STERKIANA

NOS. 69-70 COLUMBUS, OHIO MARCH, 1978

CONTENTS PAGE

GASTROPODS OF TAYLOR COUNTY, TEXAS

CLARK W. BEASLEY
McMurry College, Abilene, Texas

AND

RICHARD W. FULLINGTON
Dallas Museum of Natural History, Dallas, Texas

ABSTRACT

Twenty-nine land and freshwater gastropod species are now recorded for Taylor County, Texas. This relatively small number is somewhat surprising for a Texas county that should potentially harbor a much larger molluscan fauna.

Taylor County, situated in West Central Texas, is largely overlain by Permian sands while isolated Cretaceous (Comanche Series) limestone bluffs extend across the southern portion. The Permian plains consist of red soils which are easily eroded. The undulating surface is broken by intermittent streams. The vegetation is primarily mesquite-grassland. The Callahan Divide, as the Cretaceous eroded plateaus are called, is the northern edge of the Edwards Plateau and has a dominant vegetation of juniper-oak savanna. In the Callahan Divide small springs feed into some of the streams. Hydrologically, the county is drained by two major river systems. Drainage of the northern half flows to the Brazos River, while tributaries to the Colorado River drain the southern half of the county.

The average rainfall for Taylor County is approximately 23 inches, with the heaviest precipitation in the spring. The mean annual temperature is 63° F, with the summers often exceeding 100° F and the winters occasionally dropping below 0°F. The entire area appears to be undergoing a gradual drying trend from more temperate Pleistocene conditions (Wisconsin age). Although favorable molluscan habitats such as mesic limestone hillsides and riparian environs persist, they are not common and are being threatened by housing developments. Conditions may be more unfavorable than suspected as evidenced by *Helicina orbiculata* occurring only as a fossil in Taylor County while it is living in counties just to the east and southeast. Whether or not the county was invaded during cooler periods by Rocky Mountain faunal elements (i. e., *Discus cronkhitei*) is presently unknown due to our lack of knowledge of the county's fossil fauna. It may also be noted that the majority of the listed species either have a generalized distribution in North America or are species representative of semi-arid regions.

Judging from literature records for the county, previous collecting has been, at best, sporadic. Pilsbry (1944) recorded 15 species from drift debris taken from Elm Creek with three other species identified to genus only. His later works (Pilsbry, 1946, 1948) give no indication that these three taxa were ever specifically identified. Other literature records include Pratt (1965), Cheatum, Fullington, and Pratt (1972), and Fullington and Pratt (1974).

The following is a list of all species known to occur in Taylor County based on literature records and from personal collecting. Pilsbry's (1944) species are included, although as drift specimens, the origin is uncertain. Personal collections over the past several years have added several new county records. All terrestrial gastropods reported from personal collecting (Source 6) have been collected from near homes and other buildings, their frequency of occurrence seemingly proportional to lawn and garden irrigation.

TERRESTRIAL SPECIES	*SOURCE*
Deroceras reticulatum (Müller, 1771)	6*
Euconulus chersinus trochulus (Reinhardt, 1883)	3
Gastrocopta cristata (Pilsbry & Vanatta, 1900)	3
G. holzingeri (Sterki, 1889)	3, 4
G. pellucida hordeacella (Pilsbry, 1890)	3
G. pentodon (Say, 1821)	3
G. procera procera (Gould, 1840) (as *G. p. mcclungi* and *G. p. sterkiana)*	3
Glyphyalina indentata paucilirata (Morelet, 1851)	6
Hawaiia minuscula (Binney, 1840)	3
Helicina orbiculata (Say, 1818) [as fossil only]	2
Helicodiscus nummus (Vanatta, 1899)	3
Lehmannia valentiana (Férussac, 1823)	6
Limax flavus Linnaeus, 1758	6
Polygyra texasiana texasiana (Moricand, 1833)	1, 5, 6
Pupoides albilabris (C. B. Adams, 1841) (as *P. marginatus* by Pilsbry, 1944)	3, 6
Rhabdotus dealbatus ragsdalei (Pilsbry, 1890)	2
Rumina decollata (Linnaeus, 1758)	6
Strobilops texasiana (Pilsbry & Ferriss, 1906)	2
Vallonia perspectiva Sterki, 1892	3
Vallonia sp.	3
Vertigo ovata Say, 1822	3
Zonitoides arboreus (Say, 1816)	3
AQUATIC SPECIES	
Lymnaea humilis (Say, 1822)	6
Lymnaea sp.	3
Physa virgata (Gould, 1855)	6

* Source numbers, listed next page.

AQUATIC SPECIES (CONT.)	*SOURCE*
Physa sp.	3
Helisoma anceps (Menke, 1830)	3
Planorbella trivolvis lentum (Baker, 1945)	6
Gyraulus parvus (Say, 1817)	3, 6

Source numbers

1. Cheatum, E. P., Fullington, Richard, and Pratt, Lloyd. 1972. Molluscan records from West Texas. -- Sterkiana 46: 6-10.

2. Fullington, Richard W., and Pratt, William Lloyd. Jr. 1974. Part 3: The Helicinidae, Carychiidae, Achatinidae, Bradybaenidae, Bulimulidae, Cionellidae, Haplotrematidae, Helicidae, Oreohelicidae, Spiraxidae, Streptaxidae, Strobilopsidae, Thysanophoridae, Valloniidae in Texas. — Dallas Museum of Natural History, Bull. 1, The Aquatic and Land Mollusca of Texas.

3. Pilsbry, H. A. 1944. Snails from Taylor County, Texas. -- Nautilus 58 (2): 69.

4. ---- (1946) Land Mollusca of North America (North of Mexico). -- Acad. Nat. Sci. Philadelphia, Monogr. 3, v. 2, pt. 1.

5. ---- 1948. *Ibid.*, v. 2, pt. 2.

6. Pratt, W. L., Jr. 1965. Notes on land snail distribution in Texas. -- Nautilus 78: 142-143.

Accepted for publication August 22, 1977

ERRATUM

The editor regrets that the following was omitted from the paper by Leslie Hubricht in Sterkiana 67-68, September 1977:

Stenotrema spinosum (Lea). Tishomingo.

THE MUSSEL FAUNA OF THE CLINCH RIVER, TENNESSEE AND VIRGINIA

John M. Bates* and Sally D. Dennis '

ABSTRACT

Intensive studies of the Clinch River during the years 1972–1975 have documented the persistence of viable mussel populations at several localities within an approximate 35 kilometer reach of the river (Clinch River Miles 189–211). This restricted area represents approximately 7% of the original river habitat which supported mussels.

Of 33 sites intensively sampled, the shoals at Kyles Ford, Tennessee, and Speer's Ferry, Virginia, were the most productive, yielding 33 and 27 species respectively. This does not enumerate subspecies. While this rich fauna closely approximates that recorded by A. E. Ortmann in 1918, the total number of species recorded for the river has significantly decreased. Ortmann's records indicate 57 species; including subspecies this total becomes 71. The authors' records indicate 43 species, 5 of these being post-impoundment invaders of the lower river. Nineteen species thus appear to have been extirpated from the river; this represents one-third of the original species assemblage. It is of especial note that 12 of these extirpated species are of unique Cumberlandian origin; their continued survival in other rivers is tenuous.

The authors express concern for the continued survival of this unique faunal assemblage; adverse environmental impingements pose constant threats. Emphasis must be placed on the preservation of habitats that continue to support these unique mussel assemblages; the Clinch River is certainly one of the most important of these.

****

INTRODUCTION

The Tennessee River drainage above Walden Gorge, defined as the Upper Tennessee River System, historically supported one of the richest freshwater molluscan faunas in the world. Habitat destruction, particularly in the Holston, French Broad, and Powell Rivers, has reduced this once rich fauna to a few scattered populations. Concern for the remaining fauna, particularly those species endemic to the Cumberland Plateau, prompted this study of the Upper Clinch River. The authors have defined the 'Upper Clinch River' as the reaches of this drainage above the direct influence of impoundment. This study thus deals primarily with the mussel fauna of the Clinch River from Clinch River Mile (CRM) 152 to approximately CRM-340. Information has been included in the limited fauna of the downstream impoundments ('Lower Clinch River').

This evaluation of the mussel fauna covers the time period from 1972 to 1975. A total of 33 sites were intensively examined yielding a total of 36 living species of freshwater mussels remaining in the Upper Clinch River. During this study, an attempt was made to examine all existing records for the Clinch River. These records have been incorporated into this report and form a basis for evaluating the magnitude and direction of ecological shift over the past 50 years.

While an invasion by the Asiatic Clam, *Corbicula* cf. *manilensis*, has taken place in the Clinch River within the past few years, that problem is not dealt with in this report. Additionally, data on gastropod distribution are not included here.

ACKNOWLEDGEMENTS

Dr. Henry van der Schalie (The University of Michigan and Ecological Consultants, Inc.) provided invaluable help in conducting field work, providing historical information, taxonomic expertise, and review of this manuscript.

****

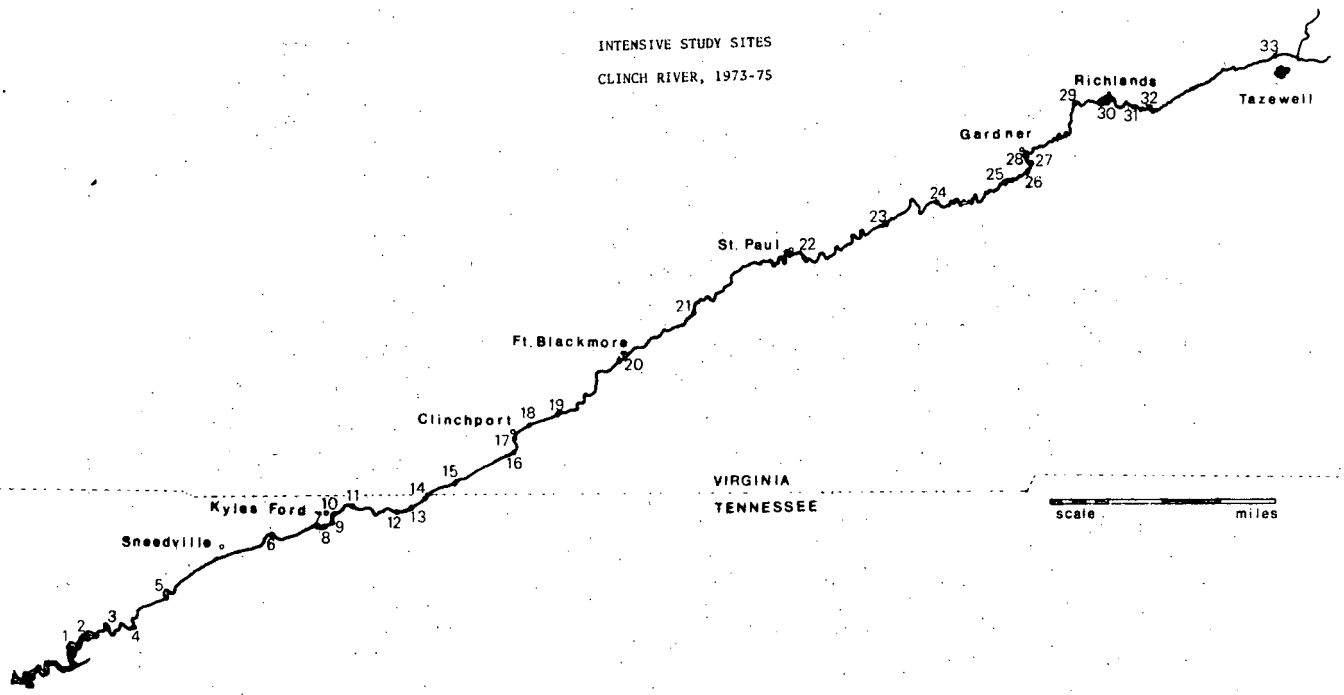
* Ecological Consultants, Inc., 1900 Dexter Avenue, Ann Arbor, Michigan 48103

' Forestry, Fisheries, and Wildlife Development, Tennessee Valley Authority, Norris, TN 37828

FIGURE 1

INTENSIVE STUDY SITES

CLINCH RIVER, 1973-75



Many biological aides in the TVA Fisheries and Waterfowl Branch assisted in the completion of field work. Special thanks for this help in the preparation of tables, maps, and collection of field data are due Steven A. Ahlstedt.

Especial acknowledgement is due Ms. Nancy A. Bates for the final typing and proofing of this paper.

HISTORIC BACKGROUND

The Clinch, with the Powell, French Broad, and Holston Rivers, forms the headwaters of the Tennessee River System. The Clinch River flows through the Valley and Ridge Province of the Appalachian Region, an area characterized by fold mountains with formations of shale and limestone formed during the Paleozoic Era (Hunt, 1974).

This Upper Tennessee River System has developed a very diverse aquatic fauna, especially freshwater mussels. The fauna here contains species endemic to the Cumberland Plateau. This region includes the Clinch, Powell, Holston, Cumberland, French Broad, and Upper Duck Rivers. These Cumberlandian species are indicated on Tables II and V. Within the past 50 years, man's alteration of the environment (i. e. impoundment, pollution, siltation) has resulted in destruction of much of this fauna.

While certain mussel species have adapted to impoundment of the mainstream Tennessee River, the diversity of species within this system has been drastically reduced (Bates, 1962, 1975). The habitat necessary for support of this rich fauna has been reduced to a few isolated locations in the Upper Clinch, Powell, and Duck Rivers. The richest of these remnant populations is located within an approximate 35 kilometer reach of the Clinch River from Speer's Ferry, Virginia, to Kyles Ford, Tennessee.

While there is a general paucity of significant publications dealing with the mussels of this Upper Tennessee River region, there is one excellent account published by A. E. Ortmann in 1918. This work forms the basis for an evaluation of changes in this fauna which have occurred over approximately the past 50 years (Tables I and II). The work of C. C. Adams (1900) on snails of the genus *Io* provides invaluable background information for interpretation of habitat changes within this drainage. The works of Cahn (1936) and Hickman (1936) document the existence of that rich mussel fauna in the Lower Clinch River prior to the construction of Norris Dam. Cahn's records are summarized in Table III. A more recent report by Stansbery (1972) lists species from the Clinch River but, unfortunately, does not provide locality data or indication of live versus dead status of species reported. Other literature has been cited where pertinent.

In making nomenclatural judgments, the authors have relied on the classic work of Ortmann and Walker (1922). The authors feel strongly that the '50 year rule' of zoological nomenclature be adopted by malacologists, and have adhered to this principle in this report.

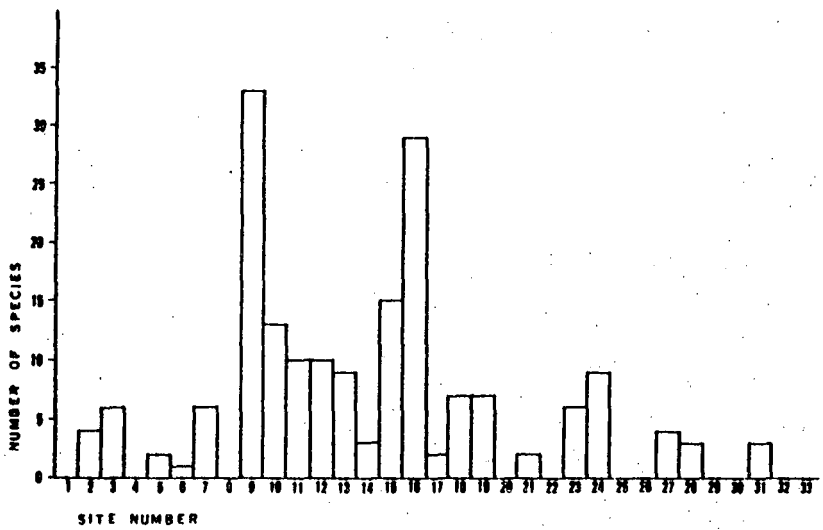
For a detailed history of nomenclatural synony-

TABLE I
MUSSEL RECORDS: CLINCH RIVER, ORTMANN, 1918 (Synonymized Names)

	Tazewell Co., Va.	Cedar Bluff Tazewell Co., Va.	Richland Tazewell Co., Va.	Raven Tazewell Co., Va.	Cleveland Russell Co., Va.	St. Paul Wise Co., Va.	Dungannon Scott Co., Va.	Clinchport Scott Co., Va.	Speer's Ferry Scott Co., Va.	Horton Ford Hancock Co., Tn.	Kyles Ford Hancock Co., Tn.	Sneedville * Hancock Co., Tn.	Lower Clinch **
Present Site No.	33	31	30	29	23	22	21	18	16	12	9	*	**
Margaritanidae													
Cumberlandia monodonta	-	-	-	-	-	-	-	-	-	-	-	-	X
Unioninae													
Amblema costata	-	-	-	-	X	X	X	X	X	-	-	-	X
Cyclonaias tuberculata	-	-	-	-	-	-	-	X	X	X	-	-	X
Elliptio crassidens	-	-	-	-	-	-	-	X	-	-	-	-	X
Elliptio dilatatus	-	X	X	X	X	X	-	X	X	-	X	X	X
Fusconaia barnesiana	X	X	X	X	-	X	-	X	-	-	X	-	X
Fusconaia cuneolus	-	-	-	-	-	-	-	X	X	X	-	-	X
Fusconaia edgariana	-	-	-	-	X	X	-	X	X	-	-	X	X
Fusconaia pilaris	-	X	X	X	X	X	-	X	X	X	X	X	X
Lastena lata	-	-	-	-	X	X	-	X	-	-	-	-	X
Lexingtonia dolabelloides	-	X	X	X	X	X	-	X	-	-	-	-	X
Plethobasus cooperianus	-	-	-	-	-	-	-	-	-	-	-	-	X
Plethobasus cyphyus	-	-	-	-	-	-	-	X	-	-	-	X	X
Pleurobema cordatum	-	-	-	-	X	-	-	X	-	-	-	-	X
Pleurobema oviforme	-	X	X	X	X	X	-	X	X	-	X	-	X
Quadrula cylindrica	-	X	X	X	X	-	-	X	X	-	-	-	X
Quadrula intermedia	-	-	-	-	X	-	-	X	-	-	-	-	-
Quadrula pustulosa	-	-	-	-	-	-	-	-	-	-	-	-	X
Anodontinae													
Alasmidonta marginata	-	-	X	-	X	X	-	X	X	-	-	-	X
Alasmidonta minor	X	X	X	-	X	X	-	-	X	-	-	-	-
Lasmigona costata	-	X	X	X	X	X	-	X	X	X	-	-	X
Lasmigona holstonia	X	X	X	-	-	-	-	-	-	-	-	-	-
Strophitus rugosus	-	X	X	X	X	X	-	-	-	-	-	-	X
Lampsilinae													
Actinonais carinata	-	-	-	-	-	X	-	X	-	X	-	-	X
Actinonais pectorosa	-	-	-	-	X	X	-	X	X	X	-	-	X
Carunculina moesta	-	-	-	-	-	-	-	-	X	-	-	-	-
Conradilla caelata	-	-	-	-	-	X	-	-	-	-	-	-	X
Cyprogenia irrorata	-	-	-	-	-	-	-	-	-	-	-	-	X
Dromus dromas	-	-	-	-	-	-	-	-	-	-	-	-	X
Dysnomia arcaeformis	-	-	-	-	-	-	-	-	-	-	-	-	X
Dysnomia capsaeformis	-	X	-	X	X	X	-	X	X	X	-	-	X
Dysnomia haysiana	-	-	-	X	-	-	-	-	-	-	-	-	X
Dysnomia brevidens	-	-	-	-	-	-	-	X	X	-	-	-	X
Dysnomia lenior	-	-	-	-	-	-	-	-	X	-	-	-	-
Dysnomia propinqua	-	-	-	-	-	-	-	-	-	-	-	-	X
Dysnomia stewardsoni	-	-	-	-	-	-	-	-	-	-	-	-	X
Dysnomia torulosa gubernaculum	-	-	-	-	-	-	X	X	-	-	X	-	X
Dysnomia triquetra	-	-	-	-	-	-	-	X	X	X	-	-	X
Lampsilis fasciola	-	X	X	X	X	X	-	X	-	-	-	-	X
Lampsilis orbiculata	-	-	-	-	-	-	-	-	-	-	-	-	X
Lampsilis ovata	-	X	X	X	X	X	-	X	X	-	-	-	X
Leptodea fragilis	-	-	-	-	-	-	-	-	-	-	-	-	X
Leptodea leptodon	-	-	-	-	-	-	-	-	-	-	-	-	X
Ligumia recta latissima	-	-	-	-	-	X	-	X	-	-	-	-	X
Medionidus conradicus	-	X	X	X	X	X	-	X	X	-	X	-	X
Micromya fabalis	-	-	-	-	X	X	-	-	X	-	-	-	X
Micromya nebulosa	X	X	X	X	X	X	-	X	X	-	-	-	X
Micromya perpurpurea	-	X	X	X	X	X	-	X	X	-	-	-	-
Micromya trabalis	-	-	-	-	-	-	-	-	X	-	-	-	-
Micromya vanuxemensis	-	-	-	-	-	-	-	-	X	-	-	-	X
Obliquaria reflexa	-	-	-	-	-	-	-	-	-	-	-	-	X
Obovaria retusa	-	-	-	-	-	-	-	-	-	-	-	-	X
Plagiola lineolata	-	-	-	-	-	-	-	-	-	-	-	-	X
Proptera alata	-	-	-	-	-	-	-	X	-	-	-	-	X
Ptychobranchus fasciolaris	-	-	-	-	X	X	-	X	X	-	-	-	X
Ptychobranchus subtentum	-	X	X	X	X	X	-	X	-	-	X	X	X
Truncilla truncata	-	-	-	-	-	-	-	-	-	-	-	-	X
Totals	4	17	17	16	24	25	2	32	18	8	7	7	50

Total Number of Species--All Sites: 57
* Not sampled due to lack of suitable habitat.
** Stations now impounded by Norris Reservoir.

Figure II. Numbers of species per site 1973-75



mies, the works of Binney (1863), Call (1898), and Simpson (1900) are recommended. An excellent bibliography of the zoology of the Tennessee Valley Region has been prepared by Shoup (1974).

METHODS AND MATERIALS

Preliminary sampling for mussels in the Clinch River was begun in 1972, with additional sites sampled during 1973, 1974, and 1975. Of the many sites visited, thirty-three were selected for intensive study. When feasible, sampling was done during periods of low flow. Since schedules occasionally dictated sampling under adverse conditions, attempts were made to visit all sites more than once.

Sampling was carried out employing techniques developed and proven effective during earlier investigations by Bates, Dennis, and van der Schalie. Collecting methods included handpicking, raking, use of a Needham Scraper, exployment of SCUBA, and examination of muskrat middens.

Shells collected were cleaned, labeled, and placed in cloth bags for storage. Representative living specimens were relaxed using propylene phenoxytol, fixed in Bouin's Solution or formelin, and stored in 70% ethyl alcohol for future anatomical and histological study. Selected soft parts have been frozen and retained for future chemical analyses. All collections are deposited at the Forestry, Fisheries, and Wildlife Development unit, Tennessee Valley Authority, Norris, Tennessee. Most specimens were returned to the river after identification.

All records are based upon the collection of living and/or freshly dead material unless otherwise noted. 'Freshly dead' is defined as a specimen having the hinge ligament intact, with the nacre exhibiting some luster, indicating that the animal had recently died.

