

NEOGENE TONNOIDEAN GASTROPODS OF TROPICAL AND SOUTH AMERICA: CONTRIBUTIONS TO THE DOMINICAN REPUBLIC AND PANAMA PALEONTOLOGY PROJECTS AND UPLIFT OF THE CENTRAL AMERICAN ISTHMUS

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ABSTRACT

The 142 species of tonnoidean gastropods recorded from the Neogene to Recent faunas of tropical America (Mexico, and a few taxa from Florida and California, south to Ecuador and Brazil) are revised, along with the 12 species of Neogene to Recent Personidae and Ranellidae occurring in Chile and Argentina. Taxa included are: (1) BURSIDAE: *Bursa*, 11 species, including the eastern Atlantic species *B. scrobilator* (Linnaeus, 1758) in the Pliocene and Pleistocene of tropical America; *Aspa marginata* (Gmelin, 1791), an eastern Atlantic species recorded in the Pliocene-Pleistocene of Limón, Costa Rica; *Crossata*, with one eastern Pacific species (California to Peru); *Marsupina*, five species, including *M. judensis* n. sp. (Miocene, Punta Judas, Costa Rica). (2) PERSONIDAE: *Distorsio*, 12 species, including *D. biangulata* n. sp. and *D. jungi* n. sp. (both Miocene, Cantaure, Venezuela); *Personopsis*, one Recent species. (3) RANELLIDAE, RANELLINAE: *Argobuccinum*, one species; *Fusitriton*, three species; *Halgyrineum*, one species; *Priene*, one Chilean species; *Ranella*, three species, including *R. chilena* n. sp. (Oligocene-Miocene, Chile); *Ameranella*, one species. (4) RANELLIDAE, CYMATIINAE: *Cabestana*, one living southwestern Atlantic species; *Charonia*, three species; *Crassicymatium crassicordatum* n. gen., n. sp. (Oligocene-Miocene, Chile); *Cymatium*, four species; *Gelagna*, one species; *Gutturnium*, one species; *Linatella*, one species; *Monoplex*, 31 species, including *M. gatunicus* n. sp. (Miocene, Panama), *M. jackwinorum* n. sp. (Miocene, Venezuela), *M. longispira* n. sp. (Miocene, Dominican Republic), *M. panamensis* n. sp. (Miocene-Pliocene, both coasts of Panama), and two species left unnamed; *Ranularia*, three species; *Reticutriton*, five species, one left unnamed; *Septa*, two species, including *S. landaui* n. sp. (Miocene-Pliocene, Dominican Republic); *Turritriton*, four species; *Sassia*, seven species, including *S. warreni* n. sp.; *Cymatiella*, one species, *C. vokesorum* n. sp. (the last two both Miocene-Pliocene, Dominican Republic). (5) CASSIDAE, CASSINAE: *Cassis*, 12 species, including *C. altispira* n. sp. (Plio-Pleistocene, Dominican Republic, Atlantic Costa Rica, and Panama) and *C. costulifera* n. sp. (Pliocene, Atlantic Costa Rica, and Panama); *Cypraecassis*, six species, including *C. cantaurana* n. sp. (Miocene, Cantaure, Venezuela); *Galeodea*, one species; *Sconsia*, six species. (6) CASSIDAE, OOCORYTHINAE: *Dalium*, two species; *Oocorys*, one species. (7) CASSIDAE, PHALIINAE: *Echinophoria*, three species; *Semicassis*, five species. (8) TONNIDAE: *Eudolium*, one species; *Malea*, nine species, including two unnamed; *Tonna*, two species. Although *Ficus* is now included in the superfamily Ficoidea, and most tropical American Ficidae are not included here, the three *Ficus* species in the Dominican Republic are described in an Appendix: *F. bernardi* n. sp., *F. gibsonsmithi* n. sp., and *F. lisselongata* n. sp.

Neosconsia ecuadoriana Olsson, 1942 (Pliocene, Ecuador), is transferred to the family Buccinidae. The Argentinean Oligocene/Miocene species *Ocenebra* (?) *rada* (Ihering, 1907), *Xymene obliteratedus* (Cossmann, 1899), and *Urosalpinx (sensu lato) dautzenbergi* (Ihering, 1897) are transferred to the family Muricidae. *Ipunina vladimiri* Nielsen & Frassinetti, 2008 (Litiopidae; formerly thought to be an *Oocorys* species), is recorded from Cantaure, Venezuela. *Charonia seguenzae* (Aradas & Benoit, 1870) is a fourth Recent *Charonia* species limited to the eastern Mediterranean Sea.

