Ann. Naturhist. Mus. Wien, Serie A	112	195-470	Wien, Juni 2010

Index of Living and Fossil Echinoids 1971-2008

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Manuscript submitted on November 20th 2009,
the revised manuscript on January 21st 2010

Abstract

All new taxa of fossil and living echinoids described from 1971 to 2008 are listed with their age, geographic and stratigraphic occurrence, repository of type material and bibliographic citation.

Keywords: Echinodermata, Echinoidea, bibliography, species list, type material.

Introduction

Comprehensive listings of living and fossil echinoids for the species and genera established before 1970 were published by Lambert & Thiéry (1909-25) and Kier & Lawson (1978) respectively. Kier & Lawson's supplement for the years 1971-75 to their "Index of Living and Fossil Echinoids 1924-1970" has never been published. More than thirty years have passed since the latter publication and although the advent of information technology and the internet has made taxonomic research much easier, a comprehensive, up-to-date resource for echinoid species is still missing. At genus-level though, echinoids are described in detail in Andrew Smith's Echinoid Directory (http://www.nhm.ac.uk/research-curation/research/projects/echinoid-directory/index.html), an indispensible resource for anyone working with this group.

This list was prepared utilizing a variety of resources, printed and online. The bulk of taxa was located by culling the current echinoderm literature for new taxa and by cross checking this list with the Zoological Record. Citations before 1971 are included if they were absent in Lambert & Thiéry (1909-25) and Kier & Lawson (1978).

In every case the original paper was consulted and checked for species that might have been missed. Where possible, information on the type material and its repository has been included in this index. No attempt has been made to revise the taxonomic assignment of the species. This index strictly follows the classification of the Treatise on Invertebrate Paleontology, even where I disagree with it. Higher-level taxa are also included in this index.

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Information in this index is presented in the following way:

Family Name AUTHOR, Date

Genus *Name* AUTHOR, Date

Time horizon

G. species AUTHOR, Date: pages-pages; fig. x; pl. x: figs x-x. [Formation Fm., Locality, Region, Country] (Geological age) <HT(Holotype): ABBREVIATED INSTITUTION Specimen No.; PT(Paratype/s): ABBREVIATED INSTITUTION Specimen No.> {remarks}.

Acknowledgements

Special thanks to Mike REICH, Loïc VILLIER, and the librarians Andrea KOURGLI, Wolfgang BRUNNBAUER and Helga SCHMITZ for their help in locating even the most obscure papers. Johanna KOVAR-EDER, Inesa VISLOBOKOVA, and Oleg MANDIC helped translating Russian papers. Wenyu WU provided translations of Chinese texts.

Stephen K. DONOVAN, John W.M. JAGT, Mathias HARZHAUSER, Gudrun HÖCK, Christine LATAL, Kenneth MCNAMARA, Rich MOOI, James H. NEBELSICK, Edeltraud PREIS, Werner E. PILLER, Ortwin SCHULTZ, Andrew B. SMITH, Herbert SUMMESBERGER, and numerous other persons helped in various ways during the preparation of this paper.

This research was supported by the Austrian Science Foundation, project No. P-14366-Bio to Werner E. PILLER (University of Graz) and the SYNTHESYS Project (http://www.synthesys.info/) which is financed by European Community Research Infrastructure Action under the FP 6 "Structuring the European Research Area" Programme.

Abbreviations

HT: Holotype

PT: Paratype/s

LT: Lectotype

PLT: Paralectotype/s

ST: Syntype/s

NT: Neotype

Collections:

AM	Australian Museum, Sydney, Australia
AMNH	American Museum of Natural History, New York, NY, USA
ANSP	Academy of Natural Sciences of Philadelphia, Pennsylvania, USA
ANU	Department of Geology, Australian National University, Canberra

ASU-GM	Ain Shams University, Geological Museum, Egypt
AU	Auckland University, New Zealand
AUGD	Adelaide Department of Geology and Mineralogy, Adelaide, Australia
AzINEFTEKHIM	Azerbeijan Institute of Gas and Oil Chemistry, Azerbeijan
AZIOC	Azerbaijan Institute of Oil Chemistry, Baku, Azerbaijan
BAS	British Antarctic Survey, Cambridge, UK
BEG	Texas Bureau of Economic Geology, Texas, USA (collections held by the TMM Nonvertebrate Paleontology Laboratory, see TMM)
BFU	Brigham Young University Repository, Provo, Utah, USA
BGS GSM	British Geological Survey, Geological Survey Museum, UK
BMNH	British Museum of Natural History, London, UK
BSPG	Bayerische Staatssammlung für Paläontologie und historische Geologie, München, Germany
BSIP	Museum, Birbal Sahni Institute of Palaeobotany, Lucknow, India
CASG	California Academy of Sciences geology collection, San Francisco, USA
C-EM	Collection COTTEAU, today included in the collection of the Ecole des Mines, Paris, France
CFP	Institut des Sciences de la Terre, Université de Dijon, Dijon, France
CGM	Central Geological Museum F.N.Chernysheva [Chernyshov], Leningrad [today Saint Petersburg], Russia
CGCPE	Colección del Grupo Cultural Paleontológico de Elche y del Museo de Paleontología de Elche, Spain
CGS	Museum of the Central Geological Survey, Republic of China
CGST	Central Geological Survey, Taipei, Taiwan
CM	Canterbury Museum, New Zealand
CNIGR	F.N. Chernyshev Central Research Geological Museum, Saint Petersburg, Russia
CPBA	Cátedra de Paleontología de la Facultad de Ciencias Exactas y Naturales de la Universidad de Buenos Aires, Argentine
CPC	Palaeontological Collection, Bureau of Mineral Resourches, Canaberra, Australia
CPUC	Colecciones Paleontológicas, Unicersidad de Concepción, Chile
CWUS	Collection Westlake, University of Southampton, UK

DGM do DNPM	Divisão de Geologia e Mineralogia do Departamento Nacional da Produção Mineral, Rio de Janeiro, Brazil
DGUL	Museum, Department of Geology, University of Lucknow, Lucknow, India
DNSM	Durban Natural Science Museum, Durban, South Africa
DPUW	Department of Paleontology, Faculty of Geology, University of Warsaw, Poland
ECG	Escuela Centroamericana Geología, Universidad de Costa Rica, San José, Costa Rica
EGSG	Department of Earth Sciences (Geology), Universities of Perugia (Italy) and Alicante (Spain) [as in the original publication]
EM	Ecole des Mines, Paris, France
FCDP	Facultad de Ciencias, Departamento de Paleontología, Montevideo, Uruguay
FGWG	FR Geowissenschaften, Ernst-Moritz-Arndt-Universität Greifswald, Germany
FPH	Fundação Paleontológica Phoenix, Aracaju, Brazil
GHUNL-Pam	Facultad de Ciencias Exactas y Naturales, Universidad de La Pampa, Argentinia
GIH	Geological Institute, Hungary
GIUS	Museum of Department of Earth Sciences, Silesian University, Poland
GM-GDEMU	Geological Museum of the Geology Department, Faculty of Science, El Mina University, Egypt
GMM	A.P. & M.V. Pavlov Geological Museum, Moskva, Russia
GMUS	Geological Museum of the University of Seville, Spain
GPIH	Geologisch-Paläontologisches Institut Hamburg, Germany
GPIMUM	Geologisch-Paläontologisches Institut und Museum, Universität Münster, Münster, Germany
GPIUB	Geologisch-Paläontologisches Institut, Universität Bonn, Germany
GPIUF	Geologisch-Paläontologisches Institut der Universität Freiburg, Germany
GSI	Geological Survey of India, India
GSJ	Geological Survey of Japan, Tsukuba, Japan
GSM	Geological Survey Museum (now British Geological Survey), UK
GSP	Geological Survey Pretoria, South Africa
GSWA	Geological Survey of Western Australia, Perth, Australia

GU/R/KE	Laboratory of Vertebrate Palaeontology, Department of Geology, HNB Garhwal University, Srinagar (Garhwal), Uttaranchal, India
HUJ	Zoological Museum, Hebrew University, Jerusalem, Israel
IGEO	Instituto de Geosciências da Universidade Federal do Rio de Janeiro, Brazil
IGM	Instituto de Geología, Universidad Nacional Autónoma de México, Mexico City
IGMCU	Museo de Paleontología del Instituto de Geología, en la Ciudad Universitaria, Mexico
IGN-ANURSR	Institute of Geological Sciences, Academy of Sciences URSR, Kiev, Ukraine
IGS	Insitute of Geological Sciences, London, UK
IGPUW	Museum of the Faculty of Geology, University of Warsaw, Warsaw, Poland
IGUFP	Istituto de Geosciências da Universidade Federal de Pernambuco, Brazil
IGUFRJ	Istituto de Geosciências da Universidade Federal de Rio de Janeiro, Brazil
IIGA	Instituto de Investigaciones Geológicas de Antofagasta, Chile
IMBAS	Institute of Marine Biology, Academy of Sciences, Moscow, Russia
IMBFE	Institute of Marine Biology, Far East Center, Academy of Sciences, Vladivostok, Russia
IMGP-Gö	Institut und Museum für Geologie und Paläontologie, Universität Göttingen, Germany
IOANSSR	Institute of Oceanography, Academy of Sciences of the USSR, Moskva
IOAS	Institute of Oceanology, Academia Sinica, Qingdao, China
IORAS	Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia
IPM	Institut de Paléontologie du Muséum, Paris, France
IPPAS	Institute of Paleobiology of the Polish Academy of Science, Warszawa, Poland
KBIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium (Royal Belgian Institut of Natural History)
LACMIP	Natural History Museum of Los Angeles County, Invertebrate Paleontology Section, California, USA
LGU	Leningrad State University, Saint Petersburg, Russia

LGUT	Laboratoire de Géologie sédimentaire et Paléontologie de l'Université Paul-Sabatier de Toulouse, France
LPB	Palaeontological Collection, University of Bucharest, Romania
LSJU	Stanford University, Regular Collection (transfered to the California Academy of Sciences, San Francisco, CA, USA)
LUGD	Lucknow University Geology Department, Lucknow, India
MACSG (MACS-G)	Maharashtra Association for Cultivation of Sciences, Research Institute, Department of Geology and Palaeontoology, Pune, India
MÁFI	Magyar Állami Földtani Intézet Múzeum (Palaeontological Collection of the Museum of the Geological Survey of Hungary), Budapest, Hungary
MBE	Museum für Naturkunde, Berlin, Germany
MBSM	Musée de Boulogne-sur-mer, France
MCA	Museo di Cortina d'Ampezzo, Italy
MCZ	Museum of Comparative Zoology at Harvard University, Cambridge, MA, USA
MGB	Museo de Geologia, Barcelona, Spain
MGCA	Museo Geologico di Castell'Arquato, Italy
MGD-UAA	Museum of the Geological Department, University of Al Ain, United Arabian Emirates
MGIANGSSR	Geological Museum & Institute, Academy of Sciences of the Georgian SSR
MGPD	Dipartimento di Geologia, Paleontologia e Geofisica, Università degli Studi di Padova, Muséo di Geologia e Paleontologia, Padova, Italy
MGSB	Museo Geológico del Seminario de Barcelona, Spain
MGU	Minno-Geložski Universitet, Museum of Geology & Palaeontology, Sofia, Bulgaria
MHNN	Muséum du Havre, France
ML	Muséum d'Histoire naturelle de Lyon, Lyon, France
MMBS	Misaki Marine Biological Sation, University of Tokyo, Japan
MMGL	Museo Mineralógico e Geológico da Faculdade de Ciências de Lisboa, Portugal
MMH	Mineralogisk Museum, Copenhagen, Denmark
MN	Museu Nacional do Rio de Janeiro, Brazil
MNA-CPO	Museo nacional de Antropología, Collección Paleontológica F. Oliveras, Uruguay

MNHN	Muséum National d'Histoire naturelle de Paris, France
MNHN-DHT	Muséum National d'Histoire naturelle de Paris, Département Sciences de la Terre, France
MNRJ	Museu Nacional do Rio de Janeiro, Brazil
MOZ	Museo Juan Olsacher, Dirección General de Minería de la Provincia del Neuquén, Neuquén, Argentinia
MPEG	Museu Parmense Emílio Goeldi, Pará, Brazil
MSNV	Museo di Storia Naturale, Venice, Italy
MSU	Moscow State University, Moscow, Russia
MUGD	Melbourne University, Geological Department, Melbourne, Australia
MUGM	Geological Museum, El Minia University, Egypt
MV	Museum of Victoria, Melbourne, Australia
MZUB	Museum of Zoology, University of Bergen, Norway
MZUC	Museo de Zoología, Universidad de Concepción, Chile
NHM	Natural History Museum, London, UK
NHMM	Natuurhistorisch Museum at Maastricht, The Netherlands
NHMW	Naturhistorisches Museum Wien, Austria (Natural History Museum Vienna)
NIGP	Nanjing Institue of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China
NMB	Naturhistorisches Museum Basel, Switzerland
NMMNH	New Mexico Museum of Natural History, Albuquerque, New Mexico, USA
NMNH	National Museum of Natural History, USA
NMNZ	National Museum of New Zealand, Wellington, New Zealand
NMP	Czech National Museum, Prague, Czech Republic
NMV	National Museum of Victoria, Australia
NRF	Geological Survey of India, Northern Region, Lucknow, India
NSM	National Science Museum, Tokyo, Japan
NTUG	National Taiwan University, Geological Department, Taipei, Taiwan
NZGS	New Zealand Geological Survey Museum, New Zealand
NZOI	New Zealand Oceanographic Institute, Wellington, New Zealand
OU	Otago University, New Zealand
PASME	Polish Academy of Sciences, Museum of the Earth, Warszawa, Poland

PIASC	Paleontological Institute of the Academy of Sciences of Cuba, Havana, Cuba
PIN	Paleontological Institute, Academy of Sciences of the USSR
PMOZ	Museo Juan Olsacher, Neuquén, Argentinia
PRI	Paleontological Research Institution, Ithaca, NY, USA
PUAB	Universitat Autonòma de Barcelona, Palaeontological Collections, Spain
PUPCE	Fossil echinoid collection at the Zoological Department, Punjab University, Lahore, Pakistan
QM	Queensland Museum, Australia
QVM	Queen Victoria Museum, Launceston, Australia
RSM	Royal Scotish Museum, Edinburgh, Scotland, UK
RUCA	Rijksuniversitair Centrum Antwerpen, Belgium
SAfM	South African Museum, Cape Town, South Africa
SAM	South Australian Museum, Adelaide, Australia
SGNP	Servicio Geológico Nacional, Paleontología, Buenos Aires, Argentinia
SGWG	Sektion Geologische Wissenschaften der Ernst-Moritz-Arndt Universität Greifswald, Germany
SM	Sedwick Museum of Earth Sciences, University of Cambridge, Cambridge, UK
SMF	Senckenberg-Museum, Frankfurt am Main, Germany
SMNS	Staatliches Museum für Naturkunde Stuttgart, Germany
SNLfB	Niedersächsisches Landesamt für Bodenforschung, Hannover, Germany
SNM	Slovak National Museum, Bratislava, Slovakia
SUI	Repository of the Geological Department, The University of Iowa, Iowa City, USA
SUPTC	Stanford University, Paleontological Type Collection (transferred to the California Academy of Sciences, San Francisco, CA, USA)
TCE	Museum, Department of Geology, University of Lucknow, Lucknow
TGU	Geological & Palaeontogical Department, Tbilisskogo Gosudavstevennogo Universiteta, Tbilisi, Georgia
TM	Tasmanian Museum & Art Gallery, Hobart, Australia
TMM	Texas Memorial Museum, Austin, Texas, USA
UA	University of Alaska Museum, Fairbanks, AK, USA

UCMP	University of California, Museum of Paleontology, Berkeley, CA, USA
UF	Florida Museum of Natural History, University of Florida, USA
UFS	Florida State Museum, University of Florida, Gainesville, USA
UI	University of Iowa, Iowa City, Iowa, USA
UILL	University of Illinois, Urbana, Illinois, USA
UIMG	University of Ife, Museum of Geology, Nigeria
UK	Geology Department, University of Kentucky, Lexington, KY, USA
UNAM	Universidad Nacional Autónoma de México, México City, Mexico
UNE	University of New England, Department of Geology, Armidale, N.S.W., Australia
UPNG	Department of Geology, University of Papua New Guinea, Port Moresby, Papua New Guinea
UPS	Université Paris-Sud, Orsay, France
USC	collection of the University of Sofia, Bulgaria
USGS	United States Geological Survey, USA
USNM	United States National Museum, Washington, USA
V	private collection of Alain Vadet, Boulogne-sur-mer, France
VNIGRI	Vsesoyuznogo Neftyanogo Nauchno-Issledovatel'skogo Geologo-Razvedochnogo Instituta, Leningrad [today Saint Petersburg], Russia
WAM	Western Australian Museum, Perth, Australia
YCM	Yokosuka City Museum, Japan
YPM	Peabody Museum of Natural History, Yale University, New Haven, USA
ZGI	Zentrales Geologisches Institut, Berlin, Germany
ZI	Zoological Institute, Saint Petersburg, Russia
ZMA	Zoölogisch Museum, Universiteit van Amsterdam, The Netherlands
ZMTAU	Zoological Museum, Tel-Aviv University, Israel
ZMUC	Zoologisk Museum, Copenhagen, Denmark
ZPAL	Institute of Palaeobiology of the Polish Academy of Sciences, Warszawa, Poland

Class Echinoidea Leske, 1778

Genus ***Bromidechinus*** Smith & Savill, 2001

Bromidechinus Smith & Savill, 2001: 138-141. Type-species: *B. rimaporus* Smith & Savill, 2001.

Ordovician

B. rimaporus Smith & Savill, 2001: 141; figs 3a-b, 4a-d, 5a-c. [Bromide Fm.; Dunn Quarry, Criner Hills, Carter County, Oklagoma, USA] (Blackriverian [= Harnagian, Burrellian, early Caradoc], Upper Ordovician) <HT: BMNH EE6607; PT: BMNH EE6632>.

Subclass Perischoechinoidea M'Coy, 1849

Subclass Cidaroidea Smith, 1984

Superorder Eognathostomata Smith, 1984

Order Bothriocidaroida Zittel, 1879

Family Bothriocidaridae Klem, 1904

Genus *Bothriocidaris* Eichwald, 1859

Ordovician

B. kolatai Kier, 1982: 311-314; figs 74A-B; pl. 41, figs 1-2. [Poolville Mb., Bromide Fm., Culley Creek, Criner Hills, Carter County, Southern Oklahoma, USA] (Middle Ordovician) <HT: Graffham coll. 1122TX57>.

B. maquoketensis Kolata, Strimple & Levorson, 1977: 146-149; text-fig. 1a-c; pl. 1, figs 1-8. [Fort Atkinson Formation, Maquoketa Group, SE Fort Akinson, Winneshiek County, and SW Eldorado, Fayette County, Iowa, USA] (Cincinnatian, Late Ordovician) <HT: SUI 42700; PT: SUI 42701>.

B. solemi Kolata, 1975: 66; pl. 14, figs 14-15. [Walgreen Mb., Grand Detour Fm., Platteville Grp., Medusa Cement quarry, north side of Route 2, 0.5 miles N of Dixon, Lee County, Illinois, USA] (Middle Ordovician) <HT: UILL X-4882; PT: UILL X-4942 to X-4945>.

B. vulcani Guensburg, 1984: 67-68; pl. 14, figs 4-10. [Lebanon Limestone, locality Z-656, Maury County, Central Tennessee, USA] (Middle Ordovician) <HT: UI X-5842; PT: UI X-5841, X-5839>.

Genus *Neobothriocidaris* PAUL, 1967

Ordovician

N. templetoni KOLATA, 1975: 66-68; text-figs 18-19; pl. 14, figs 1-2. [Eagle Point Mb., Dunleith Fm., Galena Grp., Porter Brothers quarry, west of Highway 2, 1 mile S of Rockton, Winnebago County, Illinois, USA] (Middle Ordovician) <HT: UILL X-4882; PT: UILL X-4942 to X-4945>.

Genus *Unibothriocidaris* KIER, 1982

Unibothriocidaris KIER, 1982: 310-311. Type-species: *U. bromidensis* KIER, 1982.

Ordovician

U. bromidensis KIER, 1982: 311; fig. 73; pl. 41, fig. 3. [Poolville Mb., Bromide Fm., Culley Creek, Criner Hills, Carter County, Southern Oklahoma, USA] (Middle Ordovician) <HT: Graffham coll. 1122TX1>.

U. kieri GUENSBURG, 1984: 68; text-fig. 16; pl. 14, figs 12-15. [Lebanon Limestone, locality Z-651, Nashville, Davidson County, Central Tennessee, USA] (Middle Ordovician) <HT: UI X-5832; PT: UI X-5833-5838, X-6036-6044>.

Order Echinocystitioida JACKSON, 1912

Family Echinocystitidae GREGORY, 1897

Genus *Praepholidocidaris* FREST & STRIMPLE, 1977

Praepholidocidaris FREST & STRIMPLE, 1977: 101-102. Type-species: *P. pellaensis* FREST & STRIMPLE, 1977.

Carboniferous

P. pellaensis FREST & STRIMPLE, 1977: 102-105; text-fig. 1a-d, 2a-d; pl. 1, figs 3-9; pl. 2, figs 1-7. [Pella Formation, abandoned county quarry N of Oskaloosa, and inactive quarry NE of Givin, Mahaska County, Iowa, USA] (Mississippian (basal Chesterian), Early Carboniferous) <HT: SUI 39491; PT: SUI 39483-39490, 39492-39502>.

Genus *Pronechinus* Kier, 1965

Lower Permian

P. cretensis König, 1982: 169-170; figs 1: 1-2, 2: 1-2. [Fodele Fm., Bali, Northern Crete, Greece] (Upper Carboniferous-Lower Permian, ?Asselian) <HT: GPIUF Pr. 1a+b>.

Family Lepidocentridae Lóven, 1874

Genus *Albertechinus* Stearn, 1956

Devonian

A. devonicus Boczarowski, 2001: 87-92; text-figs 32A, D-E, G-L, 33E, I, L-O, 34A-F, 35E-M; pl. 10, figs 1-4, 12-13, 16; pl. 11, figs 1-13, 15-16; pl. 12, figs 5-7, 12-13. [Marzysz, Holy Cross Mountains, Poland] (Late Givetian. Conodont Early *Mesotaxis falsiovalis* zone) <HT: GIUS 4-568 Mrz./980/1>.

Genus *Aptilechinus* Kier, 1973

Aptilechinus Kier, 1973: 652-654. Type-species: *Aptilechinus caledonensis* Kier, 1973.

Silurian

A. caledonensis Kier, 1973: 654-663; text-figs 1-4; pl. 80, figs 1-3; pl. 81, figs 1-4; pl. 82, figs 1-5; pl. 83, figs 1-3. [Starfish bed, Gutterborn Burn, Pentland Hills, Scotland] (latest Llandovery, Silurian, crenulata-zone) <HT: RSM 1897.32.537B; PT: RSM 1897.32.537A, 1897.32.538A, B, 1897.32.540A, B, 1897.32.541B, 1897.32.543, 1897.32.551, 1897.32.552>.

Genus *Elliptechinus* Schneider, Sprinkle & Ryder, 2005

Elliptechinus Schneider, Sprinkle & Ryder, 2005: 753-757. Type-species: *Elliptechinus kiwiaster* Schneider, Sprinkle & Ryder, 2005.