DESCRIPTION OF AREA SAMPLED

The Clinch River is a high gradient stream characterized by a series of shoals and pools from its headwaters near Tazewell, Virginia, to the upper reaches of Norris Lake, a distance of approximately 306 km (190 mi). The substrate consists mainly of rocks and gravel contained between outcrops of bedrock. The flow varies from a minimum of approximately 250 cfs in the fall to a maximum of approximately 35,000 cfs in the winter. Annual temperatures range from 2° to 26° C. (Water Resources Data for Tennessee, U.S. Department of the Interior, Geological Survey). The apparent high turbidity during most of the year (average 20 JTU), produces little deposition of silt in the shoal areas except at times of extreme low flow. Pool areas, however, contain considerable amounts of mud and sand. The uppermost sample site was at Tazewell, Virginia, the lowest in the headwaters of Norris Lake. The term 'shoal' is used to designate an area of shallow water over a uniform substrate, while 'riffle' refers to a shallow area of turbulence characterized by the presence of large rocks or bedrock outcrops. Designation of small, medium and large river faunal assemblages is based on the works of Ortmann, van der Schalie, and personal observation.

RESULTS

Sample sites have been separated into three categories: upper, middle, and lower. Sample sites are numbered consecutively from lowermost station to headwaters. Table IV lists the sites and the map (Figure 1) locates them. The upper sites (17-33) represent an area which has been seriously influenced by pollution. The middle sites (9-16) represent the most productive area of the river. The lower sites (1-8) support mussels, but in less abundance than the middle sites. The distribution data which follow are summarized in Table V.

Upper Sites (17-33)

The headwaters of the Clinch River, from Blackford, Virginia to Tazewell, Virginia (sites 25-33) have been influenced by pollution from many sources including siltation from construction, and wastes from the developed areas of Tazewell, Cedar Bluffs, Richlands, and Raven. Considerable siltation was evident in this stretch of the river when collected, and mussels were few. One live mussel, *Micromya nebulosa*, was found at Cedar Bluff (site 31) with relics of a few additional species. Three species were recorded from Gardners Mill (site 28) and four from below Gardner (site 27). While some relic shells were present, no live or freshly dead mussels were found at any of the remaining six sites (25, 26, 29, 30, 32, 33). This headwater fauna included a total of six species, all of which can be considered small stream forms. These were *Fusconaia barnesiana* and its form *bigsbyensis*, *Lampsilis fasciola*, *Medionidus conradicus*, *Micromya nebulosa*, and *Ptychobranchus fasciolaris*.

Approximately seven miles above Cleveland, at Nash's Ford (site 24), eight species were taken. Midden material was abundant at these sites but live mussels were rare. Several species characteristic of medium sized streams (i. e. *Actinonaias carinata, A. pectorosa, Lampsilis ovata)* increased in abundance with stream size from Cleveland to above Clinchport, Virginia (sites 20-22) where most of the fauna was destroyed as a result of two industrial spills which occurred on June 10, 1967 (fly ash), and June 19, 1970 (acid) at Carbo, Virginia (Cairns, Crossman, *et al.*, 1970, 1971), mussel species not reported. Silt accumulation was noted in this area, and only two mussel species were recorded.

Just above Clinchport, (sites 18, 19), mussels increased in abundance and numbers of species present. These two sites produced a combined total of 13 species. Immediately below Clinchport (site 17), mussels were scarce and only two species were collected.

Middle Sites (9-16)

The highest recorded concentrations of mussels were found in the stretch of river from Speers Ferry, Virginia (site 16) to Kyles Ford, Tennessee (site 9), a distance of approximately 35 kilometers (22 miles).

At Speers Ferry, there is a long shoal area (approximately 200 m), terminating at a riffle area formed by bedrock outcrops. Depth at low water varies from one-third to one meter. Mussels were abundant in numbers and diversity within the shoal area and at the riffle. This is one of the richest mussel habitats in the river, second only to Kyles Ford in population density. Twenty-nine species were taken at this site.

While the area between Speers Ferry and Kyles Ford supports many mussels, no shoal areas were found within this stretch of river (sites 11-15) which supported the abundance of mussels found at sites 9 and 16. The river in this area was generally slow moving and deep, broken by occasional bedrock outcrops and short shoal areas. There were no extensive productive shoals. Most records for these sites are based on freshly dead shell material taken from muskrat middens. Site 11 was a shoal area similar to Speers Ferry. Shells were abundant in middens along the banks but live specimens were scarce.

Site 10 is at State Highway 70 bridge crossing at Kyles Ford, Tennessee. Due to deep water (2-4 m), this site was collected employing SCUBA. The species found here are those characteristic of medium to large river faunas (i. e., *Proptera alata, Amblema costata)*. Characteristic riffle species (i. e., representatives of *Dysnomia* and *Micromya)* were absent from this area.

Site 9, downstream from the bridge at Kyles Ford, is undoubtedly the area of greatest mussel density in this river and probably the entire Tennessee Valley. The river at this station is a series of long shoal areas interspersed with riffles and shallow pools (1-2 m deep). At low water, some bedrock ledges are exposed. Mussels were abundant in the gravel substrate of the shoals and pools, and wedged between rocks along the ledges. Mussel distribution here was limited to the north side of the river, the south bank being characterized by shifting sand and gravel substrate.

Lower Sites (1-8)

Several downstream areas (sites 2, 3, 5, 6, and 7) are similar in appearance to the shoal at Kyles Ford but support only limited numbers of mussels. Mussels found in this stretch of river include species characteristic of medium to large rivers. The most abundant species was *Actinonaias carinata*. Notably absent were representatives of the genera *Dysnomia* and *Micromya*. The lowermost site, at the bridge crossing of U. S. Highway 25E, is in the headwaters of Norris Lake and is influenced by changing lake levels. When sampled the water was slow moving, with a substrate composed mainly of bedrock; only relic shells were found.

DISCUSSION OF SPECIES

Of the numerous mussel species historically recorded from the Clinch River, many no longer occur in the drainage; others have been included in synonymy (Tables II and III). The authors' distribution records are presented in Table V.

TABLE II

MUSSEL RECORDS - ORTMANN, 1918
(Synonyms Indicated)

Margaritanidae		
Cumberlandia monodonta	=	Cumberlandia monodonta
Unionidae		
Unioninae		
Amblema plicata costata	=	Amblema costata
Rotundaria tuberculata	=	Cyclonaias tuberculata
Elliptio niger	=	Elliptio crassidens
Elliptio dilatatus	=	Elliptio dilatatus
*Fusconaia barnesiana Fusconaia barnesiana bigbyensis Fusconaia barnesiana tumescens	=	Fusconaia barnesiana
*Fusconaia cuneolus Fusconaia cuneolus appressa	=	Fusconaia cuneolus
*Fusconaia cor	=	Fusconaia edgariana
*Fusconaia pilaris Fusconaia pilaris bursa-pastoris Fusconaia pilaris lesueriana	=	Fusconaia pilaris
Lastena lata	=	Lastena lata
*Lexingtonia dolabelloides Lexingtonia dolabelloides conradi	=	Lexingtonia dolabelloides
Plethobasus cooperianus	=	Plethobasus cooperianus
Plethobasus cyphyus	=	Plethobasus cyphyus
Pleurobema obliquum Pleurobema obliquum coccineum Pleurobema obliquum cordatum Pleurobema obliquum catillus Pleurobema obliquum rubrum	=	Pleurobema cordatum
*Pleurobema oviforme Pleurobema oviforme argenteum Pleurobema oviforme holstonense	=	Pleurobema oviforme
Quadrula cylindrica Quadrula cylindrica strigillata	=	Quadrula cylindrica
*Quadrula intermedia	=	Quadrula intermedia
Quadrula pustulosa	=	Quadrula pustulosa

TABLE II (cont.)
MUSSEL RECORDS - ORTMANN, 1918
(Synonyms Indicated)

Anodontinae		
Alasmidonta marginata	=	Alasmidonta marginata
Alasmidonta minor	=	Alasmidonta minor
*Lasmigona badia	=	Lasmigona holstonia
Lasmigona costata	=	Lasmigona costata
Strophitus edentulus	=	Strophitus rugosus
Lampsilinae		
Nephronoias ligamentina gibba	=	Actinonaias carinata gibba
*Nephronoias pectorosa	=	Actinonaias pectorosa
Toxolasma lividum	=	Carunculina moesta
*Lemiox rimosus	=	Conradilla caelata
Cyprogenia stegaria	=	Cyprogenia irrorata
*Dromus dromas caperatus	=	Dromus dromas
*Truncilla arcaeformis	=	Dysnomia arcaeformis
*Truncilla capsaeformis	=	Dysnomia capsaeformis
*Truncilla haysiana	=	Dysnomia haysiana
*Truncilla interrupta	=	Dysnomia brevidens
*Truncilla lenior	=	Dysnomia lenior
*Truncilla propinqua	=	Dysnomia propinqua
*Truncilla stewardsoni	=	Dysnomia stewardsoni
*Truncilla torulosa gubernaculum	=	Dysnomia torulosa gubernaculum
Truncilla triquetra	=	Dysnomia triquetra
Lampsilis fasciola	=	Lampsilis fasciola
Lampsilis orbiculata	=	Lampsilis orbiculata
Lampsilis ovata Lampsilis ovata ventricosa	=	Lampsilis ovata
Eurynia recta	=	Ligumia recta latissima
*Medionidus plateolus	=	Medionidus conradicus
Eurynia fabalis	=	Micromya fabalis
*Eurynia nebulosa	=	Micromya nebulosa
*Eurynia perpurpurea	=	Micromya perpurpurea
*Eurynia trabalis	=	Micromya trabalis
*Eurynia vanuxemensis	=	Micromya vanuxemensis
Paraptera fragilis	=	Leptodea fragilis
Paraptera leptodon	=	Leptodea leptodon
Obliquaria reflexa	=	Obliquaria reflexa
Obovaria retusa	=	Obovaria retusa
Plagiola lineolata	=	Plagiola lineolata
Proptera alata	=	Proptera alata
Ellipsaria fasciolaris	=	Ptychobranchus fasciolaris
*Ellipsaria subtenta	=	Ptychobranchus subtentum
Amygdalonias truncata	=	Truncilla truncata

*Cumberlandian Species; forms not designated separately.

Following is a discussion of species recorded from the Clinch River, arranged by genera. Within the treatment of each genus is included a discussion of current taxonomic status and distributional information. For simplicity, species have been arranged alphabetically within each subfamily; this does not follow phylogenetic order used by some authors; however, the authors feel this arrangement will facilitate use of information presented here. A discussion of common names and their use is presented in a later section of this report.

FAMILY MARGARITANIDAE, Ortmann, 1911

Cumberlandia Ortmann 1912

This monotypic genus, represented by *Cumberlandia monodonta* (Say, 1829) was found at several locations in the Clinch River, and was abundant at Kyles Ford, Tennessee (site 9). While this species is generally considered rare, recent records from the Tennessee River and other rivers of the Interior Basin indicate that it continues to be widespread and occasionally locally abundant.

FAMILY UNIONIDAE, Ortmann, 1911

Subfamily UNIONINAE, Ortmann, 1910

Amblema Rafinesque, 1819

Amblema costata Raf., 1820, is a typical Ohioan form which is presently widely distributed through the Tennessee River system. Its present distribution in the Clinch River is from Cleveland, Virginia, downstream to Speers Ferry, Virginia, where it occurs in fair abundance. According to Ortmann's records (1918), it represented an important component of the fauna of the Lower Clinch River prior to impoundment. The authors question the listing of *A. plicata plicata* (Say, 1817) by Stansbery (1972) from the Clinch River. The type locality of *A. plicata* is Lake Erie and the use of *plicata* has been properly restricted to description of the lake form of this species just as *peruviana* should be restricted to use for the greatly inflated large river form (Ortmann and Walker, 1922). The development of characteristic lake forms is well summarized by van der Schalie (1941). Stansbery's records of *A. plicata* should therefore be synonymized with *A. costata*, reported in the present survey.

Cyclonaias Pilsbry, 1922

This monotypic genus is well represented throughout the Tennessee System and is locally abundant at several sites in the Clinch River. All collections cited record this species as *Cyclonaias tuberculata* (Raf., 1820). Ortmann's 1918 listing records this species as *Rotundaria tuberculata* (Raf., 1820); however, the nomenclatural revision of Ortmann and Walker (1922) resulted in the designation of the genus *Cyclonaias* which is the present designation.

Elliptio Rafinesque, 1819

This genus, so abundantly represented in East Coast drainages, is represented in the Tennessee System by two wide ranging species, *Elliptio crassidens* (Lamarck, 1819) and *E. dilatatus* (Raf. 1820). Both of these species remain common and sometimes locally abundant throughout the Interior Basin. *Elliptio dilatatus* is well represented in collections throughout the Clinch River; *E. crassidens* is found at several of the lower stations.

Fusconaia (Simpson, 1900)

The genus *Fusconaia* presents many difficult systematic and taxonomic problems, particularly in attempting to deal with headwater forms. While as many as 20 different taxonomic names could be applied to the *Fusconaias* of the Clinch River, for the purpose of this paper prime importance will be given the identification of major species complexes that remain extant. Discussions of problems with this genus can be found in Simpson (1900, 1914) and Ortmann (1918, 1925), Ortmann and Walker (1922).

Four major species complexes are considered to be indigenous to the Clinch River; two of these clearly remain extant while the others are of uncertain status.

The group of *F. cuneolus* (Lea, 1840) is not represented in the present collections. Three years of intensive collecting have failed to produce specimens that the authors feel clearly belong to this complex. Ortmann (1918) records this form from several localities in the Clinch River; Cahn (1936) records it from below Norris Dam. Cahn's list of species includes *F. tuscumbiensis* (Lea, 1871) which is a Clinch River form of *F. cuneolus* (Ortmann, 1918) and should not be listed as a separate species.

Present collections contain large numbers of individuals representing the *F. barnesiana* (Lea, 1838) complex and substantiates the continued existence of both the typical *barnesiana* and *bigbyensis* (Lea, 1841) forms of this species.

The complex characterized by *Fusconaia edgariana* (Lea, 1840), is well represented in present collections. The authors have included in this designation *F. cor* (Conrad, 1834) and *F. cor analoga* (Ortmann, 1918).

The complex of *F. subrotunda* (Lea, *1831)* presents some difficulty. The specific name *F. pilaris* (Lea, 1840) has been used to describe the Upper Tennessee drainage analog of the typical Ohio River *F. subrotunda*. Additionally the subspecific names *lesueuriana* (Lea, 1840) and *bursa-pastoris* (Wright, 1896) have been added to *F. pilaris*. The rather indiscriminate use of various combinations of these taxonomic designations has only led to confusion. Records of Ortmann and Cahn indicate the early existence of *F. pilaris* forms in the Clinch River; the authors' collections indicate no recent records.

Fusconaia edgariana, *F. barnesiana*, and *F. bar-*

nesiana bigbyensis clearly remain viable members of the mussel fauna of a portion of the Clinch River; continued existence of other forms of *Fusconaia* is questionable.

Lastena Rafinesque, 1820

This rare monotypic species *Lastena lata* (Raf. 1820) was taken from three sites (3, 9, 16) during the course of this study. This species was reported as rare by Ortmann (1918) and indeed remains very rare at the present time. It appears that the only recent live records of this species are those reported here from the Clinch River.

Lexingtonia Ortmann, 1914

Extensive collecting of the Clinch River has failed to produce any specimen which can be definitely assigned to this genus. Ortmann (1918) records *Lexingtonia dolabelloides* (Lea, 1840) from the Lower Clinch River 'up to Agee, Campbell Co. where it intergrades with *conradi*.' This area of the Clinch River has been inundated by Norris Lake and no longer supports mussel populations.

Collections taken from the Upper Clinch contain many individuals that in shell morphology approach *L. dolabelloides conradi* (Vanatta, 1915). The authors are hesitant to assign these specimens to this taxon without adequate soft parts for study; it must be borne in mind that when Ortmann erected the genus *Lexingtonia* he did so on the basis of his studies of soft-part morphology and particularly on morphology of the marsupium and placentae. Gravid material is thus necessary for definite generic determination. Ortmann and others clearly recognized the close systematic affinities between *Lexingtonia* and the group of *Pleurobema oviforme*.

Specimens in recent collections which approach the *conradi* form of *Lexingtonia* have been tentatively assigned to the group of *P. oviforme*.

Plethobasus Simpson, 1900

This genus is presently represented in the Clinch River by *Plethobasus cyphyus* (Raf., 1820); it is present in recent collections from sites 9 and 16. This species remains widespread throughout the Interior Basin.

The form of *P. cyphyus compertus* (Frierson, 1911) has been described from the Clinch and Holston Rivers which represent the probable type locality for this form. The authors have not attempted to separate this form from *P. cyphyus*.

While Ortmann (1918) lists *P. cooperianus* (Lea, 1834) from the Lower Clinch River, there is no recent evidence for considering this species as a member of the Clinch River assemblage. While this species has been occasionally taken by Bates and Isom from locations in the Lower Tennessee River, it is undoubtedly a species of rare occurrence.

Pleurobema Rafinesque, 1818

The authors recognize two species complexes representing this genus in the Clinch River, that of *Pleurobema cordatum* (Raf., 1820) and *P. oviforme* (Conrad, 1834). Both are represented in present collections but must be considered rare in the Clinch River.

Ortmann (1918) summarized the problems relating to the *P. cordatum (obliquum)* comp'ex as follows:

> 'This consists of a group of forms very variable in shape, which has been divided into a number of 'species.' In the Upper Tennessee region several of the latter are found, but they all intergrade with each other, and there is very little indication of their separation into geographical or ecological races. Mostly, the various forms are found associated, so that they are hardly more than individual variations.'

The group of *P. cordatum* is taken to include several forms associated with the complex of *P. obliquum* (Lamarck, 1819) including for the Clinch River: *P. coccineum* (Conrad, 1836), *P. pyramidatum* (Lea, 1831), *P. plenum* (Lea, 1840), *P. catillus* (Conrad, 1836), and *P. rubrum* (Raf., 1820). Specimens which were collected during this survey could be ascribed to all of the above mentioned forms. Ortmann (1918) records *P. cordatum, coccineum, catillus,* and *rubrum,* while Cahn (1936) records *P. cordatum, pyramidatum,* and *plenum,* and Stansbery (1972) records *P. coccineum, pyramidatum,* and *plenum*. For the present the authors feel it is sufficient to indicate that this complex remains extant in the middle section of the Clinch River.

The species complex of *Pleurobema oviforme* is represented only in collections from Speers Ferry, Virginia. While the forms *P. clinchensis* (Lea, 1867), *P. raveneliarus* (Lea, 1834), and *P. holstonense* (Lea, 1840) have been described from the Clinch River, no attempt has been made to separate these forms from *P. oviforme s. s.* Ortmann (1918) found *P. oviforme* widely distributed in the Clinch (see Table II) thus indicating considerable restriction in its range and concern for its continued existence. This species complex probably represents a southern analog of the *P. clava* group of the Upper Ohio drainage.

Quadrula Rafinesque, 1820

Present collections indicate the continued existence of *Quadrula cylindrica* (Say, 1817) and *Q. pustulosa* (Lea, 1831) in the Clinch River.

Q. pustulosa was taken from Kyles Ford and Horton Ford, Tennessee, and Speers Ferry, Virginia. It remains widespread throughout the Tennessee River System although apparently absent from the Lower Clinch. *Quadrula cylindrica* (Say, 1817) was collected from Kyles Ford and Swing Bridge (site 15); Ortmann's records indicate a wider original distribution. The authors do not recognize *Q. cylindrica*

strigillata (Wright, 1898) as a distinct species but rather as a headwater form of the typical *cylindrica*. Present collections failed to yield recent specimens of *Quadrula intermedia* (Conrad, 1836) in the Clinch River. This species, which is listed as endangered *(Fed. Register*, June 14, 1976), was reported from the Middle and Upper Clinch by Ortmann (1918).

The systematic status of *Q. sparsa* is poorly understood. While it is clear that the *Q. sparsa* of Lea (1841) is in the group of *Q. metanevra* (Simpson, 1914), it also appears to have close affinities with *Q. intermedia* (Ortmann, 1918). The authors favor considering *Q. sparsa* as an ecomorph of *Q. metanevra*. After examination of recent collections from the Cumberland River and headwaters of the Tennessee River the authors have reservations as to the proven systematic affinities of this taxon. While it does not appear to exhibit a clinal relationship with either *Q. metanevra* or *Q. intermedia*, its close affinities with the group of *Q. metanevra* are clear. This form has been taken in recent TVA collections with both *Q. metanevra* (Cumberland River) and *Q. intermedia* (Powell River). As in so many instances, present judgments must be based on the very limited availability of specimens for study. While Cahn (1936) reports this species from the Lower Clinch, Ortmann (1918) does not recognize this form and present collections do not indicate its existence in this river. Stansbery (1972) lists this species from the Clinch River but without documentation. Subsequently (1977) he reports one specimen found in 1963 and states 'repeated efforts since 1963 to obtain evidence of the continued existence of this species in the Clinch River have failed.' The listing of the species as endangered in the Clinch River *(Fed. Reg.*, June 14, 1976) is thus questionable. Recent TVA surveys have revealed only one significant remaining population of this form in the Powell River (Dennis, unpublished, 1976).

SUBFAMILY ANODONTINAE Ortmann, 1910

Alasmidonta Say, 1818

Two species of this genus are reported from the Clinch River by Ortmann (1918), *Alasmidonta minor* (Lea, 1845) and *A. marginata* (Say, 1819). Present collections indicate continued existence of *A. marginata* but complete absence of *A. minor*. *Alasmidonta marginata* remains widespread throughout the Interior Basin; while generally most abundant in small to medium sized streams, it does occur in many large rivers. Efforts to find *A. minor* in the Clinch River above the Tennessee-Virginia border, where it was reported by Ortmann (1918), proved futile. This characteristic small stream form should be considered a species analog of *A. calceolus* (Simpson, 1914) and may continue to exist in some small tributary streams. Stansbery's listing (1972) of *A. viridis* (Raf., 1820) has apparently resulted from synonymizing Ortmann's *A. minor* with *A. viridis*.

Lasmigona Rafinesque, 1831

Historically two species of *Lasmigona* are known from the Clinch River, *L. costata* (Raf., 1820) and *L. holstonia* (Lea, 1838); Ortmann, 1918). Results of this survey would indicate the continued widespread distribution of *L. costata* in the Clinch River; it additionally continues to be common throughout the Interior Basin. Intensive efforts failed to produce a single specimen of *L. holstonia*. Ortmann (1918) reporting this species as *L. badia*, recorded it as widespread throughout small streams in the Tennessee headwaters. Intensive collecting of the North Fork Holston River (Dennis, unpublished, 1976) has failed to produce living specimens of this species. It may still occur in some areas of the Holston River, but no recent records are known. While Stansbery (1972) records this species from the Clinch River, his record does not give specific locality data or indicate if the specimen was living. It is questionable that this species remains extant in this drainage.

Pegias Simpson, 1900

Pegias fabula (Lea, 1836), the type and only species of the genus, was not reported by Ortmann (1918) from the Clinch River and is not represented in present collections. This rare, small stream form has not been taken live in any recent collections known to the authors.

Strophitus (Raf., 1820)

Ortmann (1918) reported *Strophitus edentulus* (Say, 1828) from several localities in the Clinch River (Table II). The authors have chosen to retain the specific taxonomic designation of *S. rugosus* (Swainson, 1822) for the forms of this genus found in the Tennessee River System (as well as the Great Interior Basin). Stansbery (1972) has listed *S. undulatum shefferianus* (Lea, 1852) as a Cumberlandian form from the Clinch River. Present collections produced one freshly dead shell from this river indicating that it is present, but rare. The authors prefer that this form be given the specific name *S. rugosus*.

SUBFAMILY LAMPSILINAE Ortmann, 1910

Actinonaias Fischer and Crosse, 1893

This genus was taken in large numbers from most collecting sites in the Clinch River. *A. carinata* (Barnes, 1823) along with the form *A. carinata gibba* (Simpson, 1900) is presently the most common large species in the Clinch River. This species remains common and widespread throughout the Interior Basin. While in some areas there is gradation between *carinata* and the form *gibba* (*i. e.* Cumberland River), most of the specimens collected in the Clinch appear to be the *gibba* form.

