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MARYLAND AND VIRGINIA MUSSELS OF LISTER

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Freshwater Mussels from the colonies figured as *"Mya"*, *"Mytilus"*, and *"Pectunculus"* by Lister in 1686 included members of each subfamily living today in the Chesapeake Bay Region. Most of them, such as *Elliptio complanatus* Lightfoot, and *Lampsilis radiata* Gmelin, have been universally recognized since they were scientifically named. In contrast, two species of the James River of Virginia are not commonly known by their earliest names. Of the Unionidae, subfamily Anodontinae, the "Red Anodonta" is correctly known as *Anodonta (Pyganodon) fucata* Dillwyn, 1817, while the plate 157, figure 12 *"Pectunculus"*, of the Amblemidae, subfamily Lampsilinae, is only correctly known as *Leptodea fluviatilis* Gmelin, 1791. The various mistaken listings of these names, *fucata*, and *fluviatilis*, or their omissions, are indicated in the following synonymies of the past century and a half.

ANODONTA (PYGANODON) FUCATA (Dillwyn, 1817)

Figs. 5-8

1686 ---- Lister, Hist. Conch., pl. 154, fig. 9. (Va.)

1770 ---- Lister (Huddesford), Hist. Conch., pl. 154, fig. 9 (Va.)

1786 *Mytilus fucatus* Solander Mss, Lightfoot, Portland Cat., p. 29, lot 672. (Md.) NUDE NAME.

1817 *Mytilus fucatus* Dillwyn, Descr. Cat., p. 317. (minus the European *avonensis* synonymy).

1823 *Mytilus fucatus* Dillwyn, Index to Lister, p. 13.

1829 *Anodonta implicata* Say, N. Harmony Diss., 2, no. 22, p. 340.

1834 *Anodonta implicata* Conrad, New Freshwater Shells, p. 73.

1835 *Anodonta implicata* Férussac, Guerin's Mag., p. 250.

1838 *Anodonta newtonensis* Lea, Trans. Am. Phil. Soc., 6: 79, pl. 21, fig. 66.

1838 *Anodonta newtonensis* Lea, Observations, 2: 79, pl. 21, fig. 66.

1838 *Margarita (Anodonta) implicata* Lea, Synopsis, p. 30.

1838 *Margarita (Anodonta) newtonensis* Lea, Synopsis, p. 30.

1840 *Anodonta implicata* Say, New Land and Freshwater Shells, p. 10.

1840 *Anodonta implicata* L.W. Say, Terr. & Fluv. Shells, p. 11.

1841 *Anodon implicata* Gould, Invertebrata Mass., p. 118, fig. 78.

1843 *Anodon implicata* DeKay, Nat. Hist., N.Y., Moll., p. 202.

1843 *Anodon excurvata* DeKay, Nat. Hist., N.Y., Moll., p. 202, pl. 17, fig. 233.

1845 *Anodonta housatonica* Linsley, Am. Journ., Sci., Ser. I, 48: 277. NUDE NAME.

1845 *Anodon newtoniana* Catlow & Reeve, Conch. Nomencl., p. 67.

1848 *Anodonta housatonica* Gould, Am. Journ. Sci., Ser. II, 6: 234, figs 4-5.

1851 *Anodonta implicata* Stimpson, Shells of New England, p. 15.

1851 *Anodonta housatonica* Stimpson, Shells of New England, p. 15.

1852 *Margaron (Anodonta) implicata* Lea, Synopsis, p. 50.

1853 *Anodonta implicata* Conrad, Proc. A.N.S.P., 6:264.

1853 *Anodonta excurvata* Conrad, Proc. A.N.S.P., 6:264.

1856 *Anodonta implicata* Girard, Proc. Nat'l. Inst. Wash., D.C., N. Series, vol. 1, no. 2, p. 79.

1862 *Anodonta williamsii* Lea, Proc. A.N.S.P., 6: 169.

1862 *Anodonta williamsii* Lea, Observations, 11: 31, pl. 10, fig. 26.

1867 *Anodon newtonensis* Sowerby, Conch. Icon., 17, pl. 17, fig. 62.

1870 *Anodon implicata* Binney's Gould, Invertebrata Mass., p. 180, fig. 481.

1870 *Margaron (Anodonta) implicata* Lea, Synopsis, p. 80.