Carboniferous

E. kiwiaster Schneider, Sprinkle & Ryder, 2005: 757-759; figs 4, 5, 10.1-10.6, 11.1-11.5, 12.1-12.2. [Winchell Formation, Canyon Group, Lake Brownwood Spillway about 13.7 km north of Brownwood, Brown County, north-central Texas, USA] (Missourian (Kasimovian), Late Pennsylvanian, Late Carboniferous) <HT: TMM 1967TX23a; PT:

TMM 1967TX23b–d, 1967TX21, 1967TX22, 1967TX25, 1967TX26, 1967TX27, 1967TX54, 1967TX58, 1967TX98, 1967TX101>.

Genus *Kongielechinus* JESIONEK-SZYMANSKA, 1979

Kongielechinus JESIONEK-SZYMANSKA, 1979: 284-286. Type-species: *Kongielechinus magnituberculatus* JESIONEK-SZYMANSKA, 1979.

Devonian

K. magnituberculatus JESIONEK-SZYMANSKA, 1979: 286-289; figs 1C, 2A-E, 3A-C, 4A, 5, 6; pl. 17, figs 1-3; pl. 18, figs 1-3; pl. 19, figs 1-4; pl. 20, figs 1-4; pl. 21, figs 1-5; pl. 22, figs 1-3; pl. 23, figs 1-4. [Świętomierz-Śniadka profile, Błonie Valley, Holy Cross Mts., Poland] (Givetian, Middle Devonian) <HT: ZPAL ED 31; PT: ZPAL ED 22, 32>.

Genus *Pholiocidaris* MEEK & WORTHEN, 1869

Upper Carboniferous

P. hungaricus MIHÁLY, 1990b: 251-252; pl. 1: fig. 1. [Mályinka Fm., Nagyvisnyó, Bükk Mts., Hungary] (Moskovian) <HT: MÁFI Coll. Ech. C. 2363>.

Order Palaechinoida HAECKEL, 1866

Family Palaechinidae M'COY, 1849

Genus *Lovenechinus* JACKSON, 1912

Carboniferous

L. zunyii LI, HE & K.F.ZHANG, in LI, ZHANG, HE & ZHANG, 1985: 99 [Chinese], 103 [Engl.]; pl. 2: figs 5-7. [Xing-an, Guangxi Province, South China] (Early Carboniferous) <HT: GBG-LH-01 (repository not given; presumably Wuhan College of Geology)>.

Genus *Melonechinus* MEEK & WORTHEN, 1861

Carboniferous

M. guangxiensis HE & LI, in LI, ZHANG, HE & ZHANG, 1985: 100-101 [Chinese], 103 [Engl.]; figs 1-3; pl. 1: fig. 10; pl. 2: figs 8-12. [Gueilin, Guangxi Province, South

China] (Early Carboniferous) <HT: GBG-HL-07 (repository not given; presumably Wuhan College of Geology)>.

Genus *Palaechinus* M'Coy, 1844

Carboniferous

P. jacksoni Chesnut & Ettensohn, 1988: 62-63; text-fig. 27; pl. 11, fig. 4. [Locality 1, Cincinnati-Southern Railroad cut near Sloans Valley, Pulaski County, Kentucky, USA] (Middle Chesterian, Upper Mississippian) <HT: USNM 372191>.

P. yangi X.P. Zhang & Li, in Li, Zhang, He & Zhang, 1985: 97-98 [Chinese], 102 [Engl.]; pl. 2: figs 1-2. [Hunan Province, South China] (Early Carboniferous) <HT: XBG-ZL-01 (repository not given; persumably Wuhan College of Geology)>.

Devonian

P. praematurus Nestler, 1981: 556-557; figs 1-3; pl. {1}, figs 1-3. [Fleckenberg, Bl. Schmallenberg, Sauerland, Germany] (Early Devonian) <HT: ZGI > {no specimen no. given}.

Family Cravechinidae Hawkins, 1946

Genus *Cravechinus* Hawkins, 1946

Devonian

C.? *frankei* Haude, 1999: 152-158, 165-166; figs 2A-C, 3A-B, 4. [quarry Iberg-Winterberg, Harz Mts., NW Göttingen, Germany] (rhenana-zone, Adorf stage, Late Frasnian, Late Devonian) <HT: IMGP-Gö 1119-1> {based on a single, fragmented specimen}.

Family Proterocidaridae Smith, 1984

Proterocidaridae Smith, 1984: 147. Type-genus: *Proterocidaris* de Koninck, 1882 [USA, Europe] (Carboniferous to Permian).

Order Cidaroida Claus, 1880

Family Anisocidaridae Vadet, 1999a

Anisocidaridae Vadet, 1999a: 72. Type-genus: *Anisocidaris* Thièry, 1928.

Family Archaeocidaridae M'COY, 1844

Genus *Aarchaeocidaris* WEBSTER, 1997

Aarchaeocidaris WEBSTER, 1997: 37. Type-species: *Aarchaeocidaris strawberryensis* WEBSTER, 1997.

Carboniferous

A. strawberryensis WEBSTER, 1997: 37; pl. 4, figs 1, 4; pl. 8, figs 4-6, 9. [Lodgepole Formation and Brush Canyon Member, Henderson Canyon Formation, South wall of Strawberry Creek, Wyoming, USA and Beirdneau Hollow, Logan Canyon, Utah, USA] (Kinderhookian (= Tournaisian), Mississippian, Early Carboniferous) <HT: USNM 487247 (from Strawberry Creek, Wyoming, USA); PT: USNM 487248, 487249>.

Genus *Archaeocidaris* M'COY, 1844

Upper Permian

A. hamata MIHÁLY, 1980: 400-401; pl. 1: figs 1-5; pl. 2: figs 1-4 [Nagyvisnyó, Komitat Borsod-Abauj-Zemplén, Northern Hungary] <HT: MÁFI P. 1251> {based on isolated primary spines}.

A. schréteri MIHÁLY, 1980: 401-402; pl. 3: figs 1-4 [Nagyvisnyó, Komitat Borsod-Abauj-Zemplén, Northern Hungary] <HT: MÁFI P. 1359> {based on isolated primary spines}.

Carboniferous

A. apheles SCHNEIDER, SPRINKLE & RYDER, 2005: 753; figs 9.1-9.4. [Winchell Formation, Canyon Group, Lake Brownwood Spillway about 13.7 km north of Brownwood, Brown County, north-central Texas, USA] (Missourian (Kasimovian), Late Pennsylvanian, Late Carboniferous) <HT: TMM 1967TX20; PT: TMM 1967TX17, 1967TX18, TMM 1967TX55>.

A. brownwoodensis SCHNEIDER, SPRINKLE & RYDER, 2005: 747-753; figs 2-5, 6.1-6.6, 7.1-7.5, 8.1-8.3. [Winchell Formation, Canyon Group, Lake Brownwood Spillway about 13.7 km north of Brownwood, Brown County, north-central Texas, USA] (Missourian (Kasimovian), Late Pennsylvanian, Late Carboniferous) <HT: TMM 1967TX60, PT: TMM 1967TX1, 1967TX3, 1967TX2, 1967TX7, 1967TX16, 1967TX35, 1967TX62, 1967TX99, 1967TX61, 1967TX100, 1967TX101>.

A.? *diadematoides* HAUDE & THOMAS, 1994: 124-125; fig. 6; pl. 2: figs I-O. [Kulm-Tonschiefer, road cut "Kohleiche", Federal road B224, N Wuppertal, Germany] (cu IIIα1,

Early Carboniferous) <HT: SMF [colln Thomas] Eko-667.1> {based on a single disarticulated specimen}.

A. faassi Aisenverg, 1974: 76-79; pl. XV: figs 1-63. [Limestone bed K5, River Volchya, Donbas, western part of the Donetz Basin, Ukraine] (Middle Carboniferous) <ST: IGN-ANURSR [no numbers given]>.

A. hemispinifera Chesnut & Ettensohn, 1988: 63-64; text-fig. 28; pl. 11, figs 5-9. [Locality 3, Strunk Construction Company Quarry, near Tatesville, Pulaski County and locality 5, Laurel County Quarry, Laurel County Kentucky, USA] (Middle Chesterian, Upper Mississippian) <HT: UK 115989>.

A. whatleyensis Lewis & Ensom, 1982: 81-97; figs 1-19. [Whatley Quarry, Wathley, near Frome, Somerset, England] <HT: BMNH E.76888; PT: BMNH E.76887, E.76889>.

Family Miocidaridae Durham & Melville, 1957

Genus *Miocidaris* Döderlein, 1887

Late Triassic

M. adrianae Zardini, 1973: 9; pl. 6: fig. 25. [Cassian Formation, Misurina, Cortina d'Ampezzo, Italy] (Carnian) <HT: MCA M12>.

M. ampezzana Zardini, 1973: 9; pl. 6: figs 23a, b. [Cassian Formation, Campo, Cortina d'Ampezzo, Italy] (Carnian) <HT: MCA C11>.

M. cortinensis Zardini, 1973: 9; pl. 6: figs 28, 29; pl. 19: fig. 7. [Cassian Formation, Milieres and Sasso Stria, Cortina d'Ampezzo, Italy] (Carnian) <HT: MCA C13>.

Genus *Triadocidaris* Döderlein, 1887

Middle Triassic

T. hungarica Mihály, 1981: 301-302; pl. 1: fig. 5. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI P. 5500> {based on test fragments}.

Family Cidaridae Gray, 1825

Subfamily Histocidarinae Mortensen, 1928

Tribe Histocidarini Mortensen, 1928

Genus *Histocidaris* Mortensen, 1903

Recent

H. longicollis Hoggett & Rowe, 1986: 2-4; pl. 1: figs A-C. [south of New Caledonia (23° S, 167°17' E, depth 420 m), South-west Pacific Ocean] (Recent) <HT: AM J19173>.

Pliocene

H. sicula Borghi, 1999: 116-117; pl. 4, figs 1-4, 8, 10-11. [near Milazzo, Northern Siciliy, Italy] (Pliocene) <HT: MGCA, specimen no. not given>.

Genus *Polycidaris* Quenstedt, 1857

Upper Jurassic

P. nusplingensis Grawe-Baumeister, Schweigert & Dietl, 2000:11-12; pl. 1: fig. 6; pl. 3: fig. 1; pl. 4: figs 1-2; pl. 5: figs 1-3. [Nusplingen Lithographic Limestone, Nusplingen, SW-Germany, Europe] (Upper Kimmeridgian) <HT: SMNS 64267/1; PT: SMNS 64104> {placed into the family Rhabdocidaridae Lambert, 1900 by Grawe-Baumeister et al., 2000: 11}.

Tribe Poriocidarini Smith & Wright, 1989

Poriocidarini Smith & Wright, 1989: 16. (Bajocian – Recent) {included genera: *Poriocidaris* Mortensen, 1909; *Plegiocidaris* Pomel, 1883}.

Subfamily Ctenocidarinae Mortensen, 1928

Genus *Aporocidaris* Agassiz & Clark, 1907

Recent

A. eltaniana Mooi, David, Fell & Choné, 2000: 227-230; fig. 2. [R/V Eltanin stations (Cruise/Station: 4/138, 6/432), Region of Livingston Island, South Shetland Islands, Antarctica] <HT: NMNH E48122; PT: NMNH E11161, E11188, E11212, E11290, E14597, MCZ 8406>.

A. usarpi Mooi, David, Fell & Choné, 2000: 230-233; fig. 3. [R/V Eltanin station (Cruise 14, station 1212), mid-ocean point far to the southeast of New Zealand, North of the Ross Sea, Antarctica] <HT: NMNH E11134; PT: NMNH E11059, E14603>.

Genus *Austrocidaris* H. L. Clark, 1907

Recent

A. pawsoni McKnight, 1974: 26-28; figs 1a-b. [NZOI Stat. E148 (44°30' S, 177°45' W to 44°30.2' S, 177°45.2' W, 880 m depth), F108 (48°19' S, 171°59' E, 1108 m depth), G700 (46°20' S, 171°15' E, 1116 m depth), New Zealand] (Recent) <HT: NZOI 181 (Stn F108); PT: NZOI P237 (Stn F148), P238 (Stn G700)>.

Eocene

A. seymourensis Radwanska, 1996: 120-122; figs 2-3; pl. 28: figs 1-4; pl. 29: figs 1-3; pl. 30: figs 1-5; pl. 31: figs 1-3. [ZPAL 1 (Bill Hill), Seymour Island, Antarctic Peninsula] <HT: IPPAS ZPAL E. VIII/1 PT: IPPAS ZPAL E.VII/2-5>.

Genus *Notocidaris* Mortensen, 1909

Recent

N. bakeri McKnight, 1974: 28-30; figs 2a-b. [NZOI Stat. D593a (41°00' S, 178°25' E, 3017-3109 m depth), New Zealand] (Recent) <HT: NZOI 182>.

N. lanceolata Mooi, David, Fell & Choné, 2000: 233-236; fig. 4. [R/V Eltanin stations (Cruise/Station: 27/1867, 27/1926, 27/1929, 32/2002, 32/2108, 32/2110, 32/2129), Ross Sea, Antarctica] <HT: MCZ 8336; PT: NMNH E21865, E21866, E22004, E22005, E22006>.

Genus *Ctenocidaris* Mortensen, 1910

Recent

C. aotearoa McKnight, 1974: 30-33; figs 3a-b. [NZOI Stat. D591 (42°28.8' S, 176°51.2' E, 1829 m depth), F123 (47°38' S, 178°57' W, 1280 m depth). F127 (49°22' S, 176°16' E, 1280 m depth), G701 (46°20' S, 171°30' E, 1400 m depth), G704 (46°17' S, 172°37' E, 1600 m depth), New Zealand] (Recent) <HT: NZOI 183 (Stn F123); PT: NZOI P239 (Stn F123), P240 (Stn F127), P241 (Stn D591)>.

Subfamily Goniocidarinae MORTENSEN, 1928

Genus *Goniocidaris* DESOR, in AGASSIZ & DESOR, 1846

Miocene

"*G.*" *noetlingi* ROMAN, 1976: 22-24; pl. 4, figs 1-12. [Upper Dam Fm., NNE of Qarn Abu Wail, Qatar] (Early-mid Miocene) <HT: MNHN 1975-16> {established for *Cidaris* sp. 1 of NOETLING, 1901}.

Subfamily Stereocidarinae LAMBERT, 1900

Genus *Hirudocidaris* SMITH & WRIGHT, 1989

Hirudocidaris SMITH & WRIGHT, 1989: 78. Type-species: *Cidaris hirudo* SORIGNET, 1850. [Central and NW Europe] (Cenomanian to Campanian) {placed into the Tribe Stereocidarini Mortensen, 1928 within the Subamily Cidarinae GRAY, 1825 by SMITH & WRIGHT (1989); other species included: *Cidaris uniformis* SORIGNET, 1850; *Stereocidaris silesiaca* SCHLÜTER, 1892}.

Genus *Phalacrocidaris* LAMBERT, 1902

In the *Treatise* this genus is considered as junior synonym of *Stereocidaris* POMEL, 1883.

Campanian

P. catherinae SMITH & WRIGHT, 1989: 77-78; text-fig. 15D; pl. 19, fig. 5. [Danes Dyke, Sewerby, Humberside, England] (*Inoceramus lingua* Zone, Campanian) <HT: BMNH E82345>.

Genus *Stereocidaris* POMEL, 1883

Early Cretaceous

S. trigonodus AZIZ, 1991: 18; pl. 1, fig. 12. [Dalmiapuram Formation, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian) <HT: MACSG 1936; PT: MACSG 1937-1939> {based on isolated spines}.

Genus *Temnocidaris* Cotteau, 1863

Maastrichtian

T. schlueteri Salah, 1982: 212-213; pl. 2, figs 1-8. [Hemmoor, North-western Germany] (Late Maastrichtian) <HT: SNLfB kma 281>.

Genus *Typocidaris* Pomel, 1883

In the Treatise, Fell (1966: U325) considered this genus as synonymous to *Stereocidaris* Pomel, 1883. Geys (1987: 202) reestablished *Typocidaris* as separate genus. Vadet (1988: 130) erected a separate family for this genus (→ Typocidaridae).

Campanian-Maastrichtian

T. ubaghsi Geys, 1987: 206-207; pl. 2, figs 5-9. [Lower Gulpen Fm., Heure-le-Romain, Liège, Belgium and Rügen, Germany] (Upper Campanian-Lower Maastrichtian) <HT: KBIN IST 10253>.

Subfamily Rhabdocidarinae Lambert, 1900

Genus *Desoricidaris* Geys, 1992

Desoricidaris Geys, 1992: 140-141. Type-specie: *Rhabdocidaris pouyannei* Cotteau, 1863. [Europe and Northern Africa] (Cretaceous) {other species included: *D. sanctaecrucis* (Cotteau, 1862); *D. salviensis* (Cotteau, 1857); *D. venulosa* (Agassiz & Desor, 1846); *Leiocidaris balli* Fourtau, 1914; *D. bonolai* (Gauthier, in Fourtau, 1900); *D. subvenulosa* (Cotteau, Peron & Gauthier, 1880); *D. schweinfurthi* (Gauthier, in Fourtau, 1901); *D. crameri* (de Loriol, 1887)}.

Genus *Fellius* Cutress, 1980

Fellius Cutress, 1980: 116. Type-species: *Cidaris foveata* Jackson, 1922. [Jamaica and Cuba] (Eocene).

Genus *Phyllacanthus* Brandt, 1835

Miocene

P. priscus Brito & Ramires, 1974: 264-266; pl. 1, figs 1, 5-7. [Pirabas Fm., Ilha de Fortaleza, Município de Primavera, Pará, Brazil] (Lower Miocene) <HT: MN 5238-I; PT: IGEO 302, 304>.

Genus *Prionocidaris* A. Agassiz, 1863

Recent

P. callista Rowe & Hoggett, 1986: 252-256; figs 12A-B, 13B. [Bushy Island, Queensland to Montague Island, New South Wales, Australia; Lord Howe Island; Norfolk Island; Kermadec Island; New Caledonia] (Recent) <HT: AM J15715; PT: AM J18919-18923>.

P. popeae Hoggett & Rowe, 1986: 7-10; pl. 4: figs A-C; pl. 5: figs A-B. [off Ile des Pins (22°50' S, 167°34' E, depth 275 m), New Caledonia; 1.5 miles south of Aneityum Island (20°17' S, 169°48' E, depth 55-75 m), Vanuatu; and south of New Caledonia (22°48' S, 167°36.5' E, depth 85-100 m), South-west Pacific Ocean] (Recent) <HT: AM J19206 (from Ile des Pins); PT: AM J8192, J13887, J19207-J19210 (all from Ile des Pins)>.

Miocene-Pliocene

P. cookei Cutress, 1976: 192-197; figs 1A-F, 2A-B. [Chipola Formation, USGS loc. 2564, right bank of Chipola River, on the McClelland Farm, one mile below the bridge at the old Bailey's Ferry; USGS loc. 2213, one mile below Bailey's Ferry on the Chipola River; USGS loc. 3419, McClelland's Farm on the west bank of Chipola River, one mile below Bailey's Ferry; all 10 miles W of Blountstown, Calhoun County Florida, USA] (Middle Miocene) <HT: USNM 232503 (from USGS locality 2564); PT: USNM 232504-232506> {based on isolated spines and interambulacral plates}.

P. katherinae Cutress, 1980: 94-99; pl. 9, figs 4-10. [Cuba and Cibao Fm., Puerto Rico] (Middle Miocene to Pliocene) <HT: PRI 29661; PT: AMNH 18566/1, 2, ANSP 50983, MCZ 4102, PRI 29635, 29720, 29746, 29749-29751>.

Oligocene

[*P. placenta* Srivastava, 1988]: 152. [India] (*Lepidocyclina* (*Eulepidina*) Zone, Oligocene) <none defined> {nomen nudum}.

Maastrichtian

P.? *emiratus* Smith, 1995: 133; fig. 9C; pl. 1: figs 3, 5-6. [Jebel Huwayyah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3431> {Smith, in Smith &

Jeffery (2000: 17-19) placed this species into the synonymy of *Phyllacanthus suleimani* (Noetling, 1897)}.

Albian

P. neglecta Smith & Wright, 1989: 90-92; text-figs 17A-D, 18A; pl. 29, figs 3-4; pl. 30, fig. 1. [Gault of Folkestone, Kent, and Red Chalk of Hunstanton, Norfolk, England] (Upper Albian) <HT: BMNH E1078; PT: BMNH E82452, E82453, E82495, E19860-1>.

Genus *Prophyllacanthus* Cutress, 1980

Prophyllacanthus Cutress, 1980: 120-122. Type-species: *Leiocidaris leoni* Lambert & Sánchez Roig, in Sánchez Roig, 1926. [Jamaica and Cuba] (Maastrichtian).

Eocene

P. eocenicus Cutress, 1980: 127-131; pl. 12, figs 1-4. [Jabaco Fm., Cuba] (Eocene) <HT: SUPTC 10249a; PT: LSJU 53248, 53249, PRI 29633, 29634, SUPTC 10249b-e, 10250, 10251>.

Subfamily Cidarinae Gray, 1825

Genus *Almucidaris* Blake & Zinsmeister, 1991

Almucidaris Blake & Zinsmeister, 1991: 632. Type-species: *Almucidaris durhami* Blake & Zinsmeister, 1991

Maastrichtian

A. durhami Blake & Zinsmeister, 1991: 632-635; text-fig. 2; pl. 1, figs 1-6. [Lopez de Bertodano Fm., Seymour Island, Antarctica] <HT: USNM 446322; PT: USNM 446323-446348>.

Genus *Balanocidaris* Lambert, 1910

Albian

B. clubis Aziz, 1991: 21; pl. 1, fig. 14. [Dalmiapuram Formation, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian, Early Cretaceous) <HT: MACSG 1941> {based on isolated spines}.

B. fusiformis SMITH & WRIGHT, 1989: 25; pl. 8, figs 6-8. [Regularis Limestone, Acre Pit, Shenley Hill, Leighton Buzzard, Bedfordshire, England] (*L. tardefurcata* Zone, Lower Albian) <HT: BMNH E37948; PT: E82348-50>.

Genus *Calocidaris* H. L. CLARK, 1907

Miocene

C. palmeri CUTRESS, 1980: 55-59; pl. 3, fig. 1. [Güines Fm., Basal Yumurí Limestone, Palmer locality 978, Habana Province, Cuba] (Middle Miocene) <HT: ANSP 50974>.

Genus *Chesniericidaris* VADET, in VADET & CHESNIER, 2003

Chesniericidaris VADET, in VADET & CHESNIER, 2003: 27. Type-species: *Cidaris wrightii* DESOR, 1865. [Crickley Hill] (Bajocian, aujourd'hui Aalénien (zone à Murchinson)).

Jurassic

C. brangeri VADET & NICOLLEAU, 2005: 16; illustr. on p. 16. [Region of Rich, Morocco] (Late Domerian (= Late Pliensbachian), Jurassic) <Type-series: Roland Reboul coll'n 548a, 548b, Philippe Nicolleau coll'n 9178 (?8952), Alain Vadet coll'n V6725>.

Genus *Cidaris* LESKE, 1778
(= Genus *Cidarites* AUCTT.)

Oligocene-Miocene

C. bermudezi CUTRESS, 1980: 49-53; pl. 2, figs 2-8. [Cojímar Fm. and Güines Fm., Basal Yumurí Limestone, Cuba; Lares Fm. and Juana Díaz Fm., Puerto Rico] (Oligocene to Middle Miocene) <HT: PRI 29603; PT: PRI 29600-02, 29604-07, 29745, 29751>.

Upper Cretaceous

C. comptoni GLAUERT, 1923: 48-49; pl. 3. [Gingin Chalk, Gingin, Perth Basin, Western Australia] (Santonian-Campanian) <HT: WAM G3775> {placed into the genus *Goniocidaris* by MCNAMARA (1986: 353-354)}.