The occurrences of the atlantiphile species *Linatella caudata* (Gmelin, 1791) in Armuelles Formation (Early Pleistocene), Burica Peninsula, Pacific Panama, and of the paciphile species *Malea ringens* (Swainson, 1822) in the Moín Formation (latest Pliocene-earliest Pleistocene), Limón, Atlantic Costa Rica, indicate that a shallow seaway still allowed intermittent transport of planktotrophic molluscan larvae between the eastern Pacific and the western Atlantic during latest Pliocene-earliest Pleistocene time. For much of Late Pliocene and Early Pleistocene time, the Central American Isthmus would have alternated between a land bridge during glacial periods of low sea level and a shallow seaway during interglacial periods of high sea level, until rising above sea level permanently at around 2 Ma.

Taxonomic decisions made herein include type locality designations for *Bursa asperrima* Dunker, 1862 (Hawaii), *B. grayana* Dunker, 1862 (off of Mucuripe, Fortaleza, Brazil), *Triton ranelloides* Reeve, 1844 (Sagami Bay, Japan), *Ranella rugosa* G. B. Sowerby II, 1835 (Perlas Islands, Panama Bay), *Ranella coriacea* Reeve, 1844 (Île Gorée, Sénégal), *Ranella ampullacea* Valenciennes, 1858 (Chiloé Island, Chile), *Buccinum caudatum* Gmelin, 1791 (Bohol Island, Philippines), *Fusus cutaceus* Lamarck, 1816 (Bohol Island, Philippines), *Cassidaria cingulata* Lamarck, 1822 (Bohol Island, Philippines), *Triton amictum* Reeve, 1844a (off of Isla San José, Perlas Islands, Panama Bay), *Triton fcooides* Reeve, 1844 (Gorée, Sénégal), *Fusus wiegmanni* Anton, 1838 (Venado Island, Panama), *Triton cynocephalum* (Lamarck, 1816 (Bahia, Brazil), *Triton moritinctus* Reeve, 1844 (Bahia, Brazil), *Triton gibbosus* Broderip, 1833 (Panama Bay), and *Cassis abbreviata* Lamarck, 1822 (Barbados). The type