Actinonaias pectorosa (Conrad, 1834); the dis-

TABLE III

MUSSEL RECORDS - A. R. CAHN, 1936

(Synonyms Indicated)

Margaritanidae:		
Margaritana monodonata	=	Cumberlandia monodonta
Unionidae:		
Amblema costata	=	Amblema costata
Cyclonaias tuberculata	=	Cyclonaias tuberculata
Elliptio crassidens	=	Elliptio crassidens
Elliptio dilatatus	=	Elliptio dilatatus
Elliptio dilatatus subgibbosus		
Fusconaia tuscumbensis	=	Fusconaia cuneolus
Fusconaia cuneolus		
Fusconaia edgarianum	=	Fusconaia edgariana
Fusconaia pilaris lesueriana	=	Fusconaia pilaris
Pleurobema cordatum	=	Pleurobema cordatum
Pleurobema cordatum pyramidatum		
Pleurobema plenum		
Quadrula cylindrica	=	Quadrula cylindrica
Quadrula metanevra	=	Quadrula metanevra
Quadrula pustulosa	=	Quadrula pustulosa
Anodontinae:		
Alasmidonta holstonia	=	Alasmidonta holstonia
Alasmidonta marginata	=	Alasmidonta marginata
Lasmigona costata	=	Lasmigona costata
Lampsilinae:		
Actinonaias carinata	=	Actinonaias carinata
Carunculina glans	=	Carunculina moesta
Carunculina parva		
Cyprogenia alberti	=	Cyprogenia irrorata
Cyprogenia irrorata		
Dromus dromas caperatus	=	Dromus dromas
Dysnomia brevidens	=	Dysnomia brevidens
Dysnomia capsaeformis	=	Dysnomia capsaeformis
Dysnomia florentina	=	Dysnomia florentina
Dysnomia haysiana	=	Dysnomia haysiana
Dysnomia triquetra	=	Dysnomia triquetra
Lampsilis fasciola	=	Lampsilis fasciola
Lampsilis orbiculata	=	Lampsilis orbiculata
Lampsilis ovata	=	Lampsilis ovata
Lampsilis ovata ventricosa		
Ligumia recta latissima	=	Ligumia recta latissima
Medionidus conradicus	=	Medionidus conradicus
Ligumia iris	=	Micromya nebulosa
Micromya nebulosa		
Obliquaria reflexa	=	Obliquaria reflexa
Proptera alata megoptera	=	Proptera alata
Ptychobranchus phaseolus	=	Ptychobranchus fasciolaris
Truncilla truncata	=	Truncilla truncata

tinctive Cumberlandian representative of this genus, remains as a common member of the Clinch faunal assemblage. As with all Cumberlandian species, its range has in recent years been progressively restricted.

Carunculina Baker, 1898

No living specimens representing this genus were taken during this survey. Ortmann (1918) records *Carunculina (Toxolasma) lividum* (Raf., 1831) from the Clinch River. As later pointed out by Ortmann and Walker (1922) the type of this species from the Rock Castle River, Kentucky, is not recognizable and should be discarded in favor of *C. moesta* (Lea, 1841). Further, Ortmann and Walker point out that the generic name *Toxolasma* must also be discarded.

Examination of material collected by Bates, Isom, Gooch, and Neill clearly establishes the scattered but often locally abundant distribution of *C. moesta* and *C. parva* (Barnes, 1823) within the main stem Tennessee system. *Carunculina parva* as reported by Bates (1962) has become a locally important member of the post-impoundment overbanks molluscan assemblage (see also Bates, 1975).

The Interior Basin analog of *C. moesta*, *C. glans* (Lea, 1841), has not been taken in its typical form from the Tennessee River system. Its occurrence in the lower stretches of the Tennessee would, however, not be surprising. The exact systematic relationship of *C. glans* and *C. moesta* is not presently clear and needs further critical investigation.

One easily could mistake small specimens of *Micromya (Villosa) vanuxemensis* (Lea, 1838) for *C. moesta* or possibly *C. glans* (see Ortmann and Walker, 1922). This would be particularly true if one did not have female soft parts available for study, since the occurrence of caruncles on the inner mantle margins of the female is perhaps the most distinctive characteristic of the genus.

Conradilla Ortmann, 1921

Conradilla caelata (Conrad, 1834), the species monotype of this genus, is presently rare in the Clinch River. Collecting efforts yielded only one freshly dead shell from Kyles Ford.

This species which historically had a fairly wide distribution within the Tennessee-Cumberland system now appears to be severely restricted in its distribution; one location in the Duck River, limited numbers in the Powell River, and possibly a few individuals in the Clinch River. It is undoubtedly deserving of its endangered status.

The generic designation *Lemiox* has recently been resurrected for this monotypic genus (Burch, 1975). Ortmann and Walker (1922), with Henry A. Pilsbry as arbitrator, resolved the *Unio (Lemiox) rimosus* (Raf., 1831) - *U. caelata* (Conrad, 1834) controversy. In that *U. rimosus* was deemed 'not identifiable' the specific name *rimosus* was discarded and with it the generic designation *Lemiox*. The authors thus accept *Conradilla caelata* (Conrad, 1834) as the only proper designation for this taxon.

Cyprogenia Agassiz, 1852

This genus is presently represented in the Clinch River by *C. irrorata* (Lea, 1828). Ortmann (1918) referred to this form as *C. stegaria* (Raf., 1820). Subsequently, Ortmann and Walker (1922) determined the validity of using the specific designation *irrorata* and thus the present name stands. All collections cited record this species. Cahn (1936) additionally lists *C. aberti* (Conrad, 1850) from the Lower Clinch. As the distribution of *C. aberti* appears to be restricted to drainages west of the Tennessee River, this identification must be considered in error. It is likely that the specimens in question were *C. irrorata*. While not occurring in large numbers, this species has consistently been present in collections from Speers Ferry, Virginia, and Kyles Ford, Tennessee.

Dromus (Simpson, 1900)

Dromus dromas (Lea, 1834) is represented in the Clinch River by a small population at Kyles Ford, Tennessee; a few fresh shells were additionally taken at site 13. At one time this species was very abundant in the mainstream Tennessee River as evidenced from Indian midden collections (Bates, personal observation; Warren, 1975). The authors presently know of only one other viable population of this species occurring in the Powell River. *Dromus dromas* and the form *D. dromas caperatus* (Lea, 1845) with type locality designated as the Clinch River, must be considered endangered.

Dysnomia Agassiz, 1852

Numerous nomenclatural difficulties have been associated with this genus. Ortmann and Walker (1922) clearly established *Dysnomia* as the proper generic designation, thus exempting the use of *Truncilla* or *Epioblasma*. A recent discussion of the *Dysnomia* versus *Epioblasma* problem has been published by van der Schalie (1973).

This large genus, containing more than twenty-five described species, is known from historic records to have been widespread and well represented throughout the Tennessee River System. Since many species of this genus are characteristic of shallow water, riffle habitats, destruction of these habitats has resulted in extinction of some members of this genus. Species recorded by Ortmann (1918) which the authors now believe may be extinct include: *D. arcaeformis* (Lea, 1831), *D. haysiana* (Lea, 1834), *D. lenior* (Lea, 1843), *D. propinqua* (Lea, 1857), and *D. stewardsoni* (Lea, 1852). Thus, five of the nine species recorded by Ortmann from the Clinch River have probably been extirpated from this drainage.

Present collections indicate the continued sur-

TABLE IV

SAMPLE SITES - CLINCH RIVER
1972 - 1975

Site Number	Description	
1	U.S. Highway 25E Bridge	CRM 152.0
2	Below Grissom Island	CRM 154.2
3	Above Grissom Island	CRM 160.0
4	At Big War Creek	CRM 164.4
5	Lawson Mill	CRM 170.6
6	Brooks Island, lower end	CRM 183.0
7	Webb Island, lower end	CRM 187.3
8	Above Webb Island	CRM 188.0
9	Kyles Ford, above Tenn. St. Hwy. 70 bridge	CRM 189.5
10	Kyles Ford, under Tenn. St. Hwy. 70 bridge	CRM 189.8
11	Island at Wallens Bend	CRM 192.6
12	Horton Ford	CRM 199.0
13	Above Horton Ford	CRM 200.2
14	New bridge near Tenn.-Va. State Line	CRM 201.8
15	At Spring House	CRM 205.0
16	Speer's Ferry, Virginia	CRM 211.8
17	Below Clinchport, Virginia	CRM 212.9
18	Above Clinchport, Virginia	CRM 214.0
19	Swing Bridge above Clinchport	CRM 216.3
20	Fort Blackmore, Virginia	CRM 227.3
21	Dungannon, Virginia	CRM 236.8
22	Above St. Paul, Virginia	CRM 256.0
23	Cleveland, Virginia	CRM 271.6
24	Nash Ford	CRM 279.5
25	Blackford, at Virginia State Hwy. 80	CRM 296.0*
26	Below Little River	CRM 298.0
27	Ford below Gardner (Hale Hollow)	CRM 302.0
28	Gardner Mill	CRM 303.0
29	Above Raven, Virginia	CRM 315.0
30	Richlands, Virginia	CRM 317.0
31	Ford below Cedar Bluff	CRM 319.0
32	Above Cedar Bluff at old mill	CRM 320.0
33	North Tazewell, off Va. State Hwy. 61	CRM 340.0

*Mile points have been approximated from United States Geological Survey Topographic maps. Sites #25-33.

vival of four species of *Dysnomia* in the Clinch River: *D. brevidens* (Lea, 1831), D. *capsaeformis* (Lea, 1834), *D. torulosa gubernaculum* (Reeves, 1865), and *D. triquetra* (Raf., 1820).

Two of these species *(D. capsaeformis* and *D. brevidens)* occur in fair abundance at several localities. *Dysnomia triquetra* is of occasional occurrence while *D. torulosa gubernaculum* is very rare in the Clinch River.

Stansbery (1972) lists as a new record from the Clinch River *Epioblasma (=Dysnomia) walkeri* (Wilson and Clark, 1914). In a recent report prepared for U. S. Department of Interior, Fish and Wildlife Service, Stansbery (1977) duscusses the status of this species as an endangered mollusk. He states:

> 'A check of the distribution map reveals evidence of populations in the Clinch, Middle Fork Holston, and Duck Rivers of the Tennessee system and in the Red and Stones Rivers in the Cumberland System. The Clinch River record is based, however, upon a single valve taken in 1965, and all efforts to find additional evidence in this river have failed.'

Based on this documentation the authors do not consider *D. walkeri* a part of the Clinch River fauna.

Lampsilis Rafinesque, 1820

Present collections from the Clinch River produced two species representing this genus: *Lampsilis ovata* (Say, 1817) and *L. fasciola* (Raf., 1820).

Lampsilis fasciola is clearly recognizable, presenting no taxonomic difficulty. *L. ovata* has been described by Ortmann (1918) as intergrading in the extreme headwaters with the form *L. ovata ventricosa* (Barnes, 1823). While present collections indicate considerable variability in this species all specimens have been designated *L. ovata.* This group of the genus *Lampsilis* exhibits pronounced clinal variation. A detailed discussion of this problem is presented by Ortmann (1913, 1920) and Cvancara (1963). Both *L. ovata* and *L. fasciola* were found to be widely distributed and well represented in present collections.

The endangered species *L. orbiculata (Fed. Reg.,* 1976) has been reported from the Lower Clinch River by Ortmann (1918), and Cahn (1936). The authors found no evidence of this species occurring in the Clinch River above the Norris impoundment and therefore have not included it as a part of the Clinch River fauna.

Leptodea Rafinesque, 1820

Two members of this genus are reported from the Clinch River by Ortmann (1918), *L. leptodon* (Raf., 1820) and *L. fragilis* (Raf., 1820). This genus was previously designated *Paraptera* (Ortmann, 1911) but subsequently revised (Ortmann and Walker, 1922) to *Leptodea.*

Leptodea leptodon was not collected during the present investigation; the authors have no knowledge of any recent collection of this species. Reported by Ortmann as 'rare,' this species may be close to extinction.

Leptodea fragilis was collected from three sites (9, 10, 16) during the present study. While this species remains common throughout most of the mainstem Tennessee River, it is a rare component of the Clinch River fauna.

Ligumia Swainson, 1840

This genus is well represented in present collections by a single wide-ranging form *Ligumia recta latissima* (Raf., 1820). It is common at Speers Ferry and Kyles Ford.

The authors have adhered to the decision of Ortmann and Walker (1922) to reserve *Ligumia recta* (Lamarck, 1819) for designation of the main species, with the type locality Lake Erie, and retain *latissima* for the typical river form found throughout the Interior Basin (van der Schalie, 1941).

Medionidus Simpson, 1900

The single Cumberlandian representative of this genus *Medionidus conradicus* (Lea, 1834), is well represented in present collections from the Clinch River. While the authors have noted this species in recent collections from the Duck, Powell, and North Fork Holston Rivers, it is apparent that a marked restriction of its past range has occurred and thus its future must be deemed tenuous.

Micromya Agassiz, 1852

For present listings, the authors have retained the generic designation *Micromya* for this extremely confusing group of Lampsilinae. Recognition of *Villosa* as the generic designation (Stansbery, 1972; Burch, 1975) is based on acceptance of Frierson's work (1927). Ortmann (1918) treats this group as a subgenus of *Eurynia;* until this group is definitively monographed, the authors prefer to accept the '50 year rule' and retain *Micromya.*

Ortmann (1918) records five species representing this group from the Clinch River (Table II), two of which he described as rare, *M. fabalis* (Lea, 1831) and *M. trabalis* (Conrad, 1834). Neither of these species are represented in present collections.

The authors presently recognize two species complexes of this group from the Clinch River, *M. nebulosa* (Conrad, 1834) and *M. vanuxemensis* (Lea, 1838). While *M. vanuxemensis* appears to be quite distinctive, *M. nebulosa* exhibits extreme variability and may actually represent several species. Present collections of *M. nebulosa* include forms exhibiting a broad spectrum of morphological variation. All of these variants have been grouped under the designation *M. nebulosa.* This taxon exhibits close systematic affinities with *M. iris* (Lea, 1830), and may be the southern analog of this

form. This group clearly needs further critical systematic study.

Obliquaria Rafinesque, 1820

Obliquaria reflexa Raf., 1820, the type of this genus, is not presently known from the Clinch River above Norris Dam. This is a typical large river form, presently common in the Tennessee River and other rivers of the Interior Basin. In the Lower Clinch River it has adapted to conditions of impoundment and colonized overbank areas (Bates, 1975).

Obovaria Rafinesque, 1819

Present collections have yielded no specimens belonging to this genus. Ortmann (1918) reports taking 'a young specimen' of *Obovaria retusa* (Lamarck, 1819) from the Clinch River at Clinton, Anderson County, Tennessee. It would appear that this genus is no longer represented as part of the Clinch River fauna.

Plagiola Rafinesque, 1820

The single species in this genus, *Plagiola lineolata* (Raf., 1820) is a typical large river form, not presently a part of the Clinch River fauna. Ortmann's records (1918) are from downstream areas now inundated.

Proptera Rafinesque, 1819

Proptera alata (Say, 1817), the common widespread representative of this genus, is presently common at several stations on the Clinch River. This species appears to have adapted well to impoundment; it has become a common member of the overbank fauna of the Tennessee River (Bates, 1975) and might be expected to colonize impounded portions of the Clinch River.

Ptychobranchus Simpson, 1900

Present collections indicate the continued existence of both *P. fasciolaris* (Raf., 1820) and *P. subtentum* (Say, 1825) in the Clinch River. *Ptychobranchus fasciolaris* is wide ranging and of common occurrence throughout the Interior Basin. *Ptychobranchus subtentum* is a Cumberlandian form presently restricted in its distribution to the Clinch, Powell, and North Fork Holston Rivers while locally it is sometimes abundant, its previous range has been significantly reduced.

Truncilla Rafinesque, 1819

Present records indicate occasional occurrences of the single species *T. truncata* (Raf., 1820) throughout the middle section of the Clinch River. This species remains widespread throughout the Interior Basin.

DISCUSSION

During this investigation the authors attempted to clarify issues surrounding the present status of the unique naiad fauna of the Clinch River; this report is not intended as a monographic treatment. All recent distribution records reported are represented by material retained in the collections of the Division of Forestry, Fisheries and Wildlife Development, Tennessee Valley Authority, Norris, Tennessee. Representative anatomical material was preserved for future study. During field studies, every effort was made to minimize disturbance of habitats; most specimens were immediately returned to their substrate following data recording. Particular attention was given the immediate replacement of rare forms.

Field and laboratory observation of individuals taken from those yet productive areas would indicate no evidence of extreme stress at the time of this study; age-size class structure, sex ratios, reproductive activity, presence of crystalline style, level of parasitism would all indicate a healthy, viable fauna. Adverse environmental impingement, however, remains a very real threat to the continued existence of this fauna.

Several areas of concern are demanding of further elucidation and thus the following considerations.

NOMENCLATURE

A nomenclatural 'Tower of Babel' has long plagued malacologists; not an exclusive problem. Specific and generic names have been changed so often and generally so indiscriminately that the uninitiated often have difficulty in interpreting current species lists. While this faunistic analysis is not the appropriate place to address all of the current problems in naiad nomenclature, the issues must be recognized. Facetiously one might suggest a specialized course in the 'Art of Taxonomic Vacillation' for success in malacology today. The excellent, succinct papers of Cole (1941, 1941a) and van der Schalie (1952) are apparently unknown to or simply ignored by many current workers. Isom (1973) again raised these questions, with similar lack of apparent impact. As stated earlier in this report, the authors have advocated adherence to the '50 year rule' and have done so in this paper.

Federal enactment of the Endangered Species Act of 1973 has unfortunately given fuel to what should have been a nomenclatural funeral pyre. This mandate to designate species and/or forms as threatened or endangered *with listing of common names* has directly produced the present 'circus atmosphere' in molluscan taxonomy. Common names have been apparently capriciously generated and published in the *Federal Register*. The use of common names is not to be abhorred; however, one must recognize that the vernacular names applied to many species are: (1) in many instances unprintable, except perhaps in modern pornographic periodicals, (2) regional in

TABLE V - MUSSEL SPECIES DISTRIBUTION: CLINCH RIVER, 1973-1975

Species	Site Number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Margaritanidae															
Cumberlandia monodonta	-	-	-	-	-	-	-	-	X	-	-	-	X	-	-
Unioninae															
Amblema costata	-	-	-	-	-	-	-	-	X	X	-	-	-	X	-
Cyclonaias tuberculata	-	-	-	-	X	-	-	-	X	X	-	-	-	-	-
Elliptio crassidens	-	-	X	-	-	-	-	-	X	-	X	-	-	-	-
Elliptio dilatatus	-	-	-	-	-	-	-	-	X	-	-	X	X	-	X
* Fusconaia barnesiana **	-	-	-	-	-	-	-	-	X	X	X	X	X	-	X
* Fusconaia b. bigbyensis	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Fusconaia edgariana **	-	-	-	-	-	-	-	-	-	-	-	X	X	-	-
Lastena lata	-	-	X	-	-	-	-	-	X	-	-	-	-	-	-
Plethobasus cyphyus	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Pleurobema cordatum	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
Pleurobema oviforme **	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quadrula cylindrica	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X
Quadrula pustulosa	-	-	-	-	-	-	-	-	X	-	-	X	-	-	-
Anodontinae															
Alasmidonta marginata	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Lasmigona costata	-	-	X	-	-	-	X	-	X	X	-	-	-	-	-
Strophitus rugosus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lampsilinae															
* Actinonaias carinata	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X
* Actinonaias c. gibba	-	X	X	-	X	-	X	-	X	X	X	X	-	-	X
Actinonaias pectorosa **	-	X	X	-	-	-	X	-	X	-	-	X	X	-	X
Cyprogenia irrorata	-	-	-	-	-	-	-	-	X	X	-	-	-	X	-
Conradilla caelata **	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Dromus dromas **	-	-	-	-	-	-	-	-	X	-	-	-	X	-	-
Dysnomia brevidens **	-	-	-	-	-	-	-	-	X	-	-	-	-	-	X
Dysnomia capsaeformis **	-	-	-	-	-	-	-	-	X	-	X	-	X	-	X
Dysmonia torulosa ** gubernaculum	-	-	-	-	-	-	-	-	X	-	-	-	-	-	-
Dysnomia triquetra	-	-	-	-	-	-	-	-	X	-	-	-	X	-	-
Lampsilis fasciola	-	-	-	-	-	-	-	-	X	-	X	X	-	-	-
Lampsilis ovata	-	-	-	-	-	-	X	-	X	X	-	-	-	-	X
Legumia recta latissima	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
Leptodea fragilis	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
Medionidus conradicus **	-	X	-	-	-	-	X	-	X	-	X	X	-	X	X
Micromya (Villosa) ** nebulosa	-	-	-	-	-	-	-	-	X	-	X	-	-	-	-
Micromya vanuxemensis **	-	-	-	-	-	-	-	-	X	-	X	-	-	-	X
Proptera alata	-	-	X	-	-	-	-	-	X	X	-	-	-	-	-
Ptychobranchus fasciolaris	-	-	-	-	-	-	-	-	X	X	-	-	-	-	X
Ptychobranchus subtentum **	-	X	-	-	-	-	X	-	X	X	X	X	X	-	X
Truncilla truncata	-	-	-	-	-	X	-	-	X	-	X	X	-	-	X
	4	6			2	1	6		33	13	10	10	9	3	13

* these two forms have been counted as one species. **Cumberlandian species.

TABLE V (cont.) - MUSSEL SPECIES DISTRIBUTION: CLINCH RIVER, 1973-1975

Site Number																	
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
X	X	X	-	-	-	-	-	X	-	-	X	X	-	-	X	-	-
-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	-	-	-
X	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	X	-	-	-	X	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	X	-	X	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	X	-	-	-	-	X	-	-	-	-	-	-	-	-	-
X	-	X	X	-	X	-	X	X	-	-	-	-	-	-	-	-	-
X	-	X	X	-	-	-	X	X	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	X	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	X	-	-	-	-	X	-	-	X	-	-	-	-	-	-
X	-	-	-	-	-	-	-	X	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	X	-	-	-	-	-	X	-	-	-	-	-	-	X	-	-
X	-	-	X	-	-	-	-	-	-	-	X	-	-	-	X	-	-
X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	X	-	-	-	-	-	-	-	-	X	X	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	2	7	7		2		6	8			4	3			3		

application, and (3) multiple, the same species is often known by several designations even within the same geographic area. The common names as reported by Coker (1915) are certainly worthy of consideration but even these have been indiscriminately tampered with in recent listings. Additionally, many of the species discussed in this paper have never had common names. For these reasons, the authors have not attempted to include a listing of common names for the species of the Clinch River. Until such time as an agreed upon list of common names is adopted by some committee of national stature, their employment in *Federal Register* listings must be questioned.

There exists the further problem attendant upon the recognition of subspecies, forms, ecomorphs, and clinomorphs. Every tributary, stream, creek, and ditch may support the recognizable form of a species; is each to be separately treated? When the diagnostic characteristics of a form become so obscure that only the author of the taxon can recognize it, its validity becomes questionable. The credibility of malacology may itself be worthy of endangered listing!

Species presently endangered

The following nine species are presently listed as endangered from the Clinch River *(Federal Register*, June 14, 1976): *Conradilla caelata, Dromus dromas, Dysnomia (=Epioblasma) torulosa gubernaculum, Fusconaia cuneolus, Fusconaia edgariana, Lampsilis orbiculata orbiculata, Pleurobema plenum, Quadrula intermedia,* and *Quadrula sparsa.* The authors believe that only three of these remain extant in viable numbers in the Upper Clinch River, *Dromus dromas, Dysnomia torulosa gubernaculum,* and *Fusconaia edgariana. Conradilla caelata* may possibly continue to exist in very limited numbers and a few specimens of *Fusconaia cuneolus* have been recently taken from the Lower Clinch River. Additional species which have been extirpated from this drainage are discussed in the conclusions. One species, *Lastena lata,* appears to remain only in the Upper Clinch River.

