

**Change of Status and Name for a Hawaiian Freshwater
Limpet: *Ancylus sharpi* Sykes, 1900, is the Invasive North
American *Ferrissia californica* (Rowell, 1863),
Formerly Known as *Ferrissia fragilis* (Tryon, 1863)
(Gastropoda: Planorbidae: Ancyliinae)¹**

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The freshwater limpet heretofore known as *Ferrissia sharpi* (Sykes, 1900) was described as *Ancylus sharpi* from material collected on the Island of O'ahu (Sykes 1900). The discussion of the species by Hubendick (1967) added little new information, but by the end of the 20th century it had been reported from the islands of Kaua'i and Hawai'i in addition to its type locality (Cowie *et al.* 1995; Cowie 1997). Recent surveys of Hawaiian stream fauna have recorded it from numerous localities on those islands and have added the islands of Moloka'i and Maui to its known range within the state of Hawai'i (Englund & Godwin 2002; Englund & Preston 2002; Anthony *et al.* 2004; Brasher *et al.* 2004; Parham *et al.* 2008).

Ferrissia sharpi has been a cryptogenic species in the Hawaiian fauna as its status as native or introduced has been unclear. Most recent authors have regarded its status as uncertain (Cowie *et al.* 1995; Cowie 1997, 1998; Englund & Godwin 2002; Englund & Preston 2002; Ziegler 2002; Anthony *et al.* 2004; Brasher *et al.* 2004), but Parham *et al.* (2008) treated it as native and the Hawaii Department of Land and Natural Resources has identified it as among its "species of greatest conservation need" (Mitchell *et al.* 2005).

The status of *F. sharpi* has recently been resolved in the course of phylogenetic studies of a North American species generally known as *Ferrissia fragilis* (Tryon, 1863). *Ferrissia fragilis* has now been shown to be conspecific with *F. sharpi* (Walther *et al.* 2010) as well as with a European snail described as *Watsonula wautieri* Mirolli, 1960 (Walther *et al.* 2006). In addition to Europe and the Hawaiian Islands, this highly invasive species has been reported (as *F. fragilis* or *F. wautieri*) from North Africa (Khalloufi & Boumaïza 2007), the Middle East (Marrone *et al.* 2014), East Asia and nearby islands (Beckmann *et al.* 2006; Walther *et al.* 2006, 2010; Sharapova 2008), and South America (Lacerda *et al.* 2015). As an alien in the Hawaiian Islands its conservation here need no longer be a matter of concern.

Ferrissia fragilis has long been regarded as conspecific with a taxon described as *Gundlachia californica* Rowell, 1863 (Basch 1963; Burch 1982; Walther *et al.* 2010), and as it has been assumed that Tryon's *fragilis* has priority over Rowell's *californica* the former name has been in general use by these and other recent authorities (*e.g.*, Turgeon *et al.* 1998; Dillon & Herman 2009; Marrone *et al.* 2014; Bouchet & Neubauer 2015; Lacerda *et al.* 2015). Bequaert & Miller (1973: 212), however, concluded that *californica* had priority over *fragilis*, stating that "so far as could be traced, the description [of *frag-*

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ilis] was published in June or early July [of 1863], while that of *G. californica* appeared not later than May [1863.]” Taylor (1981) also regarded *californica* as a senior synonym of *fragilis*, though he cited no authority for this conclusion. Coan (1989: 45) noted Bequaert & Miller’s conclusion that *californica* has priority over *fragilis*, stating that “Rowell’s paper was published in May, [and] Tryon’s paper was published in July[.]” The priority of *californica* has also been acknowledged by the International Union for the Conservation of Nature (Cordeiro & Perez 2011). Standard bibliographic authorities (Evenhuis 2011) confirm that Rowell’s paper (Rowell 1863) had been published by May, 1863 (Meisel 1929: 149), whereas Tryon’s description (Tryon 1863) cannot be shown to have been published before 13 July 1863 (Nolan 1913: xiii). Pursuant to Articles 21.3 and 21.4 of the *International Code of Zoological Nomenclature* (I.C.Z.N. 1999, hereinafter “the Code”) the dates of publication of *californica* and *fragilis* must be regarded as 31 May 1863, and 13 July 1863, respectively, establishing the priority of the former name.

Article 23.9 of the *Code* provides that a long-overlooked senior synonym can be suppressed as a *nomen oblitum* and the junior synonym in general use can be conserved as a *nomen conservandum* if the senior synonym has not been used as a valid name after 1899 and the junior synonym meets certain criteria for frequency of recent usage. Tryon’s *fragilis* is ineligible for conservation under this provision because Rowell’s *californica* has been used at least twice since 1899 as a valid name (Bequaert & Miller 1973: 211–212; Taylor 1981: 161). Accordingly, the senior synonym *californica* must replace *fragilis* as the valid name for this species, which must henceforth be known as *Ferrissia californica* (Rowell, 1863).