locality of *Triton constrictus* Broderip, 1833, is corrected from St. Elena to Manta, Ecuador. Lectotype designations are made for *Ranella caelata* Broderip, 1833, *Murex scrobilator* Linnaeus, 1758 (with type locality designation of Palermo, Sicily), *Ranella ventricosa* Broderip, 1833, *Buffo spadiceus* Montfort, 1810, *Ranella granulata* Lamarck, 1816 (with type locality designation of off of Cayenne, Guiana), *Ranella nana* Broderip & G. B. Sowerby I, 1829, *Ranella albofasciata* G. B. Sowerby II, 1841, *Distorsio gatunensis* Toula, 1909, *Tritonium thersites* Philippi, 1887, *Triton cancellatus* Lamarck, 1816 (with type locality designated as Maldonado, Uruguay), *Neptunea magellenica* Röding, 1798, *Triton rudis* Broderip, 1833, *Tritonium gemmiferum* Euthyme, 1889, *Murex olearium* Linnaeus, 1758 (with type locality designated as Palermo, Sicily), *Ranella gigantea* Lamarck, 1816, *Triton variegatum* Lamarck, 1816, *Murex femorale* Linnaeus, 1758, *Triton lotorium* Lamarck, 1816, *Triton tigrinum* Broderip, 1833 (with type locality designated as Corinto, Nicaragua), *Triton lignarius* Broderip, 1833 (with type locality designated as Panama Bay), *Triton turtoni* E. A. Smith, 1890, *Triton gallinago* Reeve, 1844 (with type locality designated as Mauritius Island), *Triton aegrotus* Reeve, 1844 (with type locality designated as Mauritius Island), *Tritonium exiguum* Philippi, 1887, *Buccinum flammeum* Linnaeus, 1758 (with type locality designated as Grand Bahama Island), *Cassis madagascariensis* Lamarck, 1822 (with type locality designated as Beaufort, North Carolina), *Buccinum tuberosum* Linnaeus, 1758 (with type locality restricted to Puerto Plata, Dominican Republic), *Buccinum plicatum* Linnaeus, 1758, *Cassis labiata* Conrad, 1849, *Buccinum testiculus* Linnaeus, 1758, *Cassidaria striata* Lamarck, 1816 (with type locality designated as Punta Alegre, Cuba), *Cassidaria sublaevigata* Guppy, 1866, *Cassidea granulosa* Bruguière, 1792, *Cassis abbreviata* Lamarck, 1822 (with type locality designated as Barbados), *Cassis monilifera* Guppy, 1866, *Malea camura* Guppy, 1866, *Cassis ringens* Swainson, 1822 (with type locality designated as Acapulco, Mexico), and *Ficus pilsbryi* B. Smith, 1907. The lectotype designation of *B. grayana* (incorrectly cited by Beu, 1987) is corrected. Neotype designations are made for *Biplex corrugata* Perry, 1811, *Bufonaria pesleonis* Schumacher, 1817, *Apollon quercina* Mörch, 1853, *Buccinum marginatum* Gmelin, 1791, *Ranella laevigata* Lamarck, 1822, *Eione inflata* Risso, 1826, *R. tenuis* Potiez & Michaud, 1838, *R. californica* Hinds, 1843, *Murex bufu* Bruguière, 1792, *Bursa gibbosa* Röding, 1798, *Buffo spadiceus* Montfort, 1810, *Murex crassus* Dillwyn, 1817, *Buccinum pustulosum* Lightfoot, 1786, *Murex argus* Gmelin, 1791, *Tritonium argo-buccinum* Röding, 1798 (the last three with type locality designations of Jeffreys Bay, South Africa), *Triton scaber* King, 1832, *Gyrina maculata* Schumacher, 1817, *Triton atlantica* Bowditch, 1822, *Lotorium lotor* Montfort, 1810, *Septa triangularis* Perry, 1811, *Tritocurrus amphitridis* Lesson, 1842, *Triton vestitus* Hinds, 1844, *T. vestitus* var. *senior* C. B. Adams, 1852, *Triton perforatus* Conrad, 1849, *Cassis tenuis* Wood, 1828 (with type locality designated as Galápagos Islands), *Buccinum granulatum* Born, 1778, *B. gibbum* Gmelin, 1791, *B. recurvirostrum* Gmelin, 1791, *Cassis cepa* Röding, 1798, *C. malum* Röding, 1798, *C. globulus* Röding, 1798, *Buccinum inflatum* Shaw, 1811, *Cassis minuta* Menke, 1828, *C. laevigata* Menke, 1829, *Buccinum cicatricosum* Gmelin, 1791, *Cassis corrugata* Swainson, 1822, *Dolium album* Conrad, 1854, *D. tenue* Menke, 1830, *D. antillarum* Mörch, 1877, *D. a.* var. *brasilianum* Mörch, 1877, *D. plumatum* Green, 1830, *Cadus coturnix* Röding, 1798, *C. meleagris* Röding, 1798, *Helix sulphurea* C. B. Adams, 1849, *Perdix reticulatus* Montfort, 1810. Other first reviser decisions are made concerning the nomenclature of *Distorsio ringens* (Philippi, 1887), *Ranella gemmifera* (Euthyme, 1889), and *Cabestana cutacea* (Linnaeus, 1767). *Marsupina* Dall, 1904, is declared a *nomen protectum* under ICZN Article 23.9.1. Three previously missing holotypes are identified: *Triton tranquebaricum* Lamarck, 1816, in the collection at Muséum d'Histoire Naturelle de Genève (with type locality designated as Île Gorée, Sénégal), and *Malea crassilabris* Valenciennes, 1832, and *Cassis centiquadrata* Valenciennes, 1832, both at Muséum National d'Histoire Naturelle, Paris. *Sassia tatei* is provided as a replacement name for *Triton armatus* Tate, 1888 (not *T. armatum* Hupé, 1854). The spellings of *Cymatium* (*Ranularia*) *mohorterae* A. H. Verrill, 1952, *Simpulum carlottae* Ferreira & da Cunha, 1957, and *Triton dautzenbergi* Ihering, 1897, are corrected. *Buccinum tuberosum* Linnaeus, 1758, is selected as the senior synonym of the species named both *B. tuberosum* and *B. plicatum* by Linnaeus (1758). *Cassis centiquadrata* Valenciennes, 1832, is selected as the senior synonym of the species named both *C. centiquadrata* and *C. doliata* by Valenciennes (1832).