Life History data

Conclusive life history data for the mussel fauna of the Clinch River is lacking! Many fish species, particularly members of the Centrarchidae, have been implicated as potential hosts for the glochidial stage of development. Much of the available information on implicated host fish is based on the early work of the U. S. Bureau of Fisheries; Lefevre and Curtis (1912), Coker *et al.* (1921). Fuller (1974) has compiled available data on fish species implicated as glochidial hosts. These classic experimental studies yielded a great deal of information on potential host relations as established under artificial conditions. Without field verification these data must be considered inferential and not definitive.

Ellis and Ellis (1926) reported obtaining metamorphosis of the glochidial stage of several species in artificial media. The precise techniques employed were, however, never published and the work has never been duplicated. Their work has left investigators with at least some doubt as to the facultative or obligatory nature of the parasitic stage.

More recent studies by Matteson (1958) and Yokley (1972) leave the same unanswered questions as to applicability of laboratory data to natural systems. Forced exposure of potential hosts to foreign parasites has often led to disastrous ecological consequences. Questions of natural host-parasite relationships and host specificity of mussels with fish remain unanswered.

Lower Clinch River Fauna

The Clinch River from its confluence with Watts Bar Reservoir, Tennessee River upstream to CRM-152, has been defined as the Lower Clinch River in this paper. This stretch of river has been influenced by construction and operation of Melton Hill Dam, CRM-23, Norris Dam, CRM 80, and the backwater effects of Watts Bar Reservoir on the Tennessee River.

The mussel fauna of this area is now apparently reduced to nine species. Five species, *Anodonta corpulenta* (Cooper, 1834), *A. imbecillis* (Say, 1829), *A. suborbiculata* (Say, 1831), *Lasmigona complanata* (Barnes, 1823), and *Leptodea laevissima* (Lea, 1829) are not discussed elsewhere in this paper as prior to the report of Bates (1975) they were not considered members of the Clinch River faunal assemblage. These are characteristic impoundment forms (Bates, 1962) and their occurrence in these downstream impounded areas is not surprising; they do not occur in the river above Norris Dam. *Leptodea fragilis* continues to occur in the Upper Clinch River and historically belonged to this fauna (Ortmann, 1918). *Obliquaria reflexa* was reported by Ortmann (1918) and Cahn (1936) and continues to exist in the river downstream from Norris Dam. These seven species have all become successful members of the overbank fauna of the Lower Clinch River (Bates, 1975).

Two main channel, pre-impoundment species, *Fusconaia cuneolus* and *Lampsilis fasciola* continue to exist in limited numbers in the Lower Clinch River below Norris Dam. Present records for these two species are based on specimens taken by TVA biologists during 1973-1975. *Lampsilis fasciola* is well represented in present collections from the Upper Clinch River but *Fusconaia cuneolus* now is apparently restricted to isolated areas downstream from Norris Dam. Specimens of these two species taken from the Lower Clinch River exhibit extreme age and periostracal erosion indicating tenuous survival. *Fusconaia cuneolus* is presently listed as an endangered species.

This Lower Clinch River, downstream of CRM-152, historically supported the greatest diversity of species known from this drainage. Ortmann (1918) recorded no fewer than fifty species from this area; this contrasts with the forty-two species he reported for the river above areas now impacted by impoundment.

The authors encountered considerable difficulty in attempting to verify the records of Cahn (1936) and Hickman (1936). These authors (Cahn and Hickman) listed essentially the same species for the Clinch River downstream of Norris Dam and thus the one listing by Cahn is here reported (Table III). Since original material from neither of these collections could be located for verification, the

authors felt compelled to take limited license in producing a synonymized species list for the Clinch River immediately downstream of Norris Dam. Certain species reported were clearly out of range and were reduced to known indigenous synonymy. Cahn's list (Table III) after conservative synonymization still indicates no fewer than thirty-four species present in this area. The greatest number of species produced from any one site by Ortmann was thirty-two (Clinchport, Va.); the authors' most productive site (Kyles Ford, Tenn.) yielded the same number. The mussel fauna of the Lower Clinch River has clearly been impacted by development.

Cumberlandian Faunal Elements

Many Cumberlandian species historically associated with the Clinch River Basin have been apparently extirpated. Ortmann's list of 1918 would indicate no fewer than twenty-five species of Cumberlandian origin; inclusion of a minimum of eight recognized forms would raise this total to thirty-three.

The authors can verify the continued existence of thirteen Cumberlandian species in the Upper Clinch River. The continued tenuous existence of *Fusconaia cuneolus* in the Lower Clinch River would raise this total to fourteen. The addition of *Fusconaia barnesiana bigbyensis* to this list would produce a total of recognizable species and forms of fifteen at the present time.

Taxa of Cumberlandian origin which the authors feel have been clearly extirpated from the Clinch River include *Fusconaia pilaris* (and forms), *Quadrula intermedia, Lasmigona holstonia, Dysnomia arcaeformis, D. haysiana, D. lenior, D. propinqua, D. stewardsoni,* and *Micromya (=Villosa) trabalis.*

Many species and forms of Cumberlandian origin are undoubtedly already extinct and others appear to be on the verge of extinction. Further reduction in available habitat and/or adverse environmental impingement could well lead to the eventual total extirpation of these unique species.

Cumberlandian species recorded by Ortmann are indicated on Table II; those believed by the authors to remain extant in the Upper Clinch River are indicated on Table V.

SUMMARY AND CONCLUSIONS

This study made obvious to the authors that an approximately thirty-five kilometer reach of the Upper Clinch River from Speer's Ferry, Virginia, to Kyle's Ford, Tennessee, supports what is probably the most abundant and diverse fresh water mussel fauna remaining in the world. The closest approximation of this unique faunal assemblage occurs in a small section of the Powell River. Historic records clearly indicate that this uniquely rich fauna was once dispersed over most of the Upper Tennessee River System.

The present distribution of mussel species in the Upper Clinch River is graphically presented in the Figure II histogram. It should be apparent that the middle sample sites (9-16) remain the most productive. Upper sites (1-8) and lower sites (17-33) have for many years been subjected to adverse environmental stress. Survival of the fauna at these middle sites is at best tenuous. This short reach of river represents approximately 7% of the original mussel habitat of the Clinch River.

After placing subspecies and forms in synonymy (Table II), Ortmann's records clearly establish a minimal faunal assemblage for the Upper Clinch River of 42 species; present data indicate continued survival of 36. The authors feel this apparent loss of 6 species is extremely conservative. Ortmann's records for the entire Clinch Basin indicate 57 species; including subspecies this total becomes 71. Present records indicate a total of 43 species for the Basin, 7 of these being restricted to the Lower Clinch River. Of these 7 species, 5 have invaded following impoundment. Thus the original Clinch River mussel fauna representing 57 species has been reduced to 38. A total of 19 native species have thus apparently been extirpated from the Clinch River Basin; if subspecies and forms were included in this estimate, the number of taxa extirpated would be much greater. In summary:

Ortmann Records	
Total species and subspecies recorded for the Clinch River	71
Total after placing subspecies in synonymy	57
Upper Clinch River	42
Lower Clinch River	50
Authors' Records (subspecies not separated)	
Total for the Clinch River	43
Upper Clinch River	36
Lower Clinch River	9
Post-impoundment colonizers	5
Native species now restricted to Lower Clinch	2
Cumberlandian Species	
Ortmann: Total	33
Synonymized	25
Authors (Only one species remaining in the Lower Clinch)	13
Species extirpated from the Clinch Basin	
Authors (12 of these Cumberlandian)	19

During this study, the authors have adhered to conservative taxonomic principles; whenever there has been a question as to the taxonomic status of a form, it has been placed in synonymy. Some forms placed in synonymy may well be erected to species status in the future should adequate systematic documentation become available.

There continues to exist the need for life history and broad based ecological studies to provide the basis for the development of intelligent guidelines for the management of this unique resource.

The authors must express concern for the continued survival of this unique faunal assemblage. Adverse environmental impingements pose constant threats. Emphasis must be placed on preservation of the habitats that continue to support this fau-

na. Recent action by the State of Tennessee in setting aside that reach of the Clinch River from the Virginia-Tennessee State Line to Sneedville, Tennessee, as a mussel sanctuary must be lauded as enlightened environmental action.

LITERATURE CITED

ADAMS, C.C. (1900) Variations in Io. -- Proc. Tenn. Acad. Sci. v. 49:

BATES, John M. (1962) The impact of impoundment on the mussel fauna of Kentucky Reservoir, Tennessee River. -- Am. Midl. Nat. 68 (1): 232-236.

---- (1975) Overbank and tailwater studies. -- TVA Contract TV 38606A, Final Report.

BINNEY, W. G. (1863) Bibliography of North American Conchology, previous to the year 1860. -- Smiths. Misc. Collections:

BURCH, J. B. (1975) Freshwater unionacean clams (Mollusca: Pelecypoda) of North America. -- Revised edition, Malacological Publ., originally prepared for U.S. Environmental Protection Agency, Biota of Freshwater ecosystems, Identification Manual No. 11, p. 1-176.

CAHN, A. R. (1936) The molluscan fauna of the Clinch River below Norris Dam upon completion of that structure. -- Unpub. TVA report.

CAIRNS, John, Jr., Crossman, John S., & Dickson, Kenneth L. (1970) The biological recovery of the Clinch River following a fly ash pond spill. -- 25th Ind. Waste Conf.

CAIRNS, John, Jr., Crossman, John S., Dickson, Kenneth, & Hendricks, Edwin (1971) The effect of major industrial spills upon stream organisms.

CALL, R. E. (1898) A descriptive illustrated catalogue of the Mollusca of Indiana. -- Brooklyn, N. Y.

COKER, Robert E. (1915) Common and scientific names of fresh-water mussels. -- Dept. of Commerce, Bur. Fisheries, Circ. no. 15.

----, Shira, A. F., Clark, H. W. & Howard, A. D. (1921) Natural history and propagation of freshwater mussels. -- Bull. U. S. Bur. Fish., 37: 77-181. (Separately issued as Bur. Fish. Document No. 893).

COLE, Leon J. (1941) Each after his kind. -- Science 93 (2413): 289-293.

---- (1941a) Each after his own kind. -- Science 93 (2414): 316-319.

CVANCARA, Alan M. (1963) Clines in three species of *Lampsilis* (Pelecypoda: Unionidae). -- Malacologia 1 (2): 215-225.

ELLIS, M. M. & Ellis, M. D. (1926) Growth and transformation of parasitic glochidia in physiological nutrient solutions. -- Science 64: 579-580.

FEDERAL REGISTER (1976) v. 41, no. 115, p. 24062-24064.

FRIERSON, L. S. (1927) A classified and annotated check list of the North American Naiades. -- Baylor University Press, Waco, Texas, 111 p.

FULLER, Samuel L. H. (1974) Clams and mussels (Mollusca: Bivalvia) *in* Hart, C.W., Jr. and Fuller, Samuel L.H. -- Pollution ecology of freshwater invertebrates. -- Academic Press, Inc., New York.

HICKMAN, Mary (1936) Contribution to the knowledge of the molluscan fauna of East Tennessee. -- Unpubl. thesis, University of Tennessee.

HUNT, Charles B. (1974) Natural regions of the U. S. and Canada. -- W. H. Freeman and Co., San Francisco.

LEFEVRE, G. & Curtis, W.C. (1912) Studies on the reproduction and artificial propagation of freshwater mussels. — Bull. U. S. Bur. Fish. 30: 105-201). (Separately issued as Bur. Fish. Document 756)

MATTESON, M. R. (1948) Life history of *Elliptio complanatus* (Dillwyn, 1817). — Amer. Midl. Natur. 40: 690-723.

ORTMANN, Arnold E. (1913) The Alleghenian Divide, and its influence upon the freshwater fauna. -- Proc. Amer. Philos. Soc. LVII: 581-626.

---- (1920) Correlation of shape and station in freshwater mussels (Naiades). -- Proc. Amer. Philos. Soc. XIX (4).

---- (1925) The naiad-fauna of the Tennessee River system below Walden Gorge. -- Amer. Midl. Natur. 9: 321-372.

---- & Walker, Bryant (1922) On the nomenclature of certain North American Naiades. -- Occ. Papers Mus. Zool., Univ. Michigan, no. 112.

SHOUP, Charles S. (1974) A bibliography of the zoology of Tennessee and the Tennessee Valley region. -- U.S. Atomic Energy Comm., Office of Info. Serv., Tech. Info. Center, Oak Ridge, Tenn.

SIMPSON, Charles Torrey (1900) Synopsis of the Naiades, or pearly freshwater mussels. -- Proc. U. S. National Museum XXII: 501-1044.

---- (1914) A descriptive catalogue of the Naiades, or pearly freshwater mussels. -- Bryant Walker, Detroit, Michigan.

STANSBERY, David H. (1972) A preliminary report on the naiad fauna of the Clinch River in the southern Appalachian Mountains of Virginia and Tennessee (Mollusca : Bivalvia : Unionoida). — Bull. Amer. Malacol. Union, March 1973 (Abstract).

---- (1977) Unpublished reports on status of endangered fluviatile mollusks in central North Ame-

rica. Prepared for U. S. Department of the Interior, Fish and Wildlife Service, Bureau of Sport Fisheries *and* Wildlife. Washington, D. C. 20240 Contract no. 14-16-0008-755. (Reports cited are on *Epioblasma walkeri* and *Quadrula sparsa*).

van der SCHALIE, Henry (1941) The taxonomy of Naiades inhabiting a lake environment. -- Jour. Conch. 21: 246-253.

---- (1952) An old problem in naiad nomenclature. -- Nautilus 65: 93-99.

---- (1973) The mollusks of the Duck River drainage in central Tennessee. -- Sterkiana 52: 45-56.

Reference omitted after Hunt, p. 22:

ISOM, Billy G. (1973) Critique 'Proceedings of a symposium on rare and endangered mollusks (Naiades) of the U.S. Columbus, Ohio, 1971' -- Sterkiana No. 49

WARREN, Robert E. (1975) Prehistoric Unionacean Site (JJA305), northeast Alabama. -- Thesis, Univ. of Nebraska, Dept. of Anthropology.

YOKLEY, P., Jr. (1972) Life history of *Pleurobema cordatum* (Rafineswue, 1820) (Bivalvia: Unionacea). -- Malacologia 11: 351-364.

Accepted for publication December, 1977

CORRIGENDA

Page 6, left hand column, last paragraph, 5th line from the bottom: the sentence beginning 'All collections are ....' should read: 'Representatives of all collections are ....'

Page 7, left hand column, first line: The heading 'RESULTS' should have been inserted after the first paragraph beginning 'Sample results ....' and not above that paragraph.

Purpura fluviatilis compreſſa. List. *ſynopſ.* tab. anat. 7. f. 1 - 3.

Cochlea pulla ex utraque parte circa umbilicum cava. List. *an. angl.* t. 2. f. 26.

Cochlea pulla quatuor orbium; Purpura lacuſtris coccum fundens. List. *ſynopſ.* t. 137. f. 41.

Cochlea fluviatilis depreſſa, pulla, ex utraque parte umbilicata. Gualt. *teſt.* t. 4. f. D. D.

Cochlea limacum minor dilute cæruleſcens. Seb. *theſ.* 3. t. 39. f. 17.

Helix teſta ſupra umbilicata, plana, nigricante, anfractibus quatuor teretibus. Lin. *Syſt.* 671. Mus. L. U. 366.

Argenville *Conchyl.* 1. t. 27. f. 8. 11. t. 8. f. 7.

Swammerd. t. 10. f. 3. 4.

Berl. Magaz. 4. B. p. 249 - 53. t. 8. f. 17.

Geve. p. 27. t. 3. f. 18. & p. 29. t. 3. f. 19.

Bonan. *Muſ. Kirch.* Cl. 3. f. 312. *vivent.* f. 316.

Lesser *Teſtac.* p. 148. g.

Gin. *op. poſt.* Tom. 2. p. 50. t. 2. f. 12.

Dan. PURPUR - SKIVEN; PURPUR - SNEGLEN; POST-HORNET.

Germ. DAS VERTIEFTE POST - HORN; DIE GROSSE TELLER - SCHNECKE.

Gall. LE GRAND PLANORBE.

Ital. CORN - AMONE MAGGIORE.

diam. 1 - 15. axis $\frac{5}{8}$ - 5 lin.

Teſta glabra dextrorſa nitida vel obſcura, transverſim absque punctis ſubtiliſſime ſtriata; juniores tantum pellucidæ ſtriis transverſis & ſpiralibus notantur; utrinque planiuſcula, medio concava, umbilicata; umbilicus in pagina ſuperiore diſtinctior. *Anfractus* quinque teretes utrinque convexi ſeſe uti in congeneribus involventes; extimus in adultis in pagina ſuperiore complanatus eſt. *Apertura* lunata, pagina ſuperiore ultra inferiorem elongata; anfractus vicinus in apertura labio obtegitur. Pagina ſuperior dicenda, quæ dorſum Limacis ſpectat; hæc in dextrorſis & ſiniſtrorſis æque profundius umbilicata, quam oppoſita pagina, ejusque labium protenſum, hinc patet, *Geve* fig. 18 & 19., quæ dextrorſæ ſunt, minus bene ſiniſtrorſas dixiſſe. Cæterum hunc *Planorbem* quoque ſiniſtrorſum inveniri obiter indicat Clariſ. MARTINI, cujus ſingularitatis jam meminit, ipſamque cochleam figura expreſſit *Buonani* p. 314. f. 316. e Muſeo Mathematici Naumburgenſis deſumta; ulteriore tamen inquiſitione maxime dignum eſt, cum plurimum lucis quæſtioni, an ſiniſtrorſæ cochleæ ſola circumvolutione a dextrorſis diverſæ ſint, hoc exemplum domeſticum afferre poſſit.

Colore valde variat, pulla, fuſca, rufa, alba, ſublutea, cæruleſcens mihi reperta; raram varietatem inveni, ſaturate fuſcam, glaberrimam, nitidam impreſſionibus plurimis ſubquadratis notatam; aliam ſtriis raris, ſubelevatis, longitudinalibus. Sæpe teſtæ quaſi vermiculis corroſæ.

Limax niger; latere ſiniſtro appendicula carnoſa inſtruitur, hanc incedendo laciniæ inſtar extendit. *Tentacula* longa, curvata ſordide cinerea, apice varie criſpata; & contracta, antequam ſtricte extendantur, hæc inteſtinum pallidum, ſordibus fartum, vel ipſa Limacis excrementa, colore & figura ſæpe mentiuntur. *Oculi* difficulter videntur. Animal timidiſſimum, minimum motum ſentiens teſta ſe totum condit, nec niſi de periculo ſecurum rurſus exit, dum congenera & *Buccina* inceſſum a timore tuta pergunt.

E littore

E littore *Coromandel* ſpecimina juniora teneo, transverſim ſubtiliſſime ſtriata, ſtriis æqualibus & æque diſtantibus, oculo armato convexis, cum in noſtris ſtriæ minus diſtinctæ & absque ordine dispoſitæ videantur.

In rivis, paludoſis, aquisque ſtagnantibus, vulgaris.

344. PLANORBIS CARINATUS.

PLANORBIS teſta pallida, pellucida, ſupra umbilicata, carina marginali media.

PLANORBIS teſta plana fuſca, ſupra concava, anfractibus quatuor, margine prominulo. GEOFR. *teſt.* 4.

COCHLEA fuſca, altera parte planior & limbo inſignita quatuor ſpirarum. LIST. *an. angl.* t. 2. f. 27.

COCHLEA fuſca limbo circumſcripta. LIST. *Syn.* t. 138. f. 42.

COCHLEA fluviatilis depreſſa, altera parte complanata & limbo inſignita quatuor ſpirarum. GUALT. *teſt.* t. 4. E E.

HELIX teſta ſubcarinata, umbilicata, plana: ſupra concava, apertura oblique ovata, utrinque acuta. LIN. *Syſt.* 662.

SWAMMERD. *Bibl. nat.* t. 10. f. 5.

KLEIN. *oſtrac.* t. 1. f. 8.

Berl. Mag. 4. B. p. 254. t. 8. f. 18.

GEVE. t. 4. f. 21. a. b. & 23. minus bonæ.

Dan. KIÖL-SKIVEN

Germ. DIE KLEINE PLATTE SCHNECKE; DAS GELBLICHE PLATTE POST-HÖRNCHEN.

Gall. LE PLANORBE A ARETE.

diam. 1 - $5\frac{1}{2}$ - $7\frac{1}{2}$ lin. alt. $\frac{1}{4}$ - $\frac{1}{2}$ lin.

Teſta plana cornei coloris, pallida, parum flavicans, glaberrima, pellucida, ſubtiliſſime transverſim ſtriata, ſupra convexa, parum umbilicata, ſubtus planiuſcula, ſolo centro aliquantum cava. *Anfractus* quatuor planiuſculi, ſupra minus convexi, quam in Pl. *umbilicato*, extimus imprimis, qui ſupra ſenſim verſus utrumque latus inclinatur, ac latior eſt, quam in *umbilicato*; *Carina* in medio marginis acuti, ſeu ipſum totum marginem occupat, hinc ab utraque pagina conſpicua eſt; *Apertura* ovato-acuta; margo nempe anfractuum acutiſſimus, aperturam ſimul acutam reddit.

Limax aperturam & interiores anfractus tantum occupat, exterior latiſſimus ſemper vacuus apparet.

Teſtæ juniores & adultæ omnes, etiam limace foetæ, pellucidæ, carina marginali diſtinctæ; inter complures tamen unicum juniorum ſpecimen reperi, omni margine carinato deſtitutum.

In copula alter maſſam carneam informem a ſiniſtro latere, pone tentaculum hoc quinquies craſſiorem exſertam in aperturam pallii alterius infert, ibique varie tentat; maſſa hæc annulato-rugoſa eſt, corporeque limacis pallidior, lumbriciformis. Alterius genitalis veſtigium nullum videre potui.

In lacubus ac foſſis frequens. *Italici* noſtris majores.

345. PLANORBIS VORTEX.

PLANORBIS teſta flavo-fuſca, ſubcarinata, ſupra concava, ſubtus plana.

PLANORBIS polygyrata minor. PETIV. *gaz.* t. 92. f. 6.

PLANORBIS

PLANORBIS testa plana fusca, supra concava, anfractibus sex, margine acuto. GEOFR. *test.* 5.

COCHLEA exigua subfusca, altera parte planior sine limbo, quinque spirarum. LIST. *an. angl.* t. 2. f. 28.

COCHLEA exigua quinque orbium. LIST. *Syn.* t. 138. f. 43.

COCHLEA fluviatilis, exigua, depressa, altera parte planior, subflava sine limbo, quinque spirarum. GUALT. *test.* t. 4. G G.

HELIX testa carinata, supra concava, apertura ovali, plana. LIN. *Syst.* 667.

KLEIN. *ostr.* t. 1. f. 9.

Berl. Mag. 4. B. p. 257. n. 8. f. 19.

GEVE. t. 4. f. 22, prava.

Dan. HVIRVEL-SKIVEN.

Germ. DIE SECHSFACH GEWUNDENE TELLER-SCHNECKE.

Gall. LE PLANORBE A SIX SPIRALES A ARETE.

diam. $1\frac{1}{2}$-4 lin. alt. $\frac{1}{4}$ lin.