1870 *Margaron (Anodonta) williamsii* Lea, Synopsis, p. 81.

1873 *Anodonta implicata* Clessin, Conch. Cab. *Anodonta*, p. 78, pl. 19, fig. 3.

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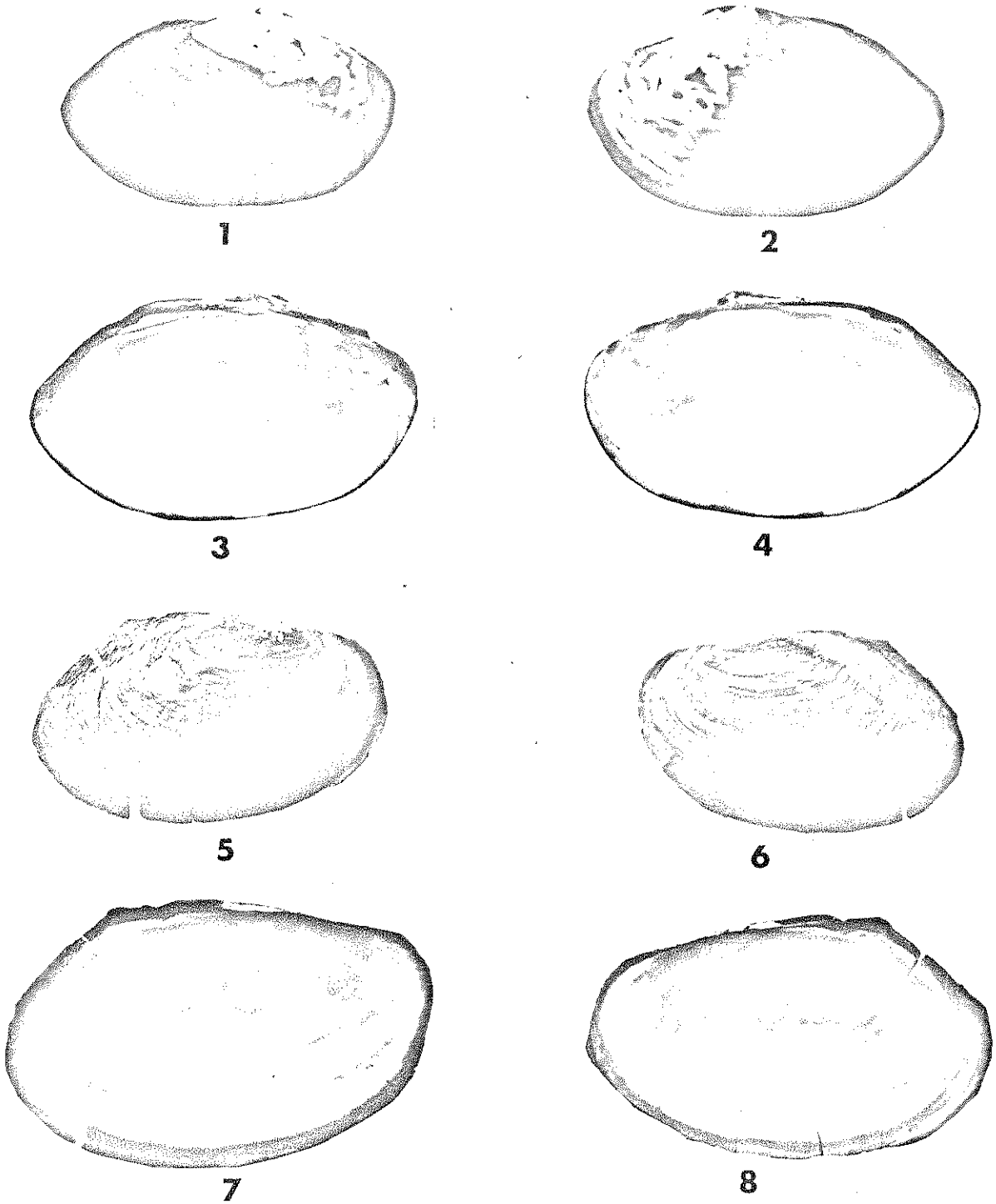

Figs. 1-4: *Mytilus fluviatilis* Gmelin. Neotype. USNM 709986

Figs. 5-8: *Mytilus fucatus* Dillwyn. Neotype. USNM 709985

1874 *Anodon implicata* Hartman & Michener, Conch. Cestrica, p. 94, fig. 193.

