

Numbers of Hawaiian Species. Supplement 5¹

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This is the fifth supplement to the earlier tabulations of species known from the Hawaiian Islands (Eldredge & Miller, 1995, 1997, 1998; Miller & Eldredge, 1996; Eldredge, 1999). The Hawaiian Islands, by virtue of their geographic isolation, rich volcanic soils, and enormous topographic and climatic diversity, have produced a highly endemic biota, which includes many of the world's outstanding examples of adaptive radiation. The biota includes more than 22,000 species (Table 1). Hawai'i accounts for only about 0.2% of the land area of the United States; it has 31% of the nation's endangered species and 42% of its endangered birds. Of the 1,072 species of native flowering plants, 73 are down to about 20 or fewer individuals in the wild, and nine are down to one. Almost 75% of the historically documented extinction of plants and animals in the United States have occurred in Hawai'i (Allison & Miller, 2000).

Hawaii Biological Survey is continually posting species checklists in searchable interfaces for the Hawaiian biota on our web server at <http://www.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, amphibians, reptiles, birds, and mammals).

This year 2 invertebrate groups are noted. Two species of nematomorph worms have been described: one as early as 1898, the other in 1933. Neither of these species has been collected or reported in decades. The literature on these 2 species is reviewed for the first time. The aberrant arthropod subphylum Pentastomida is noted with 2 species from Hawai'i, one reported without special recognition in 1997 and other known from a specimen deposited at Bishop Museum.

Algae: Rhodophyta

A total of 343 species of marine red algae (Rhodophyta), excluding the crustose coralline algae, are reported by Abbott (1999); 74 of these species are new records to the Hawaiian Islands.

Flowering Plants

The total of 2,101 species of angiosperms including 1,029 native species [917 endemic (818 dicots and 99 monocots) and 112 indigenous] and 1,072 nonindigenous (766 dicots and 306 monocots) (W.L. Wagner, pers.comm.).

Cnidaria

Solanderia secunda (Inaba) photographed by Hoover (1998) is the first island record for this species; the previously reported *S. minima* Stechow is considered a synonym (Bouillon *et al.*, 1992)

Platyhelminthes

Digenetic trematode metacercaria from reef coral, *Porites compressa*, identified as *Podocotyloides stenometra*; *Plagioporis* sp. of Cheng & Wong (1974), synonym of *P. stenometra* (Aeby, 1998).

Bryozoa

One new species: *Thalamoporella molokaiensis* Soule, Soule, & Chaney, described from Moloka'i, specimens also from O'ahu (Soule *et al.*, 1999).

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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, 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	2087	240	?
Flowering plants	2105	917	1072
Other plants	763	241	44
Cnidarians	356	75	10
Insects	8311	5433	2848
Other arthropods	1016	349	660
Molluscs	1661	962	90
Annelids	417	80	36
Crustaceans	1206	63+	60+
Echinoderms	283	150	0
Other invertebrates	1347	441	40+
Fishes	1212	149	73
Amphibians	8	0	8
Reptiles	27	0	23
Birds	294	63	46
Mammals	44	1	19
Totals	23,150	9,246	5,047

Nematomorpha

Two reviously described species not reported in this series: *Gordius agassizi* Montgomery described from Sandwich Islands by Montgomery (1898), redescribed by de Miralles & Cristina de Villalobos (1993); and *Gordius hawaiiensis* Heinze from Maui by Heinze (1933).

Annelida

Four species of Nereididae (Namanereidinae) have been reported from Hawaiian waters Glasby *et al.* 1998); these are reviewed and 2: *Namalycastis brevicornis* (Audouin & Edwards) and *N. senegalensis* (Saint-Joseph) are questionably added (Glasby, 1999); 2 species of Nerilidae: *Nerilla antennata* O. Schmidt and *Mesonerilla fagei* Swedmark were collected in coarse sand from Honolulu Harbor, both are less than 0.5 mm in length (Bailey-Brock, 1999).