Testa pellucida, striis transversis minutis: vacua flava, foeta fusca, subtus planissima, supra medio concava. *Anfractus* quinque, sex, in quibusdam septem, supra convexiusculi, subtus plani; extimus in angulum, seu marginem acutum compressus, vel si mavis supra convexus in margine inclinatus, subtus planus. *Apertura* ovata, anfractus ejus pagina inferiore vel acuto margine impositus, vel extra eundem. Aperturæ margo tenuis, acutus. *Limax* rufus, tentacula alba.

Sæpe ex aqua in vicina objecta sicca ascendere solet. Plures in vasculo aquæ repleto servatos, mense Septembri parietibus vasis affixos extra aquam dies quosdam hærere vidi; hi quoties aquæ immissi

immiſſi, mox rurſus exiere; ac ultra ſeptimanam in ſicco ſine vitæ dispendio morabantur; vitæ ulterius periculum non feci.

In paludoſis & plantis aquaticis vulgaris.

346. PLANORBIS UMBILICATUS.

PLANORBIS teſta fuſca, opaca, utrinque ſubumbilicata, carina marginali infera.

PLANORBIS teſta plana, ſubtus concava, anfractibus tribus deorſum marginatis. GEOFR. *teſt.* 6.

HELIX teſta deorſum carinata, umbilicata, convexa, ſubtus plana, apertura ſemicordata. LIN. *Syſt.* 663.

Dan. NAVLE-SKIVEN.

diam. 1 - 6½ lin. . axis ¾ - ¾ lin.

Teſta brunnea, fuſca, interdum pallida, lumini obverſa pellucida, ſubtiliſſime transverſim ſtriata, ſupra & ſubtus convexa, medio depreſſa; parum umbilicata. *Anfractus* quinque vel ſex utrinque convexi; extimus anguſtior, magis elevatus, quam in Pl. *carinato*, extus rotundatus, non acutus, hinc margo latior eſt, nec in carinam perditur, ſed ipſa carina tantum infimam ejus partem occupat; hæc cauſa eſt, cur ab inferiore pagina unice conſpicitur. *Apertura* ovata eſt, non in anfractu oppoſito acuta, ſed rotundata, carina in quibusdam minimam compreſſionem efficiente. In vetuſtioribus carinæ veſtigium modo ſupereſt, ac in pullis pluribus, qui cæterum in omnibus majoribus ſimillimi ſunt, nullum ejus rudimentum, horum quidam brunnei, opaci vel pellucidi; alii albiſſimi pellucidi, quos pro diverſa ſpecie ne ſumas, cavendum eſt. *Limax* niger; *Tentacula* rufa.

Satis

Satis diu hæsito, an hic Helix *Planorbis* Linnæi, an *complanatus* autorum dicatur, & descriptiones me dubium adhuc reliquunt; quid quod, hunc & *Planorbem* confudisse videntur & sequens forte erit eorum *complanatus*. In tantis difficultatibus has tricas solvendi, ipso Linnæo litteris frustra consulto, Planorbem & complanatum, nomina generi toti propria, oblivioni dandos, descriptiones & nomina aptiora magisque significantia effingenda reor.

In paludosis vulgaris; pulli frequentes in conferva rivulari.

347. PLANORBIS spirorbis.

Planorbis testa flavescente, utrinque concava, æquali; anfractibus teretibus.

Planorbis testa plana, alba, utrinque concava, anfractibus quinque teretibus. Geofroi test. 2.

Helix testa utrinque concava, plana, albida, anfractibus quinque teretibus. Lin. *Syst.* 672.

Berl. Magaz. 4. B. p. 258. t. 8. f. 20.

Dan. brikke - skiven.

diam. $\frac{1}{2}$ - 2 lin. alt. $\frac{1}{4}$ lin.

Testa pellucida, vix striata (vestigia striarum oculo armato ægre detegenda) pallide flavescens, utrinque fere æqualis, in medio parum cava. *Anfractus* quatuor vel quinque utrinque convexi, minus tamen in inferiore pagina, margine tereti absque ulla carina. *Apertura* rotundata sublabiata; margo saltem summus intus albus, crassiusculus. Hac nota & convexitate paginæ inferioris a P. *vortice* distinguitur, cujus meram varietatem diu credidi.

In paludosis cum P. *vortice*, at minus vulgaris.

348. PLANORBIS CONTORTUS.

PLANORBIS testa fusca, supra plana, subtus umbilicata, apertura arcuata.

PLANORBIS minima crassa. PETIV. *gazoph.* t. 92. f. 8.

PLANORBIS testa fusca, supra plana, subtus concava, perforata, anfractibus sex teretibus. GEOFROI *test.* 3.

HELIX testa subumbilicata, plana, utrinque æquali, apertura lineari arcuata. LIN. *Syst.* 673.

Berl. Magaz. 4. B. p. 260. t. 8. f. 21. p. 261. No. CXVI.

Dan. TOBAKSRULLE-SKIVEN.

Germ. DIE KLEINE TELLER-SCHNECKE ODER POSTHÖRNCHEN.

Gall. LE PETIT PLANORBE A SIX SPIRALES RONDES.

diam. 1-2 lin. axis $\frac{1}{2}$ lin.

Testa opaca, fusca, brunnea, interdum fulva, centro pellucida, in aqua tota deaurata, supra plana puncto centri cavo, subtus umbilicata; Anfractus arctissime sibi invicem perpendiculariter adpressi, pro ætate tres, quatuor, quinque, sex, septem; hinc H. *contorta Lin.* & Planorbis 3. *Geofr.* sola ætate diversa. Subtus umbilicus excavatus, quatuor & in paucis sex anfractus numerandi. *Apertura* lunæ instar, in primo quadrante, arcuata.

Limax griseus; tentacula vix $\frac{1}{2}$ lineæ longæ, grisea margine albo.

In fossis aquosis, in Lemna & Marchantia.

349. PLA-

349. PLANORBIS NITIDUS.

PLANORBIS testa polita, flavescente, supra convexa, umbilicata, subtus plana perforata.

Berl. Magaz. 4. B. p. 262. t. 8. f. 22.

Dan. GLANDS-SKIVEN.

diam. $\frac{1}{6}$ - 3 lin. axis $\frac{1}{8}$ - $\frac{1}{4}$ lin.

Testa tota lævis, politissima, nitida, diaphana, fusca vel flavescens, qua vermis latet, nigra. *Anfractus* pro ætate uti in reliquis tres, quatuor, quinque. *Extimus* semper interioribus simul sumtis duplo latior, supra convexus, subtus planus vicinum ita includit, ut minima ejus pars supra conspiciatur, subtus fere nulla, hinc interiores supra & subtus umbilicum formant, hac tamen differentia, quod centrum paginæ superioris parum cavum anfractus numerare permittat, inferioris vero angustius & ad verticem usque perforatum, anfractus minus clare monstret. *Apertura* cordata, in quibusdam albida. Eo sensu, quo præcedentes, carinatus minus bene dicitur, in illis enim lineola marginalis extra testam prominere videtur, in hoc minime; nec margo alius anfractum cingit, sed ipsius anfractus structura, convexa supra, plana subtus, marginem constituit. Ultra quinquaginta examini subjeci, quorum quidam strigis duabus ligamentorum instar in superna parte extimæ spiræ, forte ex restauratione fractæ testæ, notantur.

Limax niger, in junioribus totus albus. Tentacula apice alba.

A præcedentibus, colore, figura & structura diversus, hinc non potest esse Planorbis 6 Geofr. An H. complanata *Linnæi*, haud liquet.

Corpuſcula ovata, pellucida, margine obſcuro, teſtæ ſæpe adhærent, qualia in Nerita *Rubella*, an ova limacis vel alius animalculi?

In foſſis aquarum haud infrequens.

350. PLANORBIS ALBUS.

PLANORBIS teſta alba, utrinque umbilicata, apertura dilatata.

PLANORBIS minima duorum orbium. PETIV. *gazophyl.* t. 92. f. 7.

Berl. Magaz. 4. B. p. 253. t. 8. f. 23.

Dan. DEN HVIDE SKIVE.

diam. 1 - 2 lin. alt. $\frac{1}{2}$ lin.

Teſta albida, pellucida, raro ſubfuſca, ſupra planiuſcula, ſubtus convexa, utrinque æque umbilicata. *Anfractus* tereres, in adultis ad ſummum quatuor; lenticulæ oculari ſtriis longitudinalibus & transverſalibus inſigniti, hæ in quibusdam obſoletæ & vix detegendæ, illæ ſatis conſpicuæ. *Anfractus* extimus reliquis omnibus major & latior, ſuperna ejus pars ultra infernam valde extenſa eſt, uti in P. *Purpura*. *Apertura* rotundata, larga, obliqua margine inferiore anfractum vicinum tegit.

Limax griſeus, $1\frac{1}{4}$ lin. longus. *Tentacula* albida ejusdem fere longitudinis. Soli *oculi* nigri.

Vaſculo vitreo ſervati copula medio Julii jungebantur, ſimul agentes & patientes. Membra genitalia latere ſiniſtro.

In plantis aquaticis amnis *Fridrichsdalenſis*.

351. PLA-

351. PLANORBIS IMBRICATUS.

PLANORBIS teſta alba, umbilicata, carina dentata.

PLANORBIS teſta plana, ſubtus concava, anfractibus tribus, plicis transverſis, fimbriatis. GEOFR. *teſt.* 8.

TURBO teſta planiuſcula anfractibus annulatis, dorſo criſtatis. LIN. *Syſt.* 654.

ACTA *helv.* 4. p. 212. t. 9. f. 21, 22.

ROES. *inſ.* 3. t. 97. f. 6, 7.

Berl. Magaz. 4. B. p. 269.

Dan. TEGEL - SKIVEN.

Germ. DIE ZIEGELFÖRMIGE TELLER - SCHNECKE.

Gall. LE PLANORBE TUILÉ.

diam. $\frac{1}{2}$ - $\frac{2}{3}$ lin. alt. $\frac{1}{8}$ lin.

Adeo minuta & levis eſt cochlea hæc, ut, poſtquam plures annos cognoverim, centies viderim, omni cura ſervaverim, dum eam novo examini ſubjicio, totus ei & ejus deſcriptioni intentus, eodem temporis momento uno oris halitu plures collectas diffflarem, imagine granorum pulveris deceptus.

Teſta alba, pallida vel cinerea, minutiſſima, pellucida, fragiliſſima ſupra plana, ſubtus convexa, umbilicata, lineis transverſis ligamentorum inſtar elevatis cincta; hæ in margine prominentes carinam denticulatam reddunt. *Anfractus* vix $2\frac{1}{2}$, in centro ſubtus quoque ope lentis conſpicui. *Apertura* rotundata larga.

Plicæ ſeu lineæ elevatæ transverſæ facile abſterguntur; *denticuli* in carina diutius perſiſtunt, ſæpe tamen delentur, ita ut teſta facile glaberrima reperiatur, veſtigio plicarum, ſi lumini quoque obvertatur, in quibusdam vix ſuperſtite; obſoletam hanc *Roeſel* pro ſpecie ſumſit.

Limax albus; *Tentacula* vix capite longiora.

Figura *Roeſelii* bona eſt, apertura vero nimis circinnata, cum pagina teſtæ ſuperior in noſtris plana ſit, ac anfractus vicini pars aperturam ſecet. Numerus quoque anfractuum in noſtro minor, & menſura in ſpecimine Clariſ. *Geofroi* major, plurium enim, quos inveni, nullus menſuram lineæ æquavit.

Hunc *Linnæus* primum *Nautilum*, dein *Turbinem*, nec meliori jure, fecit, teſta enim nec polythalamia, nec ſolida, nec inter Turbines ejus turritos, ſed umbilicatos, referendus eſt.

Quærendus eſt in gutulis ſolitariis folio *Nymphææ* & *Potamogotonis* ex aqua extracto bullarum arenarum inſtar adhærentibus.

In rivo *Fridrichsdalenſi*.

352. PLANORBIS SIMILIS.

PLANORBIS teſta pellucida, ſupra umbilicata, punctis ſtriata.

Berl. Magaz. 4. B. p. 265. t. 11. f. 64. B.

Dan. LIGEDAN - SKIVEN.

diam. 3 lin. axis 2 lin.

Hujus tanta cum junioribus Pl. *purpuræ* ſimilitudo, ut non obſtante Clariſ. *Martini* exacta deſcriptione & figura, eundem putarem, niſi ipſe inventor mihi ſpecimen miſiſſet; hoc etiam cum junioribus dictæ cochleæ conferendo, nudo oculo nulla differentia apparuit, ſi umbilicum in ſuperiore pagina minus diſtinctum exceperis, armato quoque aqua diu hæſit; tandem ope lenticulæ ſtrias in hoc argutiſſime punctatas eſſe, ex punctis pubem minimam, armato quoque oculo ægre conſpicuam, pullulare, detexi; pubes hæc ratio eſt, cur teſta minus nitida, quam P. *purpura* appareat.

Adde,

Adde, quod teſtæ P. *purpuræ* apertura impoſita non quieſcat, hæc vero ſemper.

Lacinia carnoſa limacis, quæ dextro latere propendere dicitur, in figura ſiniſtro picta eſt, jure quidem uti ex analogia cum *purpura* ſuſpicor.

In foſſis Berolinenſibus.

Hæc Anno 1769. Septembri anni inſequentis in paludoſo luci *Spurreſkiul* Fridrichsdalenſis rariſſimum hunc Planorbem reperi, novoque examine hæc addere libet.

Color teſtæ P. *purpuræ* in aqua in rufum, hujus in luteum vergit, extra aquam, dum adhuc madet, ſtriæ longitudinales in hoc, minus in illo, conſpicuæ, qua nota nudus oculus eos diſtinguit. Armatus ſeries punctorum elevatorum, quæ formantur ex pube adhuc madente, in teſta aqua extracta, pulchras percipit.

Limax omnino uti in *purpura*; lacinia pallii, membrana ovata ſuperne parum reflexa, a latere ſiniſtro propendet.

Varietas Pl. *purpuræ*, an vera ſpecies nihilominus ambigo.

* * Teſta conica:

353. PLANORBIS BULLA.

PLANORBIS teſta fragili, ſiniſtrorſa, vertice obtuſo, apertura ovata.

PLANORBIS teſta fragili, pellucida, globoſa, anfractibus quatuor ſiniſtrorſis. GEOFR. *teſt.* 10.

BULLA

Trinæ hæ Cochleæ diſpoſitioni *Teſtaceorum* ex ſtructura *Limacis* averſari videntur, cum teſtarum figuræ *Helici* vel *Buccino* maxime affines a congeneribus toto cælo diſcrepent, at re vera, ideis acceſſoriis *Planorbem* ovatum, turritum vel caudatum ægre ferentibus, generi aliud tantum nomen urgent.

Bulla teſta ovata, pellucida contraria, ſpira obſoleta, apertura ovato-oblonga. Lin. *Syſt.* 386.

Buccinum exiguum trium ſpirarum, a ſiniſtra in dextram convolutarum. List. *an. angl.* t. 2. f. 25.

Buccinum fluviatile, a dextra ſiniſtrorſum tortile triumque orbium, ſive Neritodes. List. *Syn.* t. 134. f. 34.

Buccinum fluviatile, teſta fragili, pellucida, albida, prima ſpira admodum elongata & ventricoſa. Gualt. *teſt.* t. 5. f. cc.

Berl. Magaz. 4. B. p. 365. t. 11. f. 61.

Dan. BOBLE-PERLEN.

Germ. DIE WASSER-BLASE.

Gall. LA BULLE AQUATIQUE.

long. 1-4 lin. lat. ½-2 lin.

Teſta ovata, diaphana, nitidiſſima, tenera & fragilis, flavicans; quædam aeri expoſitæ albicant. *Anfractus* tres, extimus magnus, ventricoſus, reliqui minimi in vertice obtuſo. *Apertura* effuſa, margine columellam incumbente in adultis albo.

Limax albus vel griſeus pallio in varias lacinias, quibus teſta operitur, diſſecto inſtruitur.

Licet *Liſteri* Buccinum dextrorſum dicatur, ac in tabula 2 tale ſiſtitur, ex contrario reliquarum in iſta tabula cochlearum ſitu hoc tamen indigitari patet. Apex quidem in *Gualtieri* figura acutus ſiſtitur, figura vero ſiniſtrorſa & ipſa deſcriptio noſtrum eſſe vix dubitare ſinunt. Bulinus cl. *Adanſon* a noſtra Bulla diverſus eſt.

In rivo, lacubus ac fontibus, Julio, Auguſto & Septembri frequentiſſime. Ante ſolſtitium nullum unquam invenire potui.

354. PLANORBIS TURRITUS.

PLANORBIS teſta nitida, vertice acuminato, apertura oblonga.

Dan. TAARN - PERLEN.

long. $\frac{1}{2}$ - 6 lin. lat. $\frac{1}{4}$ - $1\frac{1}{2}$ lin.

Facies *Buccini*, at tentacula filiformia.

Teſta ovato - oblonga, apice acuminata, ſiniſtrorſa, glabra, politiſſima, limace foeta, nigra, vacua fulva, pellucida. *Anfractus* teretes 3 - 6. *Apertura* inverſe conica; in perfectis labrum in extremitate columellæ ſulcatum incarnati coloris. Teſta in majoribus vermibus ſæpe eroſa.

Limax junior griſeus, adultior nigerrimus. *Oculi* aterrimi; apex *tentoculorum* albus; unus mihi obtigit, cui oculus ſiniſter defuit. *Teſtæ* minores, limace foetæ, extra aquam nigræ, in aqua minus.

Limax quamvis *concreto rigeat vincta repente gelu*, ſoluto tamen reviviſcit; plures enim in vaſculo frigori hiemali expoſito glacie correpti, in tepidarium relati, liqueſcente eadem, libere vagabantur.

Poſſet eſſe Bulla Hypnorum *Linnæi*, at cum tenerrima & minus acuta, quam Bulla fontinalis (Pl. Bulla) quæ obtuſa eſt, dicatur, noſtraque minus tenera ſit, quam Pl. Bulla, pluribusque cochleis commune ſit, ſpiram infimam habere majorem toto corpore teſtæ ſuperioris, non liquet. Poſſet eſſe Buccinum ſeptimum *Argenv.* t. 27. f. 6, ſi deſcriptionem & anfractus ſiniſtrorſos ſpectes, at nec ventricoſus eſt, nec in ſicco unquam obvius fuit.

In aquis foſſarum inter putrida folia, ac in foſſis campeſtribus agri Fridrichsdalenſis & alibi haud infrequens. Clariſ. *Schröter* e Saxonia miſit, celeberrimus *Chemnitz* dealbatum in ripa Danubii reperit.

355. PLANORBIS GELATINUS.

PLANORBIS testa fragilissima, sinistrorsa, vertice depresso; apertura caudata.

Dan. SLIIM-PERLEN.

long. $2\frac{1}{2}$ lin.

Testa ventricosa, fulva, diaphana, nitida, tenerrima, tactus omnino impatiens, pluma levior. *Vertex* latus, depressus anfractibus obsoletis, extimo excepto, qui totam testam efficit. *Apertura* in mucronem acutissimum elongata.

Limax griseus, testa sua triplo major, hinc ea condi nequit. Instruitur pallio gelatinoso, crasso, domunculam fragilissimam maximam partem involvente.

In rivo, omnium rarissimus.

XXVIII. NERITA.

Vermis cochleatus, tentaculis binis setaceis, oculis ad basin externe.

356. NERITA SPHÆRICA.

NERITA testa globosa, cornea, vertice obtuso.

Dan. KUGLE NERITEN.

diam. $\frac{3}{4}$ - 2 lin.

Testa

Nerita & Valvata *operculo* perenni facile dignoscuntur; hoc ab ipsa testa undique solutum pedi limacis adhæret, aperturamque cochleæ

Teſta ſubgloboſa, cornea, diaphana, alba vel cinerea, immaculata, glabra, apice obtuſo non adeo acuto, uti in N. *jaculatore*, conferva plerumque obſita. *Anfractus* quatuor convexi; infimus ventricoſus, reliquis omnibus ſimul ſumtis duplo largior & longior, cum in *jaculatore* longitudine æqualis ſit. Varietatem cineream ſtrigis anfractuum transverſis albidioribus reperi. Cætera uti in *jaculatore*, a qua differentia teſtæ ſplendida diverſam ſpeciem conſtituere videtur.

In paludoſis, minus frequens.

357. NERITA PUSILLA.

NERITA teſta globoſa, vireſcente, perforata, apertura circinnata.

Berl. Magaz. 4. B. p. 268. t. 8. f. 26.

Dan. ERT - NERITEN.

diam. 1 lin.

Teſta ſubgloboſa plerumque invenitur, & alba exſiccata, recens vero cornea, ſubviridis. *Neritam piſcinalem* valde refert, at multo minor, & tamen anfractuum quatuor eſt. *Apertura* exacte circularis columellæ labio albido incumbit. *Centrum* pervium.

In lacu *Ruppinenſi*. Clariſ. *Martini* miſit.

cochleæ arcte claudit, hinc teſtæ operculatæ nihil cum bivalvibus commune habent; cl. *Geofroi* quidem aſſerit, dari genera, quorum opercula ipſi teſtæ juncta ſint, at nec nominantur, nec mihi noſcuntur.

358. NERITA PISCINALIS.

NERITA testa globosa, perforata, rufo-fusca.

Dan. DAM-NERITEN.

long. 2-3 lin. lat. $1\frac{1}{2}$-$2\frac{1}{2}$ lin.

Testa rotundata, subglobosa, duriuscula, opaca (lumini obversa parum pelluçet) fusca vel rufa, impura, subtilissime transversim striata. *Anfractus* quatuor, rotundati, ample excurrentes. *Apertura* circinnata. *Faux* albida, sive margaritacea. *Centrum* pervium & quasi umbilicatum, at nulli anfractus in eo visibiles.

Testas vacuas plures reperi, limace foetam ne unquam ullam, licet sæpius quæsiverim.

In piscina horti *Fridrichsdalensis* frequens, nec unquam alibi reperi.

359. NERITA AMPULLACEA.

NERITA testa perforata, ventricosa, supra depressa, apice obtuso; apertura larga.

COCHLEARIA lutaria. RUMPH. *Conchyl.* t. 27. f Q. PETIV. *gaz. amboin.* t. 12. f. 14.

GALEA fasciata; media Pomatia, tenuis, subviridis & fusca, venis transversalibus. KLEIN. *ostrac.* p. 57. spec. 11. 2.

HELIX testa subumbilicata, subglobosa, glabra, anfractibus supra ventricosioribus, umbilico subobtecto, apertura ovato-oblonga. LIN. *Syst.* 676. Mus. L. U. 666.

COCHLEA

Cochlea terreſtris vulgaris, oblonga, ventricoſa, fere pellucida, ſplendens, colore carneo, & ſubalbido depicta, nonnullisque faſciis ſubrubris leviter & obſcure cincta. Gualt. *teſt.* t. 1. f. R.

Cochlea e viridi ſubflava, clavicula leviter compreſſa, faſciis anguſtis donata. List. *Syn.* t. 130. f. 30.

Berl. Magaz. 3. B. p. 152. t. 6. f. 68.

Geve t 27. f. 289. a, b. & f. 291. nimis coloratæ.

Lesser *Teſtac.* p. 162.

Dan. KRUKKE-NERITEN.

Makaſſarenſibus SISSO CAPONG ET SISSO POTIR.

Batavis SLYK-SLEK; GEBANDE AJUYN SCHIL.

Germ. SCHLAM-SCHNECKE; KOTH-SCHNECKE.

Angl. SMOOTH GIRDLED SNAIL-SHELL.

diam. 8-19 lin.

