

ANNOTATED CATALOGUE OF THE GENUS *DIPLODON*  
(UNIONACEA - HYALIDAE)

J. J. PAROBIZ

Carnegie Museum, Pittsburgh, Pa.

The present catalogue lists all specific and subspecific names introduced since 1792 into the generic group now known as *Diplodon* Spix, 1827. Names in capitals are followed by the original reference of the taxon, and type locality. References have been kept to a minimum in order to simplify the procedure; for authors as d'Orbigny, Lea, and Simpson, who first diagnosed their species briefly without giving illustrations, the next reference with full description and figures is added. Lea usually reprinted his own description in several journals, but the original reference is followed by that of the 'Observations on the genus *Unio*,' which ran for 13 volumes and compiled all his descriptions and figures.

Subgeneric denominations are not indicated. Although there are embryological bases to divide *Diplodon* into subgenera characterized by larval forms, the results have not always been consistent with, or manifest in, those extracted from anatomi-

cal or conchological characteristics. Their introduction will require a discussion which is beyond the scope of this catalogue. Thus all the forms are listed as *Diplodon sensu lato*.

Actual status and nomenclature of each taxon is indicated following the ♀ sign. Such indication makes the catalogue taxonomically more useful than a bare checklist, and at the same time it reveals that a basic research on the genus taxonomy has necessarily been made. Many years in the observation and classification of the species of *Diplodon* led the author to experience not a few frustrations. *Diplodon* taxonomy always has been one of a difficult and complicated nature. Most of the large collections which I had opportunity to revise contain a considerable amount of misidentified materials. In the literature of the genus it is not likely to be found two authors who agree even on half of the accepted taxa or synonyms; under such fashion, while some authors were creating more

names for taxa they could not identify with species already named, others were increasing the list of synonyms. The approaches to recognition of the valid species in this catalogue were made with the author's awareness that, far from being definitive, it is sure to have shortcomings. Nevertheless, it will help to clarify much of the confusion.

A factor which had called very little attention from previous authors, is the hybridization among closely related species of probably common ancestry. Not a small number of specific names which were synonymized under broadly defined species, simply as ecological or clinal variations, are usually found together in the same ecological locus. That any single species would present very distinct populations in the same locality or same type of habitat, is very unlikely; some of these *Diplodon* populations when confronted with the specific descriptions of Lea and d'Orbigny, and studied in detail, were perfectly identifiable. Also, some of the so-called subspecies have not sufficient allopatry to qualify as such; on the contrary, they overlap greatly. From all this it follows that the 'intermediaries' within or between these populations must have been the result of cross-breeding. The system of reproduction peculiar to the Naiades makes such hybridization not only feasible but also frequent. When related species of very close genetic affinity share a same locality, and male gametes of more than one species are drawn with the water into the inhalant female opening, fertilization may produce an heterozygous organism developing in company with others, which are perfectly pure or homozygous, in the marsupia. Thus a generation produced by a single female may be of heterogeneous composition. This has not been proved experimentally, but theoretically there is nothing to preclude such multiple fertilization, except that the limitation of the occurrence is determined only by the degree of relationship among the species involved; heterozygous individuals are com-

mon in the overlapping areas of subspecies, and to a lesser degree among the very closely related species of a superspecific monogenetic complex. In fact the modern concept of superspecies is based on these premises. A superspecific group contains both species and subspecies; while in subspecies the segregation is caused by geographic isolation, in the species of a superspecies the tendency to isolation is genetical, but not so completely as to preclude occasional interbreeding with other species of the same group.

Many species although identifiable conchologically, were declared synonyms on account of similarities in larval forms. Actually, the glochidia differ less between species than the adults. But overall similarity between two glochidia does not warrant the co-specificity of their adult individuals. While differences in glochidia are perfect indicators of differences in shell groups, similarities are not, because a number of specific characters become evident only after the individual reaches a certain stage in its development. It is for this reason that I consider *Diplodon variabilis*, *burroughianus*, *paranensis*, and *funerialis* as different species, even if their glochidia are almost identical.

The Notes have been numbered and grouped after the alphabetical listing. Since each note may discuss or compare more than one name such procedure results in economy of space. The bibliography cites only the titles corresponding to the references in the text.

All living and Tertiary species of *Diplodon* are South American. Older fossil records are only known from the Mesozoic of the Nearctic Region.

#### ACUTIROSTRIS

*Unio* Lea 1866: 34; 1869: 30, pl. 35, f. 84. Type loc.: South America (according to Haas: Uruguay River near Salto). = *Diplodon parallelipipidon* (Lea). See Note 1.

**AETHIOPIFORMIS**

*Unio* Ihering (in litteris). Nomen nudum. = *Diplodon parallelepipedon aethiops* (Lea). See notes 1, 2.

**AETHIOPS**

*Unio* Lea 1860: 91; 1863: 13, pl. 41, f. 285. Type loc.: Uruguay River. = *Diplodon parallelepipedon aethiops* (Lea). See Note 2.

**AMPULLACEUS**

*Unio* Lea 1866: 34; 1869: 29, pl. 35, f. 83. Type loc.: South America (Uruguay River near Salto). = *Diplodon uruguayensis* (Lea).

**ANDINA**

*Unio frenzelli*: 'var.' *andina* Ihering 1893: 113. Type loc.: Cordillera of Patagonia (probably in province of Neuquén). = *Diplodon chilensis patagonicus* (d'Orb.).

**APLATUS**

*Unio* (Swainson MS) Sowerby in Reeve 1865, sp. 143. Type loc.: Island of Chiloe, Chile. = *Diplodon chilensis* (Gray). It appears like a hybrid with *patagonicus* in that area where the two subspecies overlap.

**APPRIMUS**

*Unio* Lea 1866: 34; 1869: 23, pl. 33, f. 78. Type loc.: Uruguay River near Salto. = *Diplodon uruguayensis* (Lea). See note 3.

**ARAUCANUS**

*Unio* Philippi 1847 (*Unio* IV): 10, pl. 4, f. 3. Type loc.: 'Austral province of Chile.' = *Diplodon chilensis* (Gray).

**ARCUATUS**

*Diplodon* Marshall 1922: 4, pl. 1, f. 4-6, pl. 2, f. 7, 10, pl. 3, f. 3. Type loc.: Barra of Arroyo Sacra, Paysandú, Uruguay. = *Diplodon variabilis* Maton. See note 4.

**ASUNCIONIS**

*Diplodon* Marshall 1926: 8, pl. 2, f. 2, 3, pl. 3, f. 5. Type loc.: Paraguay River at Asunción, Paraguay. = *Diplodon guaranianus* (d'Orb.). See note 5.

**ATRATUS**

*Unio* Sowerby, Conchol. Man. 1839 (no description) f. 148. Type loc.: not given. = *Diplodon chilensis* (Gray). Sowerby in the table of plates gives Lamarck as the author, but I have not found the name *atratus* among Lamarck's species. Not '*Natica atrata*' Swainson 1841 which is *Unio gracilis* Barnes.

**AUREUS**

*Diplodon* Simpson 1900: 883 (new name for *aureatus* Kuster 1856 not Philippi 1847). Type loc.: 'Chile.' = *Diplodon chilensis* (Gray).

**BASSLERI**

*Prediplodon* Marshall 1928: 3, pl. 1, f. 1. Type loc.: from strata of probable Miocene age (Pebas formation) of Pebas, eastern Peru. = *Diplodon bassleri* (Marsh.). See note 6.

**BERTHAE**

*Diplodon* Ortmann 1921: 528, pl. 38, f. 1-4, pl. 46, f. 6. Type loc.: Jacuhy River at Cachoeira, Rio Grande do Sul, Brazil; also Vaccahy River at Santa Maria. = *Diplodon piceus* (Lea). See note 2.

**BESKEANUS**

*Unio* Dunker 1848: 182. (Illustr. in Haas 1930 figs. 18-22). Type loc.: Minas Geraes, Brazil. = *Diplodon beskeanus* (Dunker). See note 7.

**BIBLIANA**

*Ecuadorea* Marshall 1932: 5, pl. 1, f. 7, 8. Type loc.: Biblian, NE of Azogue, in strata of Lower Miocene, Ecuador. = *Diplodon guaranianus biblianus* (Marsh.).

**BINNEYI**

*Unio* Lea 1845: 165; 1848: 51, pl. 6, f. 18. Type loc.: 'Southern states, U.S.A.' (a mistake, the form is probably from southern Brazil). = ? *Diplodon martensi* Ih. See note 8.

**BISCHOFFI**

*Unio* Ihering (in litteris). Nomen nudum.

**BOETTGERI**

*Unio firmus* 'var.' *boettgeri* Ihering 1893: 105, pl. 4, f. 2. Type loc.: Cambucy, in the Tietê River drainage, São Paulo, Brazil. = *Diplodon martensi* (Ihering). See note 9.

**BOMPLANDI**

*Unio* Valenciennes 1827? Nomen nudum. See note 1.

**BONDENBENDERI**

*Diplodon* Doello Jurado 1927: 411, pl. 3, f. 14-16, pl. 4, f. 18. Type loc.: from strata of the Jahuel Formation (Danian) Paleocene, at Bajo de Santa Rosa, 50 miles S. Negro River (Patagonia), Argentina. The most abundant fossil species to which belong most of the reported *Unios* from Rio Negro. = *Diplodon bondenbenderi* (D. J.). See note 6.

**BOREALIS**

*Diplodon* Pilsbry 1921: 33, text f. 5, a, b, c. Type loc.: from gray shales of Little Conewago Creek, Newark Series. (Triassic) of York County, Pennsylvania. = *Diplodon borealis* (Pils.). See note 6.

**BROWNI**

*Unio* Lea 1856: 95; 1857: 27, pl. 29, f. 22. Type loc.: Lea indicated that the specimens were obtained by Capt. Brown, in

Mocha, Asia! It must have been originally from southern Brazil. = *Diplodon rhombeus* (Wagner) Spix.

#### BULLOIDEUS

*Unio* Lea 1859: 187; 1860: 82, pl. 62, f. 144. Type loc.: Rio de la Plata. = *Diplodon variabilis* (Maton). See note 4

#### BURCKHARDTI

*Unio* Mayer-Eymar in Burckhardt 1900. 124, pl. 24, f. 6, 7. Type loc.: Valle de Paula between the rivers Bio Bio and Lonquimay, Chile, in the Lonquimay limestone, Upper Paleocene or Lowest Eocene. = *Diplodon burckhardti* (M. E.).

#### BURROUGHIANUS

*Unio* Lea 1834: 67, pl. 10, f. 27; Type loc.: Paraná River at Province of Corrientes, Argentina. = *Diplodon burroughianus* (Lea). See notes 4 and 20.

#### CAIPIRA

*Unio* Ihering 1893: 98, pl. 4, f. 9. Type loc.: Piracicaba, on the Tietê River, Sao Paulo, Brazil. = hybrid: *Diplodon uruguayensis* X *expansus*. See note 17.

#### CAROLUSIMPSONI

*Diplodon* Pilsbry 1921: 34, pl. 2, f. 4, 5, 6. Type loc.: Shale, Little Conewago Creek (Newark Series, Triassic), York County, Pennsylvania. See note 6. = *Diplodon carolusimpsoni* (Pils.).

#### CASABLANCAE

*Unio* Philippi 1848: 146; Pfeiffer 1869: 481, pl. 104, f. 1, 2. Type loc.: Casablanca, 20 km SW of Valparaiso, Chile. = *Diplodon chilensis* (Gray).

#### CHARRUANUS

*Unio* d'Orbigny 1835: 35; 1843: 606 (for reference to figures see note 10). Type loc.: 'Banda Oriental' -Uruguay. See note 2. = *Diplodon charruanus* (d'Orbigny).