Jurassic

Cidarites burckhardti LARRAIN, 1975: 38-42; figs 21-31, tab. 2. [Lonquimay, Malleco Province, Chile] (Rauracian, Late Jurassic) <HT: Colección del Departamento de Geología y Paleontología, Universidad de Concepcion, Chile (1 spine); PT: as HT (10 spines)> {based on isolated spines}.

C. leberti Vadet, in Chevet & Rigollet, 1989: 18; un-numbered fig. on p. 18. [Oolithe de Chemilly, Sarthe, France] (*K. jason* Zone, Middle Callovian) <HT: Alain Vadet coll. no. V1558> {placed into the genus *Anisocidaris* Thiéry, 1928 by Vadet, 1991}.

Late Triassic

C. aialensis [*aculeata*] Zardini, 1973: 21; pl. 12: figs 24a-b, 25a-b, 26-35. [Cassian Formation, Campo, Forcella Giau, Milieres, Misurina, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 33> {mentioned as "*C*. n.sp *aculeata*" in part of the plate descripton; based on isolated spines}.

C. aialensis fusiformis [*aculeata ailaensis*] Zardini, 1973: 21; pl. 18: fig. 28. [Cassian Formation, Sasso di Striae, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: repository and specimen no. not given > {mentioned as "*C*. n.sp *aculeata* n.sp. *ailaensis*" in the plate descripton; based on isolated spines}.

C. alata brevicaulis Zardini, 1973: 19; pl. 9: fig. 25; pl. 10: figs 2a-c, 9, 10, 11a-e, 22a-c, 25; pl. 15: fig. 12; pl. 18: fig. 21. [Cassian Formation, Campo, Milieres, Misurina, Sasso Stria, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 28> {based on isolated spines}.

C. alata canaliculata Zardini, 1973: 20; pl. 9: figs 20a, b; pl. 10: figs 17a-d. [Cassian Formation, Campo, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 31> {based on isolated spines}.

C. alpina Zardini, 1973: 20; pl. 7: fig. 27; pl. 21: fig. 3. [Cassian Formation, Forcella Giau, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 32> {based on isolated spines}.

C. biconica Zardini, 1973: 18; pl. 9: figs 1-5, 6a, b, 7, 8, 9a, b; pl. 21: fig. 5. [Cassian Formation, Alpe di Specie, Misurina, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 25> {based on isolated spines}.

C. coralliophila Zardini, 1973: 23; pl. 18: figs 26-27. [Cassian Formation, Sasso Stria, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA SS 43> {based on isolated spines}.

C. costalarensis Zardini, 1973: 21; pl. 12: figs 4-11. [Cassian Formation, Costalaresc, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA CO 34> {based on isolated spines}.

C. costata Zardini, 1973: 19-20; pl. 10: figs 15a-b, 20a-b. [Cassian Formation, Alpe di Specie and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 29> {based on isolated spines}.

C. costata tuberculata Zardini, 1973: 20; pl. 10: figs 21a-b. [Cassian Formation, Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA T 30> {based on isolated spines}.

C. costeanensis ZARDINI, 1973: 21-22; pl. 10: figs 24a-b; pl. 17: figs 22, 23a-b; pl. 18: fig. 37. [Cassian Formation, Campo and Sasso Stria, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 35> {based on isolated spines}.

C. dorsata alata ZARDINI, 1973: 17-18; pl. 10: figs 1a-c; pl. 9: figs 18a-c, 19a-c. [Cassian Formation, Forcella Giau, and Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA MI 24> {based on isolated spines}.

C. dorsata fusiformis ZARDINI, 1973: 17; pl. 8: figs 16-19. [Cassian Formation, Milieres, Misurina, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA M 23> {based on isolated spines}.

C. flexuosa brevicostata ZARDINI, 1973: 26; pl. 15: figs 19, 23a-b. [Cassian Formation, Campo and Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 47> {based on isolated spines}.

C. forminensis [*forninensis*] ZARDINI, 1973: 18; pl. 9: figs 13a, b; pl. 17: figs 9a-c; pl. 20: fig. 35; pl. 21: fig. 8. [Cassian Formation, Forcella Giau, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA G 27> {named "*C*. n.sp. *forninensis*" in part of the plate descriptions; based on isolated spines}.

C. giauensis ZARDINI, 1973: 12; pl. 20: figs 34a-b. [Cassian Formation, Forcella Giau, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA G 17>.

C. glabra ZARDINI, 1973: 23; pl. 12: figs 37-39; pl. 18: fig. 33. [Cassian Formation, Alpe di Specie, Campo, Sasso Stria, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 42> {based on isolated spines}.

C. lancedelli ZARDINI, 1973: 12-13; pl. 5: fig. 24a-b. [Cassian Formation, Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA MI 18>.

C. leonardi ZARDINI, 1973: 11-12; pl. 5: fig. 13. [Cassian Formation, Cianzopè, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA R 15>.

C. lineola campanulata ZARDINI, 1973: 26-27; pl. 15: figs 17a-b, 18a-b. [Cassian Formation, Campo and Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA MI 48> {based on isolated spines}.

C. milierensis ZARDINI, 1973: 23; pl. 12: figs 19-20, 21a-b. [Cassian Formation, Campo and Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 41> {based on isolated spines}.

C. montanaro ZARDINI, 1973: 12; pl. 5: figs 14, 15a, b. [Cassian Formation, Alpe di Species and Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 16>.

C. ovata ZARDINI, 1973: 18; pl. 8: figs 23a-c, 24a, b, 25a, b, 26a-c. [Cassian Formation, Campo and Tamari, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 26> {based on isolated spines}.

C. plana Zardini, 1973: 22; pl. 12: figs 45a-b; pl. 15: fig. 20; pl. 19: figs 2a-c; pl. 22: fig. 4. [Cassian Formation, Campo and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA MI 37> {based on isolated spines}.

C. quadrialata Zardini, 1973: 28; pl. 10; fig. 27. [Cassian Formation, Milieres, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA MI 49> {based on isolated spines}.

C. quadriserrata Zardini, 1973: 24-25; pl. 13: figs 1, 2, 4; pl. 22: fig. 6. [Cassian Formation, Alpe di Species, Milieres, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 44> {based on isolated spines}.

C. reticulata Zardini, 1973: 25; pl. 13: figs 9, 10a-b, 11a-b, 12. [Cassian Formation, Alpe di Specie, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 45> {based on isolated spines}.

C. rinbianchi Zardini, 1973: 11; pl. 5: figs 1a-b, 2a-b; pl. 6: fig. 12. [Cassian Formation, Alpe di Specie, Campo, and Misurina, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA M 14>.

C. seelandica Zardini, 1973: 16-17; pl. 11: figs 1-5, 6a-b, 7a-c, 8, 9a-b, 10a-b, 11; pl. 21: fig. 4. [Cassian Formation, Alpe di Specie, Carbonin, and Misurina, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA M 21> {based on isolated spines}.

C. seelandica misurinensis Zardini, 1973: 17; pl. 7: figs 6a, b, 7a, b, 8a, b, 9a, b, 10a, b. [Cassian Formation, Misurina, Campo, and Rumerlo, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 22> {based on isolated spines}.

C. spongiosa Zardini, 1973: 22; pl. 12: figs 47a-b, 48a-b, 49a-b, 50; pl. 17: figs 5a-b, 6a-b, 7a-b, 8a-b; pl. 18: figs 10a-b, 11a-c, 12, 13a-b. [Cassian Formation, Forcella Giau, Milieres, Sasso Stria, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA SS 39> {based on isolated spines}.

C. sulcata Zardini, 1973: 22; pl. 12: figs 12a-b, 13-17. [Cassian Formation, Milieres, Misurina, and Tamarin, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA M 36> {based on isolated spines}.

C. tenuicostata Zardini, 1973: 25; pl. 13: figs 8a-b; pl. 19: figs 4a-b; pl. 22: fig. 5. [Cassian Formation, Campo, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA C 46> {based on isolated spines}.

C. tetraedrica Zardini, 1973: 16; pl. 7: figs 21, 22a, b, 23-26. [Cassian Formation, Alpe di Specie, Milieres, and Misurina, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA S 19> {based on isolated spines}.

C. tetraedrica appendiculata Zardini, 1973: 16; pl. 18: figs 14-15, 16a-b, 17a-d, 18a-c, 19a-d. [Cassian Formation, Sasso Stria, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA SS 20> {based on isolated spines}.

C. trapezoidalis ZARDINI, 1973: 22; pl. 12: figs 42a-b, 43a-b, 44a-b, 46a-b. [Cassian Formation, Forcella Giau, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA G 38> {based on isolated spines}.

C. valparolae ZARDINI, 1973: 28; pl. 18; figs 30-31. [Cassian Formation, Sasso Stria, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA SS 50> {based on isolated spines}.

C. verticillata [*spongiosa*] ZARDINI, 1973: 23; pl. 18: figs 6, 7a-c, 8, 9a-c. [Cassian Formation, Sasso Stria, Cortina d'Ampezzo, Italy] (Carnian, Late Triassic) <HT: MCA SS 40> {labelled as "*C.* n.sp. *spongiosa*" in the plate description; based on isolated spines}.

Middle Triassic

C. adunca MIHÁLY, 1981: 309-310; pl. 6: figs 3-5. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI T. 5441; PT: MÁFI T. 5440, T. 5442b> {based on isolated primary spines}.

C. aggtelekensis MIHÁLY, 1981: 308; pl. 5: figs 4-5. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI T. 5293c> {based on isolated primary spines}.

"*C.*" *bangtoupoensis* STILLER, 2001: 535-536; pl. 1, figs 1-10. [Leidapo Member, Yuqing Subformation, Qingyan Formation, Bangtoupo, NNE of Qingyan, Guizhou Province, south-western China] (early Late Anisian, Middle Triassic) <HT: GPIMUM B3A-6.E2.Fbt-1; PT: GPIMUM B3A-6.E2.F61-1, B3A-6.E2.F61-2>.

C. batheri MIHÁLY, 1981: 307-8; pl. 4: figs 8-9. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI T. 5253b> {based on isolated primary spines}.

"*C.*" *fangchui* STILLER, 2001: 539-540; text-figs 6g-n. [Leidapo Member, Yuqing Subformation, Qingyan Formation, Bangtoupo, NNE of Qingyan, Guizhou Province, south-western China] (early Late Anisian, Middle Triassic) <HT: GPIMUM B3A-6.E6.F60-1; PT: GPIMUM B3A-6.E6.F53-1, B3A-6.E6.F61-1>.

C. gladius MIHÁLY, 1981: 304; pl. 2: fig. 5; pl. 3: fig. 1. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI T. 5340> {based on isolated primary spines}.

"*C.*" *gu* STILLER, 2001: 541-546; text-figs 7a-j, 8a-l. [Leidapo Member, Yuqing Subformation, Qingyan Formation, Bangtoupo, NNE of Qingyan, Guizhou Province, south-western China] (early Late Anisian, Middle Triassic) <HT: GPIMUM B3A-6.E7.F30-1; PT: GPIMUM B3A-6.E7.F30-2, B3A-6.E7.F53-1, B3A-6.E7.F60-1, B3A-6.E7.F60-2, B3A-6.E7.F61-1>.

"*C.*" *mafengpoensis* STILLER, 2001: 546; pl. 2, figs 16-19. [Mafengpo Member, Xiaoshan Subformation, Qingyan Formation, Mafengpo, NNE of Qingyan, Guizhou Province,

south-western China] (middle Late Anisian, Middle Triassic) <HT: GPIMUM B3A-6.E8.F92-1>.

C. palaformis Mihály, 1981: 307; pl. 3: fig. 4. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI T. 5496> {based on isolated primary spines}

C. serradentata Mihály, 1981: 309; pl. 6: figs 1-2. [Aggtelek, Northern Hungary] (Anisian [Pelsonian-Upper Illyrian]) <HT: MÁFI T. 5285> {based on isolated primary spines}

"*C.*" *venustespinosa* Stiller, 2001: 538-539; text-figs 6a-f. [Leidapo Member, Yuqing Subformation, Qingyan Formation, Wachangpo, and Bangtoupo, NNE of Qingyan, Guizhou Province, south-western China] (early Late Anisian, Middle Triassic) <HT: GPIMUM B3A-6.E4.F83-1; PT: GPIMUM B3A-6.E3.F43-1, B3A-6.E3.F43-2>.

"*C.*" *wachangpoensis* Stiller, 2001: 536-538; pl. 1, figs 11-16. [Leidapo Member, Yuqing Subformation, Qingyan Formation, Wachangpo, and Bangtoupo, NNE of Qingyan, Guizhou Province, south-western China] (early Late Anisian, Middle Triassic) <HT: GPIMUM B3A-6.E3.F83-1; PT: GPIMUM B3A-6.E3.F40-1>.

Genus *Cyathocidaris* Lambert, 1910

Miocene

C. avenionensis nerthensis Philippe, 1989: 27. [Rhône Basin, France] (Miocene) <not given> {no description, figures or repository are given}.

C. avenionensis nerthensis Philippe, 1998: 42-44; pl. 4, figs 2-7. [Anse du Petit-Nid, à Sauset-les-Pins, Bouches-du-Rhône, France] (Aquitanian) <HT: ML 53127; PT: ML 53128-31>.

Genus *Gymnocidaris* A. Agassiz, 1863

In the Treatise (p. U333) this genus is considered a synonym of *Eucidaris* Pomel, 1883.

Jurassic

G. boutini Vadet & Nicolleau, 2002: 4-7; 3 figs [calcaire à Nérinées; vincinity of Angoulème, Charente, France] (Kimmeridgian) <HT: Boutin coll. 1459; PT: Coutin coll. 1460, Nicolleau coll. 7710, Vadet coll. 6224, 6235-6237>.

Genus *Leurocidaris* KIER, 1977

Leurocidaris KIER, 1977: 20. Type-species: *Cidaris montanaro* ZARDINI, 1973. [St. Cassian Beds, Italy] (Early Karnian, Late Triassic).

Genus *Lissocidaris* MORTENSEN, 1939

Recent

L. xanthe COPPARD & VAN NOORDENBURG, 2007: 55-63; figs 1A-C, 2A-I, 4Ai-Axii, 5Ai-Aii, 6Ai-Axii. [near Mactan Island, Philippines (depth 150-250 m)] (Recent) <HT: NHM 2007.4; PT: NHM 2007.5>.

Genus *Palmerius* CUTRESS, 1980

Palmerius CUTRESS, 1980: 63-64. Type-species: *Palmerius roberti* CUTRESS, 1980.

Eocene

P. roberti CUTRESS, 1980: 64-66; pl. 4, figs 1-4. [Jabaco Fm., Bermúdez 337, Palmer 52, Palmer 1102 and Palmer 1640 localities, Cuba] (Lowermost Upper Eocene) <HT: SUPTC 10242a; PT: PRI 29632, 29760, LSJU 53244; SUPTC 10242b-h, 10243>.

Genus *Paurocidaris* KIER, 1977

Paurocidaris KIER, 1977: 18. Type-species: *Cidaris rinbianchi* ZARDINI, 1973. [St. Cassian Beds, Italy] (Early Karnian, Late Triassic) {placed into the family Triadocidaridae by SMITH (1994: 187)}.

Genus *Plegiocidaris* Pomel, 1883

Middle Jurassic

P. ? *gemmata* GERASIMOV, 1955: 17-18; pl. 5: figs 11a, б, 12a, б, 13a, б, 14a, б. [Open pit mine near Gzhel' and Amerevo, Klyazme River, Moskva Oblast, USSR] (Middle Callovian) <HT: GMM 860>.

Genus *Stylocidaris* Mortensen, 1909

Recent

S. ryukyuensis Shigei, 1975a: 321-327; figs 1-19. [East China Sea, off Ryukyu Islands, Soyo-Maru Stat. 93 (27°52'6" N, 125°34'8" E), depth 109 m] (Recent) <HT: MMBS Echi 1011; PT: MMBS Echi 1012>.

Genus *Tretocidaris* Mortensen, 1903

Miocene

T. anguillensis Cutress, 1980: 59-63; pl. 2, figs 9-12. [Anguilla Fm., Cleve locality (a), Anguilla] (Upper Lower Miocene) <HT: USNM 115399a; PT: USNM 115399b-e>.

Genus *Triassicidaris* Smith, 1994

Triassicidaris Smith, 1994: 184-186. Type-species: *Triassicidaris peruviensis* Smith, 1994.

Triassic

T. peruviensis Smith, 1994: 186; text-fig. 4; pl. 1, figs 1-8. [Huanincocha and Huaricolca, Peru] (Norian) <USNM 398514; PT: USNM 398506, 398515-398517, 465250>.

Genus *Zardinechinus* Kier, 1977

Zardinechinus Kier, 1977: 16. Type-species: *Cidaris lancedelli* Zardini, 1973. [St. Cassian Beds, Italy] (Early Karnian, Late Triassic) {placed into the family Triadocidaridae by Smith (1994: 187)}.

Triassic

Z. giulinii Kier, 1984a: 11-12; pl. 12, figs 2-6; pl. 13, figs 1-4. [St. Cassian Beds, Stolla, St. Cassiano and Miurina, Italy] (Early Karnian, Late Triassic) <HT: MSNV 10088; PT: MSNV 10089 and one unnumbered specimen in a private collection>.

Z. pulchellus Smith, 1994: 192-193; text-fig. 5; pl. 4, figs 1-6; pl. 5, figs 1-8. [Huaninchocha and Vinchuscancha, Peru] (Norian) <HT: USNM 465261; PT: USNM 398501, 398509, 398510>.

Z. regularis Smith, 1994: 191; text-fig. 5; pl. 3, figs 1-10; pl. 4, figs 7-10. [Huaricolca, near Tarma and Huaninchocha, Peru] (?Norian) <HT: USNM 398503; PT: USNM 398504, 398505, 398513, 465255>.

Z. stanleyi SMITH, 1994: 187-190; text-fig. 5; pl. 2, figs 5-11. [Huaricolca, near Tarma, Peru] (Norian) <HT: USNM 398511; PT: USNM 398512>.

Tribe Cidarini GRAY, 1825

Subtribe Phyllacanthina SMITH & WRIGHT, 1989

Phyllacanthina SMITH & WRIGHT, 1989: 88. Type-genus: *Phyllacanus* BRANDT, 1835. [cosmopolitic] (Albian to Recent) {genera included: *Acanthocidaris* MORTENSEN, 1903; *Chondrocidaris* A. AGASSIZ, 1863; *Eucidaris* POMEL, 1883; *Prionocidaris* A. AGASSIZ, 1863}.

Family Psychocidaridae IKEDA, 1936

Genus *Levicidaris* KIER, 1977

Levicidaris KIER, 1977: 21. Type-species: *Levicidaris zardinia* KIER, 1977. {placed into the family Triadocidaridae by SMITH (1994: 187)}.

Triassic

L. furlani KIER, 1984a: 10-11; pl. 10, figs 1-6; pl. 11, figs 1-4. [St. Cassian Beds, Stolla, Alpe di Specie and Miurina, Italy] (Early Karnian, Late Triassic) <HT: MSNV 10086; PT: MCA 5715>.

L. pfaifferi KIER, 1984a: 11; pl. 11, figs 5-7; pl. 12, fig. 1. [St. Cassian Beds, Miurina, Italy] (Early Karnian, Late Triassic) <HT: Pfaiffer coll. (private) 164>.

L. zardinia KIER, 1977: 21-22; pl. 14, figs 1-8; pl. 15, figs 1-5. [St. Cassian Beds, Alpe di Specie, Miurina, Bao Staolin and Tamarin, Italy] (Early Karnian, Late Triassic) <HT: MCA 148-S-So.-T; PT: MCA 147-S-L, 151-M-Z>.

Genus *Megaporocidaris* KIER, 1977

Megaporocidaris KIER, 1977: 22-23. Type-species: *Megaporocidaris mariana* KIER, 1977. {placed into the family Triadocidaridae by SMITH (1994: 187)}.

Triassic

M. mariana KIER, 1977: 23-24; pl. 15, figs6-8; pl. 16, figs 1-10. [St. Cassian Beds, Alpe di Specie and Miurina, Italy] (Early Karnian, Late Triassic) <HT: MCA 2728-S-L; PT: MCA 176-S-Z, 2729-S-L>.

Genus *Reboulicidaris* Vadet & Nicolleau, 2005

Reboulicidaris Vadet & Nicolleau, 2005: 7. Type-species: *Reboulicidaris rebouli* Vadet & Nicolleau, 2005. [Morocco] (Jurassic).

Early Jurassic

R. rebouli Vadet & Nicolleau, 2005: 7-9; illustr. on p. 8. [Region of Rich, Morocco] (Late Domerian (= Late Pliensbachian)) <HT: MNHN J00951 (Lambert coll'n); PT: Philippe Nicolleau coll'n 8575, 8929; Roland Reboul coll'n 0480; Alain Vadet coll'n V6498, V6499-1 to -5, V6728, V6745, V6912-V6916, V6720-V6724, V6763-6766, V6502(1-14), V6753-1 to -7>.

Genus *Tylocidaris* Pomel, 1883

Eocene

T. bermudezi Cutress, 1980: 134-137; pl. 14, figs 1-4. [Loma Candela Fm. and Jabaco Fm., Cuba] (Middle to Upper Eocene) <HT: SUPTC 10252a; PT: ANSP 16682, LSJU 53250-58, PRI 29700-11, SUPTC 10252b-r, 10253>.

Maastrichtian

T. hemmoorensis Salah & Schmid, 1982: 187-188; pl. 7, figs 1-4. [Hemmoor/Niederelbe, Northern Germany] (*junior*-zone, Late Maastrichtian) <HT: SNLfB kma 108>.

T. (*T.*) *inexspectata* Jagt & van der Ham, 1995: 234-237; fig. 2. [Meerssen Mb., Maastricht Fm., ENCI NV quarry, Maastricht, the Netherlands] (late Late Maastrichtian) <HT: NHMM 1993149>.

Early Cretaceous

T. safiense Vadet, Marignac, Nicolleau & Reboul, 2007: 7-8; pl. 1: figs 1-7. [Falaise de Borj Nador, N of Safi, Morocco] (Late Berriasian to Early Valanginian, Early Cretaceous) <Type series: Maignac coll. 1 to 7, Nicolleau coll. 5198, 7193 to 7197, Reboul coll. 42(a-b), Vadet coll. V7022 to V7024, 7440 to 7443, 7476 to 7479, 7479 to 7781; spines: Nicolleau coll. 5185, 7203, 8588, Reboul coll. 42(1-4b), Vadet coll. V7445(1-11)> {specimen Nicolleau 5185 is listed also in the type series of *Abelleicidaris borjnadorensis* Vadet, Marignac, Nicolleau & Reboul, 2007}.

Subgenus *Oedematocidaris* Smith & Wright, 1989

Oedematocidaris Smith & Wright, 1989: 33-34. Type-species: *Cidaris asperula* Römer, 1841. [France, Germany, Denmark and Britain] (Cenomanian to Maastrichtian) {fur-

ther species included: *Cidaris pleracantha* AGASSIZ & DESOR, 1846; *Cidaris baltica* SCHLÜTER, 1892}.

Subgenus *Sardocidaris* LAMBERT, 1907

Late Cretaceous

T. (*S.*) *trempinus* GALLEMÍ & SMITH, in SMITH, GALLEMÍ, JEFFERY, ERNST & WARD, 1999: 91; pl. 1, fig. 2. [Tremp Basin and Santander, Spain] (Upper Campanian-Maastrichtian) <HT: PUAB-4321; PT: PUAB-4055, PUAB-43626-32>.

Family Diplocidaridae GREGORY, 1900

Genus *Smithicidaris* VADET, 1991

Smithicidaris VADET, 1991: 156. Type-species: *Diplocidaris jacquemeti* LAMBERT, 1910. (Jurassic).