Teſta ovato-ventricoſa, glabra, nitens, virideſcens, apice obtuſo. *Gualtieri* figura quidem mucrone acuto terminatur, at noſtra ſpecimina omnia obtuſa. Supra dilatata eſt, infra in figuram ovatam coarctatur. *Anfractus* quinque ſupra planiuſculi, extimus ampliſſimus. *Umbilicus* nullus, mera rima ſeu foramen, quod quidem in nonnullis aperturæ labio obtegitur. *Apertura* ovato-oblonga, labro albo, membranaque tenui columellam obtegente, concolore. Intus *faſciæ* plures rufæ conſpicuæ. *Operculum* durum, corneum, auriforme, ſublunatum, extus ſqualide griſeum, lineis concentricis tenuiſſimis, intus glabrum, ſplendens, colore ſtanni, diſco area oblonga, cornea, opaca, ſtriis undulatis exarata, centro polito ſplendente. Onyx *Rumphii*, cap. 17. n 9. minores (ſiſſopotir Rumphii) albæ intus & extus rufo-faſciatæ, ultra centrum perforatum, ut recte meminit *Rumphius*, magis acuminatæ reliquis.

Ab H. *effuſa* imprimis diſtinguitur centro non umbilicato, teſtaque ultra centrum acuminata.

Variat livida, nigricans & ex luteo viridis, faſciis extus conſpicuis vel inconſpicuis, ſaturatioribus; harum novem & plures, quasdam duplicatas inæquali latitudine numeravi. Striæ transverſales conſtantes. Faux fuſca, faſciata.

Licet *Rumph* hanc terreſtrem vocet, ex verbis ejus tamen & ex operculo pater, eam fluvialibus deberi.

In Aſiæ paludoſis.

360. NERITA URCEUS.

NERITA teſta ſubumbilicata, ventricoſa, rugoſa, fuſca; apertura effuſa alba.

COCHLEA maxima e viridi, nigricans. LIST. *Syn.* t. 125. f. 25.

COCHLEA lutaria maxima *Rumphii*.

Dan. ÖSE-NERITEN.

Gall. IDOLE.

Makaſſer. SISSO SALOMBE.

diam. 5 unciarum.

Media inter N. *effuſam* & *ampullaceam*; *hanc* dicerem niſi obſtaret umbilicus diſtinctus & pervius, teſta circa umbilicum non acuminata, & anfractus juxta juncturam non depreſſus, ſed convexus; *illam*, niſi contrarium juberet, umbilicus minus patulus, teſta ſupra non depreſſa ſed convexa.

Teſta dura, craſſa, nitida, fuſca, ſtriata, rugoſa, absque faſciis aut maculis. Anfractus ſeptem. Apertura uti in H. *ampullacea*; faux vero tota alba immaculata, nec faſciata nec labro craſſiori

craſſiori diſtincta. Faſciæ duæ vel tres, quæ, teſta lumini obverſa, in fauce videntur, ſunt mera veſtigia novæ teſtæ accretionis, non ſecundum anfractus, ſed transverſim ductæ. Umbilicata revera eſt & pervia, at in umbilico vix duo anfractus conſpicui.

In Inſulis Indiæ edulis. In Muſeo *Moltkiano*.

361. NERITA EFFUSA.

NERITA teſta umbilicata, ventricoſa, faſciata, ſupra depreſſa, apice acuto; apertura effuſa.

COCHLEA maxima faſciata. LIST. *Syn.* t. 128. f. 28.

SEB. *theſ.* 3. t. 40. f. 3, 4, 5.

GEVE, p. 30. t. 3. f. 20.

Dan. NAVLE - NERITEN.

Gall. OEIL D'AMMON; OEIL DE BOUC.

Germ. AMMONS AUGE.

diam. 14 - 18 lin.

α *faſciis ſeptem.*

Faſciarum (ab umbilico numerando) quarta latiſſima, 3, 5 & 6 tenuiſſimæ.

β *faſciis octo.*

Tertia latiſſima, prima, 6 & 8 tenuiſſimæ.

γ *faſciis novem.*

Secunda & ſexta latæ, reliquæ ſubæquales.

ε *faſciis*

ε faſciis undecim.

Secunda, tertia & ſexta latiſſima, 1, 4, 5, 8, 11. anguſtæ.

η faſciis duodecim.

Secunda, 3, 5, 11. latiſſimæ, 12 anguſtiſſima, reliquæ ſubæquales.

Facies N. *ampullaceæ*, at ſtructura diverſa.

Teſta alba, faſciis compluribus fuſcis inæqualibus in ſpira majori numero & latitudine variantibus, ſupra ſubdepreſſa, ſpiris in centro in mamillam elatis; ſubtus convexa, umbilico diſtincto patulo, ſpiris protuberantibus pervio, faſciis notatis. *Anfractus* ſex, extimus amplus, qua vicino jungitur, depreſſus. *Apertura* elliptica ultra latitudinem anfractus adjacentis deorſum protenſa; intus ſubfulva absque ulla pellucente faſcia, vel faſciis omnibus pellucentibus. Labrum interius teſtæ adnatum. Teſta nitidiſſima polituram induit.

Teſta in *ε*, *η*. ſupra minus depreſſa, quam in reliquis, umbilicusque minus largus, ſat tamen patulus.

Seba terreſtrem dicit, at levis autoritatis eſt.

In Muſeo *Moltkiano*.

362. NERITA TROCHUS.

NERITA teſta trochiformi, carinata, apertura coarctata.

Dan. TOP-NERITEN.

long. 3 lin. lat. 2¼ lin.

Teſta

Teſta cretacea, craſſa, trochiformis, vertice obtuſo. *Anfractus* quinque in planum declinantes, medio carinati, inferne convexi; ultimus largior. *Apertura* ad anfractum vicinum in angulum coarctata; centrum umbilicatum eſt.

In Saxonia Weimarienſi. Cl. *Schröter* miſit.

363. NERITA ELEGANS.

NERITA teſta ovata, cinerea, ſpiraliter convexe ſtriata; apertura adnata.

NERITA teſta oblonga, cinerea, denſiſſime ſtriata, maculis rufeſcentibus, anfractibus quinque. GEOFR. *teſt.* 1.

COCHLEA operculata, parva, tenuiſſime ſtriata, faſciata. LIST. *exerc. anat.* p. 2. t. 1.

COCHLEA terreſtris turbinata & ſtriata. COLUMNA *Purp.* c. 9. p. 27. optima. LIST. *Syn.* t. 27. f. 25.

COCHLEA cinerea, interdum leviter rufeſcens, ſtriata, operculo teſtaceo cochleato donata. LIST. *an. angl.* t. 2. f. 5. minus bona.

TURBO terreſtris ſtriatus, ſubruber & lineis variegatis obſcure punctatus. GUALT. *teſt.* t. 4. f. A.

TURBO terreſtris tenuiſſime ſtriatus, ipſo ore circinnato, cui etiam limbus latus ſtriatus albidus. GUALT. *teſt.* t. 4. f. B.

ARGENVIL. *conchyl.* t. 28. f. 12. & 11, t. 9. f. 9.
Berl. Magaz. 2. B. p. 604. t. 1. f. 4 & 6.

Dan. NET - NERITEN.

Germ. DIE FEINGESTRICKTE DECKEL - SCHNECKE.

Gall. L'ELEGANTE STRIEE.

long. 6 lin. lat. 4 lin.

Teſta ovato-oblonga, dura, cinerea, flaveſcens, vel umbra & maculis rubris ſuffuſa; ſtriæ convexæ ſpiras denſe ambiunt, area inter ſtrias ſpirales rurſus oculo armato minutiſſime ſtriata. *Anfractus* quinque convexi. *Apertura* circinnata anfractui vicino ex parte adnata. Umbilicus nec foramen ullum; rimula tantum inter aperturam & columellam. *Operculum* corneum, cochleatum ſtriis ſubtiliſſimis radiantibus.

Specimina, quæ ex Italia teneo, vel cinereo flaveſcentia immaculata, vel rubentia punctis ſaturatioribus ſpiras percurrentibus, cæterum eadem, figuræque utrique *Gualtieri* convenientia. Autor hic per limbum operculum intelligere videtur.

Figuræ ex *Argenville* deſumtæ minus bonæ ſunt; ſtriæ enim, quæ ſpiras teſtæ ambire debent, transverſim ſculptæ ſunt, limacique quatuor tentacula oculos apice præferentia tribuuntur, cui, *Nerita* ſi ſit, quantum a ſtructura teſtæ conjicere licet, duo tantum debentur, oculique ad baſin inſeruntur. Cur hujus ſingularitatis ne verbo meminerit Clariſ. *Geofroi*, qui procul dubio limacem viderat, & figuras *Argenville* citat, non video. Ex figura teſtæ, quæ in tabula anatom. *Liſteri* depreſſa & umbilicata eſt, diverſam crederem, niſi cætera convenirent. Cochlea hæc, ſi quæ tradit *Liſter*, exacte vera ſint, *Helicem* & *Neritam* jungit, huic enim tentaculis duobus, oculis ad baſin, operculo & ſexu diverſo, illi vero tentaculis apice globatis, contractilibus ac habitatione terreſtri affinis eſt. *Columna* primus *elegantiſſimam* dixit.

In Italia, Anglia & Gallia; terreſtris dicitur.

364. NERITA LICINIA.

NERITA teſta ovata, incarnata, ſtriata; apertura in puncto adnata.

TURBO teſta oblonga, obtuſa, rugoſo-ſtriata, apertura limbo dilatato, plano, crenato. Lin. *Syſt.* 639.

Bucci-

Buccinum tenuiſſime ſtriatum, ipſo ore circinnato, cui etiam limbus latus & ſtriatus. List. *ſynopſ.* t. 26. f. 24. Petiv. *gaz.* t. 118. f. 11.

Turbo lunaris, nimboſus, ore circinnato, limbo lato & ſtriato. Klein *oſtracod.* p. 55. t. 3. f. 71. a. b.

Dan. olive - neriten.

long. 8 lin. lat. 5½ lin.

Teſta dura, pellucida, intus & extus incarnato - rufa, transverſim & ſpiraliter ſtriata, at minus diſtincte, quam in N. *elegante*. Anfractus quinque. *Apertura* ſubcircinnata margine aliquantum dilatato, vix, ſeu in puncto, anfractum vicinum tangente. Foramen diſtinctum quidem, at non pervium.

Limbus latus & ſtriatus autorum in noſtra deeſt, at incrementum teſtæ nondum abſolutum videtur.

In Muſeis paſſim.

365. NERITA minuta.

Nerita teſta cylindracea apertura ovali.

Dan. lille - neriten.

long. 1¼ lin. lat ½ lin.

Teſta ſubvireſcens, cylindrica, æquali fere craſſitie, vertice obtuſo. *Anfractus* tres cum ſemiſſe, teretes; major reliquis duplo longior. *Apertura* ovalis, margine æquali.

Limacem, nec *Operculum* vidi, *Neritam* tamen eſſe vix dubito.

In Saxonia Weimarienſi. Clariſ. *Schröter* miſit.

366. NERITA LUNULATA.

NERITA teſta cylindracea alba, reticulata; apertura remota.

Dan. MAANE - NERITEN.

long. 7 lin. lat. $4\frac{1}{2}$ lin.

Teſta dura, pellucida, eleganter ſtriata, ſeu reticulata, uti Nerita *elegans*, ſtriæ vero minus convexæ. *Anfractus* quinque, faſciis quatuor vel quinque lunularum ruſeſcentium, vel ſi mavis lineis transverſim ſerpentibus notati; maximus minus ventricoſus, quam in congeneribus. Juncturæ ſpirarum punctis elevatis, ſive papillis parvis diſtinctæ; hæ partem anfractus, qua vicino adjacet, quaſi crenulatam reddit. *Apertura* circinnata ultra anfractum vicinum porrecta. Foramen uti in N. *Licinia*. Lunulæ rufæ evaneſcunt.

In Muſeo *Fabriciano*.

367. NERITA LABEO.

NERITA teſta oblonga, umbilicata, fuſca, punctis convexis ſtriata, labro albo, dilatato.

BUCCINUM umbilicatum quinque orbium admodum tenuiter ſtriatum & cancellatum, ipſo ore rotundo. LIST. *Syn.* t. 25. f. 23.

LICINA rugoſa, utrinque ſtriata, ore marginato, margine horizontali crenato. BROWN *jam.* p. 401. t. 40. f. 5.

Dan. FLAB - NERITEN.

long. 15 lin. lat. 11 lin.

Teſta

Teſta pellucida, fuſca, punctis convexis ſplendidis in utrumque ſenſum ſtriata. Anfractus quinque protuberantes. Apertura circinnata, margine dilatato, complanato, integro, utrinque albo, anfractui vicino adnato. *Umbilicus* diſtinctus, pervius. Faux fuſca, glabra.

In Muſeo *Moltkiano*.

368. NERITA LIGATA.

NERITA teſta ventricoſa, acuminata, ſubumbilicata, faſciis rubris, apertura circulari.

Dan. BÆNDEL-NERITEN.

long. 6-11 lin. lat. 6-10 lin.

α *faſciis duabus ſubæqualibus.*

β *faſciis quatuor, infima remota.*

γ *faſciis quinque, infima remota, latiore.*

Teſta perquam dura, pellucida; alba vel lutea, ſubtiliter & eleganter in non detritis in utrumque ſenſum ſtriata, faſciis quatuor, vel quinque rubris notata. *Anfractus* quinque vel ſex valde convexi, & eximie decreſcentes. Apertura circinnata, columellæ adnata, margine craſſiuſculo. Faſciæ intus ac extus æque conſpicuæ. Centrum ſubumbilicatum, pervium.

Variat numero faſciarum & defectu ſtriarum circularium in inferiori pagina.

In Muſeo *Spengleriano*.

369. NERITA FASCIATA.

NERITA teſta ovato-ventricoſa, alba, faſciis tribus rubris, ſplendidis.

BUCCINUM fluviatile craſſum, ſex ſpiris finitum, læve, albidum, tribus faſciis ſubrubris per dorſum excurrentibus notatum. GUALT. *teſt.* t. 5. f. M.

CHIOCCIOLA *maggiore.* GIN. *op. poſt.* p. 49. Tom. 2. t. 1. f. 6.

Dan. BAAND-NERITEN.

long. $9\frac{1}{2}$ - 15. lat. $7\frac{1}{2}$ - 10 lin.

Teſta alba, glabra, pellucida, tenuiſſime transverſim ſtriata, ſubnitens; faſciis in extimo anfractu tribus, in proximo duabus rubris, ſplendidis. Anfractus quinque, minus convexi, quam in præcedente; minus junctura diſtantes. Mucro verticis acutus. *Apertura* obovata, minus rotundata, quam in *vivipara*; centrum perforatum foramine minori. *Faux* albo-cæruleſcens.

Gualtieri figura noſtra major; præcedentis varietas?

In Italia & Saxonia. Clariſſ. *F. Baſſi* & *Schröter* miſerunt.

370. NERITA VIVIPARA.

NERITA teſta ovato-ventricoſa, vireſcente, faſciis tribus lividis, obſcuris.

NERITA teſta oblonga, ſubvirideſcente, faſciis tribus lividis, anfractibus quinque. GEOER. *teſt.* 2.

COCHLEA vivipara. SWAMMERD. *Bibl. Nat.* p. 73-78. t. 9. f. 5-13.

COCHLEA

Cochlea maxima fuſca, ſive nigricans, faſciata. List. *an. angl.* t. 2. f. 18.

Cochlea vivipara, faſciata. List. *Synopſ.* t. 126. f. 26. tab. anat. 6.

Cochlea veſca, orbibus fere elatis. Petiv. *gazophyl.* t. 99. f. 16.

Cochlea maxima, virideſcens, faſciata, vivipara. List. *exerc anat. de Bucc.* p. 17. t. 2. f. 12. 5.

Buccinum fluviatile fuſcum, ſive nigricans, faſciatum quinque orbibus præditum. Gualt. *teſt.* t. 5. f. A.

Helix teſta imperforata ſubovata, obtuſa, cornea, cingulis fuſcatis, apertura ſuborbiculari. Lin. *Syſt.* 690.

Frisch *inſ.* vol. 13. t. 1.

Argenville *Conchyl.* 11. t. 8. f. 2.

Berl. Magaz. 4. B. p. 234 - 242. t. 7. f. 4 - 9.

Chiocciola *mezzana.* Ginan. *op. poſt.* Tom. 2. p. 49. t. 2. f. 8.

Dan. foster-neriten.

Germ. die lebendig gebährende.

Gall. la vivipare à bandes.

long. 11. lat. 10 lin.

Teſta tenera, pellucida, glabra, viridi-flaveſcens, faſciis tribus lividis obſcuris anfractum cingentibus, aliquantum nitens, ſubtiliſſime longitudinaliter ſtriata. *Anfractus* quinque vel ſex valde convexi, mucro in vertice acutus, tenuis, minime obtuſus. *Apertura* ovalis margine interiori parum reflexo, exteriori acuto, ſinus ſive foramen in centro ſub flexura marginis. In faſciatis, licet faſciæ injuria aëris pereant, veſtigia tamen earundem in teſta lumini obverſa conſpiciuntur. Faux albida vel cæruleſcens.

Opercu-

Operculum & limacem haud vidi. Datur alia diaphana tenerrima tota vireſcens absque omni faſcia aut macula, cæterum in omnibus eadem, quæ Cochlea vivipara altera noſtra teſta tenuiori. *Liſt.* Syn. Mantiſ. t. 1055.

Ex *Swammerdamio* conſtat, juniores teſtas ſetis criſtallinis ornari, & dehinc criſtallinam Clariſ. *Martini* non eſſe ſpeciem a vivipara diverſam. Specimen quoque, quod ipſe mihi miſit, tenerrimum, pellucidum, faſciis lividis inſcriptum absque omni ſeta, quæ uti me in litteris certiorem facit, in ſicca teſta deletur.

Hujus cochleæ marem a foemina primo intuitu diſtingui teſta nempe in mare minore, tentaculoque dextro, in quo genitalia maris continentur, ſiniſtro duplo latiore, apiceque obtuſo, *Liſter* in anatom. docet, ſic ego alteram *Cyclopis* maris antennam medio genitalibus incraſſatam deprehendi.

In fluviis & foſſis extra Daniam.

371. NERITA DISSIMILIS.

NERITA teſta ſubovato - acuminata, luteo - albeſcente; labro nigro.

Dan. ULIGEDAN - NERITEN.

long. 9½ lin. lat. 7½ lin.

Inter N. *jaculatorem* & *viviparam* ambigit, diverſa quidem videtur, licet differentia difficulter exprimatur.

Teſta pellucida glabra fuſceſcente - alba; albedo maxime in inferiore anfractus parte conſpicitur, quaſi faſcia lata alba cincta eſſet. *Anfractus* ſex convexitate inter *viviparam* & *faſciatam* media. *Apertura* diſtinguitur margine minus acuto, nigro, nitido. *Operculum* pellucidum luteo - fuſcum, nitidum.

In Muſeo *Spengleriano*.

372. NERI-

372. NERITA JACULATOR.

NERITA teſta oblonga, cornea, vertice acuto.

NERITA teſta oblonga, pellucida, cornea, anfractibus quinque. GEOFR. *teſt.* 3.

COCHLEA parva, ſubflava, intra quinque ſpiras finita. LIST. *an. angl.* t. 2. f. 19.

COCHLEA parva, pellucida, operculo teſtaceo, cochleatoque clauſa. LIST. *Synopſ.* t. 132. f. 32.

BUCCINUM fluviatile, parvum, ſubflavum, lineis transverſis undique ſignatum, ſpiris quatuor finitum. GUALT. *teſt.* t. 5. f. B.

HELIX teſta imperforata, ovata, obtuſa, impura, apertura ſubovata. LIN. *Syſt.* 707.

TURBO fluviatilis minor operculatus janitor dicendus coloris fuſci, ventre ſatis proruberante, & in mucronem non ita acutum breviorem deſinente. SCHLOTTERB. *act. helv.* vol. 5. t. 3. f. 19. 20.

Berl. Magaz. 4. B. p. 243-46. t. 7. f. 12. 13.

Gazette litt. de Berlin.

Dan. SÖE- NERITEN; BOMBE- KASTEREN.

Germ. DER THÜRHÜTER.

Gall. LA PETITE OPERCULEE.

long. $\frac{6}{8}$ - $4\frac{1}{4}$ lin. lat. $\frac{1}{2}$ - 2 lin.

Teſta ovato-acuminata, cornea, diaphana, glabra, in quibusdam limo obducta, fuſca, brunnea, absque maculis aut faſciis. Unicum tantum ſpecimen reperi, cui faſciæ albæ anfractus transverſim percurrunt. *Anfractus* quatuor, quinque, raro ſex teretes, convexi; variant magis vel minus elevati. *Apertura* ovata;

Centrum absque omni foramine, etiam in junioribus. *Faux* teſtæ concolor. *Operculum* ovatum, corneum, pellucidum, album, *Limax* niger punctis aureis inſignitus.

Nomen triviale *tentaculatum* a tentaculis omni cochleæ communibus, item *janitoris* ab operculo, quo limax teſtam claudit, deſumtum toti generi commune deſerui, aliudque a ſpectaculo æque miro & jucundo, quod 16 Julii 1769 præbuit, impertii.

Nerita, quam in vaſe vitreo aqua impleto per aliquot dies ſervaverim, parieti affixa pallium in aperturam protuberantem, emarginatam, per quam in interiora limacis inſpicere licuit, latere dextro prolongaverat; ex hac quovis temporis minuto in diſtantiam unius unciæ vel ultra globuli duo vel tres albi ſumma vi ejaculabantur; tantum a limace remotus quivis globulus in duos pedicellos reſolvi videbatur, quos ingenti celeritate vibrando extra conſpectum aufugit. Quidam globulorum momentum temporis quieſcendo corpus oblongum album, pedicello terminatum oſtendebant, confeſtim vero formam ſphæricam natando receperunt; pedicellus hic licet unicus incredibili vibrationis celeritate duos, tres & plures ſimulabat; ita ut ſphærulæ glandes ardentes e machina bellica ſenſim ejaculatos prorſus referrent. Exploſio ultra horæ ſpatium continuabatur. Limax interea temporis tentaculis ſtrictis, omnibusque artubus immotus parieti vaſculi inhærebat. Examini microſcopico hæc corpuſcula ſubjicere optaviſſem, at ope vitri inquiſitorii ea fruſtra in aqua quæſivi; an ova limacis? an vermiculi in inteſtino limacis hoſpitantes? Dum hæc & alia mente volvo, in tabulam novam *Swam.* Bibl. nat. forte incidi, ac ſimilitudine figurarum 8 & 11 cum corpuſculis dictis non parum excitatus, in earundem deſcriptionem ſedulus inquiro. In motu dum eſſent, fig. undecimam, in quiete vero momentanea octavam, quæ pullos *Neritæ* ſiſtit, referebant. Quoniam vero motus incitatus concentricus ſphæram oculo ſiſtere valet, patet, corpuſcula hæc generi vermiculorum deberi. Vermiculi acutiſſimi autoris, ex utero limacis Neritæ viviparæ exciſi & aquæ immiſſi in celerem gyrum etiam rotabantur. Quo vero mechanismo

limax

limax ſeſe his animalculis liberare valet, majoris indaginis erit.

In lacubus & rivis, vulgaris.

373. NERITA ANGULARIS.

NERITA teſta imperforata, vireſcente, anfractibus ſpiraliter angulatis, fauce alba.

COCHLEA virginiana e flavo virideſcens non faſciata. LIST. *Syn.* t. 127. f. 27.

Dan. KANT-NERITEN.

long. 12 lin. lat. 6 lin.

Teſta opaca, conica, glabra vireſcens ſtriis transverſis, ſubtiliſſimis, ſpiralibus vero tribus in ſingulo anfractu elevatis, acutis. *Anfractus* quinque fere perpendiculares. *Apertura* rotundata, ad anfractum vicinum in angulum producta. *Foramen* vel umbilicus nullus. *Faux* calcarea. Striæ ſpirales in quibusdam evaneſcunt.