#### CHILDRENI

*Unio* Griffith in Cuvier 1834: Index 600; pl. 20, f. 1. Type loc.: 'South America' (probably Chile). *Nomen nudum*, see note 11.

#### CHILENSIS

*Unio* Gray 1828: pl. 6, f. 12. Philippi 1847: 9, pl. 4, f. 2. Type loc.: 'Chile.' = *Diplodon chilensis* (Gray). See note 21.

#### CHILOENSIS

*Unio* Kuster 1856: 161, pl. 35, f. 6. Type loc.: Chiloé Island, Chile. = *Diplodon chilensis* (Gray).

#### COLCHAGUENSIS

*Unio* Philippi 1869: 47; Pfeiffer 1869: 484, pl. 104, f. 9-10. Type loc.: San Fernando, 80 km S. of Santiago, Colchagua, Chile. = *Diplodon chilensis* (Gray).

#### COLHUAPIENSIS

*Diplodon* Ihering 1903: 217, f. 2. Type loc.: Lake Colhue Huapi in strata of the 'Sehuenian' Paleocene (originally indicated as Upper Cretaceous), province of Chubut, Patagonia, Argentina. = *Diplodon colhuapiensis* (Ih.).

#### CORIACEUS

*Unio* Dunker 1848: 181. Type loc.: Rio Negro in State of Rio Janeiro, Brazil. = *Diplodon granosus* (Bruguière).

#### CUPRINUS

*Unio* Simpson 1900: 883 (new name for *fragilis* Sowerby, not Swainson). Type loc.: Chiloé Island, Chile. = *Diplodon chilensis* (Gray).

#### DECEPTUS

*Diplodon fontaineanus* 'var.' *deceptus* Simpson 1914: 1281. Type loc.: Guahyba River, Rio Grande do Sul, Brazil. = *Diplodon rotundus gratus* (Lea). See note 12.

#### DECIPIENS

*Diplodon* Ortmann 1921: 499, pl. 36, f. 3-6, pl. 45, f. 4, pl. 48, f. 7, text fig. 4e. Type loc.: a creek tributary of Iguaçu River at Serrinha, state of Paraná, Brazil. = *Diplodon martensi* (Ihering). See note 17.

#### DELODON

*Unio* Strobel 1874: 71. Type loc.: Argentina. = *Diplodon delodontus* (Lam.).

#### DELODONTUS

*Unio delodonta* Lamarck 1819: 77. Delessert 1841: pl. 12, f. 7. Type loc.: ? (The synonym *lacteolus* Lea is from Rio de la Plata). = *Diplodon delodontus* (Lamarck).

#### DEMERARENSIS

*Unio* Lea 1859: 152, 1860: 71, pl. 29, f. 133. Type loc.: Demerara River, British Guiana. = *Diplodon rhombeus* (Wagner). See note 14.

#### DEPRESSA

*Unio* 'Lamarck' d'Orbigny 1835: 34. Not *Unio depressa* Lam. 1819 from Australia = *cultelliformis* Conrad? D'Orbigny's references cannot be but *chilensis* as indicated by Haas.

#### DILUVII

*Unio* d'Orbigny 1842: 127, pl. 7, f. 12, 13. Type loc.: 'Falaises du Nord' (Barrancas al Norte) of the Negro River (Patagonia) Argentina, in Pliocene strata. Information from the British Museum confirmed that its type is lost; I have selected a neotype (collected by R. Wichmann in 1924) from the right bank of the Colorado River at Colorado, province of Rio Negro. = *Diplodon diluvi* (d'Orbigny).

#### DIPLODON

*Unio* Philippi 1869: 45; illustration

in Pfeiffer 1869: 483, pl. 104, f. 7, 8. Type loc.: Valdivia, Chile. = *Diplodon chilensis* (Gray).

Genus *Diplodon* Spix 1827. Type: *D. ellipticum* (Wagner).

**DISCULUS**

*Unio* Lea 1860: 91; 1863: 21, p. 44, f. 293. Type loc.: Uruguay River. = *Diplodon funebris* (Lea). See note 15.

**DIVARICATUS**

*Unio* Lea 1834: 64, pl. 9, f. 24. Type loc.: South America (Uruguay River). = *Diplodon delodontus delodontus* (Lam.).

**DUNKERIANUS**

*Unio* Lea 1856: 94; 1857: 25, pl. 23, f. 20. Type loc.: Rio Janeiro, Brazil; also New Granada! See note 16.

**EFFULGENS**

*Unio* Lea 1856: 94; 1857: 23, pl. 28, f. 18. Type loc.: Brazil (probably) Piracicaba, being the same as *eurhynchus*. = *Diplodon expansus* (Küster).

**ELLIPTICUS**

*Unio* Wagner in Spix 1827: 33, pl. 26, f. 2. Type loc.: San Francisco River, northern Brazil. = *Diplodon ellipticus* (Wagner); as *D. ellipticum* Spix in plate. See note 8.

**ENNO**

*Diplodon* Ortmann 1921: 531, pl. 38, f. 5, pl. 46, f. 7. Type loc.: Rio Grande at Boqueirao, Bahia, Brazil. = *Diplodon rotundus enno* (Ortmann). See note 12.

**EURHYNCHUS**

*Unio* Küster 1861: 237, pl. 79, f. 5. Type loc.: Brazil (Sao Paulo). = *Diplodon expansus* (Küster). See note 17.

**EXPANSUS**

*Unio* Küster 1856: 149, pl. 43, f. 5. Type loc.: Conigo River at Nova Friburgo, State of Rio Janeiro, Brazil. = *Diplodon expansus* (Küster). See note 12.

**FABA**

*Unio* d'Orbigny 1835: 35; 1843: 606, pl. 71, f. 8-11. Type loc.: Uruguay. = *Diplodon charruanus* (d'Orbigny). See notes 9 and 10.

**FELIPPONEI**

*Diplodon* Marshall 1917: 381, pl. 50, f. 1-3, pl. 51, f. 1. Type loc.: Maldonado, Uruguay (also from tributaries of the Negro River in south-central Uruguay). = *Diplodon delodontus wymanni* (Lea). See notes 3, 13, 24.

**FIRMUS**

*Unio* Lea 1866: 33; 1869: 27, pl. 34, f. 82. Type loc.: 'South America' (Uruguay River, near Salto). = *Diplodon delodontus* (Lam.). See note 9.

**FLUCKI**

*Diplodon* Morrison 1943: 14, pl. 5, f. 5-9. Type loc.: Munduapo, Orinoco River, Venezuela. = *Diplodon flucki* Mor. Related to *suavidicus* (= *rhombus*), but larger, elongated and more solid, this is a northernmost isolated species.

**FLUCTIGER**

*Unio* Lea 1859: 152; 1860: 68, pl. 39, f. 130. Type loc.: unknown. This does not belong to *Diplodon* or any other South American genus; according to Simpson (1900) and Haas (1910) it is a *Nodularia*. The two shells described by Lea were labelled (cfr. Simpson) as coming from British Guiana but it is one of those mistakes not uncommon among labels of the Cumings collection.

**FOKKESI**

*Unio* Dunker 1853: 354. Type loc.: 'Rio de la Plata, Brazil'. Hybrid: *Diplodon uruguayensis* X *expansus*. See note 13.

**FONCKI**

*Unio* Philippi 1869: 49; 1869 (Conch. Nov. 2): 483, pl. 104, f. 9, 10. Type loc.: Puerto Mont, province Llanquihue, Chile. = *Diplodon chilensis*.

**FUNCKI**

*Unio* Paetel 1890: (3) 153. Misspelling for *foncki*.

**FONTAINEANUS**

*Unio fontaineana* d'Orbigny 1835: 36; 1843: 605, pl. 49, f. 6, 7. Type loc.: Parahyba River, Parahyba State, northeastern Brazil. = *Diplodon rotundus fontaineanus* (d'Orb.). See note 12.

**FORTIS**

*Diplodon* Marshall 1917: 382, pl. 52, f. 1-4. Type loc.: Tacuarembó River, northern affluent of the Negro River, Uruguay. = *Diplodon piceus*. See note 2.

**FRAGILIS**

*Unio* Sowerby in Reeve 1866: no. 155 (wrong date at foot of page '1856'). Not *fragilis* Swainson 1823 = *Lampsilis*, or *Rafinesque* 1820 = *Elliptio*. Type loc.: Chiloe Island, Chile. = *Diplodon chilensis* (Gray).

**FRAUS**

*Diplodon* Ihering 1907: 467, pl. 18, f. 129. (New name for *Modiola contorta* Borchert = *Unio contorta* Ameghino not Heude). Type loc.: Barrancas at Paraná, Paraná River, Entre Rios, Argentina (probably Pliocene). = *Diplodon fraus* Ih. See note 1.

**FRENZELLI**

*Unio* Ihering 1893: 111, pl. 4, f. 12. Type loc.: 'Patagonia et republicae chilensis'. = *Diplodon chilensis patagonicus* (d'Orb.).

**FUNEBRALIS**

*Unio* Lea 1860: 91; 1863: 14, pl. 41, f. 286. Type loc.: Uruguay River. = *Diplodon funebris* (Lea). See note 15.

**GARBEI**

*Diplodon* Ihering 1903: 133, pl. 12, f. 7a, 7b. Type loc.: Lagoa Juparana, State of Spirito Santo, Brazil. = *Diplodon beskeanus* (Dunker). See note 7.

**GARDNERAE**

*Eodiplodon* Marshall 1928: 4, pl. 1, f. 2, 8. Type loc.: in Pliocene strata of Pebas, Iquitos region, eastern Peru. = *Diplodon gardnerae* (Marshall).

**GASSIESI**

*Unio* Küster 1856: 148, pl. 43, f. 4. Type loc.: Chile (Chiloé). = *Diplodon chilensis* (Gray).

**GRANOSUS**

*Unio granosa* Bruguière, Journ. d'Hist. natur. 1792:(I) 107, pl. 6, f. 3, 4. (See also Deshayes, Encyclop. méthod. pl. 249, f. 2). Type loc.: (cfr. Lamarck) 'Rivières de la Guyane.' *Diplodon granosus* (Bruguière). See note 18.

**GRANULIFERUS**

*Unio* Dunker 1848: 182. Pfeiffer 1866: 150, pl. 39, f. 1, 3. Type loc.: Maccue, State of Rio Janeiro, Brazil. = *Diplodon granosus* (Brug.).

**GRATUS**

*Unio* Lea 1860: 91; 1863: pl. 43, f. 290. Type loc.: Uruguay River. = *Diplodon rotundus gratus* (Lea). See notes 14 and 15.

**GREEFFIANUS**

*Unio* Ihering 1893: 96, pl. 4, f. 8. Type loc.: Campinas and Piracicaba in headwaters of the Tiete River, Sao Paulo, Brazil. = *Diplodon paulista* (Ihering). See note 19.

**GUAHYBAE**

*Unio* Ihering (in litteris). Nomen nudum. Specimens labelled by Ihering with this name from Guahyba River, Rio Grande do Sul, in the Senckenberg Museum are, according to Haas, equal to *expansus*).

**GUARANIANUS**

*Unio* d'Orbigny 1835: sp. 16; 1846: 608, pl. 61, f. 12. Type loc.: Paraná River at Italy, Corrientes, Argentina (50 km E. of Corrientes city. = *Diplodon guaranianus* (d'Orb.). See note 5.

**GUAYANENSIS**

*Diplodon* Haas 1929: 12, f. 6-7. Type loc.: NW British Guiana. = *Diplodon guayanensis* Haas. Species of the group of *granosus*.

**HARTWRIGHTI**

*Diplodon* Ihering 1910: 135, pl. 12, f. 8. (Not *Unio hartwrighti* Wright). Type loc.: Lagoa Alagadinha, Goyaz, Brazil (also Tapajoz River and Amazon). = *Diplodon rhombeus* (Wagner). See note 14.