Genus *Rolliericidaris* VADET, 1991

Rolliericidaris VADET, 1991: 160-161. Type-species: *Cidaris etalloni* DESOR, in DESOR & DE LORIOL, 1869, by subsequent designation of VADET et al. (2002: 12). [Europe] (Jurassic) {originally two species were mentione, but none selected as type: *Cidaris etalloni* DESOR and *Cidaris alternans* QUENSTEDT}.

Family Nenoticidaridae VADET, 1988

Nenoticidarideae VADET, 1988: 107. Type-genus: *Nenoticidaris* VADET, 1988. {other genera included: *Paracidaris* POMEL, 1883; *Plegiocidaris* Pomel, 1883; VADET (1991: 97) included the following further genera: *Abelleicidaris* VADET, 1991; *Couvelardicidaris* VADET, 1991; *Nudicidaris* VADET, 1991; *Philicidaris* VADET, 1991; *Romanocidaris* VADET, 1991}.

Genus *Nenoticdaris* VADET, 1988

Nenoticdaris VADET, 1988: 107-108. Type-species: *Cidaris parandieri* AGASSIZ, 1840. (Liassic and Dogger) {other species included: *Cidarites blumenbachii* MÜNSTER, in GOLDFUSS, 1836; *Cidaris moeschi* DE LORIOL, 1869; *Cidaris smithii* WRIGHT, 1857; VA-

DET (1991: 100-104) included further species: *Plegiocidaris pichaueriensis* LAMBERT, in LAMBERT & THIÉRY, 1924; *Cidaris zschokkei* COTTEAU, 1875 *ex* DESOR; *Cidaris desori* COTTEAU, 1875}.

Genus *Abelleicidaris* VADET, 1991

Abelleicidaris VADET, 1991: 109-110. Type-species: *Cidaris bradfordensis* WRIGHT, 1856. [Europe] (Jurassic-Early Cretaceous) {other species included: *Cidaris saemanni* COTTEAU, 1857}.

Early Cretaceous

A. borjnadorensis VADET, MARIGNAC, NICOLLEAU & REBOUL, 2007: 9-10; pl. 3: figs 1-6. [Falaise de Borj Nador, N of Safi, Morocco] (Late Berriasian, Early Cretaceous) <Type series: Maignac coll. 15 to 22, Nicolleau coll. 5185, 7204, 7205, 7635, Reboul coll. 570, Vadet coll. V6376 to 6379, 7446; spines: Maignac coll. 23 to 25, Nicolleau coll. 2027, 7365, Reboul coll. 570(1-5), Vadet coll. V7477(1-7)> {specimen Nicolleau 5185 is listed also in the type series of *Tylocidaris safiense* VADET, MARIGNAC, NICOLLEAU & REBOUL, 2007}.

Genus *Couvelardicidaris* VADET, 1991

Couvelardicidaris VADET, 1991: 97-98. Type-species: *Cidaris moorei* WRIGHT, 1956. [Europe] (Jurassic).

Liassic

C. couvelardi VADET, 1991: 99-101; pl. 2, fig. 11. [May-sur-Orne, Normandie, France (type locality); Auxois, France; Somerset, England] (Hettnangian-Lower Toarcian (type stratum)) <ST: C-EM 12491 (1-5b, 8-10, 14) (tests) C-EM 12489 (4-17-33-38-39-45) (spines)>.

Genus *Nudicidaris* VADET, 1991

Nudicidaris VADET, 1991: 113-114. Type-species: *Cidaris sublaevis* COTTEAU, 1875. [Europe] (Jurassic) {other species included: *Cidarites elegans* MÜNSTER, in GOLDFUSS, 1826}.

Genus *Philicidaris* VADET, 1991

Philicidaris VADET, 1991: 104-105. Type-species: *Rhabdocidaris blainvillei* DESOR *ex* DESMAREST, 1858. [Europe] (Jurassic) {other species included: *Cidaris desnoyersi* COTTEAU, 1875}.

Genus *Remycidaris* VADET, 2003

Remycidaris VADET, 2003: 12. Type-species: *Remycidaris largiporus* VADET & REMY, 2004. [France, Germany, and Switzerland] (Callovian-Tithonian, Late Jurassic) {*Cidarites elegans* MÜNSTER, in GOLDFUSS, 1826}.

Late Jurassic

R. largiporus VADET, 2003: 11-12. [Oolithe de l'Antonnière and Calcaires Sableux de Teillé, environs de Degré, Sarthe, France] (Late Jurassic) <HT: Alain Vadet coll'n V2315; PT: Alain Vadet coll'n V2316-1636, 3102, 3592, 3593, 3594, 4439>.

Genus *Romanocidaris* VADET, 1991

Romanocidaris VADET, 1991: 117. Type-species: *Romanocidaris radeti* VADET, 1991.

Jurassic

R. dietli VADET, 1991: 119-120; pl. 5, figs 5-6. [Laufen, Germany] (Lower Bajocian) <HT: SMNS 62234>.

R. pseudofilograna NICOLLEAU & VADET, 1995: 70-71; 1 fig. on p. 70, 1 fig. on p. 71; pl. 32: figs 3A, B. [Marnes à spongiares, environs de Niort, Poitou, France] (*luciaeformis* Subzone, *transvesarium* Zone, Middle Oxfordian, Jurassic) <HT: Rigollet coll. no. 79.52; PT: Alain Vadet coll. 2721, 2722, Philippe Nicolleau coll. no. 2630>.

R. radeti VADET, 1991: 118-119; pl. 5, figs 3-4. [Marnes de Dives entre Houlgate et Villers sur-mer, Normandie, France] (zone à Lamberti, Upper Callovian) <HT: V 1906(1-2)> {other species included: Cidarites ornatus Quenstedt, 1858}.

Family Polycidaridae VADET, 1988

Polycidaridae VADET, 1988: 103-104. Type-genus: *Polycidaris* QUENSTEDT, 1858. [Europe] (Jurassic) {other genera included: *Procidaris* POMEL, 1883; later VADET (1991: 122-123) included further genera: *Anisocidaris* THIÉRY, 1928; *Pannericidaris* VADET, 1991; *Zbindenicidaris* VADET, 1991}.

Genus *Pannieriicidaris* Vadet, 1991

Pannieriicidaris Vadet, 1991: 129-130. Type-species: *Cidaris moraldina* Cotteau, 1849. [Europe] (Early Jurassic) {other species included: *Miocidaris lorioli* Lambert & Thiéry, 1909}.

Genus *Zbindenicidaris* Vadet, 1991

Zbindenicidaris Vadet, 1991: 133. Type-species: *Cidaris toucasi* Cotteau, 1875. [Europe] (Late Triassic-Middle Jurassic) {other species included: *Rhabdocidaris varusensis* Cotteau, 1875}.

Family Rhabdocidaridae Lambert, 1900

This family is not used in the Treatise, Vadet (1988: 131-132) reinstalled it and placed the genera *Rhabdocidaris* Desor, 1856 and *Dickesicidaris* Vadet, 1988 into it. Vadet (1991: 142 ff.) included further genera: *Callaudicidaris* Vadet, 1991; *Guttonicidaris* Vadet, 1991 and *Laurenticidaris* Vadet, 1991}.

Genus *Callaudicidaris* Vadet, 1991

Callaudicidaris Vadet, 1991: 146-147. Type-species: *Cidaris fowleri* Wright, 1851. [Europe] (Jurassic).

Genus *Dickesicidaris* Vadet, 1988

Dickesicidaris Vadet, 1988: 136-137. Type-species: *Cidarites maximus* Münster, 1826. [Europe] (Jurassic).

Genus *Guittonicidaris* Vadet, 1991

Guittonicidaris Vadet, 1991: 151-152. Type-species: *Rhabdocidaris bigoti* Mercier, 1930. [Europe] (Jurassic).

Genus *Laurenticidaris* VADET, 1991

Laurenticidaris VADET, 1991: 143-144. Type-species: *Cidaris major* COTTEAU, 1875. [Europe] (Jurassic) {other species included: *Rhabdocidaris impar* DUMORTIER, 1875}.

Genus *Rhabdocidaris* DESOR, 1856

Late Jurassic

R. reginae BAUMEISTER, 1999: 320-321; figs 1, 3-5. [Günsberg Beds, Vigier company quarry, Pery/La Reuchenette, Switzerland] (Oxfordian) <HT: Promusée Paléontologique, Glovelier, Switzerland, No. 3018> {based on a single specimen}.

R. schneideri LAMBERT, 1926: 761-763; pl. 29: fig. 2. [Crenularis-Schichten, Mellikon, Switzerland] (Séquanien inférieur, Late Jurassic) <repository unknown, formerly coll. G. Schneider> {based on a single, apparently well preserved partial corona segment}.

Middle Jurassic

R. lahuseni GERASIMOV, 1955: 20; pl. 6: fig. 22. [Leninskie Mt., near Moskva, D'yakoo, Moskva Oblast; Ogarkovo, Unzhe River, Ivanovskog Oblast, USSR] (Middle Callovian) <n/a> {nomen novum pro *Rhabdocidaris remus* LAGOOZEI, 1895: p. 173, fig. 236, non DESOR, non TRAUTSCHOLD}.

Family Typocidaridae VADET, 1988

Typocidaridae VADET, 1988: 130. Type-genus: *Typocidaris* POMEL, 1883.

Order Roseicidaroida VADET, 1999a

Roseicidaroida VADET, 1999a: 78. {included families: Roseicidaridae VADET, 1991}.

Family Roseicidaridae VADET, 1991

Roseicidaridae VADET, 1991: 85-86. Type-genus: *Roseicidaris* VADET, 1991. [Europe] (Jurassic) {other genera included: originally: *Caenocidaris* THIÉRY, 1928; *Merocidaris* THIÉRY, 1928; later: *Leurocidaris* KIER, 1977, see VADET, 1999a}.

Genus *Roseicidaris* Vadet, 1991

Roseicidaris Vadet, 1991: 86. Type-species: *Cidaris morieri* Cotteau, 1875. [Europe] (Toarcian).

Order Thielicidaroida Vadet, 1999c

Thielicidaroida Vadet, 1999c: 69. {included families: Thielicidaridae Vadet, 1999c}.

Family Thielicidaridae Vadet, 1999c

Thielicidaridae Vadet, 1999c: 69. Type-genus: *Thielicidaris* Vadet, 1999c.

Genus *Thielicidaris* Vadet, 1999c

Thielicidaris Vadet, 1999c: 69. Type-species: *Thielicidaris thieli* Vadet, 1999c. [Europe] (Late Triassic)

Triassic

T. thieli Vadet, 1999c: 69-70; figs 81-85. [Couches de Saint Cassian, Italy] (Carnian) <HT: Thiel K-1>.

Subclass Euechinoidea Bronn, 1860

Order Triadotiaroida Hagdorn, 1995

Triadotiaroida Hagdorn, 1995: 249. {included families: Triadotiaridae Hagdorn, 1995}.

Family Triadotiaridae Hagdorn, 1995

Triadotiaridae Hagdorn, 1995: 249. Type-genus: *Triadotiaris* Hagdorn, 1995. [Europe] (Anisian-Ladinian) {Vadet (1999c: 70) included the following genera: *Lenticidaris* Kier, 1968; *Mesodiadema* Neumayr, 1889; *Anaulcidaris* Zittel, 1879}.

Genus *Triadotiaris* HAGDORN, 1995

Triadotiaris HAGDORN, 1995: 250. Type-species: *Cidarites grandaevus* v. ALBERTI, 1834. [Central Europe] (Anisian-Ladinian).

Order Serpianotiaroida HAGDORN, 1995

Serpianotiaroida HAGDORN, 1995: 258. {included family: Serpianotiaridae HAGDORN, 1995}.

Family Serpianotiaridae HAGDORN, 1995

Serpianotiaridae HAGDORN, 1995: 258. Type-genus: *Serpianotiaris* JEANNET, 1933. [Central Europe] (Anisian-Karnian).

Infraclass Acroechinoidea SMITH, 1981

Family Nicolleaumatidae VADET, 1999a

Nicolleaumatidae VADET, 1999a: 75. Type-genus: *Nicolleauma* VADET, 1999a.

Genus *Nicolleauma* VADET, 1999a

Nicolleauma VADET, 1999a: 75-76. Type-species: *Pseudodiadema collenoti* COTTEAU, 1882. [Europe] (Jurassic) {other species included: *Eodiadema lacostei* LAMBERT, 1933; *E.* aff. *minutum* SMITH, 1981; *Acrosalenia chartroni* LAMBERT, 1904}.

Order Glyptocidaroida JENSEN, 1982

Glyptocidaroida JENSEN, 1982: 90. {included families: Glyptocidaridae JENSEN, 1982}.

Family Glyptocidaridae JENSEN, 1982

Glyptocidaridae JENSEN, 1982: 90. Type-genus: *Glyptocidaris* A. AGASSIZ, 1853.

Superorder Echinothuriacea Jensen, 1982

Echinothuriacea Jensen, 1982: 92. {included orders: Echinothurioida Claus, 1880}.

Superorder Diadematacea Duncan, 1889

Order Echinothurioida Claus, 1880

Jensen (1982: 92) placed this order into a new own super: Echinothuriacea Jensen, 1982.

Family Phormosomatidae Mortensen, 1934

This family is not used in the *Treatise*, instead it runs as Subfamily Phormosomatinae Mortensen, 1934. Smith & Wrigth (1990: 104) proposed a new classification for the Echinothuroida, where this taxon is used at family level.

Subfamily Kamptosomatinae Smith & Wright, 1990

Kamptosomatinae Smith & Wright, 1990: 104. Type-genus: *Kamptosoma* Mortensen, 1903.

Family Echinothuriidae Wyville Thompson, 1872

Subfamily Echinothuriinae Wyville Thompson, 1872

Genus *Asthenosoma* Grube, 1868

Recent

A. marisrubis Weinberg & de Ridder, 1998: 32-35; fig. 3A-C, 4A-C, 5A-E, 6a-g, 7a-g. [northern Red Sea] (Recent) <HT: ZMA V.ech.E 9365; PT: ZMA V.ech.E 9366; ZM-TAU EC 25123, NS 5091; HUJ ECHI 343; MNHN 6-9. EC ES 8376>.

Genus *Hapalosoma* MORTENSEN, 1903

Recent

H. pulchrum ROWE, 1989: 263-265; figs 2A-B, 3A-B. [off Norfolk Island] (Recent) <HT: AM J21699>.

Genus *Kamptosoma* MORTENSEN, 1903

Recent

K. abyssale MIRONOV, 1971: 321-322; figs 2, 3а-д, 4а-г. [R/V Vityaz Stat. 2074 (42°32' N, 150°41'05" E, depth 5140 m), 2119 (46°08' N, 155°16' E, depth 5070-5090 m), 3162 (43°15' N, 157°48' E, depth 5502 m), 3206 (30°53' N, 153°09' E, depth 5988-5998 m), 3575 (38°02' N, 146°33' E, depth 5495 m), 3825 (25°32' S, 175°27' W, depth 5123-5329 m), 4655 (16°07' S, 53°35' E, depth 4675 m), 4911 (1°55' S, 83°05' E, depth 4794-4809 m), 5065 (16°23' N, 146°36' W, depth 5363-5570 m), 5315 (8°22' S, 80°35' E, depth 5100-5120 m), 5322 (18°57' S, 56°05' E, depth 4374 m), 5609 (46°06' N, 153°18' E, depth 6090-6235 m), 5620 (44°48' N, 156°33' E, depth 5005-5045 m), 5623 (46°26' N, 154°59' E, depth 4995-5045 m), 5625 (45°28' N, 153°46' E, depth 6205-6215 m), 6143 (51°40' N, 163°00' W, depth 4860 m), Pacific Ocean and Indian Ocean] (Recent) <HT: IOANSSR no specimen no. given (from R/V Vityaz Stat. 5609)>.

Genus *Retzneiosoma* KROH, 2005

Retzneiosoma KROH, 2005: 14. Type-species: *Retzneiosoma jasenecki* KROH, 2005. [Europe] (Miocene).

Miocene

R. jaseneki KROH, 2005: 16-18; fig. 10; pl. 9, figs 1-12; pl. 10, figs 1-8. [grey marls overlying the Weissenegg Formation, Retznei (Lafarge quarry (formerly Perlmoser)), Styria, Austria] (Early Badenian [= Langhian], Middle Miocene) <HT: NHMW 2003z0071/0001>.

Genus *Sperosoma* KOEHLER, 1897

Recent

S. nudum SHIGEI, 1977a: 71-76; figs 1-16. [Soyo-Maru Stat. B2 (34°05'2" N, 140°00'7" E, off Miyake Island, depth 1410-1450 m), Stat. B3 (32°32'4" N, 140°18'7" E, off Aogashima Island, depth 2080 m) and Stat. 51 (34°3'5" N, 139°39'5" E, off Izu-Os-

hima Island, depth 1570 m), off central Japan, North Pacific Ocean] (Recent) <HT: MMBS Echi 1211; PT: MMBS Echi 1212-1216>.

Subfamily Hygrosomatinae Smith & Wright, 1990

Hygrosomatinae Smith & Wright, 1990: 104. Type-genus: *Hygrosoma* Mortensen, 1903.

Subfamily Paraphormosomatinae Smith & Wright, 1990

Paraphormosomatinae Smith & Wright, 1990: 104. Type-genus: *Paraphormosoma* Mortensen, 1934.

Subfamily Pelanodiademinae Hess, 1972

Pelanodiademinae Hess, 1972: 42. Type-genus: *Pelanodiadema* Hess, 1972.

Genus *Pelanodiadema* Hess, 1972

Pelanodiadema Hess, 1972: 42. Type-species: *Pelanodiadema oolithicum* Hess, 1972. [Central Europe] (Middle Jurassic).

Middle Jurassic

P. oolithicum Hess, 1972: 42-50; figs 48-63; pl. 16, figs 1-3; pl. 17, figs 1-3; pl. 18, fig. 3. [Upper Hauptrogenstein, Schinznach-Dorf, Switzerland] (Upper Bajocian) <HT: Hess coll. E300>.

Subfamily Sperosomatinae Smith & Wright, 1990

Sperosomatinae Smith & Wright, 1990: 104. Type-genus: *Sperosoma* Koehler, 1897. {other genera included: *Tromikosoma* Mortensen, 1903}.

Order Diadematoida Duncan, 1889

Family Diadematidae Gray, 1855

Genus *Centrostephanus* Peters, 1855

Recent

C. sylviae Fell, 1975: 182-190; figs 1, 2b-f, 4, 5. [San Felix Island, Chile and between Point Island and Padre Bay, west end of Mas a Tierra, Juan Fernández Islands, South Pacific Ocean; depth 9-70 m] (Recent) <HT: USNM E11379; PT: MCZ 8778-8780, 8783, NMNZ ECH.1500, National Museum Chile (Santiago), USNM E11380>.

Genus *Diadema* Gray, 1825

Recent

D. setosum forma *depressa* Dollfus & Roman, 1981: 38-39; pl. 5, figs 4-6; pl. 6, figs 1-3. [Red Sea] (Recent) <HT: not given>.

Genus *Palaeodiadema* Pomel, 1887

Oligocene

P. reingardae Kutscher, 1985a: 5-6; pl. 1, fig. 5; pl. 2, figs 1-4. [Magdeburg, Germany] (Middle Oligocene) <HT: no specimen no. given>.

Family Aspidodiadematidae Duncan, 1889

Genus *Aspidodiadema* A. Agassiz, 1878

Recent

A. intermedium Shigei, 1977b: 79-84; figs 1-10. [East China Sea, off Shimo-Koshiki Island, 31°35' N, 129°42' E, depth 380 m] (Recent) <HT: MMBS Echi 1201>.

A. montanum Mironov, 1981: 132-133; figs 1.1, 1.3, 2.1, 2.3. 2.10. [Marcus Necker Ridge, North Pacific Ocean; 1270-1950 m depth] (Recent) <HT: IONASSR XY-65-17>.

A. sinuosum Mironov, 1981: 133-135; figs 1.2, 1.4, 2.2, 2.5. 2.8, 2.12. [Marcus Necker Ridge, North Pacific Ocean; 100-1350 m depth] (Recent) <HT: IONASSR XY-65-18>.

Genus *Cherreauma* Vadet, Nicolleau & Pineau, 1996

Cherreauma Vadet, Nicolleau & Pineau, 1996: 60-61. Type-species: *C. cherreaui* Vadet, Nicolleau & Pineau, 1996. [Europe] (Jurassic).

Middle Jurassic

C. cherreaui Vadet, Nicolleau & Pineau, 1996: 61-63; figs 74-77; pl. 15, figs 1a-d. [Oolithe de l'Antonnière, environs du Mans, Sarthe, France] (Callovian) <HT: Cherreau coll.; PT: Thiel coll., Dudicourt coll.> {no specimen numbers given}.

Genus *Culozoma* Vadet & Slowik, 2001

Culozoma Vadet & Slowik, 2001: 35. Type-species: *Culozoma baroini* Vadet & Slowik, 2001. [Europe] (Jurassic).

Bajocian

C. baroini Vadet & Slowik, 2001: 35-38; 2 text-figs (not numbered); pl. 6, 6 figs (not numbered). [Culoz dans l'Ain, France] (Lower? Bajocian) <HT: Vadet coll. V6006; PT: Vadet coll. V6120>.

Genus *Gymnotiara* Pomel, 1883

Middle Jurassic

G. kuhni Hess, 1971: 622-626; figs 11-14. [Anceps-Athleta-Beds, Schinboden ob Ramiswil, Solothurn, Switzerland] (Callovian, Jurassic) <HT: Hans Hess coll. E269>.

Family uncertain

Genus *Brangema* Nicolleau & Vadet, 1995

Brangema Nicolleau & Vadet, 1995: 77. Type-species: *Brangema brangeri* Nicolleau & Vadet, 1995. [Europe] (Jurassic).

Jurassic

B. brangeri Nicolleau & Vadet, 1995: 77-78; 2 figs on p. 77; pl. 30: figs 4A, B. [Marnes à spongiares, environs de Niort, Poitou, France] (stenocycloides Subzone, bifucatus Zone, Late Oxfordian, Late Jurassic) <HT: Philippe Nicolleau coll. no. 2532>.

Family Eodiadematidae SMITH, 1984

Eodiadematidae SMITH, 1984: 171, 172-173. Type-genus: *Eodiadema* DUNCAN, 1889.

Eodiadematida KINMAN, 1994: 31, 64. Type-genus: *Eodiadema* DUNCAN, 1889. (Jurassic) {objective junior homonym of Eodiadematidae SMITH, 1984}.

Order Micropygoida JENSEN, 1982

Micropygoida JENSEN, 1982: 92. {included families: Micropygidae MORTENSEN, 1904}.

Superorder Pedinacea JENSEN, 1982

Pedinacea JENSEN, 1982: 93. {included orders Pedinoida MORTENSEN, 1939, Pygasteroida DURHAM & MELVILLE, 1957}.

Order Pedinoida MORTENSEN, 1939

Family Pedinidae POMEL, 1883

Genus *Caenopedina* A. AGASSIZ, 1869

Recent

C. alanbakeri ROWE, 1989: 265-268; figs 4A-B, 5A-D. [off Norfolk Island] (Recent) <HT: AM J21700>.

C. novaezealandiae PAWSON, 1964: 64-66; figs 1-5; plate 1. [16 miles south-east of Mayor Island, Bay of Plenty, 180-240 fathoms (4/8/1963, prawn net), Australasia] (Recent) <HT: Dominion Museum, Wellington, without no.>

C. otagoensis MCKNIGHT, 1968: 90-94; figs 1-3. [Stat. E 399 (46°00' S, 171°33' E, depth 1214-1222 m), E 427 (44°54' S, 172°54' E, depth 1207-1233 m), F 751 (45°23' S, 175°29' E, depth 1227-1258 m), Tasman Sea] (Recent) <HT: NZOI 22 (Stat. E 427, female); PT: NZOI P 38, P 40 (2 females, Stat. E 427), P 39, P 41 (2 males, Stat. E 427)>.

