

SYMPATRIC SPECIES OF *ELLIPTIO* IN NORTH CAROLINA

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In 1834 Conrad named *Unio raveneli* from the Wateree Canal, South Carolina. It was collected in company with *Unio congaraea* Lea, 1831, in the same waters by Conrad's declaration. These two species both belong to the section *Cunicula* Swainson, 1840 of the genus *Elliptio* Rafinesque, 1819. By anatomy, glochidia, and reproduction — including parasitism on gills of host fishes — they are proven to belong to the subfamily Ambleminae s.s., of the family Amblemidae Rafinesque, 1820.

Examination of the North East Cape Fear River, about 2 miles west of Chinquapin, Duplin County, North Carolina, on July 11, 1970, showed these two species living together, just as Conrad had recorded them one and a third centuries ago. 39 males and 25 females of these mussels are *Elliptio congaraea* Lea, 1831 (Trans. Am. Phil. Soc., 4 : 72 : 6 : 4), of which *Unio icterinus* Conrad 1834 (New Freshwater Shells U. S., p. 41 : 6 : 15) is a synonym. *Elliptio congaraea* is more quadrate and much smoother in general appearance than is *E. complanata* Lightfoot, 1786. Its ecological preference in the North East Cape Fear River is for sandy bottoms, in which it burrowed completely below the water surface.

The second species, with a more elongate shell, duller periostracum, and of greater proportionate diameter, was more abundant in the muddier bottoms closer to the river bank. There were 9 males and 15 females in this sample of the species named *raveneli* Conrad (New Freshwater shells U.S., p. 39 : 6 : 4). *Unio confertus* Lea, published later in 1834 (Trans. Am. Phil. Soc., 5: 103 : 16 : 47), from the same Santee River System, is a synonym of *raveneli* Conrad.

When these shells were cut open, and the animals examined, it was found that all but three (12 out of 15) females of *raveneli* were gravid with eggs in the outer gills, on the date of collection, July 11, 1970. This was in direct contrast to the 25 females of *congaraea*, none of which were gravid on this date, with either eggs or glochidia in the gills. The discovery that *Elliptio*

congaraea and *E. raveneli* reproduce at different times, proves their specific distinction as continuing biological species that are sympatric. It corroborates Conrad's judgement of them as separate species when he named *raveneli* in 1834. The widespread *Elliptio complanata* was not found with *E. congaraea* and *E. raveneli* near Chinquapin in the North East Cape Fear River on July 11, 1970, although it is known to live in this river system.

Also in the Cape Fear River System, and in Lake Waccamaw, there is a third member of the *Elliptio angustata* (*producta*) group, that was first named *folliculata* Lea in 1838. This even more elongate and narrow *Elliptio* species is stretching out in the direction of the extremely longest and most narrow *Elliptio shepardiana* Lea of the Altamaha System. *Elliptio folliculata* lives alongside *E. raveneli* Lea, and *E. waccamawensis* Lea, 1863, in the sandy shallows of Lake Waccamaw. (see: Wildlife in North Carolina, Vol. 35, No. 4., April 1971, pp. 10 - 12.) This corroborates earlier records in the United States National Museum.

In the Potomac River System, *Elliptio complanatus* Lightfoot, and *Elliptio angustata* Lea, 1831 (+ *producta* Conrad, 1836) are living side by side in sandy silt, silt, or clayey bottoms.

A search for further sympatric species observations led to Ortmann's (1913, p. 319) listing of three species from the Rappahannock River of Virginia, *E. complanata* Lightfoot, *E. angustata* Lea, (+ *producta* Conrad) and *E. lanceolata* Lea, 1828. I know the latter two are sympatric, because I collected them living side by side in the Hazel River of the Rappahannock River System in 1934.

I found two *Elliptio* living together in the Tar River, August 26, 1966 at the route 64 bridge, 1 1/2 miles west of Spring Hope, North Carolina. In addition to 26 living *Elliptio complanata* Lightfoot and 14 living *E. raveneli* Conrad, there were dead shells of both *E. angustata* Lea and *E. lanceolata* Lea collected in the same 50 yard stretch of the Tar River at that time and place. In other words, there are 4 sympatric *Elliptio*

species in the Tar River System.

If you question what *Elliptio raveneli* Conrad is like — that is the only *Elliptio* species that was collected alive from the muddy shore of University Lake, west of Chapel Hill, August 24, 1966, along with the pygmy mussel, *Toxolasma pulla* Conrad, 1838. It did not surprise me to learn that *Unio pygmaeus* Lea, 1852 is a synonym of Conrad's name.

The entire Cape Fear River System includes five sympatric species of *Elliptio* living in these waters, : *E. complanata*, *congaraea*, *raveneli*, *angustata*, and *folliculata*.

This story of sympatric species of one genus is not unique in North American Amblesminae. I believe Dr. Stansbery has collected five *Pleurobema* species in the same mussel bed of the Green River of Kentucky. Apparently Rafinesque also originally collected three of them together in the Ohio River, 150 years ago. These five are: *Pleurobema clava* Lamarck 1819 (+ *mytiloides* Rafinesque, 1820); *P. obliquum* Lamarck, 1819 (+ *cordatum* Rafinesque, 1820); *P. obliquata* Rafinesque, 1820 (+ *pyramidatam* Lea, 1834); *P. premorsa* Rafinesque, 1831 (+ *plenum* Lea, 1840); and *P. sintoxia* Rafinesque, 1820 (+ *solidum* Lea, 1838).

The commonest Lampsiline species found living together in Wisconsin Rivers and Lakes are *Lampsilis luteola* Lamarck, 1819, and *Lampsilis cardium* Rafinesque, 1820. In the Ohio and Tennessee regions, the most striking example of even closer sympatry is the repeated recording of *Lampsilis ovata* Say, 1817 and *L. cardium* Rafinesque living together. The biological proof of their speciation is that they are distinct in shell, with different beak sculpture, and that each

exists alone in some places. Of the two, there is only *L. cardium* in any of the waters of Wisconsin known to me. In contrast, there is only *L. ovata* of Say in the New River of Virginia (Kanawha River System above the falls), and in the Potomac River System, above the fall - line.

The named "form" *cohongoronta* Ortmann, 1912 is a form of *ovata*, and has no direct relation to *cardium* of Rafinesque. *Lampsilis o. cohongoronta* has not replaced *Lampsilis cariosa* Say, which in the Potomac region is essentially a tide-water species. *Lampsilis o. cohongoronta* filled a void that was not previously filled by any *Lampsilis* species, or that was not collected in by any scientific worker for more than 200 years. What I used to think was *L. cariosa* from the Upper Potomac (and Shenandoah River) System, proved some weeks ago to be only the slightly dwarf form *cohongoronta* of *ovata* Say. There are no *L. cariosa* specimens known to me from the Potomac at any appreciable distance above the fall - line.

Sympatry is also known for the Family Unionidae. A couple of years ago, I personally collected two species of *Unio* in the same cut-off pond of the Danube Flood-plain, a little east of Vienna, Austria. Those two species had animals of different color, as described by the European authorities. Of the subfamily Anodontinae, the most striking sympatric example known to me is the occurrence of *Anodonta (Anodonta) imbecilis* Say, A. (A.) *couperiana* Lea, and A. (*Pyganodon*) *teres* Conrad, living together in the same bottoms in Greenfield Pond, Wilmington, North Carolina.