1890 *Anodonta implicata* Carpenter, Nautilus, 4: 57.

1900 *Mytilus fucatus* Simpson, Proc. U.S.N.M., vol. 22, p. 622. (incorrectly synonymous under *cygnaea* of Europe).

1900 *Anodonta implicata* Simpson, Proc. U.S.N.M., vol. 22, p. 633.

1914 *Mytilus fucatus* Simpson, Descript. Cat., p. 362 (not *avonensis* Mont., incorrectly synonymous under *cygnaea* of Europe).

1914 *Anodonta implicata* Simpson, Descript. Cat., p. 391.

1919 *Anodonta implicata* Ortmann, Mem. Carnegie Mus., 8: 159, pl. 11, fig. 2,3.

1927 *Anodonta implicata* Frierson, Checklist, p. 16.

1946 *Anodonta implicata* Johnson, Occ. Pap. Moll., I: 112, pl. 16, fig. 1,2.

1959 *Anodonta implicata* Clarke & Berg, Cornell Univ. Exp. Sta. Mem. no. 367, p. 40, fig. 42.

1962 *Anodonta implicata* Athearn & Clarke, Nat'l Mus. Canada, Bull. 183, p. 26, pl. 2, figs. 1-2.

1969 *Anodonta (Pyganodon) implicata* Haas, Tierreich 88, Unionacea, p. 368.

1970 *Anodonta (Pyganodon) implicata* Johnson, Bull. M.C.Z., vol. 140, no. 6, p. 360, pl. 15, fig. 4; pl. 16, figs. 1-2.

1973 *Anodonta implicata* Johnson & Baker, Proc. A.N.S.P., 125 (no. 9), p. 158.

The name given by Dillwyn in 1817 is distinctive; *fucata* means painted, or painted red, in Latin. This agrees with the very brief Latin description of Lister – *Musculus angustior, subfuscus, paulo crassior,* – for this species of *Anodonta*, which is elongate in typical adult shells. The pale copper or salmon color of the nacre is normally specific, as Johnson has noted in 1970. Also characteristic is the habitat in sand or gravel bottoms, in contrast to that of most other *Anodonta* species, in muddier or silty sands. This species, *fucata* of Dillwyn, is apparently not, and has not been living south of the Chesapeake Bay Drainage, since Lister figured it. The pale colored form from the Potomac River south of Mount Vernon named *williamsii* by Lea may now be extinct because of pollution. It is interesting to note the re-discovery of this species in Virginia, almost 300 years after the original Listerine locality was published.

The first specimen of this *Anodonta* I ever personally collected was found in shallow water in current–swept gravel, in the lower Appomattax River, of the James River System, near Hopewell, Virginia, June 12, 1973. This specimen, from near the original locality of Lister, U.S.N.M. No. 709985, is hereby declared the NEOTYPE of the species *Anodonta (Pyganodon) fucata* Dillwyn, 1817.

LEPTODEA FLUVIATILIS (Gmelin, 1791)

Figs. 1–4

1686 *Pectunculus* – Lister, Hist. Conch., Pl. 157, fig. 12.

1770 *Pectunculus* – Lister (Huddesford Edn.), pl. 157, fig. 12.

1791 *Mytilus fluviatilis* Gmelin, Syst. Naturae, 13th Edn., p. 3359.

1801 *Anodonta fluviatilis* Bosc, Hist. Nat. de Coquilles, vol. 3, p. 146.

1816 *Anodontes fluviatilis* Cuvier, La Regn. Animal, vol. 2, p. 472.

1817 *Mytilus fluviatilis* Dillwyn, Descr. Cat., p. 316.

1817 *Unio ochraceus* Say, Nicholson's Encyclopedia, p. 2, pl. 3, fig. 8.

1820 *Lampsilis rosea* Rafinesque, Ann. Gen. de Sci. Phys. Bruxelles, vol. 5, p. 299; separate, p. 33.

1820 *Unio (Metaptera) ochracea* Raf., Ann. Gen. de Sci. Phys. Bruxelles, vol. 5, p. 300. separate, p. 34.

1823 *Mytilus fluviatilis* Dillwyn, Index to Lister, Hist. Conch., p. 13.

1824 *Anodonta fluviatilis* Bosc, Hist. Nat. de Coq. (2nd Edn.), vol. 3, p. 143.