Mollusca

In their phylogeny of the genus *Hypselodoris* (Nudibranchia: Chromodorididae), Gosliner & Johnson (1999) described the following new species: *H. alboterminata*, *H. bertschi* [= *H. lineata* of Kay & Young, 1969], *H. insulana* (from Midway), *H. paulinae*, and *H. violabanchia*; they also reported the following previously known species from Hawaiian waters: *H. andersoni* Bertch & Gosliner, *H. infucata* (Ruppell & Leuckart), and *H. maridadilus* Rudman; the *Hypselodoris* species of Kay (1979), *Thorunna daniellae* (Kay & Young) [= *H. daniellae* Kay & Young], *Chromodoris vibrata* (Pease) [= *H. vibrata* (Pease)], *H. bertschi* Gosliner & Johnson [= *H. lineata* (Eydoux & Souleyet)]. *Microliotia hawaiiensis* Kase [Gastropoda, Pickworthiidae] described as new (Kase, 1998). *Vexillum (Costellaria) nodai* Turner & Salisbury [Gastropoda, Costellariidae] described as new (Turner & Salisbury, 1999).

Tardigrada

Several new records have been located. Eight species, new state records, have subsequently been noted: *Echiniscus kerguelensis* Richter, *E. baius* Marcus, *E. marginatus* Binda & Pilato (new species), *Pseudechiniscus jiroveci* Bartos, *Macrobotus montanus*

Murray, *M. areolatus* Murray, *Ramazzottius horningi* Binda & Pilato (new species) (Binda & Pilato, 1994; McInnes, 1994); *Echiniscus tessellatus* Murray has been newly reported (Dastych, 1997). The total number of species currently is 29.

Pycnogonida

Two newly reported species: *Pigrogromitus timsanus* from Pearl Harbor (Coles *et al.*, 1999a) and *Anoplodactylus arescus* from Barber's Point (Coles *et al.*, 1999b); both species are considered to be introduced.

Arthropoda: Pentastomida

All members of this aberrant arthropod subphylum are modified for total parasitism; their status as a subphylum is not well established. Two species are reported from the Hawaiian Islands: *Raillietiella frenatus* Ali, Riley & Self from the mourning gecko *Lepidodactylus lugubris* was first noted by Goldberg & Bursey (1997) but not specifically reported as a new state record. *Raillietiella affinis* Bovier was collected from the lungs of the marine toad *Bufo marinus* in 1994 and deposited at Bishop Museum [BPBM H74].

Arthropoda: Insecta and Related Forms

Increased activity in documenting arrival of alien species accounted for most of the increase in total numbers of species. Examples of these papers include Beardsley (1999), Beardsley *et al.*, (1999), Jamieson (1999), Taiti (1999), and Takumi (1999a). Revisions and corrections of status as well as new species descriptions (Polhemus, 1999; Schwartz & Polhemus, 1999; Shelley & Lehtinen, 1999; Takumi, 1999b) served to further refine the total number of arthropods (G.M. Nishida, pers. comm).