**HASEMANI**

*Diplodon* Ortmann 1921: 478, pl. 34, f. 1, 4, pl. 47, f. 5, text f. 4a. Type loc.: Guaporé River, near Sao Simao, Rondonia, Brazil. = *Diplodon guaranianus* (d'Orb.). See note 5.

**HIDALGOI**

*Diplodon* Haas 1916: 18, 49, pl. 1, f. 1. Type loc.: Arroyo Miguelete, Montevideo, Uruguay. = *Diplodon piceus* (Lea). See note 2.

**HILDAE**

*Diplodon* Ortmann 1921: 514, pl. 36, f. 1-3, pl. 46, f. 3. Type loc.: Jacuhy River at Cachoeira (100 miles W of Porto Alegre), Rio Grande do Sul, Brazil. = *Diplodon piceus* (Lea). See note 2.

**HUAPENSIS**

*Diplodon* Bartsch 1906: 394, pl. 27, f. 1, pl. 28, f. 1, pl. 29, f. 2. Type loc.: Lake on Victoria Island, Lake Nahuel Huapi. (Province of Neuquen), Argentina. = *Diplodon chilensis patagonicus* (d'Orb.).

**HYLAEUS**

*Unio hylaea* d'Orbigny 1835: 36; 1843: 607, pl. 49, f. 8, 9. Type loc.: Palometa River, in the headwaters of Marmoré-Guaporé Rivers, north-central Bolivia. = *Diplodon hylaeus* (d'Orb.). See note 5.

**IHERINGI**

*Unio* (Cléssin?). Unfigured and publication uncertain after Simpson 1914: 1272. Not *Unio iheringi* Wright 1898 from Texas. Simpson gave a description in 1914 from specimens of Guahyba River which seem to be = *Diplodon burroughianus* (Lea). See note 20.

**IMITATOR**

*Diplodon* Ortmann 1921: 491, pl. 34, f. 5-7, pl. 45, f. 1, 2, pl. 47, f. 6. Type loc.: Vaccahy-Mirim River, Santa Maria; also Jacuhy at Cahoeira, Rio Grande do Sul, Brazil. = *Diplodon martensi* (Ih.). See note 9.

**JACKSONI**

*Diplodon* Marshall 1928: 1, pl. 4, f. 1-3. Type loc.: Small tributary of San Francisco River, Arcas, Minas Geraes, Brazil. = *Diplodon ellipticus* (Wagner).

**JACOBAEUS**

*Unio* Philippi 1869: 44. Pfeiffer 1869: 478, sp. 635, pl. 103, f. 3, 4. Type loc.: Santiago, Chile. = *Diplodon chilensis* (Gray).

**JANTHINUS**

*Unio* Philippi 1869: 46. Pfeiffer 1869: 485, pl. 104, f. 11, 12. Type loc.: Santiago, Chile. = *Diplodon chilensis* (Gray).

**KELSEYI**

*Diplodon* F. Baker 1913: 665, pl. 27, f. 5-7. Type loc.: Jamauchin River (Jamanxim), tributary of the Tapajoz River, Amazon drainage, state of Par , Brazil. = *Diplodon beskeanus* (Dunker). See note 7.

**KERESETZI**

*Unio* Clessin 1888: 172 (unfigured). Type loc.: Guahyba River, Rio Grande do Sul, Brazil. Uncertain species for Simpson; 'charruanus' for Haas. = *Diplodon piceus* (Lea).

**LADDI**

*Castalioides* Marshall 1934: 78, f. 1-4. Type loc.: Biblian, NE Ecuador, from strata of Lower Miocene age. = *Diplodon guaranianus* (Marshall). See notes 5 and 6.

**LACTEOLUS**

*Unio* Lea 1834: 40, pl. 8, f. 19; Obs.: 152, pl. 8, f. 19. Type loc.: Rio de la Plata. = *Diplodon delodontus delodontus* (Lamarck). See note 13.

**LANDBECKI**

*Unio* Philippi 1869: 45; Pfeiffer 1869: 479, pl. 103, f. 5-6. Type loc.: Province of Colchagua, south of Santiago, Chile. = *Diplodon chilensis* (Gray).

**LATOURI**

*Triplodon* Pilsbry & Olsson 1935: 16, pl. 15, f. 3-5. Type loc.: Oponcito River near Guanabanas, Magdalena Valley, Colombia, at the base of La Cira Formation, Oligocene. = *Diplodon latouri* (Pils. & Ols.). (A fossil form of the *guaranianus* group).

**LEAI**

*Diplodon* Simpson 1900: 876; 1914: 1241. Type loc.: 'Brazil' (Probably Sao Paulo). = *Diplodon paulista* (Ih.). See note 19 (leai was given as a new name for *modestus* Lea).

**LEPIDIOR**

Margar n (*Unio*) Lea 1870: 53 (new name for *lepidus* Lea not Gould) Type loc.: Uruguay River. = *Diplodon charruanus* (d'Orb.) typical. See note 10.

**LEWISI**

*Antediplodon* Richards 1948: 3, f. 2. Type loc.: Montclare, near Phoenixville, Montgomery County, Pennsylvania; Stockton Formation of the Newark Series, Triassic. = *Diplodon lewisi* (Rich.). See note 6.

**LIDDLEI**

*Diplodon* Palmer 1941: 48, pl. 8, f. 1, 5. Type loc.: Center of the Azogue anti-

cline, NW of Azogue, prov. Canar, Ecuador, Miocene. = *Diplodon liddlei* Palmer. (Fossil sp. of the *guaranianus* group).

**LIMENSIS**

*Unio* K ster 1856: 146, pl. 42, f. 7, pl. 43, f. 1. Type loc.: Lima, Peru. = *Diplodon chilensis* (subsp. *limensis*?). See note 21.

**LOCELLUS**

*Unio* Lea 1866: 34; 1869: 24, pl. 23, f. 79. Type loc.: Buenos Aires. = *Diplodon burroughianus* (Lea). See note 20.

**LONGUS**

*Unio* Philippi 1869: 44; Pfeiffer 1869: 477, pl. 103, f. 1-2. Type loc.: Valdivia Chile. = *Diplodon chilensis* (Gray).

**LOSADAE**

*Diplodon* Haas 1966: 238, f. 54-56. Type loc.: Cano Losada, Upper Guayabero River, Dept. Meta, Central Colombia. = *Diplodon losadae* Haas. A form related to *D. rhombus* (Wag.) isolated in Colombia.

**LUJANENSIS**

*Unio charruanus lujanensis* Doer. 1884 (Bolet n Acad. Nac. Ciencias Cordoba, 6: 328). Nomen nudum. *U. charruanus* 'subsp. *lujanensis* Ihering 1907: 468 (brief descr., no figures). I have observed a discrete number of fossil *Diplodon* from the Pleistocene of Luj n River (and other localities from strata usually called Lujanense) and none of them can be identified as *charruanus* but belong to several other species, *delodontus*, *piceus*, and also probably *rhuacoicus*.

**MACROPTERUS**

*Unio* Dunker 1846: 109. Type loc.: 'Brazil'? Lea (1870) placed this unfigured species under his *Physunio superbus* from Asia, the indication 'Brazil' being doubtful as in other Dunker species. But the type label in the Berlin Museum (see Haas 1929: 11) reads (in Dunker's handwriting): '*Diplodon furcatum* Spix' (= *caudatum* Wagner). Haas identified this species with *Prisodon obliquus* Schumacher.

**MARTENSI**

*Unio* Ihering 1893: 100, pl. 4, f. 10. Type loc.: 'Taquara and Santa Cruz' in the Vaccahy River drainage, Rio Grande do Sul, Brazil; also Rio de Janeiro. = *Diplodon martensi* (Ih.). See notes 8 and 9.

**MATONIANA**

*Unio* d'Orbigny 1835: 35 sp. 8; 1846: 604 (as *variabilis*), pl. 71, 1-3 (as *matoniana*). Type loc.: Rio de la Plata at Buenos Aires. = *Diplodon variabilis* (Maton). See note 4.

**MEMBRANACEA**

*Unio* Hanley, 'Bivalve Shells, etc.' 1843: 202, pl. 22, f. 6. = *Diplodon variabilis* (Maton). See note 4.

**MIMUS**

*Diplodon* Simpson 1914: 1249 (unfig.). Marshall 1917: 383, pl. 51, f. 3-6. Type loc.: Iguape, Ribeira River, Sao Paulo, Brazil. = *Diplodon expansus* (Dunker). See note 17.

**MODESTUS**

*Unio* Küster 1856: 147, pl. 43, f. 2. (Not *modestus* Lea 1836 -- see *leai* Simp. = *paulista*). Type loc.: Concepción, Chile. = *Diplodon chilensis* (Gray).

**MOGYMIRIM**

*Diplodon* Ortman 1921: 520, pl. 37, f. 4-7, pl. 46, f. 5, pl. 48 f. 2. Type loc.: Creek near Mogy-Mirim, Sao Paulo, Brazil. = *Diplodon expansus* Küster. See note 17.

**MONTANUS**

*Unio* Philippi 1869: 48; Pfeiffer 1869: 482, pl. 104, f. 3-4. Type loc.: Mountain streams of Valdivia Chile. = *Diplodon chilensis* (Gray).

**MOLINAE**

*Unio* Philippi 1847: 50, pl. 4, f. 4. Type loc.: Southern Chile (probably Chile). = *Diplodon chilensis* (Gray).

**MULTISTRIATUS**

*Unio* Lea 1831: 91, pl. 12, f. 22; 1834: 101, pl. 12, f. 22. Type loc.: Brazil. = *Diplodon ellipticus* Wagner. See note 8.

**NOCTURNUS**

*Unio* Lea 1860: 91; 1863: 380, pl. 42, f. 288. Type loc.: Lower section of the Uruguay River. = Hybrid *Diplodon funebris* X *paranensis*. See note 15.

**NORDENSKJOLDI**

*Anodonta* Steinmann & Wilckens 1908: 35, f. 1 (on p. 98). Type loc.: Condor River South of Bahia Inutil, Tierra del Fuego, from the upper strata of 'Minas de Carbón', Oligocene. = *Diplodon nordenskjoldi* (St. & W.).

**NORDESTINUS**

*Diplodon* Haas 1938: 46, f. 1-3. Type loc.: San Francisco River near Jatoba, State of Pernambuco, Brazil. = *Diplodon hombeus* (Wag.). See note 14, 7.

**OBSOLESCENS**

*Diplodon* F. Baker 1914: 666, pl. 22, f. 16-17. Type loc.: Jamauchin River (Tapajoz-Amazon drainage) State of Para, Brazil. = *Diplodon obsolescens* Baker. See note 1.

**OBTUSA**

*Unio* Férussac? (in d'Orbigny 1835: 35; 1843: 610). Not *Unio obtusus* Lea 1840 = *Lampsilis*. *Unio obtusa* is not found among Férussac's species, and Simpson and Haas referred the authorship to d'Orbigny. Type loc.: Laguna, prov. Valparaiso, Chile. = *Diplodon chilensis*.

**OPONCITONIS**

*Diplodon* Pilshry & Olsson 1935: 17, pl. 4, f. 1, 2. Type loc.: Oponcito River near Guanabanas, Magdalena Valley, Colombia, from Upper Oligocene strata of La Cira Formation. = *Diplodon oponcitonis* P. & O.

**PANCO**

*Diplodon* Ihering 1910: 132, pl. 12, f. 6. Type loc.: Panco River, state of Espírito Santo, Brazil. = *Diplodon beskeanus* (Dunker). See note 7.