RESUMEN

Las 142 especies de gastropodos tonnidenos registradas de la fauna de América tropical desde el Neógeno hasta el Reciente (México, y unas taxa de Florida y California, sur hasta Ecuador y Brasil) fueron revisadas, y también las 12 especies de Personidae y Ranellidae del Neógeno hasta el Reciente que se encuentran en Chile y Argentina. Taxa incluida son: (1) BURSIDAE: *Bursa*, 11 especies, incluyendo la especie del Atlántico este *B. scrobilator* (Linnaeus, 1758) en el Plioceno y Pleistoceno de América tropical; *Aspa marginata* (Gmelin, 1791), un especie del Atlántico registrada en el Plioceno-Pleistoceno de Limón, Costa Rica; *Crossata* con una especie del Pacífico este (California a Perú); *Marsupina*, cinco especies, incluyendo *M. judensis* n. sp. (Mioceno, Punta Judas, Costa Rica). (2) PERSONIDAE: *Distorsio*, 12 especies incluyendo *D. biangulata* n. sp. y *D. jungi* n. sp. (las dos del Mioceno, Cantaura, Venezuela); *Personopsis*, una especie Reciente. (3) RANELLIDAE, RANELLINAE: *Argobuccinum*, una especie; *Fusitriton*, tres especies; *Halgyrineum*, una especie; *Priene*, una especie chilena; *Ranella*, tres especies, incluyendo *R. chilena* n. sp. (Oligoceno-Mioceno, Chile); *Ameranella*, una especie. (4) RANELLIDAE, CYMATIINAE: *Cabestana*, una especie contemporánea del Atlántico suroeste; *Charonia*, tres especies; *Crassicymatium crassicordatum* n. gen., n. sp. (Oligoceno-Mioceno, Chile); *Cymatium*, cuatro especies; *Gelagna*, una especie;

Gutturium, una especie; *Linatella*, una especie; *Monoplex*, 31 especies, incluyendo *M. gatunicus* n. sp. (Mioceno, Panamá), *M. jackwinorum* n. sp. (Mioceno, Venezuela), *M. longispira* n. sp. (Mioceno, República Dominicana), *M. panamensis* n. sp. (Mioceno-Plioceno, las dos costas de Panamá), y dos especies sin nombre; *Ranularia*, tres especies; *Reticurriton*, cinco especies, una sin nombre; *Septa*, dos especies, incluyendo *S. landaui* n. sp. (Mioceno-Plioceno, República Dominicana); *Turritriton*, cuatro especies; *Sassia*, siete especies, incluyendo *S. warreni* n. sp.; *Cymatiella*, una especie, *C. vokesorum* n. sp. (las últimas dos: Mioceno-Plioceno, República Dominicana). (5) CASSIDAE, CASSINAE: *Cassis*, 12 especies, incluyendo *C. altispira* n. sp. (Plio-Pleistoceno, República Dominicana, Costa Rica Atlántica, y Panamá) y *C. costulifera* n. sp. (Plioceno, Costa Rica Atlántica, y Panamá); *Cypraecassis*, siete especies, incluyendo *C. cantaurana* n. sp. (Mioceno, Cantaure, Venezuela); *Galeodea*, una especie; *Sconsia*, siete especies. (6) CASSIDAE, OOCORYTHINAE: *Dalium*, dos especies; *Oocorys*, una especie. (7) CASSIDAE, PHALIINAE: *Echinophoria*, tres especies; *Semicassis*, cinco especies. (8) TONNIDAE: *Eudolium*, una especie; *Malea*, nueve especies, incluyendo dos sin nombre; *Tonna*, dos especies. Aunque *Ficus* hoy en día está incluida en la superfamilia Ficoidea, y la mayoría de Ficidae de América tropical no están incluidas en este grupo, las tres especies de *Ficus* en la República Dominicana están descritas en el Apéndice F: *F. bernardi* n. sp., *F. gibsonsmithi* n. sp., y *F. lisselongata* n. sp.