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Literature Cited

- Anthony, S.S., Hunt, C.D., Jr., Brasher, A.M.D., Miller, L.D., & Tomlinson, M.S.** 2004. Water quality on the island of Oahu, Hawaii, 1999–2001. *U.S. Geological Survey, U. S. Department of the Interior. Circular 1239*, vi + 31 pp. Available from: <http://pubs.usgs.gov/circ/2004/1239/pdf/circular1239.pdf>. [Accessed 7 Dec 2015]
- Basch, P.F.** 1963. A review of the Recent freshwater limpet snails of North America (Mollusca: Pulmonata). *Bulletin of the Museum of Comparative Zoology* **129**: 399–461.
- Beckmann, M.C., He Q., Yang J., & Xu P.** 2006. First report of *Ferrissia wautieri* and *Physa acuta* in Taihu Lake of China. *South China Fisheries Science* **2**: 63–65.
- Bequaert, J.C., & Miller, W.B.** 1973. *The mollusks of the arid southwest with an Arizona checklist*. University of Arizona Press, Tucson. xvi + 271 pp.
- Bouchet, P. & Neubauer, T.A.** 2015. *Ferrissia fragilis* (Tryon, 1863). In: MolluscaBase (2015). Accessed through: World Register of Marine Species. Available through <http://www.marinespecies.org/aphia.php?p=taxdetails&id=824307> [Accessed 6 Dec 2015]
- Brasher, A.M.D., Wolff, R.H. & Luton, C.D.** 2004. Associations among land use, habitat characteristics, and invertebrate community structure in nine streams on the island of Oahu, Hawaii, 1999–2001. *U.S. Geological Survey, U.S. Department of the Interior. Water-Resources Investigations Report 03-4256*, viii + 47 pp. Available from: <http://pubs.usgs.gov/wri/wri034256/pdf/WRI034256.pdf>. [Accessed 6 Dec 2015]

- Burch, J.B.** 1982. *Freshwater snails (Mollusca: Gastropoda) of North America*. U.S. Environmental Protection Agency, Cincinnati, Ohio. 294 pp.
- Coan, E.** 1989. The publications and taxa of the Reverend Joseph Rowell (1820–1918). *The Veliger* **32**: 43–46.
- Cordeiro, J. & Perez, K.** 2011. *Ferrissia fragilis*. The IUCN Red List of Threatened Species 2011: e.T189119A8686887. Available from: <http://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T189119A8686887.en>. [Accessed 6 Dec 2015]
- Cowie, R.H.** 1997. Catalog and bibliography of the nonindigenous nonmarine snails and slugs of the Hawaiian Islands. *Bishop Museum Occasional Papers* **50**: 1–66.
- . 1998. Patterns of introduction of non-indigenous non-marine snails and slugs in the Hawaiian Islands. *Biodiversity and Conservation* **7**: 349–368.
- , **Evenhuis, N.L. & Christensen, C.C.** 1995. *Catalog of the native land and freshwater molluscs of the Hawaiian Islands*. Backhuys Publishers, Leiden. vi + 248 pp.
- Dillon, R.T., Jr. & Herman, J.J.** 2009. Genetics, shell morphology, and life history of the freshwater pulmonate limpets *Ferrissia rivularis* and *Ferrissia fragilis*. *Journal of Freshwater Ecology* **24**: 261–271.
- Englund, R.A. & Godwin, L.S.** 2002. Non-insect aquatic invertebrate surveys of four Windward O‘ahu stream systems impacted by the Waiahole Ditch. Report prepared for Division of Aquatic Resources, Hawaii Department of Land and Natural Resources. 9 pp. Available from: <http://hbs.bishopmuseum.org/pdf/WaiaholeInverts.pdf>. [Accessed 6 Dec 2015]
- , & **Preston, D.J.** 2002. Addendum to non-insect aquatic invertebrate surveys of four Windward O‘ahu stream systems impacted by the Waiahole Ditch. Report prepared for Division of Aquatic resources, Hawaii Department of Land and Natural Resources, by the Hawaii Biological Survey, Bishop Museum. 11 pp. Available from: <http://hbs.bishopmuseum.org/pdf/waihole-addendum.pdf>. [Accessed 6 Dec 2015]
- Evenhuis, N.L.** 2011. Catalog of dating sources for zoological works (2nd ed.). *Bishop Museum Technical Report* **56**, 234 pp. Available from: <http://hbs.bishopmuseum.org/publications/pdf/tr56.pdf>. [Accessed 8 Dec 2015]
- Hubendick, B.** 1967. Studies on Ancyliidae. The Australian, Pacific and Neotropical form-groups. *Acta Regiae Societatis Scientiarum et Litterarum Gothoburgensis. Zoologica* **1**: 1–52.
- International Commission on Zoological Nomenclature.** 1999. *International Code of Zoological Nomenclature*. Fourth Edition. International Trust for Zoological Nomenclature, London. xxix + 306 pp.
- Khaloufi, N. & Boumaïza, M.** 2007. Première citation et description de quatre pulmonés dulcicoles de Tunisie (Mollusca, Orthogastropoda). *Bulletin de la Société Zoologique de France* **132**: 191–204.
- Lacerda, L.E.M., Richau, C.S., Amaral, C.R.I., Silva, D.A., Carvalho, E.F. & Santos, S.B.** 2015. *Ferrissia fragilis* (Tryon, 1863): a freshwater snail cryptic invader in Brazil revealed by morphological and molecular data. *Aquatic Invasions* **10**: 157–168.
- Marrone, F., Naser, M.D., Yasser, A.G., Sacco, F. & Arculeo, M.** 2014. First record of the North American cryptic invader *Ferrissia fragilis* (Tryon, 1863) (Mollusca: Gastropoda: Planorbidae) in the Middle East. *Zoology in the Middle East* **60**: 39–45.

