai'i for the first time (Barton & Pichelin, 1999).

**Chordata: Reptilia**

Eight helminth parasites are reported from the brown anole *Anolis sagrei* (Polychrotidae); two, *Atractis scelopori* and *Atractis squamatae*, were previously unknown in Hawai'i.

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