**PARAGUAYANUS**

*Unio* Martens 1895: 34 (unfigured). Type loc.: Paraguay? Unidentifiable species according to Simpson 1914, but probably the same as *paraguayensis* Lea = *Diplodon delodontus*?

**PARAGUAYENSIS**

*Unio* Lea 1866: 34; 1869: 31, pl. 35, f. 85. Type loc.: Paraguay. = *Diplodon delodontus* (Lam.). See note 13.

**PARALLELIPIPEDON**

*Unio* Lea 1834: 60, pl. 8, f. 20; Obs. 1834: pl. 8, f. 20. Type loc.: Parana River, prov. of Corrientes, Argentina = *Diplodon parallelipipedon parallelipipedon* (Lea). See note 1.

**PARANENSIS**

*Unio* Lea 1834: 49, pl. 14, f. 42; Obs. 1834: pl. 14, f. 42. Type loc.: obtained by Dr. Burrough at Buenos Aires, where, he said, have been brought from the Parana River; it might be from La Plata River as well. = *Diplodon paranensis* (Lea). See note 15.

**PARCUS**

*Unio* Lea 1866: 34; 1869: 22, pl. 33, f. 77. Type loc.: 'South America' (Uruguay River). = *Diplodon charruanus* (d'Orb.). See note 10.

**PARODIZI**

*Diplodon* Bonetto 1961: 214, fig. in p. 216, 217. Laguna Vargas, at the confluence of Arroyo Malabrigo and San Javier River, near Romang, Santa Fe, Argentina. = *Diplodon parodizi* Bonetto. See note 20.

**PATAGONICUS**

*Unio* d'Orbigny 1835: 37; 1843: 610, pl. 70, f. 1-4. Type loc.: 'Río Negro, Patagonia.' D'Orbigny explored the Negro River only 40 or 50 miles from its mouth & saying he collected the specimens there; this corresponds to the extreme eastern distribution of *patagonicus*, but it is more abundant in the west. = *Diplodon chilensis patagonicus* (d'Orb.).

**PATELLOIDES**

*Unio* Lea 1860: 89; 1863: 19, pl. 43, f. 291. Type loc.: see note 15. = *Diplodon paranensis* (Lea).

**PAUCARPATENSIS**

*Pseudodiplodon* Marshall 1928: 4 pl. 1, f. 2, 8. Type loc.: Paucarpata, on the Marañon River, in Upper Pleistocene strata of Pebas Formation, NW Peru. = *Diplodon singewaldi* (Marshall).

**PAULISTA**

*Unio* Ihering 1893: 93, pl. 4, f. 7. Type loc.: Piracicaba, Tiete River, Sao Paulo, Brazil. = *Diplodon paulista* (Ih.). See note 19.

**PAZI**

Castalia Hidalgo, *Journal de Conch.* 1868: 353, pl. 13, f. 6. Type loc.: Imbabura, Ecuador. = *Diplodon pazi* (Hidalgo). See note 5.

**PEBASENSIS**

*Eodiplodon* Marshall 1928: 5, pl. 1, f. 5-7. Type loc.: Pebas, Iquitos region, western Peru, from Upper Pliocene Pebas Formation. = *Diplodon gardnerae* (Marshall).

**PECULIARIS**

*Unio* Lea 1866: 33; 1869: 25, pl. 34, f. 80. Type loc.: 'South America' (Uruguay River, near Salto). = *Diplodon delodontus* X *uruguayensis*. See note 13.

**PEHUENCHENSIS**

*Diplodon* Doello Jurado 1927: 410, pl. 3, f. 13, pl. 4, f. 20. Type loc.: Lowlands of Lenza Niyeu, province of Rio Negro (Patagonia) Argentina, Jahuel Formation (Danian) Paleocene. = *Diplodon pehuenchensis* D. J. Originally described as 'var.' of *colhuapiensis*.

**PENNSYLVANICUS**

*Diplodon* Pilsbry 1921: 32, pl. 2, f. 1-3, pl. 3, f. 4. Type loc.: Little Cone-wago Creek, York County, Pennsylvania, from Triassic strata of the Newark Series. = *Diplodon pennsylvanicus* Pils.

**PERAEFORMIS**

*Unio* Lea 1860: 90; 1863: 20, pl. 43, f. 292. Type loc.: Uruguay River. = *Diplodon peraeformis* (Lea). See note 22.

**PERFRAGILIS**

*Diplodon* Marshall 1923: 2, pl. 1, f. 3, 4, pl. 2, f. 1-3. Type loc.: Rio de la Plata at Colonia, Uruguay. = *Diplodon variabilis* (Maton). See note 4.

**PERPLEXUS**

*Diplodon* Simpson 1914: 1248; Marshall 1917: 384, pl. 52, f. 5, pl. 53, f. 1-4. Type loc.: Lake Potrero, Maldonado, Uruguay. = *Diplodon charruanus* (d'Orb.).

**PFEIFFERI**

*Unio* Dunker 1848: 181; Pfeiffer 1866: 151, pl. 39, f. 4, 9. Type loc.: Negro River, State of Rio Janeiro, Brazil. = *Diplodon burroughianus wheatleyanus* (Lea)? See note 20.

**PICEUS**

*Unio* Lea 1860: 91; 1863: 15, pl. 41, f. 287. Type loc.: Uruguay River. = *Diplodon piceus* (Lea). See note 2.

**PIGER**

*Unio* Lea 1860: 90; 1863: 23, pl. 41, f. 296. Type loc.: Uruguay River. = *Diplodon uruguayensis* (Lea). See note 3.

**PILSBRYI**

*Diplodon* Marshall 1928: 2, pl. 1, f. 1, pl. 3, f. 2. Type loc.: Canada Grande, Departamento Cerro Largo, Uruguay. = an oversized specimen of *Diplodon huacoicus* (d'Orb.). See note 23.

**PIRACICABANA**

*Unio aethiops piracicabana* Ihering 1893: 102 (unfigured). Type loc.: Piracicaba Tiete River, Sao Paulo, Brazil. = *Diplodon expansus* (Küst.). See note 17.

**PODAGROSUS**

*Diplodon* Marshall 1923: 3, pl. 1, f. 1, 2, 5, pl. 2, f. 6-7. Type loc.: Uruguay River at Colon, Entre Rios, Argentina. = *Diplodon uruguayensis* (Lea).

**PRUNOIDES**

*Unio* Lea 1868: 150; 1869: 83, pl. 53, f. 136. Type loc.: 'South America' (Uruguay). = *Diplodon peraeformis* (Lea). See note 22.

**PSAMMATICUS**

*Unio* Philippi 1848: 11, pl. 5, f. 2, (as Bronn's in litt.). Type loc.: near Rio Janeiro, Brazil. = *Diplodon granosus* (Brug.).

**QUADRANS**

*Unio* Lea 1859: 306, 1860: 42, pl. 61, f. 185. Type loc.: 'Texas.' This is according to Simpson and Haas a South American species, and very probably = *Diplodon rotundus* (Wagner).

**RHOMBEUS**

*Unio* Wagner in Spix 1827: 34, pl. 23, f. 1, 2. Type loc.: Solimoes River and tributaries (western branch of the Amazon), Brazil. See note 7.

**ROTHI**

*Diplodon* Ihering 1904: 232, f. 6; 1907: 466. Type loc.: Arroyo Lele, foot of Sierra Leleque, western Chubut (Patagonia) Argentina; from the 'Colloncura' strata (Priasean Formation), middle Miocene. = *Diplodon rothi* Ihering.

**RHUACOICUS**

*Unio* rhuacoica d'Orbigny 1835: 35; 1843: 606, pl. 69, f. 4, 5. Type loc.: 'Banda Oriental' = Uruguay. = *Diplodon huacoicus* (d'Orb.). See note 9.

**RHUACONICUS**

*Unio* Küster 1856: 145, pl. 42, f. 5.  
Type loc.: Nova Friburgo, State of Rio  
Janeiro, Brazil. = *Diplodon wheatleyanus*  
(Lea). See note 20.

**ROTUNDUS**

*Unio* Wagner in Spix 1827: 34, pl. 25,  
f. 3, 4 (as *Diplodon*). Type loc.: Rivers  
of southern Brazil. = *Diplodon rotundus*  
(Wag.). See note 12.

**RUDUS**

*Unio* Lea 1859: 187; 1860: 84, pl. 43,  
f. 146. Type loc.: Rio de la Plata. = *Di-*  
*plodon delodontus delodontus* (Lam.). See  
note 13.

**RUFOFUSCUS**

*Unio* Lea 1865: 76; 1869: 42, pl. 39, f.  
96. Type loc.: unknown. = *Diplodon rotun-*  
*dus gratus* (Lea). See note 12.

**SANTAMARIAE**

*Diplodon* Simpson 1914: 1270; Marshall  
1917: 386, pl. 52, f. 6, pl. 55, f. 1-4.  
Type loc.: Itapoca River, Rio Grande do  
Sul, Brazil. = *Diplodon martensi* (Ih.). See  
note 9.

**SANTANUS**

*Diplodon ellipticus santanus* Ihering  
1910: 134 (type fig. in Haas 1931, f. 19).  
Type loc.: Santa Maria River, drainage of  
Dolce River, Spirito Santo, Brazil. = *Di-*  
*plodon rhombeus* (Wagner). See note 7.

**SCHENEDERI**

*Unio* Dunker MS. Nomen nudum (fontaine-  
anus after Ihering 1893 = *rotundus*).

**SEBASTIANI**

*Unio* Ihering MS. Nomen nudum. (In  
Senckenberg Museum specimens under this  
name from Camaquã River, Rio Grande do  
Sul). = *Diplodon martensi* (Ih.).

**SEMIGRANOSUS**

*Diplodon* Simpson 1914: 1252; Marshall  
1917: 387, pl. 55, f. 5-8. Type loc.: Ti-  
ete River, Sao Paulo, Brazil. = *Diplodon*  
*paulista* (Ih.). See note 19.

**SIMILLIMUS**

*Diplodon* Ortmann 1921: 495, pl. 35, f.  
3-6, pl. 45, f. 2. Type loc.: Nhundia-  
guara River, at Morretes, State of Paraná,  
Brazil. = *Diplodon martensi* (Ih.). See  
note 9.

**SINGEWALDI**

*Prodiplodon* Marshall 1928: 2, pl. 1,  
f. 3, 6. Type loc.: Paucarpata, on the  
Marañon River, NW Peru, in Upper Pliocene  
strata (Pebas Formation).

**SMITHI**

*Unio* 'Gray' 1834 Griffith & Pidgeon (in  
Cuvier's Animal Kingdom): vol. 1, pl. 20,  
f. 3 (undescribed). Type loc.: unknown.  
= *Diplodon chilensis*.

*Diplodon* Marshall 1926: 9, pl. 2, f. 1,  
7, pl. 3, f. 6. Type loc.: Tigre River,  
Prov. Buenos Aires (Paraná Delta), Argen-  
tina. = *Diplodon burroughianus* (Lea).

**SOLIDULUS**

*Unio* Philippi 1869: 45; Pfeiffer 1869:  
480, pl. 103, f. 9, 10. Type loc.: San-  
tiago, Chile. = *Diplodon solidulus* (Philip-  
pi). See note 21.

**SOLISIANA**

*Unio* d'Orbigny 1835; 1843: 604, pl. 69,  
f. 1-3. Type loc.: Solis River, W. of Mal-  
donado (at Piriapolis) Uruguay. = *Diplodon*  
*solisianus* (d'Orb.). See note 24.

**SUAVIDICUS**

*Unio* Lea 1856: 95; 1857: 29, pl. 29, f.  
24. Type loc.: Amazon River, Brazil. = *Di-*  
*plodon rhombeus* (Wagner). See note 14.