1826 *Mya ochracea* Eaton, Zool. Textbook, p. 218.

1830 *Symphynota ochracea* Lea, Trans. Am. Phil. Soc., vol. 3, p. 455.

1832 *Lampsilis rosea* Raf., (Poulson Translation), p. 28.

1832 *Unio (Metaptera) ochracea* Raf. (Poulson Translation), p. 29.

1834 *Unio ochraceus* Conrad, New Freshwater Shells, p. 70.

1834 *Symphynota ochracea* Lea, Observations, 1, p. 69.

1835 *Unio ochraceus* Férussac, Guerin's Magazine, p. 25.

1836 *Margarita (Unio) ochracea* Lea, Synopsis, p. 23.

1836 *Unio ochracea* Conrad, Mon. Unionidae, no. 4, p. 37, pl. 18, fig. 2.

1836 *Unio ochracea* (var. A.) *fluviatilis* Conrad, Mon. Unionidae, no. 4, p. 37.

1838 *Margarita (Unio) ochracea* Lea, Synopsis, p. 18.

1838 *Unio ochracea* Lea, Trans. Amer. Phil. Soc., vol. 6, pp. 48-57.

1838 *Unio ochracea* Lea, Observations, vol. 2, pp. 48-57, pl. 15, fig. 44 (anatomy).

1841 *Unio ochraceus* Gould, Invertebrata Mass., p. 112, fig. 74.

1842 *Unio ochraceus* Hanley, Test. Moll., p. 190.

1843 *Unio ochraceus* Hanley; Bivalve Shells, p. 190, pl. 20, fig. 48.

1843 *Unio ochraceus* DeKay, Nat. Hist. N.Y., p. 193, pl. 69, figs. 237, 238.

1845 *Lampsilis rosea* Raf., Chenu – Reprint, p. 14.

1845 *Unio (Metaptera) ochracea* Raf., Chenu – Reprint, p. 15.

1851 *Lampsilis ochracea* Stimpson, Shells of New England, p. 14.

1852 *Margaron (Unio) ochraceus* Lea, Synopsis, p. 27.

1853 *Unio ochracea* Conrad, Synopsis, Proc. A.N.S. Phila., vol. 6, pp. 254, 265.

1856 *Unio ochracea* Girard, Proc. Nat'l. Inst. Wash., N. ser., 1 (2), p. 79.

1856 *Unio ochraceus* Küster, Conch. Cab., *Unio*, p. 163, pl. 47, fig. 1.

1863 *Unio ochracea* Lea, Journ. A.N.S.P., ser. 2, vol. 5, pp. 401-456.

1863 *Unio ochracea* Lea, Observations, vol. 10, pp. 37-92.

1864 *Lampsilis rosea* Raf., Binney & Tryon – Reprint, p. 44.

1864 *Unio (Metaptera) ochracea* Raf., Binney & Tryon – Reprint, p. 45.

1868 *Unio ochraceus* Sowerby, Conch. Icon., 16, pl. 63, fig. 317.

1870 *Unio ochraceus* Binney's Gould, Invertebrata Mass., p. 173, fig. 476.

1872 *Margaron (Unio) ochraceus* Lea, Synopsis, p. 42.

1874 *Unio ochraceus* Hartman & Michener, Conch. Cestrica, p. 39, fig. 184.

1895 *Unio ochraceus* Simpson, Nautilus, vol. 8, p. 122, figd.

1900 *Lampsilis ochraceus* Simpson, Bull. U.S.N.M., vol. 22, p. 530.

1914 *Lampsilis ochraceus* Simpson, Descr. Cat. Naiades, p. 49.

1919 *Lampsilis ochracea* Ortmann, Mem. Carnegie Mus., vol. 8, p. 318, pl. 20, figs. 6-7.

1927 *Lampsilis ochracea* Frierson, Checklist N. Amer. Naiades, p. 68.

1929 *Lampsilis ochracea* Reardon, Proc. U.S.N.M., vol. 75, p. 1, pl. 1, figs. 1-10 (anatomy).

1947 *Lampsilis ochracea* Johnson, Occ. Papers Moll., M.C.Z., vol. 1, p. 150, pl. 20, figs. 1-2.

1959 *Lampsilis ochracea* Clarke & Berg, Cornell Univ. Exp. Sta., Mem. no. 367, p. 57, figs. 55-56.