Genus *Echinopedina* Cotteau, 1866

Eocene

E. paucituberculata Lewis, 1989: 9-13; figs 2 a-v, 3; pl. 1: figs 3-7. [Barton-on-Sea, Hampshire, England] (Bartonian) <HT: BMNH E 76581; PT: BMNH E 76425, E 76573-80, E 79701, E 79821>.

Genus *Hemipedina* Wright, 1855

Triassic

H. hudsoni Kier, 1977: 30-32; fig. 11a-c; pl. 21, figs 5-9. [Elphinstone Group, probably Sumatra Fm., Wadi Milaha, Trucial Coast, Arabia] (Norian, Late Triassic) <HT: BMNH E-76154>.

Genus *Leiopedina* Cotteau, 1866

Eocene

L. molinai Sillero, 2002: 13-16; figs 1-4. [Carretera de Busot a Jijona, Busot, Province Alicante, Spain] (Middle Eocene) <HT: CGCPE-CI966; PT: CGCPE-CI967> {figured and re-described in López & Sillero (2006: 153, fig. 126)}.

Genus *Pedina* L. Agassiz, 1838

Middle Jurassic

P. davoustiana Cotteau, 1856 var. *mercieri* Vadet, Nicolleau & Pineau, 1996: 47-48; figs 53-54; pl. 1, figs 2a-c; pl. 11, figs 1a-2c. [Oolithe de l'Antonnière, Sarthe, France] (Callovian) <HT: V 4523; Type-series: V 3167-3178, 4523, Pineau coll. 1-3, 14>.

Genus *Thieulinipedina* Vadet, Nicolleau & Pineau, 1996

Thieulinipedina Vadet, Nicolleau & Pineau, 1996: 43. Type-species: *Pedina antiqua* Cotteau, 1883. [Sarthe, France and Portugal] (Callovian) {other species included: *Pedina resecta* (Lambert, 1916)}.

Family uncertain

Genus *Farquharsonia* CURRIE, 1927

VADET, NICOLLEAU & PINEAU (1996: 57-59) place this genus into the family Aspidodiadematidae DUNCAN, 1889, within the order Diadematoida DUNCAN, 1889, whereas KIER (1972a: 19) placed it into the family Diadematidae GRAY, 1855.

Middle Jurassic

F. crenulata KIER, 1972a: 23-24; fig. 7; pl. 1, figs 1-6; pl. 2, figs 1-2. [Middle Dhruma Fm., Locality KK9-43, Saudi Arabia] (Bathonian) <HT: USNM 170370>.

F. pineaui VADET, NICOLLEAU & PINEAU, 1996: 57-60; figs 69-73; pl. 14, figs 1a-3. [Oolithe de l'Antonnière, Sarthe, France] (Callovian) <HT: Pineau coll. 306; PT: Pineau coll. 305, Grignon coll.>.

Order Pygasteroida DURHAM & MELVILLE, 1957

Family Pygasteridae LAMBERT, 1900

Genus *Jesionekechinus* VADET, 1997

Jesionekechinus VADET, 1997:128. Type-species: *Plesiechinus hawkinsi* JESIONEK, 1970. [Nevada, USA] (Sinemurian).

Genus *Plesiechinus* POMEL, 1883

Middle Jurassic

P. altus KIER, 1972a: 24-25; fig. 8; pl. 32, figs 1-4. [Middle Dhruma Fm., locality L-921, Saudi Arabia] (Bathonian) <HT: USNM 170419>.

Superorder Echinacea CLAUS, 1876

Order Acrosalenioida VADET, 1999b

Acrosalenioida VADET, 1999b: 78. {included families: Acrosaleniidae GREGORY, 1900}.

Order Salenioida DELAGE & HÉROUARD, 1903

According to SMITH & WRIGHT (1990: 117) the name Calycina GREGORY, 1900 has priority over Salenioida DELAGE & HÉROUARD, 1903.

Family Acrosaleniidae Gregory, 1900

Genus *Acrosalenia* L. Agassiz, 1840

Upper Jurassic

A. bowersi Kier, 1972a: 34-35; fig. 13; pl. 25, figs 1-5; pl. 26, figs 1-2. [Upper Dhruma Fm., locality S-1148, Saudi Arabia] (Callovian) <HT: USNM 170409; PT: USNM 170410>.

Middle Jurassic

A. arabica Kier, 1972a: 27-29; figs 9-10; pl. 28, figs 2-5; pl. 29, figs 1-4; pl. 30, figs 1-4. [Middle Dhruma Fm., localities S-1046, S-1056, S-1157, S-1160, S-1503, KK8-23, 30-35, 33-35, 34, 35-38, 37, 38.5, 40.5, 44, KK9-30-40, Saudi Arabia] (Bathonian) <HT: USNM 170412; PT: USNM 170413-170417>.

A. dhrumaensis Kier, 1972a: 29-34; figs 11-12; pl. 31, figs 1-8. [Middle Dhruma Fm., localities KK9-21-22.5, KK9-51.5, Saudi Arabia] (Bathonian) <HT: USNM 170418>.

Early Jurassic

A. marratensis Kier, 1972a: 26-27; pl. 27, figs 3-7; pl. 28, fig. 1. [Marrat Fm., localities S-1034, KK6-14, Saudi Arabia] (Toarcian) <HT: USNM 170411>.

Genus *Heterosalenia* Cotteau, 1861

Late Jurassic

H. brocki Kier, 1972a: 36-37; fig. 14; pl. 7, figs 1-6; pl. 8, figs 1-6; pl. 9, fig. 1. [Upper Dhruma Fm., localities KK9-111, S-1167, KK9-112, Saudi Arabia] (Callovian) <HT: USNM 170378; PT: USNM 170379>.

H. ornata Kier, 1972a: 37-40; fig. 15; pl. 5, figs 2-6; pl. 6, figs 1-8. [Upper Dhruma Fm., locality KK9-112, S-1167, KK9-111, Saudi Arabia] (Callovian) <HT: USNM 170375; PT: 170376-170377>.

Middle Jurassic

H. dhrumaensis Kier, 1972a: 35-36; pl. 9, figs 2-4. [Middle Dhruma Fm., locality KK9-15, Saudi Arabia] (Bathonian) <HT: USNM 170380>.

Genus *Milnia* HAIME, 1849

In the *Treatise* the genus *Milnia* HAIME, 1849 is considered a junior synonym of *Acrosalenia* L. AGASSIZ, 1840.

Middle Jurassic

M. guittoni VADET, NICOLLEAU & PINEAU, 1996: 82-84; figs 97-100; pl. 22, figs 1a-2c. [Oolithe de l'Antonnière and Oolithe de Vivoin et l'Assise des Carreaux, Sarthe, France] (Callovian) <HT: V 4442; Type-series: V 2725, 2745-2748, 4072-4074, 4440-4450, Pineau coll. 110-111-117-118-285-361-362-363>.

Genus *Prosalenia* VADET, NICOLLEAU & PINEAU, 1996

Prosalenia VADET, NICOLLEAU & PINEAU, 1996: 84. Type-species: *Acrosalenia marcoui* COTTEAU, 1879. [Sarthe and Jura, France] (Callovian to Oxfordian).

Family Pseudosaleniidae VADET, 1999b

Pseudosaleniidae VADET, 1999b: 78. Type-genus: *Pseudosalenia* COTTEAU, 1859.

Genus *Pseudosalenia* COTTEAU, 1859

Upper Jurassic

P. malogostiana RADWAŃSKA, 1999: 309-310; pl. 11, figs 1a-f; pl. 12, figs 1a-f. [Małogoszcz Quarry, south-western margin of the Holy Cross Mountains, Central Poland] (Lower Kimmeridgian) <HT: DPUW EMa/34>.

Middle Jurassic

P. magniprocta KIER, 1972a: 40-42; fig. 16; pl. 9, figs 5-7; pl. 10, figs 1-4; pl. 11, figs 1-4. [Middle Dhruma Fm., localities KK8 30-35, 34, 35-38, KK9 30-40, S-1046, S-1160, Saudi Arabia] (Bathonian) <HT: USNM 170383; PT: USNM 170381-170382>.

Family Saleniidae L. AGASSIZ, 1838

Subfamily Saleniinae L. AGASSIZ, 1838

Genus *Salenia* Gray, 1835

Subgenus *Salenia* Gray, 1835

Recent

S. nudispina Markov, 1988b: 568-569; figs 1а, г, з, 2а. [“Ихтиандр”- 6th cruise (“Ikhtiandr”-6th cruise) 23°25' S, 83°19' W, depth 390-560 m, East Pacific Ocean] (Recent) <HT: IOANSSR, no specimen no. given>.

S. profundi brevispina Markov, 1988a: 381-382; figs 1в, л, 2г. [“Академик Курчатов”-cruise (“Akademik Kurchatov”-cruise) Stat. 12 (0°08' N, 18°13' E, depth 2660-2800 m), “Витязь”-cruise (“Vityaz”-cruise) Stat. 7505 (34°17' N, 143°52' E, depth 1800-2400 m), “Дмитрий Менделеев”-cruise (“Dmitrig Mendeleyev”-cruise) Stat. 529 (2°11' N, 102°31' E, depth 3190 m), Atlantic Ocean] (Recent) <HT: IOANSSR, no specimen no. given >.

S. profundi intermedius Markov, 1988a: 382. [“Витязь”-cruise (“Vityaz”-cruise) Stat. 8021 (34°41' N, 40°37' W, depth 3160-3080 m)] (Recent) <HT: IOANSSR, no specimen no. given>.

S. profundi megalospina Markov, 1988a: 382-383; figs 1д, н, 2и. [“Академик Курчатов”-cruise (“Akademik Kurchatov”-cruise) Stat. 23 (5°08' N, 62°18' E, depth 3040-3500 m), “Витязь”-cruise (“Vityaz”-cruise) Stat. 4634 (2°47' S, 65°43' E, depth 3530 m), “Дмитрий Менделеев”-cruise (“Dmitrig Mendeleyev”-cruise) Stat. 1367 (33°63' S, 127°55' E, depth 2520 m)] (Recent) <HT: IOANSSR, no specimen no. given >.

Oligocene

S. cascadensis Linder, Durham & Orr, 1988: 946; figs 2.1, 2.3. [Scott Mills Fm., Abiqua Mb., Butte Creek, Marion County, Oregon, USA] (Late Oligocene) <HT: UCMP 38194; PT: UCMP 38195>.

Eocene

S. tandoni Srivastava, 1982: 23-25; figs 1-4. [about 2 km south-west of Guvar, Kutch, Gujarat, India] (*Nummulites beaumonti*-zone of Tandon, 1976, Middle Eocene) <HT: DGUL K500; PT: DGUL K501>.

S. trisuranalis Lewis & Jefferies, 1980: 115-118; figs 1-4. [London Clay, Walton-on-the-Naze, Essex, England] (Lower Eocene) <HT: BMNH E76505>.

Maastrichtian

S. microprocta Smith, 1995: 142; fig. 15, 16F; pl. 5: figs 13. [Jebel Huwayyah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3657>.

S. sigillata pozaryskae GEYS & MACHALSKI, 1992: 136-138; pls. 1, figs 1a-e. [Kazimierz-on-Vistula, near Pulawy, Central Poland] (*Belemnella kazimiroviensis* zone, Uppermost Maastrichtian) <HT: ZPAL E. VI/1>.

Turonian

S. cherei GEYS, 1982: 10-11; pl. 3, figs 2-5; pl. 4, fig. 1. [Chercq (Cornet quarry), Hainaut, Belgium] (Turonian) <HT: KBIN IST 10187>.

Cenomanian

S. ammonitorum BANDEL & GEYS, 1985: 104-105; pl. 3, figs 1-6. [Salihi Fm., Wadi Salihi, near Amman, Jordan] (Cenomanian) <KBIN coll., IST 10232>.

S. (*S.*) *baylissi* SMITH & WRIGHT, 1990: 153-154; text-figs 41A, B; pl. 45, fig. 3. [Shapwick Quarry and between Beer and Branscombe, Devon, England] (*Calycoceras guerangeri* Zone, Upper Cenomanian) <HT: BMNH E82856; PT: BMNH E82873, GSM 5279>.

S. pentagonalis SHMIDT & SIMAKOV, 1953: 32-33; figs 3a-в; pl. 1: figs 15-17. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Cenomanian ?) <HT: VNIGRI 2/336>.

S. (*S.*) *wilmingtonensis* SMITH & WRIGHT, 1990: 152-153; text-figs 41C, D; pl. 46, fig. 1. [Waterworks Quarry, Wilmington, Devon, England] (*M. mantelli* Zone, *N. carcitanensis* Subzone, Basal Cenomanian) <HT: BMNH E82857>.

Aptian

S. banatica DRAGOMIR, 1997: 218-219; fig. 1, pl. 29.1, figs 3-8. [Valea Minişului Fm., Tisa valley, Moldova Nová, Banat, Romania] (Bedoulian, Early Aptian) <HT: LPB elt 138; PT: LPB elt 021 (8 specimens)>.

S. danubiana DRAGOMIR, 1997: 219; fig. 2, pl. 29.1, figs 9-14. [Valea Minişului Fm., Tisa valley, Moldova Nová, Banat, Romania] (Bedoulian, Early Aptian) <HT: LPB elt 025; PT: LPB elt 025a (7 specimens)>.

Cretaceous, undifferentiated

S. bella SZÖRÉNYI, 1955: 21-23, 163-164; fig. 6; pl. 1, figs 7-9. [marne glauconieuse, Bakonynána (carrière de la vallée Gaja), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/23>.

S. bella parva SZÖRÉNYI, 1955: 23, 164-165; pl. 1, figs 21-23. [marne glauconieuse, Pénzeskút-Körisgyörpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/26>.

S. scutigera hungarica SZÖRÉNYI, 1955: 23-24, 165-166; pl. 1, figs 15-17. [calcaire à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/24>.

Subgenus *Pleurosalenia* Pomel, 1883

This taxon was considered as synonym of *Salenidia* Pomel, 1883 in the *Treatise* (p. U378).

Paleocene

S. (*P.*) *vanbirgeleni* Smith, in Smith & Jeffery, 2000: 59-60; text-fig. 21D-F. [Geulhem Mb., Albertkanaal, near Kesselt, Belgium] (Early Danian) <HT: NHMM MB 432J>.

Genus *Leptosalenia* Smith & Wright, 1990

Leptosalenia Smith & Wright, 1990: 134-135. Type-species: *Salenia pretensis* Desor, 1856. (Cretaceous) {other species included: *S. arabica* Fourtau; *S. texana* Credner; *S. mexicana* Schlüter; *S. volana* Whitney; *S. plana* Fourtau; ?*S. humei* Fourtau; ?*S. mathuri* Chiplonker}.

Aptian

L. faringdonensis Smith & Wright, 1990: 137-139; text-fig. 33A-B; pl. 37, fig. 1. [Faringdon Sponge Gravels, Faringdon, Berkshire, England] (*P. nutfieldiensis* zone, Upper Aptian) <HT: BMNH E82847; PT: BMNH E79226, E78961, E82871>.

L. qishnensis Nestler, 1998: 569-570; figs 4c-d, 5a-d. [Qishn Formation, Wadi Hajr, östl. Jawl Ba Hawa, Hadramawt, South Yemen] (Aptian, Early Cretaceous) <HT: FGWG 107/1> {based on a single specimen}.

Genus *Novasalenia* Žitt & Geys, 2003

Novasalenia Žitt & Geys, 2003: 24. Type-species: *Novasalenia predbojensis* Žitt & Geys, 2003. [Europe] (Late Cretaceous).

Cenomanian

N. plananyensis Žitt & Geys, 2003: 27-29; figs 5a-d. [Plaňany, Bohemian Cretaceous Basin, Czech Republic] <boundary interval of the *Rotalipora cushmani* and *Praeactinocamax plenus* biozones, Late Cenomanian> (HT: NMP O 6313).

N. predbojensis Žitt & Geys, 2003: 25-27; figs 2a-d, 3, 4- [Předboj, Bohemian Cretaceous Basin, Czech Republic] <boundary interval of the *Rotalipora cushmani* and *Praeactinocamax plenus* biozones, Late Cenomanian> (HT: NMP O 6312).

Genus *Perisalenia* VALETTE, 1906

Jurassic

P. hemicidaroides var. *lenoiri* VADET, 2005a: 68-69; illustr. on p. 68. [membre A, formation de Leulinghen, couches à Modioles, Boulonnais, France] (Late Bajocian-Early Bathonian) <HT: Laurent Lenoir coll'n L234b; PT: Laurent Lenoir coll'n L234a, L235, L236a-d, Alain Vadet coll'n V5276, V6441-V6444>.

Genus *Plesiosalenia* SMITH & WRIGHT, 1990

Plesiosalenia SMITH & WRIGHT, 1990: 134. Type-species: *Salenia depressa* GRAS, 1848. [Europe] (Early Cretaceous) {junior homonym of *Plesiosalenia* Valette, 1906}.

Genus *Prandinia* VADET, 2000

Prandinia VADET, 2000: 93; figs on pp. 94, 95; pl. 1 (5 figs). Type-species: *Cidarites interpunctata* QUENSTEDT, 1852. [Southern Germany] (Malm, Late Jurassic).

Genus *Salenocidaris* A. AGASSIZ, 1869

Maastrichtian

S. gallemii SMITH & JEFFERY, 2000: 65-66; text-fig. 23A-C. [Partida del Matet, Polop de la Marina, and Aspe, Alicante Province, Spain] (?Early Maastrichtian) <HT: BMNH EE6626; PT: BMNH EE6267-8, EE6785-90>.

Genus *Salenidia* POMEL, 1883

Subgenus *Salenidia* POMEL, 1883

Maastrichtian

S. sanctipetri GEYS, 1979: 303-306; figs 5.1-5.6, 6.1-6.2. [St. Pietersberg, near Maastricht, Dutch Limberg, the Netherlands] (Upper Maastrichtian) <HT: KBIN 10160>.

Subgenus *Platysalenia* SMITH & WRIGHT, 1990

Platysalenia SMITH & WRIGHT, 1990: 134, 167. Type-species: *Salenia dux* WRIGHT, 1967. [England] (Late Albian).

Tribe Salenocidarini Smith & Wright, 1990

Salenocidarini Smith & Wright, 1990: 134, 168-169. Type-genus: *Salenocidaris* Agassiz, 1869.

Tribe Holosaleniini Smith & Wright, 1990

Holosaleniini Smith & Wright, 1990: 134. Type-genus: *Holosalenia* Smith & Wright, 1990.

Genus *Holosalenia* Smith & Wright, 1990

Holosalenia Smith & Wright, 1990: 134. Type-species: *Salenia batnensis* Cotteau, Peron & Gauthier, 1879. [Europe, Northern Africa, Middle East] (Mid to Late Cretaceous).

Early Cretaceous

H. bahiensis Manso & Souza-Lima, 2007: 30-32; figs 4A-I, 5A-C. [Germânia Member, Algodões, Boipeba 2 (UTM 8.499.000N, 508.600E), Boipeba 3 (type locality, UTM 8.499.000N, 508.600E), Boipeba 4 (UTM 8.499.050N, 508.800E), and Tassimirim 1 (UTM 8.499.000N, 509.150E), Boipeba Island, NW Velha Boipeba, Camamu Bay, and Cangaíba 1 (UTM 8.462.150N, 498.100E), and Cangaíba 2 (UTM 8.462.150N, 498.250E), Cangaíba Island, Camamu Bay, Eastern Brazil] (Late Albian) <HT: FPH -462-I (Boipeba 3); PT: FPH-449-I to FPH-456-I (Boipeba 2), FPH-460-I, FPH-461-I, FPH-463-I, FPH-464-I, FPH-467-I to FPH-503-I, FPH-507-I, FPH-508-I, MN 8251-I, MN 8252-I (Boipeba 3), FPH-868-I, FPH-869-I (Boipeba 4), FPH-889-I, FPH-890-I (Tassimirim 1), FPH-870-I, FPH-871-I, FPH-873-I to FPH-876-I (Cangaíba 1), FPH-879-I to FPH-882-I, FPH-885-I, FPH-886-I to FPH-888-I (Cangaíba 2)>.

Subfamily Hyposaleniinae Mortensen, 1934

Genus *Hyposalenia* Desor, 1856.

Albian

H. radians Smith & Wright, 1990: 191-193; text-figs 62, 63; pl. 69, fig. 2. [Shenley Limestone, Double Arches pit, Shenley Hill and Arnold's pit, Billington Crossingm Leighton Buzzard, Bedfordshire, England] (*L. regularis* Subzone, Lower Albian) <HT: BMNH E83526; PT: BMNH E82866>.

Genus *Glyphopneustes* POMEL, 1869

Maastrichtian

G. hattaensis ALI, 1992a: 68-70; fig. 3a-e. [Simsima Fm., Gebel El Rowdah, Hatta area, Oman-U.A.E.] (Late Maastrichtian) <HT: MGD-UAA> {no specimen numbers given}.

Tribe Hyposaleniini SMITH & WRIGHT, 1990

Hyposaleniini SMITH & WRIGHT, 1990: 123, 174. Type-genus: *Hyposalenia* DESOR, 1856.

Tribe Goniophorini SMITH & WRIGHT, 1990

Goniophorini SMITH & WRIGHT, 1990: 123, 193. Type-genus: *Goniophorus* AGASSIZ, 1838. {other genera included: *Glyptopneustes* POMEL, 1869}.

Order Hemicidaroida BEURLEN, 1937

Family Hemicidaridae WRIGHT, 1857

Genus *Gymnotiara* POMEL, 1883

In the *Treatise* FELL & PAWSON (1966: U387) considered this genus as synonymous to *Hypodiadema* DESOR, 1858.

Middle Jurassic

G. kuhni HESS, 1971: 622-626; figs 11-14. [Anceps-Athleta-Beds, Schinboden ob Ramiswil, Solothurn, Switzerland] (Callovian, Jurassic) <HT: Hans Hess coll. E269>.

Genus *Hemicidaris* L. AGASSIZ, 1838

Cenomanian-Turonian

H. bandeli GEYS, 1989: 128; pl. 1, figs 1-4. [Atrash Fm., Wadi Qena, Eastern Desert, Egypt] (Cenomanian-Turonian) <HT: KBIN IST 10483>.

H. depressus Abdelhamid & Azab, 2003: 856-857; pl. 1, figs M-O. [Galala Fm., Saint Paul, north Eastern Desert, Egypt] (Cenomanian) <HT: Geol. Dept., Fac. Sci., Ain Shams Univ., Cairo>.

Aptian-Albian

H. psiloses Aziz, 1991: 15-16; pl. 1, fig. 8. [Dalmiapuram Formation, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian, Early Cretaceous) <HT: MACSG 1921> {based on isolated spines}.

H. rhabdoses Aziz, 1991: 16-17; pl. 1, fig. 9. [Dalmiapuram Formation, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian, Early Cretaceous) <HT: MACSG 1927> {based on isolated spines}.

H. teraniensis Aziz, 1991: 13-14; figs 2d, pl. 1, figs 3-4. [Dalmiapuram Formation, Teran, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian, Early Cretaceous) <HT: MACSG 1945>.

