Additional Species Found

Anodonta imbecillis Say, 1829
Anodonta g. grandis Say, 1829
Strophitus u. undulatus (Say, 1817)
Simpsonaias ambigua (Say, 1825)
Lasmigona costata (Rafinesque, 1820)
Lasmigona subviridis (Conrad, 1835)
Megalonaias nervosa (Rafinesque, 1820)
Tritogonia verrucosa (Rafinesque, 1820)
Quadrula pustulosa pustulosa (Lea, 1831)
Amblema p. plicata (Say, 1817)
Fusconaia m. maculata (Rafinesque, 1820)
Cyclonaias tuberculata (Rafinesque, 1820)
Pleurobema sintoxia (Rafinesque, 1820)
Pleurobema cordatum (Rafinesque, 1820)
Pleurobema rubrum (Rafinesque, 1820)
Elliptio c. crassidens (Lamarck, 1819)
Elliptio dilatata (Rafinesque, 1820)
Ptychobranchus fasciolaris (Rafinesque, 1820)
Plethobasus cyphyus (Rafinesque, 1820)
Obliquaria reflexa Rafinesque, 1820
Cyprogenia stegaria (Rafinesque, 1820)
Actinonaias l. carinata (Barnes, 1823)
Ellipsaria lineolata (Rafinesque, 1820)
Obovaria subrotunda (Rafinesque, 1820)
Truncilla truncata Rafinesque, 1820
Leptodea fragilis (Rafinesque, 1820)
Potamilus alatus (Say, 1817)
Ligumia recta (Lamarck, 1819)
Villosa i. iris (Lea, 1829)
Lampsilis r. luteola (Lamarck, 1819)
Lampsilis ventricosa (Barnes, 1823)
Lampsilis ovata (Say, 1817)
Lampsilis fasciola Rafinesque, 1820

THE DISTRIBUTION OF UNIONIDAE IN THE CALCASIEU RIVER IN SOUTHWESTERN LOUISIANA (MOLLUSCA: BIVALVIA: UNIONOIDA). David H. Stansbery and **Michael A. Hoggarth,** The Ohio State University Museum of Zoology, Columbus.

A series of eleven study sites on the main stem of the Calcasieu River revealed a fauna of twenty-two species of unionids, two species of *Sphaerium* and one species of *Corbicula* distributed over the nine uppermost sites. The lower two sites yielded six species of marine or estuarine bivalves and no freshwater species.

FRESHWATER BIVALVES OF THE LOWER RIO GRANDE SYSTEM, UNITED STATES AND MEXICO. Raymond W. Neck, Texas Parks and Wildlife Department, Austin, Texas, and **Art L. Metcalf,** Department of Biological Sciences, University of Texas at El Paso.

The Rio Grande system is one of the longer river systems of North America. Few field studies have covered this system because of its distance from centers of malacological study and the paucity of the bivalve fauna. This study was restricted to the lower Rio Grande from Falcon Reser- to the Gulf of Mexico.

Species known from this lower portion of the R- Grande are as follows: *Anodonta imbecillis henryiana* (Lea, 1857); *Anodonta grandis* (Say, 1829); *Uniomerus tetralas- mus manubius* (Gould, 1855); *Megalonaias gigante-* (Barnes, 1823); *Quadrula apiculata* (Say, 1829); *Popenaias popei* (Lea, 1857); *Cyrtonaias tampicoensis berlandieri* (Lea, 1857); *Toxolasma parvus* (Barnes, 1823); *Lampsilis teres* (Rafinesque, 1820); *Disconaias salinasensis* (Simpson, 1908); and *Corbicula fluminea* (Müller, 1774).

Most abundant species are *C. t. berlandieri*, *A. im- becillis* and *C. fluminea*. *U. t. manubius* has apparently no- been collected since the original lot was procured from northern Mexico. *C. fluminea* may be locally abundant - faster-moving water in the Rio Grande and wave-washe- shores of Falcon Reservoir. Several species *(M. gigantea, P. popei* and *D. salinasensis)* are known only from the R- Grande proper.

Human impact upon the bivalve fauna of the lower R- Grande has been varied. Most important is control of floods via a system of levees to contain high water flows, draining - certain resacas (abandoned river channels), agricultural and urban runoff, construction of Falcon Reservoir, and a button industry utilizing *C. t. berlandieri*.

Native bivalves of the lower Rio Grande are derived from two zoogeographical realms: Mississippian or Central Basin to the northeast, and the Mexican Gulf Coast to the south. Relatively few species have their affinity to the south. Close approach of low-elevation mountains to the Mexican coast has apparently restricted coastal plain stream migration. Therefore, few southern species occur in the lower Rio Grande.

ORIENTATION OF *LAMPSILIS RADIATA LUTEOLA* (LAM.) (BIVALVIA: UNIONIDAE) IN THE EAST FORK OF THE LITTLE SANDY RIVER, BOYD COUNTY, KENTUCKY. Karen J. Horn, Department of Biological Sciences, Marshall University, Huntington, West Virginia.

The orientation of *Lampsilis r. luteola* (Lam., 1819) was measured at three locations in the East Fork of the Little Sandy River, Boyd County, Kentucky. A mussel pointing directly upstream was assigned an angle of zero and one pointing downstream, an angle of 180°. The angular frequency distribution was fit to a Poisson distribution as a test for randomness. Mussels were randomly oriented at only one location. The other locations and the combined data exhibited a clumped distribution. In addition, six morphometric characters were examined for their relationship to the angle of orientation using a cluster correlation analysis. Sex and obesity were positively correlated with the angle of orientation. Females tended to orient themselves in the downstream direction. Males preferred to siphon upstream.