**SUBCYLINDRICUS**

*Diplodon* Marshall 1922: 3, pl. 2, f. 1,  
2, pl. 3, f. 1, 2, 11. Type loc.: Arroyo  
Manga, Montevideo, Uruguay. = *Diplodon rhu-*  
*acoccus* (d'Orb.). See note 23.

**SUBQUADRATUS**

*Diplodon* Marshall 1922: 3, pl. 2, f. 6,  
8, pl. 3, f. 8-10. Type loc.: Paysandu,  
Uruguay. = *Diplodon variabilis* (Maton). See  
note 4.

**SUBTRAPEZIUS**

*Unio* Philippi 1848: 12, pl. 5, f. 3.  
Type loc.: ? = *Diplodon variabilis* (Maton).

**SUPPOSITUS**

*Diplodon* Simpson 1914: 1245; Marshall  
1917: 385, pl. 51, f. 2, pl. 54, f. 1-4.  
Type loc.: State of Paraná, Brazil; also  
several localities on Tiete River, Sao Pau-  
lo after Marshall). = *Diplodon martensi*  
(Ih.). See note 9.

**TRANSANDINUS**

*Diplodon* Parodiz 1963: 145, pl. 2, f.  
1-4. Type loc.: Paleocene strata (Jahuel  
Formation) of Paso Tinguiririca, between  
headwaters of the Tinguiririca and Grande  
Rivers, Colchagua, Chile. = *Diplodon trans-*  
*andinus* Par.

**TRIFIDUS**

*Unio* Lea 1860: 89; 1863: 22, pl. 44, f.  
295. Type loc.: Buenos Aires, Argentina.  
= *Diplodon trifidus* (Lea). See note 20.

**TRIVIALIS**

*Diplodon* Simpson 1914: 1250; Marshall  
1917: 386, pl. 54, f. 5-8. Type loc.: Ja-  
boticabal, Sao Paulo, Brazil; also Pira-  
cicaba, Rio Grande do Sul, Marshall. = Hy-  
brid *Diplodon uruguayensis* X *expansus*.

**TRIVIALOIDES**

*Diplodon* Marshall 1922: 5, pl. 1, f.  
12, 14, pl. 2, f. 3, 5, pl. 3, f. 12.  
Type loc.: Arroyo Bellaco, Paysandu, Uru-  
guay; also in southeastern Uruguay. = *Di-*  
*plodon charuanus* (d'Orb.). See note 10.

**URUGUAYENSIS**

*Unio* Lea 1860: 90; 1863: 24, pl. 45, f. 298. Type loc.: Uruguay River. = *Diplodon uruguayensis* (Lea). See note 3.

**VALDIVIANUS**

*Unio* Philippi 1869: 48; Pfeiffer 1869: 482, pl. 104, f. 3, 4. Type loc.: Valdivia, Chile. = *Diplodon chilensis* (Gray).

**VARIABILIS**

*Mya* Maton 1811: 327, pl. 24, f. 4-7. Type loc.: Río de la Plata, Argentina. = *Diplodon variabilis* (Maton). See note 4.

**VICARIUS**

*Diplodon* Ortmann 1921: 497, pl. 25, f. 7, 8, pl. 34, f. 1, 2, pl. 45, f. 3. Type loc.: Agua quente, Iporanga, São Paulo, Brazil; in creeks tributaries of Ribeira River). = *Diplodon martensi* (Ih.). See note 9.

**WANNERI**

*Diplodon* Pilsbry 1921: 34, pl. 3, f. 5. Type loc.: Little Conewago Creek, York County, Pennsylvania, in shale of the Newark Series, Triassic. = *Diplodon wanneri* Pilsbry. See note 6.

**WAGNERIANUM**

*Diplodon* Simpson 1900: 877; 1914: 1246. Type loc.: San Francisco River, Brazil. = *Diplodon ellipticus* (Wagner).

**WHEATLEYANUS**

*Unio* Lea 1856: 94; 1857: 28, pl. 29, f. 23. Type loc.: 'Río de la Plata' and Negro River (a mistake); see note 20; must be Tiête River, São Paulo. = *Diplodon burroughianus wheatleyanus* (Lea).

**WYMANI**

*Unio* Lea 1860: 90; 1863: 17, pl. 42, f. 289 (*wymanii*). Type loc.: Uruguay River. = *Diplodon delodontus wymani* (Lea). See notes 3, 13.

**YAGUARONIS**

*Diplodon* Marshall 1930: 5, pl. 2, f. 2, 3, 5, 6. Type loc.: Yaguaron River, Cerro Largo, northeastern Uruguay. = *Diplodon rhuacotus* (d'Orb.). See note 23.

**YORKENSIS**

*Diplodon* Pilsbry 1921: 35, pl. 3, f. 2, 2a. Type loc.: Little Conewago Creek, York County, Pennsylvania, in shale of Newark Series, Triassic. See note 6.

## NOTES

1 *Diplodon parallelipipedon* extends into the Uruguay River up Rio Grande do Sul (Camaquã and Vacahy rivers). Ortmann (1921: 528) classified specimens from these rivers as *Diplodon berthae* but remarking on the possibility that they might be *aethiops* (the true *berthae*, according to the type lot, is equal to *piceus*). Actually, there is a subspecific form of *parallelipipedon*, typical of the rivers of central and southeastern Uruguay, *D. parallelipipedon aethiops* (it corresponds to fig. 30 in Formica Corsi's 1900); it is always shorter and smaller, entirely black, with characteristic flutings on the dorsal slope which the typical *parallelipipedon* does not have. The subspecies *aethiops* shows a clinal tendency northwards, to become shorter and less angulated posteriorly and somewhat more inflated, corresponding to the form which Ihering called *aethiopiiformis* (in *litteris*); Simpson referred to *aethiopiiformis* as uncertain, Haas included it under *charruanus* and Bo-

netto under *rhuacotus*. I examined the specimens in the M.C.Z. collection labelled by Ihering *aethiopiiformis* from the Camaquã River in Rio Grande do Sul, and I have no doubt that they represent variations of *aethiops*, and show the characteristic flutings on the dorsal slope.

*Unio acutirostris* Lea was described upon an old and heavy specimen of *parallelipipedon*, having the posterior margin acutely angulated. Such individuals, often striped with light color bands over the black surface are common from Corrientes to La Plata but do not appear in separate populations; the indication, by Lea, that *acutirostris* was larger, does not agree with the given measurements, and size is very variable in any population. *Unio sphenorhynchus* Crossé & Fischer, indicated by Martens (1900: 501) as synonym of *acutirostris*, is a species from Mexico and not a *Diplodon*.

Isolated in northern Brazil is *D. obsolescens* F. Baker, described upon a badly worn specimen. I received a better preserved single valve, of the same dimensions as the type, from the Curuá River near Santarem, in the Amazon drainage. It has a general resemblance with the group of *parallelipipedon*, and especially with *D. fraus* Ihering from the Pliocene of Paraná, Entre Rios. The only specimen known of *D. fraus*, was first described by Borchert in 1901 as *Modiola contorta* and was found by A. Bravard in the mid-nineteenth century with marine fossils of supposed Miocene age, but it is questionable that it was *in situ*; Ihering recognized it as a true *Diplodon*. Since the name *contorta* was preoccupied in *Unio* by Heude for a Chinese species, and *contorta* Borch. was subsequently also referred to *Unio*, Ihering changed the name.

Simpson (1900: 884) mentioned also *Unio bomplandi* which 'according to Lea' was equal to *parallelipipedon*. Lea never indicated any connection between the two names, and merely listed *bomplandi* without other reference but its name. Haas declared not having found any *bomplandi* in Valenciennes's works. On the other hand, Lea in his last 'Synopsis' (1870), said he had received specimens of *parallelipipedon* mislabelled as *cambodjensis*.

2 *Diplodon piceus* (Lea) is the 'black form' which in most collections has been labelled as *charruanus*. It is typical of the Uruguay River system. It includes *berthae*, *hildae*, *aethiopiiformis* (in part) and *hidalgoi*. Ihering distributed many specimens among collectors under the name *aethiops*, but as Ortmann indicated, these certainly are not Lea's *aethiops* (he thought *aethiops* plus *piceus* equal to *charruanus*) and called it *berthae*. There is a slight but apparent northward clinal variation in *piceus*; Rio Grande do Sul specimens - *berthae* and *hildae* - are progressively smaller and less melanic, and those which Ortmann in 1921 mentioned as *charruanus* from Santa Isabel in the Rio

Negro, are actually intermediate between *piceus* s. s. - *berthae*. Also, Haas and Bonetto subordinated *berthae* and *hildae* to *charruanus* but, while Haas places *piceus* under *charruanus*, Bonetto does it under *rhuacoicus*. The type specimens of *hildae* are the smaller, with 'golden-brown' periostracum and hinges rather stronger, an extreme clinal form but there is no doubt that they belong to the same species, *piceus*. Individuals are also variable in any *piceus* population, some being more pointed posteriorly, or with the umbonal ribs stronger, in number of 8-9. The original lots of both, *berthae* and *hildae*, were collected on the same day (Jan. 26, 1909), at the same place Jacuhy River at Cachoeira, Rio Grande do Sul, by the same person, J. D. Haseman; the locality is about 300 miles north of the normal habitat of *piceus* s. s. If new materials show that *hildae-berthae* have a characteristic geographical constituency (in the small drainage emptying into Lago dos Patos), and there is not complete clinal continuity, these might be considered a subspecies. Also, *Diplodon fortis* Marshall is the same as *piceus*.

3 Ortmann's acceptance of *uruguayensis* as a good species was correct. It has been mistaken for *wymanni* but it is perfectly identifiable, although it operates a great deal of hybridization with *wymanni*, *delodontus* and *expansus*, and apparently also with *piceus*. Ortmann had two lots from a same locality, 'Ponds of the Rio Negro at Santa Isabel,' one of which he recognized correctly as *uruguayensis*, and the other as *charruanus* (*piceus*) which includes hybrids; some, short specimens, of these hybrids, correspond to the form Lea described as *U. piger*.

Lea said that his *U. apprimus* has affinities with *uruguayensis*, and I agree with Ortmann that it is actually this species. Haas united *apprimus* with *wymanni*, because he thought also that *wymanni* and *uruguayensis* were the same; *apprimus* is but an oversized *uruguayensis*.

4 *Diplodon variabilis*, like *charruanus*, has been the source of much confusion. It was described upon a young shell (as well as *membranaceus* Hanley and *perfragilis* Marshall), and in any population the young seem to be always more abundant than the adults; if sexual maturity is not premature, then the species must be very prolific to maintain the population level. Adults attain the size indicated by d'Orbigny for *matonianus* (the same as *subquadratus* Marshall) maintaining the suborbicular shape of the young, very inflated near the umbos, surface very rugose, valves extraordinarily thinner compared with other species of the same size, but appearing in variations which almost can be called deformities or abnormally aged; for this Maton named it properly; only the hinge has resemblance with that of *burroughianus*, although more arched, but in general the young as well as the adults are conspicuously different from *burroughianus*; nevertheless there is an alliance between the two species, sharing the same habitat in La Plata River where they probably interbreed; but pure-breed populations are perfectly distinguishable. While *burroughianus* extends its range into the lower portions of the Paraná and Uruguay, *variabilis* seems to be typical of La Plata. Thus, *Diplodon variabilis* is maintained here within the limits and synonymy established by Haas in 1931 (adding *perfragilis* and *subquadratus*) and Castellanos 1960. *Diplodon subquadratus* is neither *solisianus* (Castellanos 1960) nor *funebrialis* (Haas 1931) but the typical adult form of *variabilis* as indicated by Bonetto, and has not alliance, as Marshall suggested, with *g-atus* and *patelloides*.