Berriasian

H. sidibouzidense Vadet, Marignac, Nicolleau & Reboul, 2007: 14-15; pl. 5: figs 1-7. [Falaise de Borj Nador, N of Safi, Morocco] (Late Berriasian, Early Cretaceous) <Type series: Maignac coll. 63 to 67, Nicolleau coll.7271, Reboul coll. 602, Vadet coll. V7482, 7483; spines: Maignac coll. 36 to 41, Nicolleau coll. 5197, 7206, Reboul coll. 321, Vadet coll. V7449(1-3)>.

Bathonian

H. ederlei Vadet, Ederlé & Robert, 1995: 104-105; pl. 5; pl. 6, fig. 2. [Calcaires compacts, Yonne, France] (Upper Bathonian) <HT: Robert Ederlé coll. 123-485; PT: Robert Ederlé coll. 123-1734>.

Genus *Heterodiadema* Cotteau, 1864

Smith & Wright (1993: 218) placed this genus in its own, new family Heterodiadematidae Smith & Wright, 1993, which they placed within the order Phymosomatoida Mortensen, 1904

Maastrichtian

H. buhaysensis Smith, 1995: 133-136; fig. 10, 11; pl. 2: figs 1-3. [Simisima Fm., Jebel Buhays, Jebel Rawdah and Jebel Thanais, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3441; PT: BMNH EE3442-5, EE5019>.

Genus *Pseudocidaris* Étallon, 1859

Smith & Wright (1993: 199) placed this genus in its own, new family Pseudocidaridae Smith & Wright, 1993.

Upper Jurassic

P. raratuberculata Kier, 1972a: 42-43; fig. 17; pl. 11, figs 5-6; pl. 12, figs 1-8. [Upper Dhruma Fm., locality KK9-111, Saudi Arabia] (Callovian) <HT: USNM 170384; PT: USNM 170385>.

P. romani Kier, 1972a: 45-46; fig. 19; pl. 13, figs 1-5; pl. 14, figs 1-4; pl. 15, figs 1-2. [Upper Dhruma Fm., localities KK9-112, KK9-111, Saudi Arabia] (Callovian) <HT: USNM 170386; PT: USNM 170387-170388>.

P. santacrucensis Radwańska, 1999: 318-319; pl. 23, figs 9-16. [Wierzbica, north-eastern margin of the Holy Cross Mountains, Central Poland] (Lower Kimmeridgian) <HT: DPUW EWi/127>.

Middle Jurassic

P. depressa Kier, 1972a: 43-45; fig. 18; pl. 15, figs 3-6; pl. 16, figs 1-4. [Middle Dhruma Fm., locality KK9-21-21.5, Saudi Arabia] (Bathonian) <HT: USNM 170389; PT: USNM 170390>.

Family Pseudocidaridae Smith & Wright, 1993

Pseudocidaridae Smith & Wright, 1993: 199. Type-genus: *Pseudocidaris* Etallon, 1859. {other genera included: *Cidaropsis* Cotteau, 1863}.

Family Pseudodiadematidae Pomel, 1883

Genus *Acrocidaris* L. Agassiz, 1840

Vadet & Nicolleau (2000: 106) placed this genus into the family Acropeltidae Lambert & Thiéry, 1915.

Early Cretaceous

A. marocense Vadet, Marignac, Nicolleau & Reboul, 2007: 23-24; pl. 11: figs 1-5. [Falaise de Borj Nador, N of Safi, Morocco] (Late Berriasian, Early Cretaceous) <Type series: Maignac coll. 1071, Reboul coll. 640>.

Callovian

A. nicolleaui Vadet & Nicolleau, 2000: 106-109; 5 figs (not numbered); pl. 3; pl. 4. [Fatima, Portugal] <HT: Nicolleau 4148; PT: Nicolleau 4147, 7004, 7005>.

Genus *Diplopodia* MacCoy, 1848

Jurassic

D. atlasensis Vadet & Nicolleau, 2005: 28-29; illustr. on p. 28. [Region of Rich, Morocco] (Late Domerian (= Late Pliensbachian), Jurassic) <Type-series: Alain Vadet coll'n V6903, Philippe Nicolleau coll'n 8937, 9180>.

D. thieulini Vadet, 1993: 90-91; fig. 74; pl. 10, figs 2-3. [Falaise de Saint Honorine les Pertes, Normandie, France] (Upper Bajocian, zone à *Parkinsoni*) <HT: MBSM coll. Thieulin>.

Genus *Girardema* Vadet, 1993

Girardema Vadet, 1993: 88. Type-species: *Diadema depressum* Cotteau, 1850. [Normandie, France] (Bajocian) {other species included: *Diplopodia bipuncata* Desor, 1857}.

Genus *Hypodiadema* Desor, 1858

Upper Jurassic

H. nanituberculata Kier, 1972a: 46-48; fig. 20; pl.16, figs 5-10; pl. 17, figs 1-2. [Upper Dhruma Fm., localities KK9-111 and KK9-112, Saudi Arabia] (Callovian) <HT: USNM 170391>.

Genus *Pedinopsis* Cotteau, 1863

Cenomanian

P. (*P.*) *sphaerica* Smith, Simmons & Racey, 1990: 50-54; figs 12a-e, 13. [Echinoid Marker Bed, Natih Fm., Jebel Madamar and Jebel Madar, Oman] (late middle Cenomanian) <HT: BMNH E83127; PT: BMNH E83128>.

Subgenus *Sinaiopsis* SMITH, SIMMONS & RACEY, 1990

Sinaiopsis SMITH, SIMMONS & RACEY, 1990: 54. Type-species: *Pedina sinaica* (AGASSIZ & DESOR, 1847). [Algeria, Egypt, Israel and Oman] (Cenomanian).

Genus *Polydiadema* LAMBERT, 1888

Cenomanian

P. bosei CHIPLONKAR & BADVE, 1972: 139-140; pl. 11: figs 8-10. [Mongra (22°00'30" N, 74°20'30" E), India] (Cenomanian) <HT: MACSG Mor. 123/69> {based on a single specimen}.

Valanginian

P. korotkovi PORETSKAYA, 1983: 113-115; figs 1, 2a-l. [vincinity of Kugusem Wells, Mangyshlak Peninsula, U.S.S.R.] (Lower Valanginian) <HT: LGU 346/1> {pagination of English translation, Russian original not seen}.

Middle Jurassic

P. ambiguum HESS, 1972: 58-62; figs 81-87, 89; pl. 2, fig. 1; pl. 4, fig.2; pl. 14, fig. 2; pl. 17, fig. 4; pl. 18, fig. 4; pl. 19, fig. 2. [Upper Hauptrogenstein, Schinznach-Dorf, Switzerland] (Upper Bajocian) <HT: Hess coll. E 321>.

Genus *Pseudodiadema* McCOY, 1848

Cretaceous

P. bakonyense SZÖRÉNYI, 1955: 28-30, 169-170; figs 9-11; pl. 1, figs 28-32. [groupes de manes argileuses, Zirc-Tündérmajor, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/30>.

Jurassic

P. vadeti NICOLLEAU & VADET, 1995: 74-75; 1 fig. on p. 74; pl. 30: figs 2A, B. [Marnes à spongiares, environs de Niort, Poitou, France] (*luciaeformis* Subzone, *transvesarium* Zone, Middle Oxfordian, Jurassic) <HT: Philippe Nicolleau coll. no. 2191>.

Genus *Tetragramma* L. Agassiz, 1840

Cretaceous

T. gloriae Buitrón, 1973: 38-39; pl. 1: figs 1-7. [San Lucas Formation, San Nicolás, Huetamo Region, south-south-eastern Michoacán, Mexico] (Hauterivian-Aptian, Early Cretaceous) <HT: IGM-2456; PT: IGM-2455> {designation of holotype and paratype added in handwriting in some copies of the paper}.

T. variolare baconicum Szörényi, 1955: 33-34, 172-173; figs 12-13; pl. 1, figs 33-35. [marne glauconieuse, Pénzeskút-Körisgyörpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/56>.

Genus *Trochotiara* Lambert, 1901

Radwańska (1999: 319) placed this genus into the order Phymosomatoida Mortensen, 1904.

Coniacian

T. kiiensis Tanaka, 1984b: 189-190; text-fig. 1; pl. 1, figs 1a-b, 2a-b; pl. 2, figs 5. [Matsubara Fm., Ikadachi, Kanaya-cho, Arida-gun, Wakayama Prefecture, Kii Province, Japan] (?Coniacian) <HT: GSJ F6073A, B; PT: GSJ F6074>.

Cenomanian

T. moabitorum Bandel & Geys, 1985: 107-108; pl. 5, figs 5-7; pl. 6, figs 1-3. [Rumeimin Fm., Rumeimin, near Amman, Jordan] (Cenomanian) <HT: KBIN coll., IST 10214>.

Kimmeridgian

T. kongieli Radwańska, 1999: 319-321; pl. 24, figs 1-5; pl. 25, figs 1-6. [Czarnogłowy near Szczecin, Western Pomerania, Poland] (Lower Kimmeridgian) <HT: DPUW ECz/128>.

T. suleiovense Radwańska, 1999: 321; pl. 26, figs 1a-c. [Sulejów, south-western margin of the Holy Cross Mountains, Central Poland] (Lower Kimmeridgian) <HT: DPUW ESl/133>.

Subfamily Polydiadematinae Hess, 1972

Polydiadematinae Hess, 1972: 58. Type-genus: *Polydiadema* Lambert, 1888. {placed into the family Pseudodiadematidae by Hess (1972)}.

Family Emiratidae ALI, 1990

Emiratidae ALI, 1990: 103. Type-genus: *Emiratus* ALI, 1990. {emended to Emiratiidae by SMITH & WRIGHT, 1993: 248; they included also the genera *Alloma* POMEL, 1883 and *Polydiadema* LAMBERT, 1888 in this family}.

Genus *Emiratus* ALI, 1990

Emiratus ALI, 1990: 103. Type-species: *Emiratus raskhaimahensis* ALI, 1990. [UAE] (Cenomanian) {emended to *Emiratia* by SMITH & WRIGHT (1993: 248)}.

Cenomanian

E. raskhaimahensis ALI, 1990: 103-105; figs 3 (6-11). [Mauddud Fm., Wadi Kabed al Qa's, Ras al Kaimah, United Arab Emirates] (Cenomanian) <HT: MGD-UAA > {no specimen no. given}.

Family Uncertain

Genus *Allomma* POMEL, 1883

SMITH & WRIGHT (1993: 254-255) included this genus into the family Emiratiidae ALI, 1990.

Cretaceous

A. kalon SZÖRÉNYI, 1955: 26-27, 167-168; figs 7-8; pl. 1, figs 24-26. [marne glauconieuse, Bakonynána (carrière de la vallée Gaja), Pénzeskut, and Körisgyörpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/27 (from Bakonynána)>.

A. wrighti SMITH & WRIGHT, 1993: 261-262; text-figs 88, 89F-H; pl. 90, figs 1-8; pl. 91, figs 1-3. [Grey Chalk, Folkestone and Dover, Kent, England] (Cenomanian) <HT: SM B50355; PT: SM B32755-58, BMNH 75381, E1084, EE1295>.

Genus *Trochodiadema* DE LORIOL, 1900

ROMAN (1991: 53) placed this genus into the family Pseudodiadematidae POMEL, 1883.

Albian

T. ? *dhofarense* Roman, 1991: 53-56; fig. 2; pl. 1, figs 1-3, 7-9. [Dhalqut Fm. and Kharfot Fm., Umbaraaf, Dhofar, Oman] (Middle to Late Albian) <HT: MNHN RO9027; PT: 8 specimens, not numbered>.

Order Phymosomatoida Mortensen, 1904

Family Phymosomatidae Pomel, 1883

Genus *Gauthieria* Lambert, 1888

Campanian

G.? *mosae* Geys, 1980: 215-218; figs 5/1-3, figs 6/1. [Lower Gulpen Chalk, Heure-le-Romain, Liège, Belgium] (Upper Campanian) <HT: KBIN 10178> {Jagt (2000: 233) confirmed the placing of this species in the genus *Gautheria*}.

Genus *Gauthiosoma* Kutscher, 1985c

Gauthiosoma Kutscher, 1985c: 524. Type-species: *Phymosoma princeps* v. Hagenow, 1840. [Northern Germany] (Campanian-Maastrichtian).

Genus *Hemithylus* Arnaud, 1895

Maastrichtian

H. alternus Kutscher, 1985b: 239-240; pl. 1, figs 11-12; pl. 3, figs 5-12. [Quarry Wittenfelde, Rügen, Germany] (Late Early Maastricht) <HT: Kutscher coll. 1493/1> {transferred to *Gauthieria* by Jagt et al. (1998: 23) and Smith & Jeffery (2000: 89)}.

Genus *Kachchhia* Srivastava, Gupta & Jauhri, 2008

Kachchhia Srivastava, Gupta & Jauhri, 2008: 107-108. Type-species: *Kachchhia krohi* Srivastava, Gupta & Jauhri, 2008. [India] (Eocene).

Eocene

K. krohi Srivastava, Gupta & Jauhri, 2008: 108-110; pl. 1: figs 1-9. [Fulra Limestone, Three km SSE of Harudi Village, Kachchh, Gujarat, India (23°29'21.6" N, 68°41'48.9" E)] (NP17 Zone, Bartonian, late Middle Eocene) <HT: LUGD/I/2028> {based upon a single specimen}.

Genus *Micropsis* COTTEAU, 1856

Maastrichtian

M. (?) *caementum* JAGT & VAN DER HAM, in JAGT, 2000: 239-240; pl. 12, figs 12-13. [Emael Mb., Maastricht Fm., ENCI-Maastricht Quarry, Maastricht, The Netherlands] <HT: NHMM K 2681>.

Genus *Phymosoma* HAIME, 1853

Maastrichtian

P. maastrichtensis ENGEL, 1972: 540-543; pl. 1. [Belvédère, Caberg, Prov. Zuid-Limburg, The Netherlands] (Maastrichtian) <HT: NHMM 1340> {JAGT (2000: 242) referred this species to the genus *Circopeltis*}.

Cenomanian

P. mongraensis CHIPLONKAR & BADVE, 1972: 140-141; pl. 11: figs 5-6. [Mongra (22°00'30" N, 74°20'30" E) and Guneri, 4 miles E of Walpur (22°07'30" N, 74°29' E), India] (Cenomanian) <HT: MACSG Mor. 114/69>.

Aptian-Albian

P. dalmiapurensis AZIZ, 1991: 12-13; figs 2b, pl. 1, figs 1-2. [Dalmiapuram Formation, Dalmiapuram Mine, N of Kallakkud, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian, Early Cretaceous) <HT: MACSG 1944>.

P. paynei SMITH & WRIGHT, 1996: 276-277; text-fig. 94; pl. 94, fig. 6; pl. 95, figs 1-2; pl. 110, figs 1-3. [Shenley Limestone, Double Arches Pit, Shenley Hill, Leighton buzzard, Bedfordshire, England] (*L. tardefurcata* zone, *L. regularis* subzone, Lower Albian) <HT: BMNH EE5514; PT: BMNH EE5515-16>.

Genus *Pleurodiadema* DE LORIOL, 1870

Middle Jurassic

P. raboeufi VADET, NICOLLEAU & PINEAU, 1996: 98-100; figs 116-119; pl. 25, figs 1a-2.. [Oolithe de l'Antonnière, Sarthe, France] (Callovian) <HT: Raboef coll.; PT: Pineau coll. 311> {no specimen number for the holotype given}.

Genus *Pomeliosoma* Vadet, 2005b

Pomeliosoma Vadet, 2005b: 136-137. Type-species: *Cyphosoma legayi* Rigaux, 1882. [France & Germany] (Kimmeridgian-Tithonian, Late Jurassic) {other species included: *Cyphosoma duplicatum* Cotteau, 1885}.

Genus *Porosoma* Cotteau, 1856

Paleocene

P. fifei Wagner, 1972: 652-655; text-figs 1-4; pl. 1, figs 1-3, 5-7. [Sepultura Fm., El Cardon area, Baja California, Mexico] (Late? Paleocene) <HT: UCMP 10782; PT: UCMP 10783-10785, USNM 178626>.

Campanian

P. kaspicum Geys, 1984: 28-29; figs 2-6. [Shhakh-Bogota, Mangyshlak, Kazachstan, U.S.S.R.] (*Belemnitella langei*-zone, Upper Campanian) <HT: KBIN IST 10210>.

Genus *Rachiosoma* Pomel, 1883

Maastrichtian

R. gigasei Geys, 1983: 255-256; pl. 1, figs 6. [Upper Gulpen Chalk, Lixhe, Liège, Belgium] (Lower Maastrichtian) <HT: KBIN IST 10204>.

Genus *Thylechinus* Pomel, 1883

Paleocene

T. (*T.* ?) *tessieri* Adegoke, 1977: 60-61; pl. 4: figs 18-21. [Ewekoro Fm., Ewekoro quarry, Ewekoro, 50 km N Lagos, Nigeria] (Paleocene) <HT: UIMG 166> {based on single specimen}.

T. vanderhami Smith & Jeffery, 2000: 124. [Geulhem Mb., Maastricht, The Netherlands] (Early Danian) <NHMM MB432N>.

Subfamily Circopeltinae Smith & Jeffery, 2000

Circopeltinae Smith & Jeffery, 2000: 110-111. Type-genus: *Circopeltis* Pomel, 1883. {other genera included: *Phymechinus* Desor, 1856; and *Phymotaxis* Lambert & Thiéry, 1914}.

Family Diplopodiidae SMITH & WRIGHT, 1993

Diplopodiidae SMITH & WRIGHT, 1993: 221. Type-genus: *Diplopodia* MCCOY, 1848. {other genera included: *Tetragramma* L. AGASSIZ, 1840; *Tiaromma* POMEL, 1883}.

Family Heterodiadematidae SMITH & WRIGHT, 1993

Heterodiadematidae SMITH & WRIGHT, 1993: 218. Type-genus: *Heterodiadema* COTTEAU, 1864. {further genera included: ?*Trochodiadema* DE LORIOL, 1900}.

Family Polydiadematidae VADET, 1999b

Polydiadematidae VADET, 1999b: 79. Type-genus: *Polydiadema* LAMBERT, 1888.

Family Stomechinidae POMEL, 1883

Genus *Baronechinus* VADET & NICOLLEAU, 2005

Baronechinus VADET & NICOLLEAU, 2005: 29. Type-speceies: *Baronechinus baroni* VADET & NICOLLEAU, 2005. [Morocco] (Early Jurassic).

Jurassic

B. baroni VADET & NICOLLEAU, 2005: 29-30; illustr. on p. 29 and 30. [surroundings of Rich, Morocco] (Late Domerian (= Late Pliensbachian), Jurassic) <no types designated; Material studied: Philippe Nicolleau coll'n 8922, 8923, 8925, 9179, Roland Reboul coll'n 535, Alain Vadet coll'n V6715, V6734-V6736, V6920, V6923>.

Genus *Circopeltis* POMEL, 1883

Maastrichtian

C.? *emiratus* SMITH, 1995: 172; fig. 37; pl. 15: figs 1-3; pl. 17: figs 1-2. [Jebel Buhays, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3584; PT: BMNH EE3582, EE3583, EE3585, EE3596>.

Genus *Codechinus* Desor, 1856

Barremian

C. prosorovskyi Poretzkaja, 1989: 161-165; figs а-в; unnumbered pl., figs 1а-б, 2а-в, 3. [Lesser Balkan, Turkmenistan] (Barremian) <HT: Экз. No. 305/21>.

Genus *Diplotagma* Schlüter, 1870

Smith & Jeffery (2000: 87) placed this genus into the subfamily Phymosomatinae Pomel, 1883, within the family Phymosomatidae Pomel, 1883.

Maastrichtian

D. snellingsi Smith & Jeffery, 2000: 87-88; text-fig. 33A-B. [Maastricht Fm., Maastricht district, The Netherlands or Belgium] (Late Maastrichtian) <HT: BMNH E3186>.

Genus *Leioechinus* Kier, 1972a

Leioechinus Kier, 1972a: 48. Type-species: *Leioechinus namus* Kier, 1972a. [Saudi Arabia] (Middle to Late Jurassic).

Upper Jurassic

L. amplus Kier, 1972a: 52-53; figs 24-25; pl. 22, figs 1-7. [Upper Dhruma Fm., localities KK9-111-112, S-1176 and L-926, Saudi Arabia] (Callovian) <HT: USNM 170397; PT: USNM 170398-170401>.

Middle Jurassic

L. namus Kier, 1972a: 48-52; figs 21-23; pl. 23, figs 1-6; pl. 24, figs 1-11. [Middle Dhruma Fm., localities KK8-30-35, KK7-131, KK8-6-40.5, KK9-20-40, S-1064, S-1154, S-1160 and L-921, Saudi Arabia] (Bathonian) <HT: USNM 170402; PT: USNM 170403-170408>.

Genus *Noetlingaster* Vredenburg, 1911

Maastrichtian

N. monotuberculatus Smith, in Smith & Jeffery, 2000: 77; text-fig. 28J, L. [Simsima Fm., United Arab Emirates-Oman border region] (*A. fresvillensis* zone, mid Maastrichtian) <not given> {new name for *Hattopsis paucituberculatus* Smith, 1995}.

N. emiratescus Ali, 1989a: 398-400; figs 2(6), 3. [Simsima Fm., Gebel El Rowdah, United Arab Emirates] (Late Maastrichtian) < MGD-UAA > {no type specimen defined}.

Genus *Phymechinus* Desor, 1856

Maastrichtian

P.? perplexus Smith, 1995: 172-175; fig. 38, 39; pl. 15: figs 4-10. [Jebel Rawdah, Oman/ United Arabian Emirates Border Region] <HT: BMNH EE3579; PT: BMNH EE3581, EE3591, EE3593, EE3619>.

Genus *Polycyphus* L. Agassiz & Desor, 1846

Upper Jurassic

P. parvituberculatus Kier, 1972a: 58-59; pl. 18, figs 4-8. [Upper Dhruma Fm., locality KK9-112, Saudi Arabia] (Bathonian) <HT: USNM 170394>.

Middle Jurassic

P. arabicus Kier, 1972a: 56-58; fig. 26; pl. 19, figs 1-7; pl. 20, figs 1-4. [Middle Dhruma Fm., localities KK8-46 and KK9-10-20, Saudi Arabia] (Bathonian) <HT: USNM 170395; PT: USNM 170396>.

Genus *Psephechinus* Pomel, 1883

Middle Jurassic

P. pavyi Robert, 1994: 128-129; pl. 20: figs 1-5. [Calcaires à chailles; Brétignelles, près Druyes, Dept. Yonne, France] (*Antecedens* subzone, *Plicatilis* zone, Middle Oxfordian) <HT: Philippe Robert coll'n No. 287>.

Genus *Stomechinus* Desor, 1856

Oligocene

S. ? *dissimilaris* Linder, Durham & Orr, 1988: 948; fig. 2.6. [Scott Mills Fm., Abiqua Mb., Butte Creek, Marion County, Oregon, USA] (Late Oligocene) <HT: UCMP 38196>.

Jurassic

S. tinginatus Vadet & Nicolleau, 2005: 33-34; illustr. on p. 33 and 34. [surroundings of Rich, Morocco] (Late Domerian (= Late Pliensbachian), Jurassic) <no types designated; Material studied: Philippe Nicolleau coll'n 8922, Roland Reboul coll'n 534, Alain Vadet coll'n V6714, V6733, V6751, V6769-V6775>.

Genus *Trochalosoma* Lambert, 1897

T. (*T.*) *gharamulensis* Abdelhamid & Azab, 2003: 860-862; pl. 3, figs B-D. [Galala Fm., G. Gharamul, north Eastern Desert, Egypt] (Cenomanian) <HT: Geol. Dept., Fac. Sci., Ain Shams Univ., Cairo>.