Arthropoda: Crustacea: Decapoda

Twenty-one Hawaiian species are photographed in color (Debilius, 1999). A new species, *Albunea danai* Boyko [Family Albuneidae], described; *A. speciosa* Dana redescribed from new material, not an endemic as previously believed (Boyko, 1999). Newly collected specimens of the mole crab *Hippa pacifica* (Dana) [Family Hippidae] are reported (Boyko & Harvey, 1999). The family Callianassidae is reviewed; from Hawai'i: *Callianassa parva* Edmondson, *Glypturus lanceolatus* Edmondson [= *Callianassa (Callichirus) lanceolata* Edmondson], *Glypturus winslowi* (Edmondson) [= *Callianassa (Callichirus) winslowi* Edmondson], *Neocallichirus indicus* (DeMan) [= *Callianassa (Cheramus) variabilis* Edmondson], and *Neocallichirus* sp. (Rathbun) [= *Callianassa* sp. of Rathbun] (Sakai, 1999). New combination *Thorina maldivensis* (Borradaile) [= *Thor maldivensis* Borradaile] [Family Hippolytidae] (Bruce, 1997). New family record Latreilliidae reported (Williams, 1982), just recognized, new species *Latreillia metanesa* Williams from Albatross Hawaiian material; Edmondson (1932) noted that no member of the genus *Latreillia* has been reported from the central Pacific, including Hawai'i. *Garthambrus stellata* (Rathbun) [= *Parthenope (Platylambrus) stellata* Rathbun] [Family Parthenopidae] reported (Ng & Tan, 1999). *Aethra edentata* Edmondson [Family Parthenopidae] redescribed (Ng, 1999). New species *Progeryon mus* Ng & Guinot [Family Geryonidae] described (Ng & Guinot, 1999). In a revision of the genus *Echinoecus*, the local species *E. pentagonus* (A. Milne Edwards) is redescribed (Chia, *et al.*, 1999). In a revision of the family Dynomenidae McLay (1999) reported *Dynomene hispida* Guérin-Méneville, *Dynomene praedator* A. Milne Edwards (first record for Hawai'i), *Dynomene pilumnoides* Alcock (first record for Hawai'i); and *Metadynomene devaneyi* (Takeda) [= *Dynomene devaneyi* Takeda].

Chordata: Pisces

New species described from Hawaiian waters: *Callionymus comptus* Randall and *Synchiropus rosulentus* Randall [Callionymidae] (Randall, 1999a); *Eviota rubra* Greenfield & Randall and *E. susanae* [Gobiidae] (Greenfield & Randall, 1999); *Eustomias dinema*

Clarke [Melanostomiidae] (Clarke, 1999). New records of fishes from the Hawaiian Islands: *Synodus rubromaculatus* Russell & Cressy [Synodontidae] known previously from the Great Barrier Reef, Indonesia, Malaysia, Taiwan, and the Philippines (Randall, 1998); the Indo-Pacific *Bathycongrus guttulatus* (Gunther) [Congridae] and endemic *B. aequoreus* (Gilbert & Kramer) now recognized as 2 valid species in Hawaiian waters (Castle & Smith, 1999); *Caranx caballus* [Carangidae], an eastern Pacific endemic, appeared in the Hawaiian Islands during a recent El Niño event, established status unknown (Randall, 1999b; Randall & Carlson, 1999). A third species of seahorse, *Hippocampus fisheri* Jordan & Everman, was recognized as an endemic species (Lourie *et al.*, 1999). *Synchiropus kinmeiensis* resurrected from synonymy with *S. altivelis*; found only in the Hawaiian Islands and southern Emperor Seamounts (Randall, 1999a). The *Gonorhynchus* population in Hawaiian waters is distinct from other populations as a previously described endemic species *G. moseleyi* Jordan & Snyder; since the mid-1940s the Hawaiian *Gonorhynchus* has been included in an Indo-Pacific *B. gonorhynchus* (Grande, 1999). An unusual parrotfish collected on O'ahu has been reported as a possible hybrid or possibly a new species, although it is unlikely that a new species of large parrotfish exists in the main Hawaiian Islands (Randall, 1999c). Two freshwater fishes were reported as introduced, the Lake Malawi cichlid *Melanochromis johanni* (Eccles) and the central American cichlid *Parachromis managuensis* (Gunther) [usually reported as *Cichlasoma managuense*] (Fuller *et al.*, 1999). [Thanks to B.C. Mundy for his personal communication for this entire entry.]

Chordata: Amphibia

Three species of Caribbean frogs: *Eleutherodactylus coqui* Thomas, *E. martinicensis* (Tschudi), and *E. planirostris* (Cope) first appeared in Hawai'i around 1990 and were probably inadvertently shipped with plants and soil from plant nurseries (Kraus *et al.*, 1999)

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