The proportions given by Marshall describing *D. arcuatus* were L. 39, H. 34, D. 23 mm., but in the caption of the plates the reduction of the figures indicated as one third, actually being). 75, H. 66, D. 45 mm. The shape, hinge with long cardinals, and the almost central inflated umbos, all agree with Lea's *bulloideus*, which is also *variabilis*.

5 *Diplodon hylaeus* is an uncommonly collected species, from the eastern mountain streams of Bolivia in Santa Cruz, running north toward the confluence of the Grande-Marmoré rivers; specimens labelled as such from southeastern localities belong to *guaranianus*. D'Orbigny, who described both species, declared that *hylaeus* is very rare and different from *guaranianus*. *D. hylaeus* is always thinner and slender, with more ovate and less angulated valves, the ribs showing in the inner side which is very iridescent instead of pure white, and the pseudocardinals and muscle scars considerably weaker. On the other hand, it is more closely related to *pazi* from Ecuador.

During the heavy summer rains, the vast area of the Bolivian pampas or sabanas, known as the Pantanal Region, remains covered for several months by an average of a foot of water, making the headwaters of the Paraguay miscible with those of the Guaporé, Madeira, etc. of the Amazon system, and occasionally a temporary invasion of larval forms into the Paraguay-Paraná occur; but even under such conditions *D. hylaeus* is extremely rare, while *guaranianus* is very abundant. The northern form, *pazi*, is distinguished from *hylaeus* by its sculpture reaching the lower ventral margin, while in *guaranianus* and *hylaeus* it reaches only to the middle section of the shell; it is equally scarce.

As for *Diplodon asuncionis* Marshall, it is a synonym of *guaranianus*. The identification by Haas of *D. guaranianus* and *D. guaranianus hasemani* Ortmann is correct, but *hasemani* is known only by its original lot and can be considered an extreme of a clinal series. A more complete comparison of *hylaeus*, *guaranianus*, *pazi*, is given by the author in another paper to be printed promptly.

6 Between 1928 and 1932 Marshall created five generic names for fossil *Diplodon* of North and South America: *Prodiplo-*

don, *Eodiplodon*, *Antediplodon*, *Ecuadorea*, and *Castalioides*. All these were based on variations of the radiating sculpture of the umbos; such characteristics are not consistent, overlapping among the species groups, and defined separation of these genera or subgenera almost impossible. There are, at present, only two subspecific groups recognizable in *Diplodon*, those with parasitic larvae, *Diplodon* s. s. or with the larvae non parasitic but of direct development, *Rhipidodonta* (= *Cyclomya*) and still, such embryological division is not of much practical use when the classification of only adult shells is considered. *Rhipidodonta* also includes as synonyms *Ecuadorea* and *Schelesschiella*, the last proposed by Modell with an heterogeneous assemblage of unrelated species, with or without parasitic glochidia, as *burroughianus*, *rhuacoicus*, and *parallelipedon*.

Fossil species of *Diplodon* are known in South America from as early as the Paleocene of Patagonia and Chile, and up to the Eocene are still only known from the southern region: *D. nordenskjoldi* in Tierra del Fuego. By the middle Tertiary they had reached Ecuador and Colombia in the North, from where they returned southward, through Brazil during the Pliocene. No *Diplodon* are known from the South American Mesozoic, but they existed in the Triassic of Pennsylvania: *borealis*, *pennsylvanicus*, *wanneri*, *carolusimpsoni*, *yorkensis*, and *lewisi*. In other states also *Diplodon*-like Unios were found: from Texas *subplanatus*, *dumbei*, *granulatus*, and *dockumensis* all described by Simpson, and from the Connecticut Valley in Massachusetts, *emersoni* Troxell and *wilbrahamensis* Emerson; but the relationship of these Unios to *Diplodon* is uncertain. There is clear evidence that the genus *Diplodon sensu lato* originated in North America during the early Mesozoic and before becoming extinct in the northern continent migrated to South America at the end of the Cretaceous or very early Paleocene, when the first land communication between the two continental

masses took place, a migration which was coeval with that of the early mammals.

7 *Unio beskeanus*, *garbei*, and *panco* are one and the same species according to Haas who also placed *ellipticus santanus* under *beskeanus*. I think that *santanus* is equal to *suavidicus* = *rhombus*; Bonetto also synonymized *garbei* with *suavidicus* (having the same sculpture when young), but their hinges are very different. *Unio kelseyi* should be also considered a *beskeanus*.

On the other hand, all these names, *beskeanus*, *suavidicus*, *kelseyi*, *panco*, and *garbei*, plus *hartwrighti*, are all of the *Diplodon rhombus* group, *sensu lato*, which may constitute a superspecific unit in northern Brazil from the San Francisco River northward, and well isolated from those species of the Paraná drainage. Although the type lots of *garbei* (= *beskeanus*) and *santanus* (= *rhombus*) are both from the Doce River drainage, in the state of Spirito Santo, the differences observed in their hinges, adductors, umbos and shape, show that they are not likely to belong to the same species. At present it is justified to keep *beskeanus* as a separate species according to Haas, but his *beskeanus nordestinus* is a *suavidicus* (= *rhombus*). See also note 4.

8 Simpson's opinion that *Unio binneyi* belongs to *Diplodon*, but it is neither *dunkerianus* as Simpson thought, nor *rhuacoicus* (after Haas); it is a thinner species within the complex of *D. martensi sensu lato*, which includes *vicarius*, *santamariae*, etc. (See note 9), with a double pseudocardinal in the left valve. Although *martensi* belongs in a broader sense to the large group of *D. ellipticus*, the second species has only a single pseudocardinal in the left valve, and in this it equals *multistriatus*. A comparison of the descriptions of Lea and Spix shows that *multistriatus* (often referred as *granosus*

*multistriatus*) is identical with *ellipticus*; in all other species observed or described by Simpson, Ortmann, or Marshall, which subsequent authors assimilated to *multistriatus*, have double pseudocardinals. Lea himself found out that his own *multistriatus* was *ellipticus* (last 'Synopsis' 1870: 31): 'I have no doubt of *ellipticum* being the same form with *Unio multistriatum*'; but the specimen figured by Haas (1930, f. 28) as *multistriatus* is actually *martensi*.

9 *Unio firmus boettgeri* was synonymized by most authors under *granosus multistriatus*, but eliminating *multistriatus* as being a form of *ellipticus* (see previous note), *boettgeri* remains as a different form from both *multistriatus* and *firmus* (the last = *delodontus*) and corresponds to the thicker individuals of *martensi*.

*Diplodon martensi* (sometimes mistaken also for *rhuacoicus*) presents many clinal variations which have been named as species by Simpson and Ortmann: *imitator*, *simillimus*, *vicarius*, *santamariae*, *suppositus*. Ortmann assumed that the type locality of *martensi* was uncertain (and for that described *imitator* on differences of proportions which are not specific), but actually Ihering clearly stated Taquara, near Porto Alegre in NE Rio Grande do Sul as the locality; also about *simillimus* Ortmann said that it is 'much like *martensi* and might fall under this according to Ihering,' but described it as new on account of the 'different dimension,' recognizing nevertheless its closeness to *imitator* and *santamariae*. Haas included all those names under *rhuacoicus*, and Bonetto divided them between *granosus multistriatus* and *charruanus*. The source of so much confusion was perhaps the early Sowerby misidentification of the real *charruanus* as the 'form' *rhuacoicus* which then became a recipient for many uncertain forms; even *aethiops* and *piceus* were subordinated to *rhuacoicus* (Bonetto 1964); see notes 1 and 2.

Figures 12-14 on plate 71 of d'Orbigny's as *rhuacoicus* actually correspond to *faba*, which the author himself reconsidered as being the same as *charruanus* (see d'Orbigny's statement on p. 704); the true *rhuacoicus* is that of figures 4-5 on plate 69, with very elongated shell, sublanceolate in upper view, rounded at both ends but narrower posteriorly, umbo elevated and swollen, and with periostracum of light brown-greenish, very rarely dark-brown but never black; the shell is thick especially on the anterior lowerside and, although the surface is smooth and shiny, the growth marks are very conspicuous. I have identified specimens with these peculiar characteristics of *rhuacoicus* from La Plata River and Lake Potrero at Maldonado (from the second locality comes *D. perplexus* Simpson which is *charruanus*). When Ortmann monographed the *Diplodon* he had no specimens of *rhuacoicus* at his disposal, and he thought (perhaps following Sowerby), that it was the same as *charruanus*.

The name *suppositus* was given by Ihering (1893) without description, to a form indicated by him as close to *martensi*; Simpson in 1914 described it, and although Ortmann afterwards considered it as similar to *paulista*, it differs greatly from this species, and actually is *martensi*.

10 *Diplodon charruanus* is a typical Uruguayan species, with shining brownish green periostracum (not the black form often mistaken for *charruanus* which is *piceus* - see note 2). When Lea described *lepidus* (afterwards changed to *lepidior*) with complete detail, he actually was describing the real *charruanus*, and it also corresponds to figure 505b of Sowerby in Reeve's Conch. Icon.; Sowerby drew the figure himself from d'Orbigny's actual specimen of *charruanus* in the British Museum. But the original figures 8-10 in d'Orbigny as *charruanus* show oversized specimens which do not correspond to the type illustrated by Sowerby. The photograph given by Haas (1930: 186, f. 1) is one of a real

*charruanus*, showing the weak flutings on the dorsal slope which are not present in *piceus*.

The synonymy usually given for *charruanus* is not only mostly incorrect but also excessive: *funerialis*, *peraeformis*, *berthae*, *piger*, etc., have nothing in common with it; but *Unio parvus* is a *charruanus* by its hinge, color, and umbonal characteristics, as indicated by Haas, although it has been also mistaken for *rhucocicus*.

As for *trivialoides*, it was described upon a rather small specimen which agrees in all with *lepidior*, that is the typical *charruanus*; Marshall named it on the assumption that it was close to *trivialis* Simpson, but the last is nothing but a hybrid between *uruguayensis* and *expansus* from Rio Grande do Sul and Sao Paulo.

11. If the illustration in Griffith-Cuvier's 'Animal Kingdom' is acceptable as the true *Unio childreni*, then such form cannot be associated to *chilensis* under which it is usually listed, but rather looks like a *delodontus*. But it was not only poorly drawn; the six words in the index of the illustration, 'dark brownish periosteum, teeth small, compressed,' hardly can be taken as a diagnosis for recognition. It is recommendable that *childreni* should be rejected as a *nomen nudum*.

12. *Unio fontaineanus* d'Orbigny is a smaller northern subspecies of *rotundus* (see Bonetto 1964). Typical *rotundus* is from eastern central and southern Brazil, always larger (the same as those figured by Haas as *fontaineanus*). Haas included *rotundus* under *rhombeus*, but the second is from the Amazon and San Francisco drainages, and morphologically different: *rotundus* has a more circular shell (including the subspecies *fontaineanus*), while *rhombeus* is elongated, oval as in *suavidicus* with darker periostacum,

although the very young are greenish and rayed; the hinges are also different.

Ortmann credited *Diplodon fontaineanus* 'var.' *deceptus* Simpson, specific rank, while Haas thought it was a synonym of *paranensis funerialis*, and Bonetto synonymized it under *delodontus expansus*. A revision of the lot from Guahyba River mentioned by Ortmann (received from Ihering), showed that it actually belongs to *gratus*, as Ihering's original label so indicates; the other lot, from Jacuhy River of which Ortmann figured some specimens, contains a mixture; figures 1 and 2 of Ortmann are *uruguayensis*; finally the lot indicated by Ortmann as *gratus* from Uruguayana, is the same thing as *deceptus*; both names, *gratus* and *deceptus* constitute a single subspecies: *Diplodon rotundus gratus*. I agree with Bonetto that also *enno* is a form of *rotundus* not of *delodontus*; it is a northern subspecies in the Grande and San Francisco rivers, while *rotundus rotundus* is the southern form (Spix: 'in fluviis Brasiliae australioris'); but the specimen of '*Diplodon enno*' figured by Castellanos (1960, f. 10-11) from Misiones in NE Argentina, is not this form but *expansus*.