Family Uncertain

Genus *Boletechinus* Cooke, 1955

Lewis (1986: 61) placed this genus into the Family Zeuglopleuridae Lewis, 1986.

Maastrichtian

B. delawaricus Lewis, 1986: 71-74; figs 2a, 3a-f, 5a-d, 6, 7. [Navesink Marl, Monmouth Group, Delaware Canal, Delaware, U.S.A.] (Maastrichtian) <HT: BMNH E76803; PT: BMNH E7604-05>.

Senonian

B. rowei anglicus Lewis, 1986: 78-81; figs 2a, 3a-f, 9a-e, 10. [Charlton, Kent, England] (Senonian) <HT: BMNH E75556a; PT: BMNH E75556b, E39376-8; GSM 118257-9>.

Order Stomechinoida Vadet, 1999b

Stomechinoida Vadet, 1999b: 79. {included families: Atopechinidae Thiéry, in Thiéry, Lambert & Collignon, 1928; Stomechinidae Pomel, 1883}.

Order Arbacioida Gregory, 1900

Genus *Masrouraster* VADET, NICOLLEAU & REBOUL, 2008

Masrouraster VADET, NICOLLEAU & REBOUL, 2008: 15-16. Type-species: *Masrouraster ouhouissi* VADET, NICOLLEAU & REBOUL, 2008. [Morocco] (Early Jurassic).

Early Jurassic

M. ouhouissi VADET, NICOLLEAU & REBOUL, 2008: 16-17; unnumbered figs on p. 16 and 17. [environs d'Amellago, Haut Atlas, Maroc] (Domerian, Late Pliensbachian) <ST: Reboul coll'n 718, Nicolleau coll'n 9996>.

Family Arbaciidae GRAY, 1855

Genus *Arbacia* GRAY, 1835

Oligocene

A. abiquaensis LINDER, DURHAM & ORR, 1988: 948; figs 3.1-3.6. [Scott Mills Fm., Abiqua Mb., Butte Creek, Marion County, Oregon, USA] (Late Oligocene) <HT: UCMP 39198; PT: UCMP 38199-A, 38199-B>.

Genus *Acropeltis* L. AGASSIZ, 1840

Lower Cretaceous

A. atlantica REY, TAJ-EDDINE & WITAM, 1989: 603-604; fig. 3; pl. 1, figs 1-11. [Borj Nador, 6 km north of Safi, Morocco] (Late Berriasian-Early Valanginian) <HT: LGUT BN 13; PT: LGUT BN 9 – BN 12, BN 14 – BN 22>.

Genus *Baueria* NOETLING, 1885

Eocene

B. angelae CARRASCO, 2006: 23-32; figs 3-4; pl. 1, figs 1a-d, 2a-d. [Serraduy Fm., El Carrasquero, Tremp-Graus, Zona Central Surpirenaica, NW Barcelona, Spain] (Middle Illerdian, Early Eocene) <HT: MGSB 73.406a; PT: MGSB 73.406b, 73.407>

Genus *Codiopsis* L. Agassiz, 1840

Maastrichtian

C. lehmannae Smith, 1995: 152-153; fig. 23; pl. 9: figs 1-2; pl. 12: figs 1-3. [Simisima Fm., Jebel Buhays and Jebel Rawdah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE5033; PT: BMNH EE3439, EE3440>.

Cenomanian

C. smiseri Geys, 1985: 142-143; pl. 5, figs 3-7. [Tournai, Hainaut, Belgium] (Cenomanian) <HT: KBIN IST 9121>.

Jurassic

C. rupellensis Vadet, Nicolleau & Rigollet, 2002: 60-61; 7 figs [Le Chay, près de La Rochelle, Charente Maritime, France] (Kimmeridgian) <HT: Bertrand coll. 31K ; PT: Rigollet coll. CY 110, Guenne coll. KI27>.

Genus *Coelopleurus* L. Agassiz, 1840

Recent

C. exquisitus Coppard & Schultz, 2006: 4-14; figs 1A-C, 2A-C, 3A-N, 4A-K, 5; tab. 1a. [N.O. "Vauban" MUSORSTOM 4, Stat. DW181 (18°57' S 163°22' E, depth 350 m; C. Vadon Coll. 18th September, 1985), N.O. "Jean-Charcot" BIOCAL, Stat. DW50 (23°07' S, 167°54' E, depth 240–260 m; Guille and Menau Collection, 31th August 1985), and Coreolus Expedition, South of Isles of Pines (23°06' S, 167°05' E, depth 520 m); all off New Caledonia] (Recent) <HT: MNHN EcEh 1281 (from MUSORSTOM 4, Stat. DW181); PT: MNHN EcEh 1282 (same locality as the HT), BMNH 2006.599>.

Palaeogene

C. ulugqatensis Yang Shengqiu, 1991: 114; pl. 5, figs 1-5; pl. 6, figs 3-4. [Wulagen Fm. Bashibulake, Wuqia County, Tarim Basin, China] (Early Tertiary) <HT: NIGP 88338>.

Genus *Cottaldia* Desor, 1856

Upper Jurassic

C. paquettei Vadet, 1995: 114-115; figs 53-54; pl. 10, figs 1-3. [Marnes à Spongiaires, Poitou, France] (Oxfordian) <HT: V 3495>.

Genus *Glypticus* L. Agassiz, 1840

Middle Jurassic

G. icaunense Robert, 1994: 88-89; pl. 18: figs 1-4. [Calcaires blancs; Andryes, Yonne, France] (*Bifurcatus* subzone, *Transversarium* zone, Middle to Late Oxfordian) <HT: Philippe Robert coll'n No. 874>.

Genus *Goniopygus* L. Agassiz, 1838

Maastrichtian

G. arabicus Smith, 1995: 142-47; fig. 17, 18A, B, D, E, G; pl. 6: figs 3-10; pl. 7: figs 1, 3, 5-6. [Simisima Fm., Jebel Buhays, Jebel Faiyah, Jebel Rawdah and Jebel Thanais, Oman/United Arabian Emirates Border Region] <HT: BMNH EE4012; PT: BMNH EE3983-84, EE39896, EE3992, EE3997, EE4005, EE4007, EE4015, EE4017, EE4019>.

Genus *Hattopsis* Ali, 1992b

Hattopsis Ali, 1992b: 694. Type-species: *Hattopsis sphericus* Ali, 1992b. [Middle East] (Maastrichtian) {Smith, in Smith & Jeffery (2000: 75) placed this genus into the synonymy of *Noetlingaster* Vredenburg, 1911}.

Maastrichtian

H. sphericus Ali, 1992b: 694-695; figs 3-5. [Simsima Fm., Gebel El Rowdah, Hatta area, Oman-U.A.E.] (Late Maastrichtian) <HT: MGD-UAA 910401; PT: MGD-UAA 910402>.

H. paucituberculatus Smith, 1995: 157-159; fig. 24, 25A, 26A, 27B; pl. 9: figs 9-11; pl. 10: figs 3, 6; pl. 11: fig. 9. [Simisima Fm., Jebel Aqabah, Jebel Buhays, Jebel Faiyah and Jebel Rawdah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3683; PT: BMNH EE3682, EE3678, EE3688, EE3684-85> {Smith, in Smith & Jeffery (2000: 77) proposed the name *Noetlingaster monotuberculatus* for this species, since the name became a subjective homonym through the synonymy of *Hattopsis* and *Noetlingaster*}.

Genus *Magnosia* Michelin, 1858

Lower Cretaceous

M. densituberculata Rey, Taj-Eddine & Witam, 1989: 604-605; pl. 2, figs 5-9. [Borj Nador, 6 km north of Safi, Morocco] (Late Berriasian-Early Valanginian) <HT: LGUT BN 36; PT: LGUT BN 34>.

Genus *Magnosiopsis* Žítt, 1986

Magnosiopsis Žítt, 1986: 375. Type-species: *Magnosia suessi* Loriol, 1901. [Kopřivnice Fm., Štramberk, Czechoslovakia] (Late Valanginian).

Valanginian

M. ornata Žítt, 1986: 379-381; text-figs 2F, 8C; pl. 2, figs 4-6. 5.[Kopřivnice Fm., Kotouč massif, Štramberk, Czechoslovakia] (Late Valanginian) <HT: NMP 0 5429; PT: NMP 0 5430-5434>.

Genus *Mimiosalenia* Smith, 1995

Mimiosalenia Smith, 1995: 147. Type-species: *Mimiosalenia quinquetuberculata* Smith, 1995 [Oman/UAE] (Maastrichtian) {Smith (1995: 147) placed this genus in the family Goniopygidae Smith &Wright, 1993}.

Maastrichtian

M. quinquetuberculata Smith, 1995: 148-149; fig. 19-20; pl. 5: figs 4-10, 12. [Jebel Faiyah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3981; PT: BMNH EE3971, EE3974, EE3977-78, EE3980, EE3982, EE5014-17>.

Genus *Sexpyga* Shigei, 1975b

Sexpyga Shigei, 1975b: 329. Type-species: *Sexpyga soyoae* Shigei, 1975b. [North-west Pacific] (Recent).

Recent

S. soyoae Shigei, 1975b: 330-331; figs 1-9. [SW of 20°N, Hachijo Island, North Pacific Ocean, Soyo-Maru Stat. B4 (32°04'0" N, 140°21'5" E), depth 1940-1980 m] (Recent) <HT: MMBS Echi 1013>.

Family Coelopleuridae MÄRKEL, 1969

Coelopleuridae MÄRKEL, 1969: 24. Type-genus: *Coelopleurus* L. AGASSIZ, 1840.

Family Glyphopneustidae SMITH & WRIGHT, 1993

Glyphopneustidae SMITH & WRIGHT, 1993: 209. Type-genus: *Glyphopneustes* POMEL, 1869. {other genera included: *Arbia* COOKE, 1948}.

Family Glypticidae LAMBERT & THIÈRY, 1914

Glypticidae VADET, 1999a: 83. Type-genus: *Glypticus* L. AGASSIZ, 1840 {preoccupied by Glypticidae LAMBERT & THIÈRY, 1914}

Family Atopechinae THIÉRY, in THIÉRY, LAMBERT & COLLIGNON, 1928

Atopechinae [Atopechinaeæ] THIÉRY, in THIÉRY, LAMBERT & COLLIGNON, 1928: 101. Type-genus: *Atopechinus* THIÉRY, in THIÉRY, LAMBERT & COLLIGNON, 1928 [Europe] (Jurassic) {apparently used only rarely subsequently; elevated to family rank by VADET et al. (2007)}.

Order Temnopleuroida MORTENSEN, 1942

Family Glyphocyphidae DUNCAN, 1889

Genus *Ambipleurus* LAMBERT, 1932

Eocene

A.? *quaylei* LEWIS, 1989: 17-19; figs 2 f-h; pl. 2: figs 6 a-b, 7. [Barton-on-Sea, Hampshire, England] (Bartonian) <HT: BMNH E 76822; PT: BMNH E 76823-4, E 76923>.

A. viladensis CARRASCO, 2007: 11-15; fig. 6; pl. 1: figs a-g. [Vilada and Sant Llorenç de Morunys, N of Barcelona, Spain] (Lutetian, Middle Eocene) <HT: MGSB 10.969 (from Sant Llorenç de Morunys); PT: Pere Barniol colln 1785, 1768, 253a, 253b, s/n (from Vilada; to be deposited at the Musei Municipial de Berga), Joan Maria Viader colln 730 (from Vilada)>.

Genus *Bandelicyphus* Geys, 1992

Bandelicyphus Geys, 1992: 145. Type-species: *Bandelicyphus qenaensis* Geys, 1992. [Egypt] (Turonian).

Turonian

B. qenaensis Geys, 1992: 145-146; pl. 2; figs 1-7. [Tarfa Fm., Wadi Qena, Eastern Desert, Egypt] (Turonian) <HT: KBIN IST-10498>.

Family Temnopleuridae A. Agassiz, 1872

Genus *Arbacina* Pomel, 1869

Pliocene

A. hugueti Dudicourt, Néraudeau, Nicolleau, Ceulemans & Boutin, 2005: 553-556; pl. 4, figs 1-7. [La Minotière, Challans, Vendée, western France] (Pliocene) <HT: Musée de Niort, Nicolleau coll. no. 8279; PT: MNHN-DHT R64551, A24829>.

A. pareyni Roman, 1983: 18-20; pl. 2, figs 9-12. [Saint-André de Bohon (Manche) and E of Rougeville, Western France] (Redonien récent {Late Pliocene}) <HT: IPM R 50799>.

Miocene

A. emmae Néraudeau, Barbe, Mercier & Roman, 2003: 162-163; fig. 2; pl. 1: fig. 5; pl. 2: figs 4-6. [Lilion, Saint-Jacques-de-la-Lande, Ille-et-Vilaine, Western France] (Messinian (?), Late Miocene) <HT: MNHN coll. Barbe, no specimen no. given>.

Genus *Brochopleurus* Fourtau, 1920

Pliocene

B. pliocenicus Deviries, 1973: 84-86; pl. 5: figs 13-17. [Algeria] (Pliocene) <no type nos. mentioned, repository unknown>.

Genus *Echinocyphus* Cotteau, in Cotteau & Triger, 1860

Smith & Wright, 1996: 313 placed this genus into the Plesion (Family) Zeuglopleuridae Lewis, 1986.

Cenomanian

E. intermedius SMITH & WRIGHT, 1996: 323-324; text-figs 117A, B, 119; pl. 112, figs 3-5, 8. [Plenus Marls, Betchworth, Surrey, England] (*M. geslinianum* zone, Upper Cenomanian) <HT: BMNH EE83314>.

Genus *Genocidaris* A. AGASSIZ, 1869

Pliocene

G. maculata pliorecens BORGHI, 1995: 6; pl. 1, figs 4; pl. 2, figs 4-6; pl. 3, figs 1-3; pl. 4, figs 1-3; pl. 5, figs 1-2, 5-6. [near Castell'Arquato and Salsomaggiore, Northern Italy] (Pliocene – Pleistocene) <not given>.

Genus *Microcyphus* L. AGASSIZ, in AGASSIZ & DESOR, 1846

Quarternary

M. iglahensis ELATTAAR, 2001a: 645-646; fig. 6A; pl. 1: figs 4-9. [Raised reed at Wadi Igla, S of Wadi Wizr, 41 km SW Quseir, Red Sea coast, Egypt] (Quarternary) <3 syntypes, no numbers mentioned, AUSGM E collection>.

Genus *Nannoglyphus* NESTLER, 1978

Nannoglyphus NESTLER, 1978: 621. Type-species: *Nannoglyphus wehrlii* NESTLER, 1978. [Northern Europe] (Maastrichtian).

Maastrichtian

N. wehrlii NESTLER, 1978: 621-624, figs 2-3a-d. [Quarry Wittenfelde, Rügen, Germany] (Early Maastrichtian) <HT: SGWG 56/1> {this genus is placed into the synonymy of *Zeuglopleurus* by SMITH & JEFFERY (2000:129)}

Genus *Paradoxechinus* LAUBE, 1869

Oligocene

P. granulosus PHILIP & FOSTER, 1971: 674-676; pl. 129: figs 4, 5, 9, 10, 18, 19; pl. 134: fig. 3. [Point Addis Limestone, Airey's Inlet, Anglesea District, Victoria, Australia] (Janjukian, Upper Oligocene) <HT: NMV P27947; PT: UNE 11757, 11761>.

P. profundus Philip & Foster, 1971: 676-677; pl. 128: fig. 1; pl. 129: fig. 8; pl. 134, fig. 2. [Port Willunga Beds, Seaford, south of Port Noarlunga, South Australia] (Middle Oligocene to Lower Miocene) <HT: NMV P27945; PT: NMV P 27946, UNE 11754>.

Eocene

P. stellatus Philip & Foster, 1971: 677-678; pl. 126: fig. 2; pl. 129: figs 16, 20-23; pl. 134, fig. 1. [Port Willunga Beds, Onkaparinga River, Port Noarlunga, South Australia] (Upper Eocene) <HT: NMV P27944; PT: UNE 11753>.

Genus *Pentechinus* Philip & Foster, 1971

Pentechinus Philip & Foster, 1971: 678. Type-species: *Pentechinus mirabilis* Philip & Foster, 1971. [Victoria, Australia] (Oligocene).

Oligocene

P. mirabilis Philip & Foster, 1971: 678-681; text-figs 3-4; pl. 124: figs 1-3; pl. 129: figs 1-3, 11, 15. [Point Addis Limestone, Airey's Inlet, Anglesea District, Victoria, Australia] (Janjukian, Late Oligocene) <HT: NMV P27942; PT: UNE 11512>.

Genus *Temnotrema* A. Agassiz, 1863

Recent

T. scillae var. *eythraea* Dollfus & Roman, 1981: 56-57; figs 7-11; pl. 13, figs 7-9. [Station 11; Red Sea] (Recent) <HT: not given>.

T. xishaensis Liao, 1978: 112-114 [Chinese], 126-127 [Engl.]; figs 5.1-5.2, 6; pl. 2: figs 2-4; pl. 5: figs 2, 3, 6-8. [Xisha Island, Yongxingdao, South China Sea] (Recent) <HT: IOAS E.00813>.

Pliocene

T. greifatensis Elattaar, 2001a: 646-647; fig. 6B-C; pl. 1: figs 10-14. [Sharm El Arab Member, Shagra Formation, Mersa Um Greifat, S of Wadi Wizr, 41 km SW Quseir, Red Sea coast, Egypt] (Early Pliocene) <7 syntypes, no numbers mentioned, AUSGM E collection>.

T. wizrensis Elattaar, 2001b: 83-86; figs 3A-C, 4A-D; pl. 1, figs 1-5. [Sharm El Arab Member, Shagra Formation, Wadi Wizr, 41 km SW Quseir, and Wadi Gassus, 10 km SW Safaga, Red Sea coast, Egypt] (Late Pliocene) <2 specimen, repository unknown> {based on a single specimen}.

Subgenus *Viaudechinus* Roman, 1983

Viaudechinus Roman, 1983: 4. Type-species: *Dicoptella bigoti* Lambert & Thiéry, 1911. [Western France] ("Helvetian" {Miocene} – Redonian {Late Pliocene}).

Genus *Tremaster* Dudicourt, Néraudeau, Nicolleau, Ceulemans & Boutin, 2005

Tremaster Dudicourt, Néraudeau, Nicolleau, Ceulemans & Boutin, 2005: 552-553. Type-species: *Tremaster romani* Dudicourt, Néraudeau, Nicolleau, Ceulemans & Boutin, 2005. [Western Europe] (Pliocene).

Pliocene

T. romani Dudicourt, Néraudeau, Nicolleau, Ceulemans & Boutin, 2005: 553; pl. 3, figs 5-7. [La Minotière, Challans, Vendée (holotype + paratype 1) and Pierre Aigüe, Loire-Atlanique (paratype 2), western France] (Pliocene) <HT: MNHN-DHT R64088; PT: MNHN-DHT A24830, R64550>.

Genus *Trigonocidaris* A. Agassiz, 1869

Subgenus *Tuberculocidaris* Markov, 1989

Tuberculocidaris Markov, 1989: 81. Type-species: *Trigonocidaris* (*Tuberculocidaris*) *tuberculata* Markov, 1989. [Northern Pacific] (Recent).

Recent

T. (*Tuberculocidaris*) *tuberculata* Markov, 1989: 81-82; figs 2б, д, з, л, 3б. ["Дмитрий Менделеев"-cruise ("Dmitrig Mendeleyev"-cruise) Stat. 1255 (29°46' S, 167°59' E, depth 510 m), Fiji Sea, North Pacific Ocean] (Recent) <HT: IOANSSR, no specimen no. given >.

Subgenus *Lamprechinus* Döderlein, 1905

In the *Treatise* (1966: U423) this taxon is listed as genus. Markov (1989: 83) downgraded it to subgeneric status.

Recent

T. (*Lamprechinus*) *nitidus nascaensis* Markov, 1989: 82-83; figs 1г, 2в, е, ц, м, 3в. ["Ихтиандр"-6th cruise ("Ikhtiandr"-6th cruise) Stat. 11 (23°25' S, 83°19' W, depth 475 m), 12 (25°36' S, 82°27' W, depth 280 m), "Профессор Штокман"-cruise

("Professor Shtokman"-cruise) Stat. 1957 (24°56' S, 88°31' W, depth 570 m), 1964 (24°57' S, 88°30' W, depth 570 m), 2013 (25°07' S, 99°41' W, depth 355 m), 2034 (25°04' S, 97°35' W, depth 485 m), Naska Ridge, East Pacific Ocean] (Recent) <HT: IOANSSR, no specimen no. given >.

Genus *Zeuglopleurus* Gregory, 1889

Lewis (1986: 61) placed this genus into the Family Zeuglopleuridae Lewis, 1986.

Turonian

Z. dictyopleuroides Smith & Wright, 1996: 332-333; text-figs 120C, D, 121B, 122A; pl. 113, figs 4-6; pl. 114, fig. 12. [Middle Chalk, Whitecliff, near Seaton and The Hooken, near Branscomb, Devon, England] (*T. lata* zone, Middle Turonian) <HT: BMNH EE5526; PT: BMNH EE39794, EE5527>.

Family Toxopneustidae Troschel, 1872

Genus *Lytechinus* A. Agassiz, 1863

Oligocene

L. baldwini Linder, Durham & Orr, 1988: 950; figs 4.3, 4.4. [Scott Mills Fm., Abiqua Mb., Butte Creek, Marion County, Oregon, USA] (Late Oligocene) <HT: UCMP 38203>.

Genus *Nudechinus* H.L.Clark, 1912

Recent

N. gravieri var. *suezensis* Dollfus & Roman, 1981: 59-61; figs 12-18; pl. 15, figs 1-8. [Suez, Red Sea] (Quarternary – Recent) <HT: not given>.

Genus *Schizechinus* Pomel, 1869

Miocene

S. pentagonus Kier, 1972a: 89-90; fig. 47; pl. 55, figs 1-6; pl. 56, figs 1-6. [Dam Fm., locality S-126, Saudi Arabia] (Miocene) <HT: USNM 170473; PT: USNM 170474-170475>.

Genus *Tripneustes* L. AGASSIZ, 1841

Recent

T. gratilla elatensis DAFNI, 1983: 2-9; fig. 2A-B, fig. 4. [off Wadi Tweibe, NW Gulf of Elat] (Recent) <HT: HUJ EC 1; PT: HUJ EC 2-7, BMNH 1981.11.30.13>.

Miocene

[*T. misrai* SRIVASTAVA, 1988]: 151. [India] (*Fasciolites elliptica*-Zone, Middle Eocene) <unknown> {nomen nudum; no description or illustration}.

T. pregratilla MCNAMARA & KENDRICK, 1994: 42; figs 15F-H. [Poivre Fm., "The Ledge" Barrow Island, Western Australia] (Middle Miocene) <HT: WAM 82.326; PT: WAM 82.292.325, 82.328, 32.408, 82.413>.

Family Zeuglopleuridae LEWIS, 1986

Zeuglopleuridae LEWIS, 1986: 61-64. Types-genus: *Zeuglopleurus* GREGORY, 1889. [Europe and North America] (Upper Cretaceous) {other genera included: *Boletechinus* COOKE, 1955; *Glyptocyphus* POMEL, 1883 and probably *Echinocyphus* COTTEAU, 1860; Downgraded to subfamily status within the family Temnopleuridae A. AGASSIZ, 1872 by MARKOV & ENDELMAN, 1991}.

Genus *Sphaeropleurus* MARKOV & ENDELMAN, 1991

Sphaeropleurus MARKOV & ENDELMAN, 1991: 80. Type-species: *Sphaeropleurus geometricus* MARKOV & ENDELMAN, 1991. [Yemen] (Eocene).