Neosconsia ecuadoriana Olsson, 1942 (Plioceno, Ecuador), es transferida a la familia Buccinidae. Las especies argentinas del Oligoceno/Mioceno: *Ocenebra* (?) *rada* (Ihering, 1907), *Xymene obliteratus* (Cossmann, 1899), y *Urosalpinx (sensu lato) dautzenbergi* (Ihering, 1897) son transferidas a la familia Muricidae. *Ipunina vladimiri* Nielsen & Frassinetti, 2008 (Litiopidae; anteriormente identificada como una especie *Oocorys*), es registrada de Cantaure, Venezuela. *Charonia seguenzae* (Aradas & Benoit, 1870) es la curata especie de *Charonia* Reciente que solo se encuentra en el este del Mar Mediterráneo.

El presencia de la especie atlántica *Linatella caudata* (Gmelin, 1791) en la Formación Armuellos (Pleistoceno Temprano), Península Burica, Panamá Pacífica, y de la especie pacífica *Malea ringens* (Swainson, 1822) en la Formación Moín (Plioceno más tarde-Pleistoceno más temprano), Limón, Costa Rica Atlántica, demuestran que un pasaje marítimo poco profundo permite transportación intermitente de larvas planktotrofica mollusca entre el Pacífico este y el Atlántico oeste durante la temporada del Plioceno más tarde-Pleistoceno más temprano. Por mucha de la temporada del Plioceno Tarde y el Pleistoceno Temprano, el istmo Centro-Americano hubiera sido un puente terrestre durante periodos glaciales con niveles oceánicos bajos, y un pasaje marítimo durante los periodos interglaciales con niveles de mar altos, hasta que permanentemente paso el nivel del mar hace 2 Ma.

En este artículo se presentan nuevas decisiones taxonómicas. Se han designado localidades tipo para *Bursa asperima* Dunker, 1862 (Hawái), *B. grayana* Dunker, 1862 (frente a Mucuripe, Fortaleza, Brasil), *Triton ranelloides* Reeve, 1844 (Bahía de Sagami, Japón), *Ranella rugosa* G. B. Sowerby II, 1835 (Isla de Las Perlas, Bahía de Panamá), *Ranella coriacea* Reeve, 1844 (Île Gorée, Senegal), *Ranella ampullacea* Valenciennes, 1858 (Isla Chiloé, Chile), *Buccinum caudatum* Gmelin, 1791 (Isla de Bohol, Filipinas), *Fusus cutaceus* Lamarck, 1816 (Isla de Bohol, Filipinas), *Cassidaria cingulata* Lamarck, 1822 (Isla de Bohol, Filipinas), *Triton amictum* Reeve, 1844a (frente a Isla San José, Isla de Las Perlas, Bahía de Panamá), *Triton ficoides* Reeve, 1844 (Gorée, Senegal), *Fusus wiegmanni* Anton, 1838 (Isla Venado, Panamá), *Triton cynocephalum* (Lamarck, 1816 (Bahía, Brasil), *Triton moritinctus* Reeve, 1844 (Bahía, Brasil), *Triton gibbosus* Broderip, 1833 (Bahía de Panamá), y *Cassis abbreviata* Lamarck, 1822 (Barbados). La localidad tipo de *Triton constrictus* Broderip, 1833 ha sido emendada, de Santa Elena a Manta, Ecuador. Se han designado lectotipos para *Ranella caelata* Broderip, 1833, *Murex scrobilator* Linnaeus, 1758 (con localidad tipo designada para Palermo, Sicilia), *Ranella ventricosa* Broderip, 1833, *Buffo spadiceus* Montfort, 1810, *Ranella granulata* Lamarck, 1816 (con localidad tipo frente a Cayenne, Guiana), *Ranella nana* Broderip & G. B. Sowerby I, 1829, *Ranella albofasciata* G. B. Sowerby II, 1841, *Distorsio gatunensis* Toulou, 1909, *Tritonium thersites* Philippi, 1887, *Triton cancellatus* Lamarck, 1816 (con localidad tipo designada para Maldonado, Uruguay), *Neptunea magellanica* Röding, 1798, *Triton rudis* Broderip, 1833, *Tritonium gemmiferum* Euthyme, 1889, *Murex olearium* Linnaeus, 1758 (con localidad tipo designada para Palermo, Sicilia), *Ranella gigantea* Lamarck, 1816, *Triton variegatum* Lamarck, 1816, *Murex femorale* Linnaeus, 1758, *Triton lotorium* Lamarck, 1816, *Triton tigrinum* Broderip, 1833 (con localidad tipo en Corinto, Nicaragua), *Triton lignarius* Broderip, 1833 (con localidad tipo designada para la Bahía de Panamá), *Triton turtoni* E. A. Smith, 1890, *Triton gallinago* Reeve, 1844 (con localidad tipo designada para las Islas Mauricio), *Triton aegrotus* Reeve, 1844 (con localidad tipo designada para las Islas Mauricio), *Tritonium exiguum* Philippi, 1887, *Buccinum flammeum* Linnaeus, 1758 (con localidad tipo designada para Gran Bahama), *Cassis madagascariensis* Lamarck, 1822 (con localidad tipo designada en Beaufort, Carolina del Norte), *Buccinum tuberosum* Linnaeus, 1758 (con localidad tipo en Puerto Plata, República Dominicana), *Buccinum plicatum* Linnaeus, 1758, *Cassis labiata* Conrad, 1849, *Buccinum testiculus* Linnaeus, 1758, *Cassidaria striata* Lamarck, 1816 (con localidad tipo en Punta Alegre, Cuba), *Cassidaria sublaevigata* Guppy, 1866, *Cassidea granulosa* Bruguière, 1792, *Cassis abbreviata* Lamarck, 1822 (con localidad tipo designada para Barbados), *Cassis monilifera* Guppy, 1866, *Malea camura* Guppy, 1866, *Cassis ringens* Swainson, 1822 (con localidad tipo asignada para Acapulco, Méjico), and *Ficus pilsbryi* B. Smith, 1907. La asignación del lectotipo de *B. grayana* (incorrectamente citado por Beu, 1987) ha sido corregida. Se han designado neotipos para *Biplex corrugata* Perry, 1811, *Bufonaria pesleonis* Schumacher, 1817, *Apollon quercina* Mörch, 1853, *Buccinum marginatum* Gmelin, 1791, *Ranella laevigata* Lamarck, 1822, *Eione inflata* Risso, 1826, *R. tenuis* Potiez & Michaud, 1838, *R. californica* Hinds, 1843, *Murex bufu* Bruguière, 1792, *Bursa gibbosa* Röding, 1798, *Buffo spadiceus* Montfort, 1810, *Murex crassus* Dillwyn, 1817, *Buccinum pustulosum* Lightfoot, 1786, *Murex*