13. Several recognizable species have been included under the name *Diplodon delodontus*: *uruguayensis* (see note 3), *expansus* and *scitisanus*. *D. delodontus* proper is an easily differentiable species, corresponding to what Lea called *rudus* and *lacteolus*; *firmus* is also a synonym; it is common in the lower section of the Paraná River, with a subspecies *wymanni*. The areas of the two subspecific forms overlap greatly with consequent hybridization. *D. delodontus* hybridizes also to a large extent with its monogenetic allied species *uruguayensis* and *scitisanus*. I think that *felipponei* is but another hybrid between *delodontus-wymanni*, in which the characters of the first are dominant, and its author recalled that 'externally it mimics *wymanni*'; it is not a *paranensis* or *funerialis* as indicated by Haas.

*Diplodon paraguayensis* cannot be distinguished from *delodontus*, and *peculiaris* is very probably *delodontus Xuruguayensis*, and it is not certain that it is from Paraguay as Simpson stated.

*Unio fokkesi* Dunker was placed by Simpson (1914: 1312) in the list of the uncertain species. It was unfigured until Haas published a photograph of the type in the Senckenberg Museum, as *delodontus* with which it externally agrees, but the pseudocardinal of the right valve is of an intermediary type between *uruguayensis* and *expansus*; the locality is uncertain (Dunker indicated 'Rio de la Plata, Brazil!') but probably it is from southern Brazil.

14 *Unio suavidicus* was described from a young individual which, except for being a little inflated, in all other features corresponds to *rhombus*, characterized by the great reduction of the hinge-teeth, especially the pseudocardinals. *U. browni* Lea and *beskeanus nordestinus* Haas are also the same with *suauidicus-rhombus*; besides these, *rhombus* also includes *hartwrighti*, *kelseyi*, and *demerarensis* Lea (see note 7) and the last one is known only from a single specimen of the Cuming Collection and was illustrated by Sowerby in Reeve's (1865: pl. 22, f. 99); there is still an open question in this group if those from the Guianas and the Amazon are the same.

Of *Unio rufofuscus* Lea and Simpson said that it was similar to *granosus*, but Haas came closer comparing it with *fontaineanus* (= *D. rotundus fontaineanus*); however, it has a simpler dentition and darker colors, as in *gratus*; its correct position should be under *Diplodon rhombus gratus*.

15 Haas recognized that *Diplodon paranensis* is a perfectly identifiable species, not a form of *variabilis* or *burroughianus*. However, its synonymy includes many names which should be segregated; *peraeformis* (see note 22), *funebra-*

*lis* (plus *disculus*), *fontaineanus* a subspecies of *rotundus*, *nocturnus* (*funebrales X paranensis*), *gratus* (*D. rhombus gratus*) and *felipponei* (*delodontus-wymanni*). Some individuals of *paranensis* become more inflated, especially at the center of the shell, as in Lea's 'lenticular' *patelloides*; for this last name the author gave two localities, Amazon and Rio de La Plata; the three specimens mentioned by Lea were probably different forms, but certainly the one figured under the name *patelloides* is a *paranensis* like those of La Plata River, which extends north as far as the Paraguay; it was probably from the Amazon reference that Haas subordinated *patelloides* to *rhombus*. *U. disculus* is but a young *funebrales*.

*Unio funebrales* shows a marked difference from *paranensis*. Both are found living together in the same localities of La Plata River, in unmixed populations, although *funebrales* seems more common on the Uruguayan side. *D. funebrales* is always thinner, more depressed, umbonal ribs stronger, prismatic area wider, external color always jet black, but when the periostracum is removed it shows underneath a strong salmon color, and the interior is equally tinted; *paranensis* very seldom shows such color and when it does it is very pale, and never has black periostracum. For all this I agree, with Figueiras (1965: 237, 239), that *paranensis* and *funebrales* are two different species. Nevertheless, being so closely related, and sharing the same area, they must interbreed, resulting in such individuals as those which Lea called *nocturnus*. Although in Lea's figure *paranensis* has an exaggerated rounded point on the basal margin, compared with the original illustration of *funebrales* the differences are obvious: *paranensis* is wider or as wide as high, and *funebrales* is higher than wide, with the distance from the umbonal cavity to the center of the pallial line considerably shorter, and in relation to shell size the pseudocardinals are stronger. On the other hand *funebrales* should not be confused with *rotundus fontaineanus* from northern Brazil (see note 12).

16 The status of *Unio dunkerianus* is still problematic, but definitely it is not *rhuacoicus*, but rather approaches the *parallelipipedon* group, the type being a specimen with well preserved umbonal sculpture similar to that of *parallelipipedon aethiops* I have seen from Camaquam River, which Ortmann called *berthae* (the true *berthae* = *piceus*); this does not necessarily mean that *aethiops* and *dunkerianus* should be the same.

17 Recent authors subordinated *U. expansus* Küster as a subspecies of *delodontus*, but I consider it a very different one, more related to *uruguayensis*. The synonymy of *expansus* includes *effulgens*, *eurhynchus*, '*aethiops piracicabana*' and *mogymirim*, but the following names should be disassociated from *expansus*: *paulista*, *caipira* (probably an abnormal *uruguayensis*), *guahybae* ('in litteris,' hybrid with *paulista*), *fontaineanus deceptus* (= *rotundus gratus*), *semigranosus* (= *ellipticus*), and *decipiens* (= *martensi*).

*Diplodon minus* Simpson is the same as *mogymirim*, being the most abundant 'form' in the northern part of the species' range. The populations of the variable *expansus* overlap greatly in Sao Paulo, and subspecific consideration is out of the question; the variations are also found near the sea coast, in the rivers which empty directly into the Atlantic, and there is sympatric with *paulista*. Ortmann had synonymized *minus* with *granosus*, and Haas and Bonetto as *granosus multistriatus*.

18 The figure of Lamarck's *granosus* given by Deshayes agrees with that from Haas (1930: f. 10) which is the type of *granuliferus* Dkr., and partly with fig. 9 of *coriaceus* Dkr., but it is uncertain that all these belong to the same species. *Unio granosus* was described from 'rivers of the Guiana' which run independently to the sea, isolated from the Amazon and other Brazilian drainages by the high Sierra of Tumucumaque. All other localities, after-

ward indicated for *granosus* are from river systems 1500 miles south, and it is not likely that such identifications are correct. On this account *Diplodon granosus* stands as a poorly known and isolated species, different from the so-called *multistriatus* (= *ellipticus*), and should not be included in the list of species of the Paraná drainage.

19 The original figure of *greeffeanus*, and the details of its description, agrees well with *Diplodon paulista*; only the altitude of the shell shows slight difference. Both names have been listed as synonyms of *expansus*, which is a sympatric species; *D. paulista* is always thinner, more elongated and compressed, with characteristic dark-green periostracum without radiating lines, the hinge is less developed with small interdentum and the prismatic area is considerably thinner.

*Diplodon semigranosus* Simpson is also an elongated *paulista*, identical with those mentioned by Ortmann from the Tietê River and Sapina; the types, in the U.S. N.M. do not show the granular sculpture referred to in description. Also *Diplodon lea* Simpson, is *paulista*.

20 *Diplodon wheatleyanus*, *trifidus*, and *parodizi* belong to the superspecific complex of *D. burroughianus*.

*D. wheatleyanus* was considered by Haas as a good species, although it is rare. There is some confusion regarding its type locality: Lea said La Plata River upon specimens received from d'Orbigny (these are probably *burroughianus*) and also 'Rio Negro' collected by Wheatley which is the one figured; but Lea stated that the last came from 'a distance 1200 miles [south] from the mouth of the Amazon,' and this is about the latitude of the Tietê River in Sao Paulo, not the Negro River in Uruguay which is more than 1800 miles south. Haas mentioned four localities for *wheatleyanus* from the Tietê River, and I have specimens

from the same river near Itapura, collected by Haseman in 1908, which are like *wheatleyanus*, only darker. Any other known references from Uruguay correspond to *burroughianus*, and there is no doubt that there are great similarities between the two, but, unless new materials prove a continuous cline of *burroughianus* north of Sao Paulo, *wheatleyanus* may be considered a subspecies. According to Haas, *rhuacoticus* Dkr. is also *wheatleyanus* of dark color as those mentioned from Tietê.

Prior to the description of *Diplodon parodizi*, Bonetto had referred to it as '*D. charruanus*,' from which it differs by having parasitic instead of directly developed larvae. This is a northern species of the Paraná which d'Orbigny took for *burroughianus*, as that of the figure of Sowerby in Reeve under this name. The distribution is from the lowlands of Bolivia and Paraguayan Chaco, to Corrientes and down to La Plata River, but it becomes less frequent southwards. It also shows resemblance with *trifidus*, but while *parodizi* is a rather abundant form, *trifidus* is a rare one, only known from the northern regions of the Guaporé River, well separated from those of the Paraná-Paraguay drainage (*trifidus* however was described 'from Buenos Aires,' which is a mistake). *Diplodon trifidus* is more lanceolate than *parodizi*, and viewed dorsally it shows a well rounded 'head' and a very acute point at the posterior end (as in *parallelipedon*), and also has stronger teeth, less prominent umbos and a well formed lunule. The areas of *trifidus-parodizi* and *parodizi-burroughianus* overlap considerably as to be classed as subspecies. Pure populations are easy to differentiate, but hybrids occur between the southern forms.

*Diplodon itheringi* (Clessin ?) is a *nomen nudum* according to Haas who figured Simpson's 'type,' suggesting that it is a small specimen of *burroughianus*.

*Unio pfeifferi* Dunker is a problematic form; I cannot identify it, with certainty, with any of the species of *Diplodon* I have seen; certainly it is not *granosus*

as mentioned in the literature. The type locality is very close to that of *rhuacoticus* Küster and the descriptions of both have much in common. On such comparison, the closest form to which *pfeifferi* is allied is *Diplodon burroughianus wheatleyanus* (Lea).

21 *Unio limensis* is the same as *atratus* according to Simpson, the *chilensis* of modern authors. From many of the clinal or individual variations of *chilensis*, Küster and Philippi created a large number of superfluous names. The range of *chilensis*, however, with all the forms synonymized under it, extends nearly 3000 miles north to south on the west side of the Andes. It would be reasonable to expect within such long distribution, that some populations at the range extreme might constitute subspecies, and actually *limensis* looks different from the southern forms. In *solidulus* also, the inflation of the valves sets it apart from all the other forms which have been grouped under *chilensis*; the umbo is more acuminate, hinge stronger, and the outline is like a form similar to those of the La Plata region; nevertheless it is closer to *chilensis*, and hybridization must have taken place accounting for the many 'transitional' forms. In the north of Chile, the bodies of water are distinctly separated in transversal valleys and most are small streams running independently to the Pacific, containing local races (clones?) which have been isolated for a long time. A revision is necessary to establish the status of these segregated populations.

22 *Diplodon peraeformis* is a distinct and peculiar species, but surprisingly it took a hundred years after Lea to be newly recognized (see Castellanos 1960: 26). It is not related to *charruanus* (Bonetto 1964) or *funeralis* (Haas 1930); *peraeformis* and *prunoides* are the two more globose species of the genus. *D. peraeformis* has characteristic flutings on the dorsal slope, the hinge is extraordinarily strong for its size, and the color is al-

ways clear brown. It may be found in La Plata River, but it is peculiarly abundant in central Uruguay (Durazno).