1962 *Lampsilis ochracea* Athearn & Clarke, Nat. Mus. Canada, Bull. no. 183, p. 30, pl. 4, figs. 3-4.

1965 *Lampsilis ochracea* Dawley, Sterkiana, no. 19, p. 36.

1969 *Lampsilis (Lampsilis) ochracea* Haas, Tierreich, Unionacea, p. 454.

1970 *Lampsilis ochracea* Johnson, Bull. M.C.Z., vol. 140, no. 6, pp. 388-390, pl. 21, figs. 14-15.

1973 *Unio ochraceus* Johnson & Baker, Proc. A.N.S.P., vol. 125, no. 9, p. 163.

A search of all pertinent literature shows that Conrad in 1836 correctly named this species. His account of *Unio ochracea*, var. *fluviatilis* Gmelin, from Virginia, tells the whole story. Lister figured this shell as *Pectunculus*, thereby declaring it had (sub-equal) teeth on the hinge, both anterior and posterior to the beaks or umbones. Conrad said: "variety A (*fluviatilis*) is very abundant in James River, Virginia, where I found vast numbers of shells brought ashore by seines used in the shad fishery in March. So accurately does the above mentioned variety agree with Lister's figure and description, that I cannot doubt the identity . . . . The specimen figured has a double cardinal tooth in each valve." Such double cardinal teeth in each valve coincides with Lister's original placement of the shell as *Pectunculus*. Conrad's reference to the shad fishery specimens seined from the James River probably indicates the original method and place of discovery of this species, almost, if not exactly, three hundred years ago.

The references by Isaac Lea and others, of *fluviatilis* of Dillwyn to *Anodonta cataracta* Say, 1817, are false. There is no *Anodonta* species from Colonial Virginia that has high enough, swollen umbones to match Lister's figure 12. Apparently Gmelin called it *Mytilus fluviatilis* because he saw no hinge teeth in the (external only) figure. He forgot to read Lister's *Pectunculus*; we agree with Conrad's correction of this mistake by Gmelin.

Conrad's 1836 reference to the earliest name *fluviatilis* Gmelin, 1791 was completely and/or deliberately ignored by Isaac Lea, who left all fully dentate mussels in the genus *Unio* all his life. On the other hand, Lea in 1872, page 77, footnote, was not too sure about the name for Lister's plate 157; he said: "probably *Unio cariosus* Say." In the past century, it was "*Unio*" for all references except Rafinesque 1820, et seq., Stimpson 1851, and then Simpson in 1900, who apparently put *ochracea* under *Lampsilis* on account of the sexual dimorphism of the shells. All previous authors in this century have left the species in *Lampsilis*, simply because they did not study the anatomy critically or comparatively.

Personal research on this species, mostly since 1971, has proven two things. Firstly – *ochracea* of Say is the same as *fluviatilis* of Gmelin. Secondly – it does not belong to the genus *Lampsilis*. Both Isaac Lea in 1838, and Reardon in 1929, figured the gross anatomy of this Atlantic species. Recent examinations of numerous females from the Tar River, and from Lake Waccamaw, North Carolina, have corroborated the figures of Lea and Reardon. With smaller glochidia, and a complete lack of "mantle flaps" or papillae on the mantle margins of females, ventral to the siphonal area, it is clearly a species of *Leptodea*. This genus, of the subfamily Lampsilinae, has not previously been recognized as including any species living in the Atlantic Slope rivers.

No one has yet determined the fish host or hosts of this mussel, but I believe it will be found to be one of the anandromous species of Herring, Alewife, or Shad, of the genus *Alosa*. *Leptodea fluviatilis* has not been carried by its fish hosts above the Fall Line, in rivers wherever there is a distinct falls, as at the Great Falls of the Potomac. I have not seen any specimens of this species, or of *Lampsilis cariosa* Say, that were found living upstream of the Great Falls of the Potomac.

The specimen figured was taken with a mussel bar in 18 feet of water in the lower Appomattox River, of the James River System, near Hopewell, Virginia, June 12, 1973. Because of its almost complete accordance with Lister's figure 12 of *Pectunculus*, this specimen, *Leptodea fluviatilis* U.S.N.M. No. 709986, is here selected as the NEOTYPE of *Mytilus fluviatilis* Gmelin, 1791.