Figura *Liſteri* noſtris major, cæterum refert.

In flumine Chinenſi emporium *Canton* alluente.

374. NERITA CONTORTA.

NERITA teſta turbinata, cinerea, perforata, vertice truncato.

ARGENVILLE *Conchyl.* 11. t. 8. f. 5. ſiniſtrorſa.

Dan. SNIRKEL-NERITEN.

long. $2\frac{1}{2}$. lat. $1\frac{1}{2}$ lin.

Teſta pyramidalis, ſqualida, opaca. *Anfractus* vix quinque, convexi ſibi invicem fere perpendiculariter impoſiti; quartus & quintus in ipſo apice depreſſi, hinc lateribus tantum tres numerantur, & apex truncatus conſpicitur. *Apertura* circinnata eſt, ac *centrum* uti in antecedente perforatum.

Unicum tantum exemplar reperi, limace deſtitutum, hinc nec operculum, nec hoſpitem vidi.

Apex in figura acuta non ſatis depreſſus eſt.

In foſſa limoſa nemoris, rariſſima.

375. NERITA ATRA.

NERITA teſta ſubulata, lævi, apertura antice poſticeque ſinuata.

BUCCINUM atro-purpureum, læve, oris vertice ſive roſtro paululum ſinuato. LIST. *Syn.* t. 115. f. 10.

STROMBUS ater teſta turrita, lævi, labro antice poſticeque ſoluto. LIN. *Syſt.* 516. Mus. L. U. 624.

STROMBUS paluſtris lævis. RUMPH. *Conchyl.* t. 33. f. R.

PETIV. *gaz. amboin.* t. 13. f. 16.

SEB. *theſ.* 3. t. 56. f. 13. 14.

Dan. SORT-NERITEN.

Germ. DIE GLATTE SUMPFNADEL.

Belg. GLADDE MOERASCH PEN.

Angl. BLAKISH RIVER PIG.

long. 26 lin. lat. 6 lin.

Teſta dura, ex fuſco-nigra, lævis, ſubnitens. *Anfractus* duodecim non prominentes, id eſt planiuſculi, ſubtiliſſime transverſim

verſim ſtriati; junctura adeo cavata, ut teſta ſulco cincta videatur. Apertura ovata; labium exterius prominens craſſum, juxta columellam valde, juxta anfractus parum emarginatum; labium interius adnatum, album; faux & columella protuberans, alba.

Variat tota extus caſtanea, intus alba.

In Muſeo *Spengleriano.*

376. NERITA LINEATA.

NERITA teſta ſubulata, fuſca, lineis ſeptem ſpiralibus impreſſis, apertura ovata.

TUBA phonurgica, fluviatilis, ſpiris planis carminata in longum, longitudinalibus lineis & faſciis ſpiralibus inſignita. KLEIN. *oſtrac.* p. 54.

BUCCINUM LIST. *Syn.* t. 116. f. 11.

Berl. Magaz. 4. B. p. 348. t. 10. f. 50.

Dan. LINIE - NERITEN.

Germ. FLUS - NADEL MIT GESTREIFTEN BÆNDERN.

long. 18 lin. lat. 5 lin.

Teſta minus exquiſite ſubulata, quam quæ ſequitur, rufofuſca, glabra Anfractus decem, lineis concentricis 7 in parte cujusvis baſin ſpectante exarati, in infimo tamen lenticulæ ægre conſpicuis; hic carina aliquantum a ſutura diſtante notatur. *Apertura* ovata, labio ſiniſtro columellæ incumbente. *Faux* cæruleſcens, glabra. Striæ longitudinales, & transverſæ in fauce, quales in *Liſteri* figura; in noſtra nullæ, nec faſciæ, uti in *Kleinii*, ſed lineæ excavatæ ſpirales. Cæterum idem.

In Muſeo *Spengleriano.*

377. NERITA PUNCTATA.

NERITA teſta, ſubulata, luteſcente, faſcia juxta ſuturam candida ſtriis rubris; anfractibus minoribus ſulcatis.

BUCCINUM breviroſtrum, claviculatum, ſtriatum, maculatum, orbibus quaſi duplicatis diſtinctum. LIST. *Syn.* t. 979. f. 36.

STROMBUS fluviatilis, lævis. PETIV. *gaz. amboin.* t. 13. f. 15.

STROMBUS fluviatilis. RUMPH. *Conchyl.* t. 30. f. P.

Berl. Magaz. 4. B. p. 338. t. 9. f. 39. an GUALT. *teſt.* t. 6. f. E. F. non liquet.

KNORR. *Canchyl.* 1. p. 13. t. 8. f. 7.

Dan. LIBERIE-NERITEN.

Germ. DIE PUNCTIRTE, BANDIRTE NADEL.

long. 18½ lin. lat. 5 lin.

Teſta elongato-ſubulata, tenera, pellucida, glabra, luteſcente pallida. Anfractus 12 vel 13, omnes juxta juncturam faſcia alba cincti, majores ſex læves, minores in ipſa faſcia ſulcati; præter hæc anfractus in faſcia ſtriis abruptis rubris extra eandem atomis rubris, obſoletis notantur; hi in majori ſpira omnino deleti ſunt. Apertura obovata. Faux & columella albida. Pone axin ſtriæ perpaucæ concentricæ.

Poſſet quidem Nerita noſtra eſſe Stromb. *Rumphii*, non vero ſat conſtat. Figura *Knorrii* noſtra major & albior, apexque aperturæ diverſus.

In Muſeo meo.

378. NERITA

378. NERITA TUBERCULATA.

NERITA testa subulata, cinerea, transversim striata; anfractibus noduloſis, strigisque sanguineis.

UNICORNU fluviatile rugosum, vesicum nigricans. PETIV. *gaz.* t. 100. f. 11.

TURBO fluviatilis similis lucidus cinerei coloris & subrubris lineis undatim per longitudinem radiatus. GUALT. t. 6. f. G.

BUCCINUM fluviatile atro-purpureum, fasciatum & striatum, item in medio quovis orbe nodis quibusdam obliquis cinctum. LIST. *Synopſ.* t. 119. f. 4.

TUBA phonurgica, carminata bifariam, atro-purpurea, in medio orbe nodis obliquis picta. KLEIN. *oſtrac.* p. 34.

Berl. Magaz. 4. B. p. 349. t. 10. f. 51. noſtris major.

Dan. KNORTE-NERITEN.

Germ. DIE DUNKEL PURPURFARBENE SCHRAUBEN-SCHNECKE.

long. 4-14 lin. lat. $1\frac{1}{4}$-4 lin.

Multa cum B. *ſcabro* communia habet.

Teſta elongata, acuminatiſſima, ſive subulata, albida, pellucida, striis convexis, spiralibus, concoloribus, strigisque undulatis, sanguineis notata, sæpe limo obducta, cinerea. *Anfractus* octo vel undecim, lineis tuberculatibus, longitudinalibus, apice non acutis, in singulo sedecim; quævis linea componitur novem tuberculis. *Apertura* ovata, labro exteriore acuto, interiore adnato nitido, in majoribus candido, glabro. *Faux* concolor strigis pellucentibus.

Unico specimini operculum aderat, cæteris defuit; hinc Neritis sepoſui, donec hoſpes aliquando innotuerit.

In

In quibusdam majoribus tubercula & ſanguineæ ſtrigæ obliterantur.

In littore Coromandel cum B. *ſcabro* frequens.

379. NERITA AURITA.

NERITA teſta turrita, fuſco-faſciata; anfractibus muricata; apertura ovata.

BUCCINUM faſciatum mediis orbibus muricatis. LIST. *Syn.* t. 121. f. 16.

TYMPANOTONOS fluviatilis faſciatus & muricatus per medios orbes. KLEIN. *oſtrac.* p. 30.

Berl. Magaz. 4. B. p. 351. t. 10. f. 55.

α *alba, faſciis fuſcis.*

β *flava, faſciis fuſcis.*

γ *flava, faſciis fuſcis, margine junĉturæ albo.*

Dan. ÖRE-NERITEN.

Germ. DIE AFRICANISCHE TROMMEL-SCHRAUBE.

long. 16 lin. lat. 5 lin.

Teſta duriuſcula, pyramidata, lutea, fuſco-faſciata & tuberculis muricata. Tubercula lutea, ſeptena in ſingulo anfractu, craſſa, obtuſa, compreſſa, in minoribus truncata, & obliterata. Faſciæ tres fuſcæ, in α & β ſæpe in maculas diſruptæ; in γ margo quo ſpiræ junguntur, albus; teſta cæterum per ſpiras ſubtiliſſime ſtriata eſt. Anfractus ſeptem. Apertura ovata, ad anfractum coarctata. Labium exterius repandum. Faux & columella alba.

In Muſeo meo.

380. NE-

380. NERITA ACULEATA.

NERITA testa turrita, fusca, tuberculosa; anfractibus muricatis; labro depresso, crenulato.

CERITHIUM Popel. ADANSON *test.* t. 10. f. 2.

BUCCINUM fuscum, striatum & muricatum. LIST. *Syn.* t. 121. f. 17.

BUCCINUM fuscum, primis orbibus muricatum, cæterum striis nodo's exasperatum. LIST. *Syn.* t. 122. f. 20.

TYMPANOTONOS fluviatilis, striatus & muricatus, fuscus. KLEIN. *ostrac.* t. 2. f. 39.

ARGENV. *Conchyl.* t. 11. f. &.

Berl. Magaz. 4. B. p. 353. t. 11. f. 58.

Dan. BROD-NERITEN.

Germ. DIE BRAUNE GEZACKTE TROMMEL-SCHRAUBE.

long. 18 lin. lat. 6 lin.

Testa pyramidata, duriuscula, brunneo-fusca. Anfractus duodecim; quivis fasciis quinque tuberculatis cinctus, media nempe tuberculis majoribus, novem in singulo anfractuum, quinque inferiorum conicis aculeiformibus, exterioribus fasciis nodulis interstinctis. Junctura spirarum difficulter distinguuntur. In minoribus tubercula obliterata sunt. Subtus striis pluribus elevatis concentricis notatur. Apertura juxta columellam & juxta anfractum aliquantum canaliculata. Labium exterius subdepressum medio porrectum, margine crenulatum, interius reflexum, adnatum, album. Faux alba.

In paludosis Africæ torridæ.

381. NERITA FLUVIATILIS.

NERITA teſta dilatata, convexa, albis maculis reticulata.

NERITES fluviatilis e cæruleo vireſcens, maculatus, operculo ſubrufo, lunato, & aculeato donatus. LIST. *an. angl.* t. 2. f. 20.

NERITES fluviatilis e cæruleo vireſcens maculatus, operculo ſuberoceo, aculeatoque donatus. LIST. *Syn.* t. 141. f. 38.

NERITA fluviatilis parva, fragilis, ſubnigra, candidis punctis adſperſa, varietates ex cæruleo, viridi, candido, roſeo, fuſco & pullo colore diverſimode maculatæ, punctatæ, undatim & reticulatim pictæ, operculo ſubrufo, lunato & aculeato donatæ. GUALT. *teſt.* t. 4. f. M. & LL.

NERITA teſta rugoſa, labiis edentulis. LIN. *Syſt.* 723.

NERITA teſta lævi, vertice carioſo, labiis edentulis. LIN. *Syſt.* 724.

NERITA teſta lata, compacta, ſcabra, e cæruleo vireſcente, apertura ſemi-ovata, anfractibus duobus. GEOFR. *teſt.* 5.

VALVATA fluviatilis marmorea. SWAMMERD. t. 10. f. 2.

ARGENVIL. *Conchyl.* 1. t. 37. f. 3. 11. t. 8. f. 3.

VITTA e cæruleo vireſcens, operculo ſuberoceo. KLEIN *oſtrac.* p. 20. §. 52.

Berl. Magaz. 4. B. p. 271. t. 8. f. 27. 28.

PETIV. *gazophyl.* t. 91. f. 3.

GEVE t. 24. f. 258 - 265.

Dan. FLOD-NERITEN.

Germ.

Germ. DIE FLUSS- NERITE.

Gall. LA NERITE DES RIVIERES.

long. 4. lat. 2 lin.

Teſta dura, limo depurgata, glabra, ſupra convexa, ſubtus planiuſcula, nigra, vireſcens, vel flava maculis oblongis parvis albis teſſulata. *Anfractus* duo, alter maximus totam fere teſtam formans; alter ſeu apicis minimus, non vertici teſtæ, ſed lateri antico impoſitus. *Apertura* lunata absque dentibus, labro interiore glabro, aſcendente. *Operculum* lunatum nitidum, ſupra ſtriis ſubtiliſſimis divergentibus.

Colore valde variat; varietas pulchra eſt teſta flaviſſima maculis albis & faſciis tribus rufis notata.

Inter littoralem & fluviatilem *Linnæi* nullam differentiam video, quædam enim ſpecimina in lacubus reperta verticem cariosum habent.

In rivis ad oſtia lacuum vulgaris.

382. NERITA RUBELLA.

NERITA teſta dilatata, convexa, nigricante, labio interiore crenulato.

NERITA teſta lævi rudi, ſpirula excavato - oculata, labio interiore lævi crenulato. LIN. *Syſt.* 726.

NERITA fluviatilis maxima, leviter ſtriata, ſuperne obſcure ex nigro virideſcens, ore citrino, labio interiore plumbeo & denticulato. GUALT. *teſt.* t. 4. f. H H.

VALVATA fluviatilis, ſive rubella. RUMPH. *Conchyl.* t. 22. f. H.

VALVATA nigra, alias rubella & Erythrophthalmos dicta. SEB. *theſaur.* 3. t. 41. f. 23 - 26.

Berl. Magaz. 4. B. p. 279. t. 8. f. 31.
PETIV. *gazophyl.* t. 11. f. 4.
LIST. *Syn.* t. 143. f. 37.
SEB. *theſ.* 3. t. 41. f. 23-26.

Dan. RÖD-NERITEN.
Amboinenſ. BIA-MATTACOU.
Germ. ROTH-AUGE.
Belg. ROOD-OOG.
Angl. REDNERIT.

long. 16 lin. - 14. lat. 12 lin. - 10.

Teſta dura, læviuſcula, lumini obverſa pellucida, nigra vel rufeſcens, transverſim ſtriata, granis ovis *Hirudinis* ſive coccis *Heſperidum* haud abſimilibus plerumque obſita. Anfractus duo; alter maximus totam teſtam formans, apice in dentem acutum terminatus, alter minimus in ipſo vertice infra dictum dentem, hic cum dente in quibusdam prorſus deperditus. *Apertura* ampla lunata, margine acuto. *Faux* glabra, nitida, fundo læte cærulea vel albida, juxta marginem faſcia lata fulva cingitur. Labium interius aſcendens nitidum, margine transverſo crenulatum.

Grana, quæ dorſum cochleæ frequenter occupant, eſſe ipſius Neritæ pullos, *Rumphius* docet; horum ducenta triginta quinque in uno ſpecimine numeravi, ovalia, convexa, extus luteo-albida, intus alba, moleculis referta, corpuſcula hæc ſæpe abſtergantur, remanente in teſta circulo ovali albo. Niſi obſtaret autoritas exactiſſimi *Rumphii*, ovula peregrini animalculi putarem.

Cognomen *Rubellæ* huic ab incolis, quibus edulis eſt, & a primo inventore ob oculi imaginem, quam pars adverſa offert, inditum reſtituere convenit, cum *Nerita* fluviatilis, autore *Rappolt*, pullos æque dorſo gerat.

In Indiæ fluviis.

383. NE-

383. NERITA CORONA.

NERITA teſta dilatata, convexa, ſtriata, fuſca, aculeis longis nigris.

NERITA teſtæ anfractibus coronatis ſpinis, labiis edentulis. LIN. *Syſt.* 720. MUS. L. U. 676.

VALVATA ſtriata, ſpinoſa. RUMPH. *Conchyl.* t. 22. f. O.

VOLUTA ſpinoſa. PETIV. *gaz. amboin.* t. 3. f. 4.

URCEUS ſpinoſus. KLEIN *oſtrac.* p. 47. n. 13.

ARGENV. *Conchyl.* 1. t. 7. n. 2.

Berl. Mag. 4. B. p. 277. t. 8. f. 30.

Dan. TORNE- KRONE - NERITEN.

Amboinenſ. HEHUL.

Belg. RIVIERT DOORNTIES.

Germ. DORNICHTE KLAPPEN- SCHNECKE, FLUSS-DOERNCHEN.

Angl. THORNEY- SHELL.

long. $5\frac{1}{2}$ lin. lat. $4\frac{1}{2}$ lin.

Teſta fuſca, pulchre ſtriata. *Anfractus* vix duo, alter maximus, medio quaſi connatus, fiſſura in margine notatus, alter minimus lateri antice inſertus; in ſutura anfractus aculei erecti, acuti, longi, fragiles, nigri, quinque, quorum maximus ſex lineas æquat. *Apertura* lunata, albida, margine fuſco. *Labrum* interius aſcendens, glabrum, nitidum, album, medio fere margine denticulo inſtructum. *Operculum* nitidum, cæruleum, ſtriatum, margine curvato ſanguineo.

In Aſiæ fluviis.

XXIX. VALVATA.

Vermis cochleatus, tentaculis binis ſetaceis, oculis ad baſin poſtice.

384. VALVATA CRISTATA.

Dan. PLUMAS-NERITEN.

diam. 1¼ lin.

Teſta griſea, vel luteſcens, ſupra planiuſcula, ſubtus umbilicata. *Anfractus* tres teretes, convexi; extimus elevatus. *Apertura* exacte circinnata, anfractui vicino incumbit. *Operculum* orbiculare pellucidum, extrorſum convexum, introrſum concavum, lineis concentricis notatum; lateri interiori affigitur ligamentis duobus, quorum ope aperitur & clauditur; dum limax incedit, dorſo ejus inhæret.

Punctula oviformia teſtæ copioſe inhærent.

Limax griſeus a dextro latere inſtruitur *ſpiculo*, tentaculum mentiente, quod, quoties teſta exit, exſeritur, retrorſumque aliquantum curvatur. Hoc a tertio tentaculo Neritæ *Reaumurii* & *Planci*, ac a lingula Trochi & Turbinis *Adanſonii* diverſum eſt; teres enim, acuminatum rectaque plerumque extenſum ſiſtitur. *Limax* præterea a latere ſiniſtro *criſta pennacea* branchiali inſignitur; hanc rarius conſpiciendam præbet; de hinc pictor meus, licet limax circumvagaretur ſpiculum præferens, paucis horis fruſtra conſumtis, ſpe criſtam videndi excidit, figuramque incompletam reliquit. *Criſta* pulcherrima, pellucida, radiis utrinque duodecim decreſcentibus pinnata eſt. Pes limacis antice in duos lobos acuminatos fiſſus eſt, quod non in cæteris obtigit, proboſcisque pede anguſtior in dimidiam antennarum longitudinem porrigitur.

Limax

Limax rariſſime teſta ſua exit, diu enim teſtas in aqua ſervavi, hoſpitemque emortuum credidi, ſpe demum cum cognoſcendi omni deſtituto tandem apparuit, ac patientiam amoenitate ſpectaculi compenſavit. Poſthac aliquoties vidi, quamvis ægre eliciatur, nimium enim timidus procellæ, ultra horæ quadrantes in ima corporis protruſione acquieſcit, & ad minimum motum fæſe rurſus condit, portamque claudit. Sæpe quoque nulla cauſa extranea motus, propoſitum exeundi mutat, ſpemque obſervatoris fallit, veterumque proverbium, quod hominem nemini fidentem, *cochlea diffidentiorem* dicit, naturæ conſentaneum eſſe probat.

A Nerita 4 *Geofr.* differt teſta depreſſa, non ovata, oculis poſticis & ſpiculo non motatorio.

In paludoſis. Larvæ *Phryganearum* cucullos ſuos, quales jam olim pingebantur, teſtis hujus ſpeciei frequentes tegunt, vid. icon. apud *Geſn.* de aquat. paralip. p. 21.

XXX. ANCYLUS.

Vermis cochleatus, tentaculis binis truncatis, oculis ad baſin interne.

385. ANCYLUS LACUSTRIS.

ANCYLUS teſta membranacea, mucrone verticis ſubcentrali, apertura oblonga.

ANCYLUS GEOFR. *teſt.* 1.

PATELLA teſta integerrima, ovali, membranacea, vertice mucronato reflexo. LIN. *Syſt.* 769.

PATELLA

PATELLA piccoliſſima. GINANI *op. poſt.* Tom. 2. p. 50. t. 2. f. 11.

ARGENV. *Conchyl.* 1. t 27. f. 1. le troiſieme Lepas & 2. t. 8. f. 1. figura minus bona.

Berl. Magaz. 4. B. p. 230- 34. t. 7. f. 2. & 3.

Geſellſchaftl. Erzähl. 1. th. p. 265. Patella.

Dan. SÖE- SKÆLLET.

Germ. SCHÜSSEL- MUSCHEL; NAPF- MUSCHEL.

Gall. ANULE, PATELLE, LEPAS FLUVIATILE.

long. $1\frac{1}{2}$ - $2\frac{1}{3}$ lin. lat. $\frac{2}{3}$ - 1 lin.

Teſta ovato-oblonga, alba, pellucida, tenerrima, ſupra convexa, mucrone minimo acuto, ægre viſibili, a centro aliquantum in anticam teſtæ partem remoto, aliquantisper recurvatum. Subtus concava, margine acuto, quo objectis arcte affigitur, ut non absque vi avelli poſſit.

Limax non continuo eidem loco affigitur, ſed lente in diverſa movetur. *Tentacula* & totum animal intra teſtam condita; in figura Clariſ. *Argenv.* quidem extenſa ſunt, at mihi extra teſtam, licet multos dies plures in vaſe vitreo ſervaverim, nunquam apparuere.

Foliis Nymphææ, Potamogetonis, & Stratiotis adhæret.

Non modo fluviatilis, marinus quoque eſt, menſe enim Decembri 1757 eundem conſervis maritimis inhærentem e mari Balthico extraxi, ac aliquot dies vivum ſervavi.

In rivis & lacubus paſſim.

386. ANCYLUS

386. ANCYLUS FLUVIATILIS.

ANCYLUS teſta ſubcornea, mucrone verticis marginali, apertura ovali.

PATELLA fluviatilis fuſca, vertice mucronato inflexoque. LIST. *an. angl.* t. 2. f. 32.

PATELLA fluviatilis exigua, ſubflava, vertice mucronato inflexoque. LIST. *Syn.* t. 141. f. 39.

PATELLA fluviatilis minor, candida, vertice mucronato, incurvo, ore ovali. GUALT. *teſt.* t. 4. f. A. A.

PATELLA fluviatilis fuſca vertice mucronato incurvo, inflexoque. GUALT. *teſt.* t. 4. f. B. B.

ARGEN. *Conchyl.* 1. t. 27. f. 1. la Patelle, qui a un capuchon.

Berl. Mag. 4. B. t. 7. f. 1. p. 131.

Dan. FLOD-SKÆLLET.

Germ. DIE DRAGONER-MÜTZE.

long. $2\frac{1}{2}$ lin. lat. 2 lin.

A præcedente ſplendide diverſus, cum quo plerumque confunditur. Figuræ minus bonæ ſunt; *Argenville* a *Liſter*, Clariſ. *Martini* ab utroque figuras mutuatus eſt. Mucro in Liſteri figuris nimis groſſus, & a reliqua teſta quaſi disjunctus, in Gualtieri nimis elongatus eſt, ſtriæque in teſta longitudinales ingenio pictoris tribuendæ.