- Meisel, M.** 1929. *A bibliography of American natural history: The Pioneer Century, 1768–1865*. Vol. 3. Premier Publishing Co., Brooklyn, New York. xii + 749 pp.
- Mitchell, C., Ogura, C., Meadows, D.W., Kane, A., Strommer, L., Fretz, S., Leonard, D. & McClung, A.** 2005. Hawaii's comprehensive wildlife conservation strategy. Department of Land and Natural Resources. Honolulu. 722 pp. Available from: <http://dlnr.hawaii.gov/wildlife/files/2013/09/CWCS-Full-Document-2005Oct01.pdf>. [Accessed 6 Dec 2015]
- Nolan, E.J. (editor)** 1913. *An index to the scientific contents of the Journal and Proceedings of the Academy of Natural Sciences of Philadelphia*. Academy of Natural Sciences, Philadelphia. xiv + 1419 pp.
- Parham, J.E., Higashi, G.R., Lapp, E.K., Kuamo'o, D.G.K., Nishimoto, R.T., Hau, S., Fitzsimons, J.R., Polhemus, D.A. & Devick, W.S.** 2008. Atlas of Hawaiian watersheds & their aquatic resources. Bishop Museum & Division of Aquatic Resources, Department of Land and Natural Resources, Honolulu. Available from: <http://www.hawaiiwatershedatlas.com/index.html>. [Accessed 6 Dec 2015]
- Rowell, J.** 1863. [Description of a new California mollusk, discovered by Rev. Joseph Rowell, at Marysville, in the waters of Feather River.] *Proceedings of the California Academy of Sciences* (1) **3**: 21–22.
- Sharapova, T.A.** 2008. [Distributional and ecological peculiarities of invading mollusks in the cooler reservoir at the Tyumen heat and power plant in western Siberia]. *Vestnik Zoologii* **42**: 185–187 [In Russian.]
- Sykes, E.R.** 1900. *Fauna Hawaiiensis*. Volume II, Part IV, Mollusca, pp. 271–412, pls. 11, 12. University Press, Cambridge.
- Taylor, D.W.** 1981. Freshwater mollusks of California: a distributional checklist. *California Fish and Game* **67**: 140–163.
- Tryon, G.W.** 1863. Descriptions of new species of fresh water Mollusca, belonging to the families Amnicolidae, Valvatidae and Limnaeidae; inhabiting California. *Proceedings of the Academy of Natural Sciences, Philadelphia* **15**: 147–150.
- Turgeon, D.D., Quinn, J.F., Jr., Bogan, A.E., Coan, E.V., Hochberg, F.G., Lyons, W.G., Mikkelsen, P.M., Neves, R.J., Roper, C.F.E., Rosenberg, G., Roth, B., Scheltema, A., Thompson, F.G., Vecchione, M., & Williams, J.D.** 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks (2nd ed.). *American Fisheries Society Special Publication* 26. American Fisheries Society, Bethesda, Maryland. ix + 526 pp.
- Walther, A.C., Burch, J.B., & Ó Foighil, D.** 2010. Molecular phylogenetic revision of the freshwater limpet genus *Ferrissia* (Planorbidae: Ancylineae) in North America yields two species: *Ferrissia (Ferrissia) rivularis* and *Ferrissia (Kinkaidella) fragilis*. *Malacologia* **53**: 25–45.
- , **Lee, T., Burch, J.B., & Ó Foighil, D.** 2006. Confirmation that the North American ancyclid *Ferrissia fragilis* (Tryon, 1863) is a cryptic invader of European and East Asian freshwater ecosystems. *Journal of Molluscan Studies* **72**: 318–321.
- Ziegler, A.C.** 2002. *Hawaiian natural history, ecology, and evolution*. University of Hawai'i Press, Honolulu. xviii + 477 pp.