AN ANALYSIS OF NAIAD CHROMOSOMAL MORPHOLOGY (BIVALVIA: UNIONACEA). John J. Jenkinson, Ohio

State University and Tennessee Valley Authority, Knoxville, Tennessee.

In 1977, Jenkinson (*AMU Bulletin* for 1976:16–17) reported a diploid chromosome number of 38 for 15 North American naiad species. That research eventually included five or more counts from 41 North American naiad species, all of which had 38 as the modal diploid chromosome number. In addition, 26 other species-level taxa were represented by between one and four counted chromosome spreads, again with 38 the apparent diploid number. The constant 38 diploid number in North American species is identical to published reports for three European unionids (Van Griethuysen, Kiavta, and Butot. 1969. *Basteria* 33:51–56) and one Japanese margaritiferiid and two Japanese unionids [Nadamitsu and Kanai. *Bulletin of the Hiroshima Women's University* (1975) 10:1–3; (1978) 1–5.] but different from the 34 diploid number reported for three Australian hybrids (McMichael and Hiscock. 1958. *Australian Journal of Marine and Freshwater Research* 9:372–503).

Analysis of the comparison of arm ratios and percent total complement lengths of 79 measured chromosome spreads from 33 species produced a suggested overall mean karyotype, possible mean karyotypes for six previously-proposed suprageneric groups, and indications of relationships among the groups based solely on the chromosomal measurement data. While extensions of the results should be considered preliminary because of the small number of measured spreads for some groups, these data indicate that North American naiad fauna consist of a single evolutionary group, quite different from the polyphyletic arrangement proposed by Modell (1942. *Archiv fur Molluskenkunde* 74:161–191). The chromosomal relationships are most similar to the classification proposed by Ortmann (1912. Annals of the Carnegie Museum 8:222–365) and only slightly different from the classification proposed by Davis and Fuller (1981. *Malacologia* 20:217–253).

ONTOGENY OF THE LARVAL FOOT OF *CORBICULA FLUMINEA* (BIVALVIA: CORBICULIDAE). Louise Russert Kraemer, Department of Zoology, University of Arkansas, Fayetteville.

Dissemination of *Corbicula fluminea* (Müller), the Asian Clam, has been so rapid through the river systems of the U.S. in the past two decades that malacologists must confront the question, how? In this regard, locomotion of the larval stages and the free-living juveniles merits focused study. In the present investigation, microscopic serial sections, SEM, fresh-tissue dissection and microscopic videotaping were used. It was found that *C. fluminea* develops a characteristic, barrel-shaped trochophore larva, replete with apical tuft, which is retained within the marsupial gill. The longitudinal axis of the body rotates 90° as a pediveliger develops from the trochophore, and the foot anlage appears near the region of the apical tuft. Pediveligers typically are retained in the marsupial gills, where they develop into juveniles about 200 micrometers long. The juveniles exhibit clearly differentiated statocysts and a conspicuous sock-shaped foot that is very active in the substratum or in the water column. Sinuses of the juvenile foot are not well developed, and there is no "Hakenform," "Grabstritt," or "Schwellform" behavior, such as one sees in the adult clam. In contrast, the foot engages in vigorous, rapid maneuvers, comprised of extension, "hunching" (of the animal forward onto its extended foot), extension, etc. Alternatively, the comparatively large juvenile foot is quickly withdrawn completely within the shell valves. SEM examination of the foot revealed that it has a peculiar structure, comprised of a longitudinal series of membranous rings about 2 μm wide, which are joined to each other by loose connective tissue. It is quite evidently the "segmenting" rings of tissue that allow the rapid extension and telescoping withdrawal of the juvenile foot. This study indicates that there is structural basis for the distinctive form of pedal locomotion in the juvenile *C. fluminea*, a basis vastly different from that of the adult clam.

INDUCTION OF COLOR FORMS IN *CORBICULA*. Robert S. Prezant and Kashane Chalermwat, University of Southern Mississippi, Hattiesburg.

"White" forms of *Corbicula fluminea*, from Tallahala Creek, Mississippi, were maintained in the laboratory under four different environmental regimes. Specimens were kept for three months in aquaria at either 23°C or 31°C with or without the introduction of a mixed agal/protozoan supplement. Clams maintained at 31°C with a high organic content in surrounding waters produced internal shells with a pure white coloration. Microstructurally these white internal shells were composed of crossed acicular structure. All other regimes tested produced clams with purple highlighted internal shell colorations and "normal" crossed lamellar structures.

Lethargic, unhealthy or dying clams all showed a glossy white color and acicular microstructure. Empty valves collected from creek banks also show a crossed acicular microstructure but are dull white in internal coloration. Active, healthy clams maintain a purple highlighted internal shell color and typical corbiculacean internal shell microstructure. These results are of importance since recent reports of a purple and white morph are thought to have taxonomic value. It is unlikely that color or other morphometric features will prove to be of any systematic value in the determination of North American species of *Corbicula*. Many of the reported morphometric distinctions between or among populations of *Corbicula* in North America may be reflections of microhabitats.

DOES AMBIENT OXYGEN TENSION LIMIT THE DISTRIBUTIONS OF FRESHWATER SNAILS? Robert W. Hanley, The University of Alabama, Tuscaloosa.

This study examines the relationship between ambient oxygen tension (P_{O_2}) and metabolic rate (V_{O_2}) in freshwater snails, in order to determine whether some species are unable to exploit various habitats due to their metabolic response to declining oxygen tension. Laboratory and field data have been collected on eleven species of freshwater snails, from both lotic and lentic habitats with

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