argus Gmelin, 1791, *Tritonium argo-buccinum* Röding, 1798 (las últimas tres especies con localidad tipo en Jeffreys Bay, República de Sudáfrica), *Triton scaber* King, 1832, *Gyrina maculata* Schumacher, 1817, *Triton atlantica* Bowditch, 1822, *Lotorium lotor* Montfort, 1810, *Septa triangularis* Perry, 1811, *Tritocurrus amphytridis* Lesson, 1842, *Triton vestitus* Hinds, 1844, *T. vestitus* var. *senior* C. B. Adams, 1852, *Triton perforatus* Conrad, 1849, *Cassis tenuis* Wood, 1828 (con localidad tipo designada par alas Islas Galápagos), *Buccinum granulatum* Born, 1778, *B. gibbum* Gmelin, 1791, *B. recurvirostrum* Gmelin, 1791, *Cassis cepa* Röding, 1798, *C. malum* Röding, 1798, *C. globulus* Röding, 1798, *Buccinum inflatum* Shaw, 1811, *Cassis minuta* Menke, 1828, *C. laevigata* Menke, 1829, *Buccinum cicatricosum* Gmelin, 1791, *Cassis corrugata* Swainson, 1822, *Dolium album* Conrad, 1854, *D. tenue* Menke, 1830, *D. antillarum* Mörch, 1877, *D. a.* var. *brasilianum* Mörch, 1877, *D. plumatum* Green, 1830, *Cadus coturnix* Röding, 1798, *C. meleagris* Röding, 1798, *Helix sulphurea* C. B. Adams, 1849, *Perdix reticulatus* Montfort, 1810. Además se toman decisiones nomenclatoriales para *Distorsio ringens* (Philippi, 1887), *Ranella gemmifera* (Euthyme, 1889), y *Cabestana cutacea* (Linnaeus, 1767). *Marsupina* Dall, 1904 es designada *nomen protectum* baco el CINZ Artículo 23.9.1. Tres holotipos previamente desaparecidos han sido identificados: *Triton tranquebaricum* Lamarck, 1816, en la colección del Muséum d'histoire naturelle de Ginebra (con localidad tipo designada para Île Gorée, Senegal) y *Malea crassilabris* Valenciennes, 1832, y *Cassis centiquadrata* Valenciennes, 1832, las dos en el Muséum National d'Histoire Naturelle, París. *Sassia tatei* es el reemplaza a *Triton armatus* Tate, 1888 como nombre válido (no *T. armatum* Hupé, 1854). Los nombres *Cymatium* (*Ranularia*) *mohorterae* A. H. Verrill, 1952, *Simpulum carlottae* Ferreira & da Cunha, 1957, and *Triton dautzenbergi* Ihering, 1897, han sido corregidos. *Buccinum tuberosum* Linnaeus, 1758, ha sido seleccionado como el sinónimo senior de ambas especies *B. tuberosum* y *B. plicatum* de Linnaeus (1758). *Cassis centiquadrata* Valenciennes, 1832, ha sido seleccionado como el sinónimo senior de ambas especies *C. centiquadrata* y *C. doliata* de Valenciennes (1832).