Teſta valde fornicata, pellucida, alba, ſtriis raris concentricis eroſa; ſubſtantia calcarea durioreque, quam in præcedente. Mucro parvus obtuſus, minime in roſtrum productus, in altera verticis ora margini teſtæ fere perpendicularis. Altitudo teſtæ vix tertiam

partem minor ſua baſi, cum ultra dimidium in fluviatili ſit. *Limax* ignotus neminique huc usque viſus eſt.

In ripa ſabuloſa fluvii *Ilm* Saxoniæ. Clariſſimus *Schröter* miſit.

XXXI. TELLINA.

Vermis conchaceus, ſiphone duplici, longo.

387. TELLINA RIVALIS.

TELLINA teſta globoſa, gibba, glabra, umbone obtuſo.

TELLINA globoſa, glabra, cornei coloris: ſulco transverſali. LIN. *Suſt.* 72.

MUSCULUS exiguus piſi magnitudine, rotundus, ſubflavus, ipſis valvarum oris albidis. LIST. *anim. angl.* p. 150. t. 2. f. 31.

MUSCULUS fluviatilis, æquilaterus, transverſim ſtriatus, fuſcus & duabus vel tribus lineolis nigris cinctus. GUALT. *teſt.* t. 7. f. B.

MUSCULUS fluviatilis æquilaterus, lævis, rotundus, piſiformis, ex rubro flaveſcens, ipſis valvarum oris albidis. GUALT. *teſt.* t. 7. f. C.

MUSCULUS fluviatilis, ſtriatus, ſubflavus, pellucidus. GUALT. *teſt.* t. 7. f. C. C.

ISOCARDIA

Isocardia lævis; Bucardia. Klein. *oſtrac.* §. 364. c. p. 140.

Chama globoſa glabra, cornei coloris, ſulco transverſo. Geofr. *teſt.* 1.

Berl. Magaz. 4. B. p. 449. t. 11. f. 63. B.

Argenv. *Conchyl.* 1. t. 28. n. 9. f. 4. minus bona, & 11. t. 8. f. 10.

Geſellſchaftl. Erzähl. 1. th. p. 265. Chama.

Dan. bæk-tellinen.

Germ. gien-muschel; breit-muschel.

Gall. came des ruisseaux.

diam. $\frac{1}{2}$ - 4 lin.

Color *Teſtæ* variat, pallidus, albus, cæruleo-cinereus, fuſcus, flavus, coſta nigra cinctus. Hæc eſt *ſulcus* transverſalis auctorum in quibusdam verſus cardinem, in aliis verſus aperturam, in nonnullis prorſus nullus.

Teſta pellucida, nitida, oculo nudo vix ſtriata, armato ſtriis ſubtiliſſimis transverſis notata, intus alba ſubcæruleſcens.

Cardinis *dentes* laterales elongati, obſoleti utrinque cum foſſulis excipientibus; medii vix ulli.

Siphones in verme duo altera extremitate porrecti, parum elongati, aperturæ valvularum proximus rictum amplum & quaſi truncatum ora quadrifida habet; alter vero ſubacuminatus, rictu minori obtuſiuſculo.

Organum, quo progreditur vermis, juſto nomen *pedis* meretur, cum & uſu & figura pes ſit; affigitur ultra ſuum medium alio corpuſculo, quod *tibiam* mentitur, utrumque & tibiam & pedem animal, quoties incedit, extra teſtam porrigit. Inceſſus hoc

modo peragitur: pes primum extra teſtam parum protenditur, dein loca vicina circumcirca tentat, tum ultra duplicem teſtæ latitudinem extenditur, deinque corpus & teſta ope tibiæ ad medium pedis usque attrahitur, & ſic unus paſſus perficitur; pes rurſus extenditur & ita pergendo greſſu ſat celeri movetur. Cum victus deeſſet, plures vidi omnes vaſis, in quo tenebantur, parietes & plantas aquaticas perrepere fundum arenoſum & limoſum quæritantes; minima vero aquæ agitatione ſeſe corripere & valvulas claudere.

In amne, ac foſſis ſilveſtribus, aqua repletis, vulgaris.

388. TELLINA LACUSTRIS.

TELLINA teſta rhombea, planiuſcula, glabra, umbone acuto.

Berl. Magaz. 4. B. t. XI. f. 63. A?

Dan. SÖE-TELLINEN.

long. $1\frac{1}{2}$ - 6. lat. $1\frac{1}{4}$ - 4 lin.

Teſta rhombea, oris oppoſitis ſubæqualibus, glabra, ſubfuſca, dorſo valvularum cinereo, marginibus albidis, tenuior & fragilior T. *rivali*, intus alba. Umbones acutiuſculi, minores & minus ventricoſi, quam in præcedente, teſta licet major ſit. Valvulæ minus convexæ, verſus oras complanatæ, ſeu depreſſæ. *Cardinis* dentes obſoleti ſex; in altera nempe valvula duo utrinque, in altera unicus; denticuli medio cardinis nulli. Vivipara eſt, plures enim pullos teſta tectos in matre reperi.

Juniores albæ, diaphanæ.

Figura citata noſtram aliquatenus ſiſtit.

In lacubus & paludoſis, minus frequens.

389. TELLINA

389. TELLINA AMNICA.

TELLINA teſta ſubcordiformi, transverſim ſulcata, umbone obtuſo.

Dan. AAE - TELLINEN.

diam. 1 - 5 lin.

Teſta minus globoſa, umbonesque minus gibbi, quam in T. *rivali*, quam maxime refert; alba, fuſca & lutea variat; coſta nigricans ſimiliter in hac, in quibusdam duplex, ſimplex vel nulla; lineis transverſim elevatis quaſi imbricata, intus glabra, ſubcærulea.

Cardinis denticuli ſex vel octo cum foſſulis excipientibus, in altera nempe valvula utrinque dens ſolitarius, ac medio cardine denticuli duo, approximati; in altera utrinque denticuli duo. Teſtæ juniorum candidæ, pellucidæ.

Cum T. *rivulari* paſſim.

390. TELLINA FLUMINALIS.

TELLINA teſta triangulari, gibba, transverſim ſtriata.

Dan. STRÖM - TELLINEN.

long. 12 lin. lat. 13 lin.

Teſta craſſa, dura valde gibba, opaca, antice verſus cardinem latior, quam poſtice, extus viridis crebro ſtriatim imbricata; ſtriæ aperturæ parallelæ. Intus cyanea; *cardinis* dentes medii ſex

cum foſſulis, tres nempe in quavis valvula, utriusque ligamento proximus emarginatus eſt; laterales utrinque elongati, ſulcique excipientes, crenulati ſunt.

In fluvio Aſiæ *Euphrat.*

391. TELLINA FLUMINEA.

TELLINA teſta triangulari, gibba, transverſim coſtata.

Dan. FLOD - TELLINEN.

long. 6 - 8 lin. lat. 6 - 8 lin.

Teſta gibba, opaca, antice & poſtice verſus cardinem fere æqualis; extus viridis, coſtis latis transverſis quaſi circulis doliaribus circumdata; intus albida ſemicirculo nigro notata. *Cardinis* dentes & foſſulæ, uti in præcedente.

In arena fluviali *Chinæ.*

392. TELLINA FLUVIATILIS.

TELLINA teſta triangulari, transverſim rugoſa.

Dan. ELV - TELLINEN.

long. 8 lin. lat. 9 lin.

Teſta latior & tenuior proxime præcedentibus, fuſco-virens in cardine antice & poſtice æqualis latitudinis, lineis elevatis cincta, area interjecta anguſtior, quam in T. *fluminea*, varioloſa. Facies interna denteſque cardinis uti in proxime præcedentibus.

Trinæ

Trinæ hæ *Tellinæ* caractere *Veneris* generico quidem gaudent, at, cum habitu & loco natali T. *amnicæ* accedant, minusque notæ sint, huc sepositi.

In flumine emporium *Canton* Chinæ præterlabente.

XXXII. MYTILUS.

Vermis conchaceus, siphone duplici brevi.

393. MYTILUS ANATINUS.

MYTILUS testa ovali, antice compressa, natibus decorticatis.

MYTILUS testa ovali compressiuscula, fragilissima, margine membranaceo, natibus decorticatis. LIN. *Syst.* 258.

MUSCULUS fluviatilis, tenuis, minor, subfuscus, latiusculus, cardine lævi. KLEIN. *ostrac.* t. 9. f. 26.

MUSCULUS fluviatilis, striatus, angustior, umbonibus acutis, valvarum cardinibus veluti pinnis donatis, sinuosis, ex flavo virideſcens, intus argenteus. GUALT. *test.* t. 7. f. E.

MUSCULUS tenuis minor subfuscus. LIST. *Synops.* t. 153. f. 8.

ARGENV. *Conchyl.* 1. t. 27. n. 10. f. 1. 2. t. 8. f. 11.

Berl. Magaz. 4. B. p. 447. t. XI. f. 64. A. minus bona.

MUSCULUS

Musculus aquæ dulcis. Rondel. de piſcibus. p. 214. Gesn. de aquat. p. 231.

Petiv. *gazoph.* t. 93. f. 8. 9.

Dan. ande - musling.

Svec. siö - musla.

Germ. teich - muschel.

Gall. la moule de riviere.

Angl. horse - muscle.

long. 11, 19, 26, 54 lin.
lat. 8, 12, 17, 30 lin.

Hic & ſequens difficillime diſtinguuntur, nec ſatis conſtat, an diverſi ſint; ex menſura patet, differentiam fruſtra a magnitudine peti.

Teſta tenerrima, pellucida, antice quam poſtice latior, utrinque rotundata, juxta cardinem in angulum obtuſum truncata, ora membranacea, extus virideſcens, nitida, ſtriis, aperturæ parallelis, ſubtiliſſimis, paucisque ſtrigis nigricantibus; umbones in plerisque decorticati; ante hos juxta cardinem compreſſiuſcula, pone eosdem valde compreſſa. Intus glaber, nitidus, coloribus varians: albus totus, vel cæruleus, vel cæruleſcente & luteo iridisque coloribus micans.

In lacubus & piſcinis vulgaris.

394. MYTILUS cygneus.

Mytilus teſta ovata, antice convexa, natibus integris.

Mytilus teſta ovata antice compreſſiuſcula, fragiliſſima, cardine laterali. Lin. *Syſt.* 257.

Mytilus

Mytilus teſta tenui e fuſco virideſcente, umbone non prominulo. Geofr. *Conchyl.* 1.

Musculus latus, maximus & tenuiſſimus e cæruleo virideſcens, fere paluſtris. List. *Syn.* t. 156. f. 4.

Musculus latus, teſta admodum tenui, ex fuſco virideſcens, interdum rufeſcens. List. *anim. angl.* p. 146. t. 2. f. 29.

Musculus fluviatilis, maximus, profunde ſtriatus, latus, teſta admodum tenui, ex fuſco virideſcens, interdum rufeſcens, intus argenteus. Gualt. *teſt.* t. 7. f. F. Argenv. *conchyl.* 1. t. 27. n. 10. f. 5. 6. 7.; 11. t. 8. f. 12.

Berl. Magaz. 4. B. p. 455.

Hanows *Seltenh. der Natur.* 1. p. 546.

Von Aphelens *Natur-Hiſtorie.* 5. B. p. 476.

Dan. SVANE-MUSLING.
Germ. TEICH-MUSCHEL.
Gall. LA MOULE D'ETANG.

long. 20, 25-56 lin. lat. 12, 15-31 lin.

Teſta minus tenera, craſſiorque præcedente, ante umbones ad cardinem convexa, margine ſive ora non membranacea, umbonibus non decorticatis. Cæterum eadem. Auctorum nemo in teſtæ hoſpitem inquiſivit, qui ante pedes eſt & certiores differentiæ notas, ſi ulla unquam, ſuppeteret.

In lacubus, rarior.

395. MYTILUS RADIATUS.

Mytilus teſta ovali, antice compreſſiuſcula, poſtice radiata.

Musculus latior ex flavo ſubviridis duplici ſtriatura ad cuneum. List. *Synopſ.* t. 155. f. 10.

Conca lunga. Gin. *op. poſt.* Tom. 2. p. 51. t. 3. f. 15.

Dan. straale- musling.

Medium inter *anatinum* & *cygneum*, omnesque meras varietates ſupicor.

Teſta tenerrima, pellucida, flavicans, radiis plurimis inæqualibus virideſcentibus, ab umbone ad peripheriam ductus, horum tres, vel duo, utrinque latiſſimi ſaturateque virides. Valvulæ ante umbones compreſſæ; margo acutus, non membranaceus.

In Muſeo *Moltkiano*.

XXXIII. MYA.

Vermis conchaceus ſiphone nullo.

396. MYA MARGARITIFERA.

Mya teſta ovali-oblonga, apertura ſinuata, natibus decorticatis.

Mya teſta ovata, antice coarctata, cardinis dente primario conico, natibus decorticatis. Lin. *Syſt.* 29.

Musculus niger omnium longe craſſiſſimus. Conchæ longæ. Species Gesn. *aldrov.* List. *Syn.* t. 149. f. 4.

Diconcha ſulcata, craſſiſſima. Klein. *oſtrac.* t. 10. f. 47.

Berl. Magaz. 4. B. p. 462. t. 12. f. 65. A. B. conf. verſ. conchyl. Geoffr. p. 130.

Ströms

STRÖMS *Söndmör* 1. p. 198.

PONTOPPIDANS *Norges naturlige Hiſtorie.* 2. Deel. p. 265 - 270.

VON APHELENS *Natur - Hiſtorie* 6. B. p. 213.

Dan. PERLE - MIGEN; PERLE - MUSLING; PERLE - SKIÆL.

Svec. PÄRLE - MUSLA.

Germ. PERLEN - MUSCHEL; SCHWERE SCHWARZE FLUSS-MUSCHEL.

Gall MERE DES PERLES.

long. 4 unc. 6 lin. lat. 2 unc.

Teſta oblonga, ponderoſa, opaca, margine aperturæ ante medium aliquantum ſinuato. *Valvulæ* extus nigræ, planiuſculæ, ſeu minus convexæ, quam in congeneribus; *Nates* & cardinis margines, decorticati, eroſi, intus albidi, argentei, vel pallide incarnati, fovea anguloſa infra dentes anticos, ſulcique tres curvati, qui veſtigia muſculorum vermis, infra angulum poſticum. In altera valvula dens craſſus, conicus, ſulcatus, in altera duo minores. *Dentes* laterales elongati, obſoleti, vix diſtincti, poſtice in lacunam depreſſi. Sulcus profundus dentis lateralis, quem Clariſ. *Martini* indicat, in noſtris deeſt. Nates in ſequentibus epidermidem quidem interdum amittunt, non vero lacerantur & deſtruuntur, uti in margaritifera, in quibus ſemper lacunoſi & quaſi vermibus eroſi conſpiciuntur.

In fluviis Norvegiæ.

397. MYA PICTORUM.

MYA teſta ovata, apertura, natibusque integris.

α *teſta craſſa rudi, fuſca.*

MYA teſta ovata cardinis dente primario crenulato; laterali longitudinali: alterius duplicato. LIN. *Syſt.* 28.

Mytilus latiuſculus. Swammerd. *Bibl.* n. t. 10. f. 6. 7.

Mytilus teſta fuſca, umbone prominente. Geofr. *teſt.* 2.

Musculus anguſtior, ex flavo virideſcens, validus umbonibus acutis, valvarum cardinibus velut pinnis donatis ſinuoſis. List. *an. angl.* t. 2. f. 30.

Diconcha ſulcata margaritica. Klein. *oſtrac.* §. 371. 1. p. 145.

Diconcha ſulcata anguſta. ibid. 6. p. 146.

Berl. Magaz. 4. B. p. 465-69. t. 12. f. 66.

Gin. *op. poſt.* Tom. 2. p. 53. t. 4. f. 17.

Concha pictorum vulgaris.

Dan. MALER-MIGEN; MALER-SKIÆL.

long. 2 unc. 4 lin. lat. 1 unc. 2 lin.

β teſta elongata craſſa, fuſca.

Musculus fluviatilis ſtriatus anguſtior, umbonibus acutis, valvarum cardinibus veluti pinnis donatis ſinuoſis, ex flavo virideſcens, intus argenteus. Gualt. *teſt.* t. 7. f. E.

Concha longa, intus margaritarum nitore pellucida, foris autem ſub cortice furvo oleacinoque latet. Bon. M. Kirch. Cl. 2. f. 39. & Ricreaz. t. 40.

Concha Pictorum. Bon. M. Kirch. Cl. 2. t. 40. & Ricreaz. t. 41. Rondelet p. 24.

long. 4 unc. lat. 1 unc. 8 lin.

γ teſta craſſa, radiata, flavo virente.

Musculus ex flavo virideſcens medio dorſo leviter radiatus, ad nodum craſſus. List. *Syn.* t. 146. f. 1.

Musculus

Musculus anguſtus ſubflavus, ſive citrinus. List. *Syn.* t. 147. f. 3.

Musculus anguſtior ex flavo virideſcens medio dorſo leviter radiatus, cardinis pinna ſive denticulo bifido. List. *Syn.* t. 147. f. 2.

Berl. Magaz. 4. B. t. 12. f. 67.

long. 2 unc. 10 lin. lat. 1 unc. 5 - 7 lin.

ε teſta tenui ſubfuſca ſubtiliſſime transverſim ſtriata.

long. 2 unc. 1 - 5 lin. lat. 11 lin. - 15 lin.

Teneritate, craſſitie, convexitate, coloribus, ſtriis & radiis &c. pro loco natali variat. Situs & proportio dentium eadem, *primores* ſeu in antica cardinis parte poſiti in α craſſi, in β & γ craſſiuſculi, in ε tenues, in quavis compreſſi, omnesque (non tantum primarius) crenulati; *elongati*, ſeu in poſtica poſiti quoque conveniunt; cujusvis numerus in altera teſta duplicatus eſt. Foſſula ante dentes primores in omnibus diſtincta, pone elongatos ſæpe obſoleta; protuberantiæ ſeu coſtæ infra dentes primores, in reliquis notabiles, in ε vix veſtigium. Hæc uti Myt. *anatinus* tenuis & fragilis eſt, poſticeque ſuperne aliquantum in angulum obtuſum truncata, ac inter dentem primorum ſolitarium & marginem cardinis alio dente inſtruitur, nec tamen ſpeciem differentem crederem, cum hujus dentis rudimentum in β & γ quoque animadvertatur, ac illud etiam in nonnullis exemplaribus variet. γ occurrit; ſtriæ innumeræ ſubtiliſſimæ in exemplaribus depurgatis, ope lentis pinnatæ dendritesque ſimulantes. α, β & γ uniones ferunt. Radii in γ virides, imprimis in poſtica parte.

In fluviis, α paſſim, β in Italia, γ in Muſeo *Moltkiano*, ε in *Spengleriano*.

398. MYA CORRUGATA.

MYA teſta rhombea viridi, natibus rugoſis.

Dan. RYNKE - MIGEN.

long. 11 - 16 lin. lat. 8 - 11 lin.

Teſta virideſcens, tenera, pellucida, ab utraque cardinis parte & in natibus ſtriis elevatis rugoſis, figuraque a præcedente diſtincta. Valvulæ intus ſtriis radiantibus, ſubtiliſſimis notantur. Cætera uti in præcedente. Epidermide remota margaritacea evadit.

In fluviis littoris Coromandel.

Dovunque il guardo giro
Immenſo Dio, ti vedo,
Nell'opre tue t'ammiro,
Ti riconoſco in me.

METAST.

Teſtaceo-

Teſtaceorum agri Fridrichsdalenſis, ſeu Daniæ, non marinorum, indigenæ.

LIMAX *lævis*
ater
albus
cinereus
ſuccineus
agreſtis
cinctus
marginatus
reticulatus
flavus
fuſcus
tenellus

HELIX *pellucida*
cryſtalina
cellaria
rotundata
pulchella
coſtata
nitida
lapicida
pomatia
nemoralis
hortenſis
arbuſtorum
ſalva
ſericea
incarnata
fruticum
hiſpida
troſchulus
aculeata
ſuccinea
obſcura
lubrica
bidens
perverſa

VERTIGO *puſilla*

CARYCHIUM *minimum*

BUCCINUM *auricula*
glutinoſum
peregrum
paluſtre
ſtagnale
glabrum

PLANORBIS *purpura*
carinatus
vortex
umbilicatus
ſpirorbis
contortus
nitidus
albus
imbricatus
ſimilis
bulla
turritus
gelatinus

NERITA

Teſtaceorum agri Fridrichsdalenſis, &c.

NERITA *ſphærica*
piſcinalis
jaculator
contorta
fluviatilis

VALVATA *criſtata*

ANCYLUS *lacuſtris*

TELLINA *rivalis*
amnica
lacuſtris

MYTILLUS *anatinus.*

Teſtacea ſiniſtrorſa.

HELIX *lævipes*
cicatricoſa
pomaria
varica
ſiniſtra
inverſa
contraria
læva
quadridens
bidens
perverſa
papillaris

VERTIGO *puſilla*

BUCCINUM *columna*

PLANORBIS *contrarius*
bulla
turritus
gelatinus.

INDEX I.

INDEX I

Vermium ſecundi Voluminis.

INDEX I.

INDEX I.

INDEX II

Nominum Vernaculorum.

DANICA.

INDEX II.

INDEX II.

INDEX II.

T.

Tellinen

SVECICA.

GERMANICA.

INDEX II.

GALLICA.

Cornet

INDEX II.

ANGLICA.

BELGICA.

ERRATA.

Pag. 62. Helix nemoralis, *lege*: nemorenſis.
75. Lund, *lege*: Holt.
107. trekantede, *lege*: tretandede.

AUTHOR INDEX, STERKIANA 61-70

Reprints are not indexed. Double numbers of Sterkiana are indicated only by the first number of each pair.

PUBLICATIONS AVAILABLE FROM

STERKIANA
102 W. Beaumont Road
Columbus, OH 43214

AUTHOR INDEX TO THE NAUTILUS, volumes 3-75 and its predecessor the Conchologists' Exchange, vols. 1 and 2. By A. La Rocque. 1963. 279 pages, soft bound, $2.50 in U.S., $3.00 in other countries.

A SYNOPSIS OF THE CLASSIFICATION OF THE FRESHWATER MOLLUSCA OF NORTH AMERICA, NORTH OF MEXICO .... By Bryant Walker. 1918. 213 pages, soft bound. $2.50 in US; $3.00 in other countries.

Reprint of University of Michigan, Museum of Zoology, Miscellaneous Publications No. 6. Facsimile reprint.

LAND AND FRESH-WATER SHELLS OF NORTH AMERICA. PART IV. Strepomatidae. By George W. Tryon, Jr. Reprint of Smithsonian Miscellaneous Collections. 253. 1v, 435 pages, soft bound. $4.50 in US, in other countries $5.00. Facsimile reprint.

STUDIES ON THE REPRODUCTION AND ARTIFICIAL PROPAGATION OF FRESH-WATER MUSSELS. Reprint of Bull. Bur. Fisheries, v. XXX, p. 107-201, pls. vi-xvii, soft bound. $2.00 in US, in other countries $2.50. Facsimile reprint.

BIBLIOGRAPHY OF PALEONTOLOGY PART I. Journal of Paleontology, vols. 1-42 (1970) and vols. 43-50 (1977) Author Index. By A. La Rocque 256 pages, soft-bound. $4.50 in US, $5.00 in other countries.

VERMIUM TERRESTRIUM ET FLUVIATILIUM .... VOLUMEN ALTERUM. By Otho Friedrich Müller. 1774., 214, 10 pp., soft bound. $5.00 in US, $5.50 in other countries.

This is the mollusk volume of Müller's two-volume work which contains the original descriptions of many circumboreal and cosmopolitan species of non-marine Mollusca. Facsimile reprint.

CONDITIONS OF SALE

Checks in US funds, payable to STERKIANA should accompany each order. Institutions requiring billing should add $1.00 invoicing charge.

Prices include postage (book rate) and packing.