The locality of *prunoides* is unknown, and Lea indicated that the single type specimen was 'far from being perfect,' and probably it is but a more inflated *peraeiformis*.

23 *Diplodon subcylindricus* and *yaguaronis* Marshall are forms of *rhuacoicus* according to Haas; the first was described upon an oversized specimen with more inflated umbo, and *yaguaronis* is a smaller one, thinner and poorly developed.

24 D'Orbigny took the name *solisiana* from the Solis River at Piriapolis, near Maldonado, one of the localities indicated by him for the species, although it seems to be scarce nowadays in that area. *Diplodon solisianus* is allied with *delodontus* but remarkably different in shape. Haas recognized the species from paratypes in the Senckenberg Museum and also Castellanos (1960: 27) figured the species on plate 5 (f. 4, 5) but I doubt if that of fig. 8 is the same thing.

Usually, *solisianus* replaces *delodontus*, or vice versa, in certain localities, but it is not uncommon to find the two species living together along the lower Paraná River. I received two abundant lots sent by Bonetto, from Arroyo Malabrigo, near Romang, Santa Fe, Argentina, both labelled as '*delodontus*' but representing well differentiated populations of these two species. As in the case of other related monogenetic species, *solisianus delodontus* and *solisianus* X *delodontus wymani* are found, which in most collections are simply labeled as *delodontus*. *D. solisianus*, however, is less common than *delodontus*. Formica Corsi (1900: 449) gave as '*Unio solisiana*' a figure which is actually *D. funebris*; in fact, within the group of *Diplodon delodontus*, *solisianus* is the species which comes closer to the group of *D. paranensis*.

## REFERENCES

BAKER, Fred (1914) Land and Fresh-water Mollusks of the Stanford Expedition to Brazil. -- Proc. A. N.S.P., 65: 618-672.

BONETTO, A. A. (1961) Las formas larvales del género *Diplodon*, etc. -- Publ. Dirección de Recursos Naturales, Santa Fe, Argentina, 48 p.

----- (1961a) Especies nuevas y pocas conocidas de Nayades del Río de la Plata. -- Primera Reunión Ciencias Nturales del Litoral Argentino (Univ. Nac. del Litoral), Santa Fe, p. 213-224.

----- (1964) Especies del género *Diplodon* en la pendiente atlántica del Sur del Brasil. -- Physis, 24: 323-328.

BURCKHARDT, C. (1900) Coupe géologique de la Cordillère entre Las Lajas et Caracutin. Anales Museo La Plata (sect. Geol.), 3: 1-43.

CASTELLANOS, A. Z. J. de (1960) Almejas Nacaríferas de la Rep. Argentina. -- Dirección de Pesca y Conservación (Secretaría de Agricultura) Public. Miscelanea \* 421. Buenos Aires. 40 p.

----- (1961) Las especies del género *Diplodon* en Argentina. -- Actas y Trabajos, Primer Congreso Sudamericano de Zoología, 2(3): 85-94.

CORSI, F. A. (1900) Moluscos de la República del Uruguay. -- Anales Museo Montevideo, 2: 295-525.

DOELLO JURADO, M. (1927) Noticia preliminar sobre los Moluscos fósiles de agua dulce mencionados por Wichmann. -- Boletín Acad. Nac. Ciencias Córdoba, Argentina, 7: 457-474.

DUNKER, W. (1848) Diagnosis Molluscorum Novorum. -- Zeitschr. f. Malak., 5: 177-186.

GRAY, J. E. (1828) Spicilegia Zoologica, pl. 6, f. 12.

HAAS, F. (1916) *Nayades del Viaje al Pacífico*. -- *Trabajos, Museo Ciencias Naturales, Madrid (Zool.)*, 25: 1-63.

----- (1929) *Beiträge zur Kenntniss sudamerikanischer Binnenmollusken*. -- *Senckenbergiana* 11: 8-13.

----- (1930-1931) *Versuch einer kritischen Sichtung der sudamerikanischen Najaden*. -- *Senckenbergiana* 12: 175-195. 13: 30-52, 87-110.

----- (1938) *Neue Binnen-Mollusken aus Nordost Brasilien*. -- *Archiv f. Mollusk.*, 70: 46-51.

----- (1966) *On some new non-marine Mollusks from Colombia and Peru*. -- *Fieldiana* 44 (25): 23; 241.

IHERING, H. von (1893) *Najaden von Sao Paulo*. -- *Archiv f. Naturg.*, 1: 45-140.

----- (1903) *Les Mollusques crétaciques de l'Argentine orientale*. -- *Anales Museo Buenos Aires*, 9: 193.

----- (1904) *Nuevas Observaciones sobre Moluscos Cretáceos y Terciarios de Patagonia*. -- *Revista Museo La Plata*, 11: 227-239.

----- (1907) *Mollusques fossiles du Crétacé supérieur et du Tertiaire del'Argentine*. -- *Anales Museo Nacional Buenos Aires*, 14: 1-611.

----- (1910) *Über Brasilianischen Najaden*. -- *Abh. Senckenb. Natur. Ges.*, 32: 11-40.

KÜSTER, H. C. (1842-62) *Die Flussperlmuscheln (Unio & Hyria), in Systematisches Conchylien Cabinet*, 9: 1-318, Nürnberg.

LAMARCK, J. B. P. A. (1835) *Histoire naturelle des Animaux sans Vertèbres*. -- 2d. ed., Deshayes and Milne-Edwards, 6 (*Mulettes-Unio*): 525-560.

LEA, I. (1831-1834) *Observations on the Naiades*. -- *Trans. Am. Phil. Soc.*, 4 (1831): 63-121 5 (1834): 23-119.

----- (1834-1874) *Observations on the Genus Unio*. -- Philadelphia, 1 (1834); 2 (1848); 6 (1857-1858); 7 (1860); 10 (1863); 12 (1869).

----- (1856-1868) *Description of . . . new exotic Unionidae*. -- *Proc. A.N.S.P.*, 8: 92-95 e (1859); 187-190; 4 (1859): 306-9 (1865); 75-76 12 (1868): 150.

----- (1845) *Descriptions of new Fresh-Water and land shells*. -- *Proc. Am. Phil. Soc.*, 4: 162; 168.

----- (1860) *Description of 15 new Uruguayan Unionidae*. -- *Proc. A.N.S.P.* 4: 90-92.

----- (1866) *Description of 12 Unionidae from South America*. -- *Proc. A.N.S.P.*, 10: 33-35.

----- (1870) *A Synopsis of the family Unionidae*. -- 4th ed., Philadelphia, 184 p.

MARSHALL, W. B. (1917) *New and little known species of South American Diplodon*. -- *Proc. U.S. Nat. Mus.*, 53: 381-388.

----- (1922) *New pearly Fresh Water Mussels from South America*. -- *Proc. U.S. Nat. Mus.*, 61: 1-9, Art. 16.

----- (1923) *New pearly Fresh-Water Mussels from Mexico and Uruguay*. -- *Proc. U.S. Nat. Mus.*, 63: 1-4.

----- (1926) *New land and fresh-water Mollusks from Central and South America*. -- *Proc. U.S. Nat. Mus.*, 69: 1-2, Art. 12.

----- (1928) *New fossil fresh-water Mussels from deposits of the Upper Amazon of Peru*. -- *Proc. U.S. Nat. Mus.*, 74 (Art. 3): 1-7.

----- (1928) *New fresh-water and marine*

shells from Brazil and Uruguay. -- Proc. U. S. Nat. Mus., 74 (Art. 17): 1-7.

----- (1930) New land and fresh-water mollusks from South America. -- Proc. U.S. Nat. Mus., 77 (Art. 2): 1-7.

----- (1934) Two new species of pearly fresh-water mussels. -- Jour. Washington Acad. Sci., 24: 78-81.

MARSHALL, W.B. and BOWLES, E.O. (1932) New fossil fresh-water mollusks from Ecuador. -- Proc. U.S. Nat. Mus., 82 (Art. 5): 1-7.

MARTENS, E. von (1895) Mollusken von Paraguay. -- Sitzungsber. Natur. Fr.: 33-35, Berlin.

MATON, W.C. (1811) Description of seven new species of Testacea. -- Trans. Linn. Soc. London, 1811: 325.

MAYER-EYMAR, Ch. (1900) See Burckhardt, 1900, p. 24. Tertiaire - Lamellibranchiata.

MORRISON, J. P. E. (1943) Two new Orinoco Unionids, etc. -- Nautilus, 57: 14-16.

ORBIGNY, A. d' (1835) Synopsis terrestrium et fluviatilium Molluscorum in suo per Americam Meridionalem Itinere. -- Magazin de Zool., 5. Paris

----- (1846) Voyage dans l'Amérique meridionale V (Mollusques), Genre *Unio*: 602-611. Paris. The Mollusca in d'Orbigny's 'Voyage' corresponds to part 3 of v. 5; first pages, p. 1-48, began in 1835 and ran for 6 sections of pages; the last section, p. 489-758, corresponds to 1846.

ORTMANN, A. E. (1921) South American Naiades. -- Memoirs Carnegie Museum, 8: 451-670.

PALMER, K.A.V.W. and Liddle, R.A. (1941) Geology and Paleontology of the Cuenca-Azogue-Bibbian Region, Ecuador. -- Bull. Am. Paleont., 26 (No. 100), 62 p. Systematic description of 'Mutelidae' p. 45-51.

PARODIZ, J. J. (1963) New Fresh-water Mollusca from the Eogene of Chile and Patagonia. -- Nautilus 76: 145-147.

PFEIFFER, L. (1869) Novitates Conchologicae (1) Mollusca extra-marina, III (fasc. 23) *Unio*, p. 477-486.

PHILIPPI, R. A. (1847-1849) Centuria altera Testaceorum novarum. -- Zeitschr.

----- (1869) Bemerkungen über die chilenischen Unionen. -- Malak. Blätt., 1869: 43-49.

PILSBRY, H.A. (1921) Mollusks, in WAGNER, H. E., Faunal remains from the Trias of York County, Pennsylvania. -- Proc. A. N.S.P., 73: 25-37.

PILSBRY, H.A. and OLSSON, A. A. (1935) Tertiary fresh-water Mollusca from the Magdalena Embayment, Colombia. -- Proc. A.N.S.P., 87: 7-39. (Spanish version in Rev. Acad. Colombiana Ciencias, 4: 400-417).

RICHARDS, H. G. (1948) Fossil Mollusks from the Triassic of Pennsylvania. -- Notulae Naturae (A.N.S.P.) No. 206: 1-5.

SIMPSON, C. T. (1914) A descriptive Catalogue of the Naiades. -- Bryant Walker ed., Detroit, Part 3 (*Diplodon*, p. 1224-1312).

SOWERBY, G.B. the 1st (1839) A Conchological Manual. -- London, 338 p., 600 figs., 4th ed., 1852.

SOWERBY, G.B. the 2d, in Reeves (1868) *Conchologia Iconica*, London 16 (the different parts of *Unio* began in 1864); pages not numbered, 525 illustrations.

STEINMANN, G. and WILCKENS, O. (1908) Kreide- und Tertiärfossilien aus dem Magellanslanderns. -- Arch. f. Zool. (Stockholm), 4: 6.

STROBEL, P. (1874) Materiali per una Malacostatica de Terre e di acqua dolce dell'Argentina. -- Pisa, Biblioteca malacologica, v. 4.

WAGNER, J. A. (1827) [Descriptions] in SPIX, J.B., Testacea Fluviatilia - Brasiliam. 36 p., Leipzig.

ZILCH, A. (1966) Die Typen und Typoiden des Natur-Museum Senckenberg 39: Mollusca, Unionacea. -- Archiv f. Molluskenkunde, 97: 45.