INTRODUCTION

This monograph is part of a long-continued research program, the aim of which is to understand as much as possible of the composition and phylogeny of the Tonnoidea and, above all, how the extant “teleplanic” (planktotrophic) tonnoideans achieved their enormously wide geographical ranges. In this monograph, my aims are: (1) to provide a tropical American input to understanding the biogeographical history of the very widely distributed species that now are large, prominent, ecologically important carnivores around the Southern Ocean, but have a fossil record largely in the northern hemisphere – such species as *Argobuccinum pustulosum* (Solander in Lightfoot, 1786), *Charonia lampas* (Linnaeus, 1758), *Monoplex parthenopeus* (von Salis Marschlins, 1793), *Ranella olearium* (Linnaeus, 1758), *Ranella australasia* (Perry, 1811), and the *Fusitriton magellanicus* (Röding, 1798) species complex; (2) to provide a tonnoidean contribution to understanding the closure of the Central American Isthmus, because of the well-known wide dispersal of (at least some) tonnoideans resulting from their long-lived planktotrophic larval stages, and (3) to revise the Neogene tonnoidean fauna of tropical America as a contribution to paleontological studies of the Panama region and the northern Dominican Republic. I am interested to understand the biogeographical history of all of these species. How did they come to live where they do? Where and when did they evolve? How did they spread so widely? Why do some of the very widely distributed species live now around the Southern Ocean and in southern Japan to Taiwan, but *not in the tropical realm* between [e.g., *Charonia lampas*, *Monoplex parthenopeum*, and *Monoplex exaratus* (Reeve, 1844); Beu, 1998b, 1999]. The overall aim, then, is to understand the wider taxonomy; how are the species related

to each other, and why do they live where they do?

It should be stated at the start that the Ficidae species included in this work are only the three fossil species occurring in the Dominican Republic, as Riedel (1994) has removed them to a separate superfamily Ficoidea. Many other *Ficus* species occur in Neogene rocks of tropical America, but are not studied here. I also have not included South American Neogene Cassidae [the single species, *Echinophoria monilifera* (G. B. Sowerby I, 1846), was revised by Nielsen (2003: 89, pl. 16, figs 11-16) and Griffin & Nielsen (2008: 300, pl. 21, figs 15-20)] or the Recent tropical American Cassidae or Tonnidae, except where they occur as fossils or a few new records are required, because these species are well-known taxonomically.

A work of this scope builds largely on the works that have been published previously. It is worth listing here, then, the published catalogs and revisions of tonnoideans that have preceded the present one. For the Bursidae, Personidae, and Ranellidae, my long-term interest in the family means that this catalog is reasonably complete, but for other families it will be less so, and merely lists significant revisions that I used while compiling the present monograph. The list below does not include the early, primary works, in which many of the species were named; the most important of these are Linnaeus (1758, 1767), Gmelin (1791), Röding (1798), and Lamarck (1816, 1822). In date order, the catalogs and revisions of tonnoideans of which I am aware are: Kiener (1835a, b), Cassidae; Kiener (1835c), Tonnidae; G. B. Sowerby II (1835-1836, 1841), Bursidae; Kiener (1841), Bursidae; Kiener (1842), Ranellidae; Pfeiffer (1843), Ranellidae; Reeve (1844a), Ranellidae; Reeve (1844b), Bursidae; Reeve (1848b), Cassis; Reeve (1849b), *Galeodea* and *Sconsia*; Reeve (1848c-