Eocene

S. geometricus MARKOV & ENDELMAN, 1991: 80-82; figs в-г; pl. 1, figs 2а-г. [Tselyg Pantsir, Yemen] (Lower Eocene) <HT: PIN 4387/1>.

Family uncertain

Genus *Gagaria* DUNCAN, 1889

Oligocene

G. crenularis LINDER, DURHAM & ORR, 1988: 953; figs 4.5-4.9. [Scott Mills Fm., Abiqua Mb., Butte Creek, Marion County, Oregon, USA] (Late Oligocene) <HT: UCMP 38205; PT: UCMP 38206>.

Order Echinoida Claus, 1876

Family Echinidae Gray, 1825

Genus *Psammechinus* L. Agassiz & Desor, 1846

Pliocene

P. exoletus McCrady, in Tuomey & Holmes, 1855: 4; pl. 2: fig. 6. [Smith's, Goose Creek, South Carolina, USA] (Pliocene) <not given> {based on an adapical test fragment}.

Oligocene

P. carolinensis Kier, 1997: 5-6; fig. 2; pl. 3, figs 1-4; pl. 4, figs 1-5. [Trent Fm., Pollockville state quarry, North Carolina, USA] (Late Oligocene) <HT: USNM 398321; PT: USNM 398322, 398323, 398474>.

Genus *Sterechinus* Koehler, 1901

Recent

S. bernasconiae Larrain, 1975: 94-105; figs 109-129, tabs. 9-11, maps 9, 11, 15. [Bahia Tarn, Golfo de Penas and Estrecho de Concepcio, off Chilean coast, between 48°S and 51°S, South-east Pacific] (Recent) <HT: Museo del Departamento de Zoología, Universidad de Concepcion, Chile, no. 7969; PT: as HT, nos. 7970-7976>.

Family Echinometridae Gray, 1825

Genus *Echinometra* Gray, 1825

Recent

E. lucunter polypora Pawson, 1978: 20-22; fig. 9. [Ascension and St. Helena, South Atlantic Ocean] (Recent) <HT: USNM E16206; PT: USNM E16179 to E16187, E16189 to E16191>.

Genus *Heliocidaris* L. Agassiz & Desor, 1846

Recent

H. robertsi Lindley, 2004: 124-126; figs 4a-d, 5a-e. [Cape Gazelle, New Britain, East New Britain Province, Papua New Guinea] (Recent) <HT: ANU 60655>.

Genus *Pachycentrotus* H.L. CLARK, 1912

Recent

P. bajulus DARTNALL, 1972: 30-34; figs 1a-b, 2, 3a-e. [Darlington Beach, Maria Island, Tasman Sea off east coast of Tasmania, 42°44' S, 149°05' E and Eaglehawk Neck, SE Tasmania and Adventure Bay, Bruny Island, SE Tasmania] (Recent) <HT: TM. H603; PT: TM H604-H605, AM J6393, J7801, NMV H155>.

Family Strongylocentridae GREGORY, 1900

Genus *Mesocentrotus* TATARENKO & POLTARAUS, 1993

Mesocentrotus TATARENKO & POLTARAUS, 1993: 70. Type-species: *Strongylocentrotus franciscanus* (A. AGASSIZ, 1863). (Recent) {other species included: *Strongylocentrotus nudus* (AGASSIZ, 1863)}.

Family Parasaleniidae MORTENSEN, 1903

Genus *Diplosalenia* MORTENSEN, 1902

Pleistocene

D. faurei DOLLFUS & ROMAN, 1981: 69-71; pl. 36, figs 1-4. [W of Dalol, Afar, Ethiopia] (Pleistocene) <HT: MNHN 1979-7>.

Infraclass Proacroechinoidea VADET, 1999c

Proacroechinoidea VADET, 1999c: 87. {included orders: Plesiocidaroida DUNCAN, 1889; Triadocidaroida VADET, 1999c; Paurocidaroida VADET, 1999c}.

Order Plesiocidaroida DUNCAN, 1889

Family Kieritiaridae VADET, 1999c

Kieritiaridae VADET, 1999c: 88. Type-genus: *Kieritiaris* VADET, 1999c. {other genera included: *Batheritiaris* VADET, 1999a}.

Genus *Kieritiaris* Vadet, 1999c

Kieritiaris Vadet, 1999c: 88. Type-species: *Kieritiaris thieli* Vadet, 1999c. [Southern Europe] (Carnian, Triassic).

Triassic

K. thieli Vadet, 1999c: 88-89; fig. 124. [Couches de Saint Cassian, Italy] (Carnian) <HT: Thiel coll. K.29>.

Genus *Batheritiaris* Vadet, 1999c

Batheritiaris Vadet, 1999c: 89. Type-species: *Hemipedina incipiens* Bather, 1909. [Southern Europe] (Carnian, Triassic).

Family Serpianotiaridae Hagdorn, 1995

Genus *Zardinitiaris* Vadet, 1999c

Zardinitiaris Vadet, 1999a: 90. Type-species: *Cidaris flexuosa* Münster, 1841. [Southern Europe] (Carnian, Triassic).

Order Triadocidaroida Vadet, 1999c

Triadocidaroida Vadet, 1999c: 93. {included families: Triadocidaridae Smith, 1994; Braunechinidae Vadet, 1999c}.

Family Triadocidaridae Smith, 1994

Triadocidaridae Smith, 1994: 186-187. Type-genus: *Triadocidaris* Döderlein, 1887. {other taxa included: *Zardinechinus* Kier, 1977; *Levicidaris* Kier, 1977; *Megaporocidaris* Kier, 1977; *Mikrocidaris* Döderlein, 1887; *Parvicidaris* Smith, 1994; *Paurocidaris* Kier, 1977; *Vinchuscanchaia* Smith, 1994 and "*Miocidaris*" *adrianae* Zardini, 1973}.

Genus *Vinchuscanchaia* Smith, 1994

Vinchuscanchaia Smith, 1994: 193. Type-species: *Vinchuscanchaia kieri* Smith, 1994. [Peru] (Late Triassic/Early Jurassic).

Triassic

V. kieri SMITH, 1994: 193-194; pl. 6, figs 1-7. [Vinchuscancha, Peru] (?Late Triassic or Late Sinemurian) <HT: USNM 398508; PT: USNM 398521, 465263>.

Genus *Parvicidaris* SMITH, 1994

Parvicidaris SMITH, 1994: 194-195. Type-species: *Parvicidaris microapicalis* SMITH, 1994. [Peru] (Late Triassic).

Triassic

P. microapicalis SMITH, 1994: 195-196; text-fig. 6; pl. 2, figs 1-4. [Vinchuscancha, Peru] (?Late Triassic) <HT: USNM 465266>.

Family Braunechinidae VADET, 1999c

Braunechinidae VADET, 1999c: 99. Type-genus: *Braunechinus* VADET, 1999c. {other genera included: *Zardinechinus* KIER, 1977; *Mikrocidaris* DÖDERLEIN, 1887; *Wissmannechinus* VADET, 1999c}.

Genus *Braunechinus* VADET, 1999c

Braunechinus VADET, 1999c: 104. Type-species: *Cidaris dorsata* BRAUN in WISSMANN & MÜNSTER, 1841. [Southern Europe] (Anisian-Carnian) {other species included: *Cidaris waechteri* MÜNSTER, 1841; *Cidaris similis* DESOR, 1855}.

Genus *Wissmannechinus* VADET, 1999c

Wissmannechinus VADET, 1999c: 102-103. Type-species: *Cidaris haussmanni* WISSMANN, 1841. [Europe] (Ladinian-Carnian).

Order Paurocidaroida VADET, 1999c

Paurocidaroida VADET, 1999c: 111. {included families: Paurocidaridae VADET, 1999c}.

Family Paurocidaridae Vadet, 1999c

Paurocidaridae Vadet, 1999c: 111-112. Type-genus: *Paurocidaris* Kier, 1977. (Anisian-Carnian).

Order Orthopsida Mortensen, 1942

Family Orthopsidae Duncan, 1889

Genus *Orthopsis* Cotteau, 1864

Jurassic

O. willei Vadet & Wille, 2002: 11-12; 3 figs [Cesareda, Portugal] (*bimammatum* Zone "Lusitanian", Late Oxforian) <HT: Wille coll. 1051>.

Order undetermined

Family undetermined

Genus undetermined

Triassic

Genus ? thieli Vadet, 1999c: 92-93; fig. 132-133. [Couches de Saint Cassian, Italy] (Carnian) <HT: Thiel coll.> {taxon apparently valid according to ICZN 4th ed., Article 11.9.3; no specimen number given}.

Superorder Gnathostomata Zittel, 1879

Order Holectypoida Duncan, 1889

Suborder Holectypoina Duncan, 1889

Family Holectypoidae Lambert, 1899

Genus *Amblypygus* Agassiz, 1840

Placed in a separate family (Amblypygidae) and order (Amblypygoida) by Srivastava (1988: 150).

Eocene

A. moriensis SRIVASTAVA & SINGH, 2001: 28-30; pl. 2, figs 4-7; pl. 3, figs 5-7. [Mori village, district Kachchh, Gujarat, India] (*Asterocyclina alticostata*-zone, Middle Eocene) <HT: DGUL KTE 259; PT: DGUL KTE 260, KTE 263, KTE 264>.

[*A. moriensis* SRIVASTAVA, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <types unknown> {nomen nudum}.

[*A. ratiparensis* SRIVASTAVA, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <types unknown> {nomen nudum}.

Subgenus *Paramblypygus* TESSIER & ROMAN, 1973

Paramblypygus TESSIER & ROMAN, 1973. Type-species: *Amblypygus* (*Paramblypygus*) *houphoueti* TESSIER & ROMAN, 1973. [Côte d'Ivorie] (Paleocene).

Paleocene

A. (*P.*) *houphoueti* TESSIER & ROMAN, 1973: 141-146; figs 1-6; pl. 1, figs 1-3; pl. 3, fig. 1. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Thanetian, Paleocene) <HT: IPM 1972-9Ac>.

Genus *Coenholectypus* POMEL, 1883

SMITH & WRIGHT (1999: 345) place this genus into its own subfamily (Coenholectypinae) within the family Holectypidae.

Aptian

C. hideshimensis TANAKA *in* TANAKA & OBATA, 1982: 122-124; text-figs 2b, 3; pl. 1, figs 3a-c. [Hiraiga Fm., Hideshima, Miyako City, Iwate Prefecture, Honshu, Japan] (Upper Aptian) <HT: GSJ F6165>.

Genus *Coptodiscus* COTTEAU & GAUTIER, 1895

Maastrichtian

C. magniproctus SMITH, 1995: 183-185; fig. 44, 45; pl. 19: figs 4-7. [Jebel Rawdah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3716; PT: BMNH EE3715>.

Genus *Globoholectypus* Aziz, 1991

Globoholectypus Aziz, 1991: 18-19. Type-species: *Globoholectypus globus* Aziz, 1991. [Southern India] (Early Cretaceous).

Early Cretaceous

G. globus Aziz, 1991: 19-20; figs 2a, pl.2, figs 1-5. [Dalmiapuram Formation, Trichinopoly Subbasin, Southern India] (Late Aptian to Early Albian, Early Cretaceous) <HT: MACSG 1947; PT: MACSG 1950>.

Genus *Holectypus* Desor, 1842

Early Cretaceous

H. khelilense Vadet, Marignac, Nicolleau & Reboul, 2007: 29-30; pl. 15: fig. 1. [falaise, N of Safi, Morocco] (Late Berriasian to Early Valanginian) <Type series: Reboul coll. 216, Vadet coll. V7509 to 75212 [sic!, probably typo for 7521], 7523>.

Jurassic

H. depressoides Gerasimov, 1955: 21; pl. 5: figs 15a-г. [Border river near Moskva, Gzhel'; Nikitino, Oka River, USSR] (Middle Callovian) <HT: GMM 850>.

H. phelani Kier, 1972a: 59-61; fig. 27; pl. 39, figs 1-5; pl. 40, figs 1-5; pl. 41, figs 1-3. [Upper Dhruma Fm., localities KK9-108-114, KK9-95-97 and L-926, Saudi Arabia] (Callovian) <HT: USNM 170437; PT: USNM 170438-170441>.

H. pictaviense Nicolleau & Vadet, 1995: 58-59; 2 figs on p. 58; pl. 29: figs 1A-C. [Marnes à spongiares, environs de Niort, and environs de Poitiers, Poitou, France] (*berrense* Subzone, *bimammatum* Zone, Late Oxfordian) <HT: Philippe Nicolleau coll. no. 51a; PT: Philippe Nicolleau coll. no. 558, 2659, 2660>.

Genus *Philolectypus* Vadet, 1997

Philolectypus Vadet, 1997: 22. Type-species: *Holectypus sarthacensis* Cotteau *in* Davoust, 1856. (Middle Jurassic).

Subfamily Coenholectypinae Smith & Wright, 1999

Coenholectypinae Smith & Wright, 1999: 345. Type-genus: *Coenholectypus* Pomel, 1883. {other genera included: *Lanieria* Duncan, 1889; *Coptodiscus* Cotteau & Gauthier, 1895}.

Family Anorthopygidae Wagner & Durham, 1966

Genus *Anorthopygus* Cotteau, 1869

Cenomanian

A. arabicus Ali, 1990: 111-113; figs 6 (1-5). [Mauddud Fm., Wadi Kabed al Qa's, Ras al Kaimah, United Arab Emirates] (Cenomanian) <HT: MGD-UAA > {no specimen no. given}.

Family Discoididae Lambert, 1899

Jensen (1982: 94) placed this familiy into the order Echinoneoida Jensen, 1982.

Genus *Camerogalerus* Quenstedt, 1873

Smith, Gallemí, Jeffery, Ernst & Ward (1999: 97) placed this genus in the family Holectypoidae Lambert, 1900.

Maastrichtian

C. cantabricus Smith & Gallemí *in* Smith, Gallemí, Jeffery, Ernst & Ward, 1999: 97; figs 8a-c; pl. 2, figs 9-11. [Santander, Spain] <HT: BMNH EE6132; PT: MGB 37577>.

Genus *Discoides* Parkinson, 1811

Early Cretaceous

D. cordobai Buitrón, 1971: 22-24; pl. 4, figs 6, 8; pl. 5, figs 1-3. [Lágrima Formation, Sierra de la Ranchera, Chihuahua, Mexico] (Middle Albian, Early Cretaceous) <HT: IGMUC 2257; PT: IGMUC 2254-2256>.

Suborder Echinoneina H.L. Clark, 1925

Family Conulidae Lambert, 1911

Jensen (1982: 94) placed this family into the order Echinoneoida Jensen, 1982.

Genus *Adelopneustes* Gauthier, 1889

In the *Treatise* Wagner & Durham (1966: U447) considered this genus as synonym of *Galerites* Lamarck, 1916.

Paleocene

A. ernsti Smith & Gallemí *in* Smith, Gallemí, Jeffery, Ernst & Ward, 1999: 100; fig. 9a-e; pl. 2, figs 5-8. [Casas de Oraien, Larumbe, Navarra province, Spain] (Upper Thanetian) <HT: BMNH EE6134>.

Genus *Conulus* Leske, 1778

Late Cretaceous

[*C. akdjarensis* Egorov, 1972]: 60. [Tadzhikistan] (Maastrichtian, Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

C. angulatus Tzankov, 1982: 71; pl. 30, figs 2, 2a-b, 3. [Kreta, de Pleven, Bulgaria] <HT: USC CR_2 1274>.

[*C. arcus* Egorov, 1972]: 60. [Tadzhikistan] (Maastrichtian, Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

C. cookei Buitron, 1974: 11-12; pl. 1, figs 4, 5, 7. [Ocozocuautla, W of Tuxtla Gutierrez, Chiapas, Mexico] (Late Cretaceous) <HT: IGMUC 2544; PT: IGMUC 2545>.

C. djanelidzei Gongadze, 1972: 231-232; pl. 1: figs 10-12. [Мтавари [Mtavari] Formation, Kutai Region, Georgia] (Coniacian to Santonian, Late Cretaceous) <HT: MGI-ANGSSR 1/2683> {re-described in Gongadze (1979: 68-70; pl. 5, figs 1a-d)}.

C. kubatliensis Melikov, in Ali-zade, 1988: 188-189; figs 9-11; pl. 2a, figs 2a-в. [Kubatly, Lower Caucasus, Azerbaijan] (Early Campanian) <HT: AzINEFTEKHIM 201/6>.

C. lamberti Buitron, 1975: 12-13; pl.1, fig. 6; pl. 2, figs 1-4. [Ocozocuautla, W of Tuxtla Gutierrez, Chiapas, Mexico] (Late Cretaceous) <HT: IGMUC 2546>.

C. sinensis Mu & Wu, 1976: 360; pl. 1: figs 1-7. [Zongshan Fm., Duila , Yadong County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27119, 27120 (repository not given; persumably NIGP)>.

Genus *Globator* L. Agassiz, 1840

Late Cretaceous

G. minimus Mu & Wu, 1976: 360; pl. 1: figs 8-11. [Zongshan Fm., Duila , Yadong County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <HT (by monotypy): 27121 (repository not given; presumably NIGP)>.

Genus *Pygopyrina* Pomel, 1883

Oxfordian

P. thibaudi Vadet & Nicolleau, 1995: 84-88; figs 30-31; pl. 3, figs 3-4. [Oolithe à Diceras, Dompcevrin, Paris Basin, France] (Middle Oxfordian) <HT: Nicolleau coll. 1257>.

Genus *Pyrina* Desmoulins, 1835

Santonian

P. sphaerica Tzankov, 1984: 74; pl. 31, figs 3a-c. [Choumen, Bulgaria] <HT: USC CR_2 1278>.

Albian

P. azemati Devriès, 1972: 54-55; pl. 1: figs 11-14. [Sierra de Crevilente, Province Alicante, Spain] (Albian, Late Cretaceous) <ST: coll. J.Azema, Paris, nos. 939, 12, 770>.

Mid-Cretaceous

P. neolaevis Szörényi, 1955: 38, 195; pl. 5, figs 18-22. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/168>.

Family Galeritidae Gray, 1825

Jensen (1982: 94) placed this family into the order Echinoneoida Jensen, 1982.

Genus *Galerites* Lamarck, 1801

Cretaceous

G. chovaresmicus Trautschold, 1859: 309-310; pl. 4, figs 3a-c. [Coast of the Aral Lake, Kazakhstan/Uzbekistan] (Cretaceous) <not given>.

G. (*Galerites*) *vulgaris minor* Schulz, 1985: 50; pl. 5, fig. 1; pl. 10, figs 6; pl. 13, figs 3-8. [Lüneburg and Kronsmoor, Northwestern Germany] (middle *lanceolata*-zone to *obtusa*-zone, early Early Maastrichtian) <SNLfB kma358>.

Subgenus *Pironaster* Munier-Chalmas, 1890

Cretaceous

G. (*Pironaster*) *ernsti* Schulz, 1985: 42-43; pl. 1, figs 1-2; pl. 11, figs 5-6. [Lägerdorf bei Itzehoe, Höver and Misburg, Northwestern Germany] (Campanian) <SNLfB kca52>.

G. (*Pironaster*) *schmidi* Schulz, 1985: 45-46; pl. 3, figs 1-2; pl. 11, figs 11-14. Zeltberg quarry, Lüneburg, Northwestern Germany] (*obtusa*-zone, early Early Maastrichtian) <SNLfB kma358>.

Family Neoglobatoridae Endelman, 1980a

Neoglobatoridae Endelman, 1980a: 96. Type-genus: *Neoglobator* Endelman, 1980. [Russia and Easter Europe] (Paleogene). {other genera included: ? *Galeraster* Cotteau, 1890}.

Genus *Neoglobator* Endelman, 1980a

Neoglobator Endelman, 1980a: 96-97. Type-species: *Neoglobator panteleevi* Endelman, 1980a. [Kazakhstan] (Palecene) {other species included: *Pseudopyrina subovalis* Ravn, 1927; *Pseudopyrina subcircularis* Ravn, 1927; *Globator ravni* Nielsen *in* Ravn, 1927; *Pygorhynchus ovalis* Smiser, 1935; *Pyrina houzeaui* Cotteau, 1875; *Pyrina montainvillensis* Sorignet, 1850; genus placed into the synonymy of *Adelopneustes* Gauthier, 1889 by Smith & Jeffery (2001: 148)}.

Paleogene

N. akkajensis Endelman, 1980b: 99-103; figs1в; pl. 1, figs 5a-г, 6. [central Crimea, near Bilogursk, Ak-Kaya Mt.Ukraine] (Lower Eocene) <HT: PIN 3501/57>.

N. danicus Endelman, 1980b: 93-97; figs1a; pl. 1, figs 1а-г, 2а-в, 3а-в. [Sarytasch, North Akatau, Mangyshlak, Kazakhstan] (Danian) <HT: PIN 3500/694>.

N. insolitus Endelman, 1980b: 97-99; figs1б, 2а-г; pl. 1, figs 4а-г. [near Baysarly, Southern Mangyshlak, Kazakhstan] (Lower Paleocene) <HT: PIN 3500/333>.

N. panteleevi Endelman, 1980a: 97-103; figs 2a-i; pl. 1, figs 1-6. [near Usak, North Aktau, Mangyshlak, Kazakhstan] (Lower Paleocene) <HT: PIN 3500/621> {*N. panteleevi* Endelman, 1980a was considered a junior synonym of *Adelopneustes montainvillensis* (Sorignet, 1850) by Smith & Jeffery (2001: 149-150)}.

Suborder Conoclypina Haeckel, 1896

Family Conoclypidae Zittel, 1879

Genus *Conoclypus* Agassiz, 1839

Oligocene

C. mittereri Schlosser, 1923: 258-259. [Häring, Tyrolia, Austria] (Early Oligocene) <not given>.

Family Oligopygidae Duncan, 1889

Kier (1967) established a separate order for the oligopygid echinoids.

Genus *Haimea* Michelin, 1851

Eocene

H. bajasurensis Squires & Demetrion, 1994: 847-849; figs 2.1-2.9. [Tepetate Fm. and Bataque Fm., Baja California Sur, Mexico] (Middle Lower Eocene) <HT: IGM 5934 (=LACMIP 12121); PT: IGM 5918 (=LACMIP 12120), IGM 5935 – 5937 (=LACMIP 12122 – 12124)>.

H. rojasi Žítt, 1993: 30-36; pl. 8, figs 1-3. [Alcalá y Báguanos, Holguín, Cuba] (Eocene) <HT: PIASC 6915>.

Genus *Ovulechinus* Lambert, 1918

Late Cretaceous

O. yadongensis Mu & Wu, 1976: 362; pl. 2: figs 8-14. [Zongshan Fm., Duila , Yadong County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27126, 27127 (repository not given; persumably NIGP)>.

Subgenus *Pseudovulechinus* Szörényi, 1955

Pseudovulechinus Szörényi, 1955: 79, 217-218. Type-species: *Ovulechinus* (*Pseudovulechinus*) *rotundatus* Szörényi, 1955. [Eastern Europe] (Mid-Cretaceous).

Mid-Cretaceous

O. (*P.*) *rotundatus* Szörényi, 1955: 79-80, 218; pl. 11, figs 7-11. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/399>.

Order Echinoneoida Jensen, 1982

Echinoneoida Jensen, 1982: 94. {included families: Echinoneidae Agassiz & Desor, 1847, Galeritidae Gray, 1825, Conulidae Lambert, 1911, Discoididae Lambert, 1899}.

Order Amblypygoida Srivastava, 1988

Amblypygoida Srivastava, 1988: 150. Type-family: Amblypygidae Srivastava, 1988.

Family Amblypygidae Srivastava, 1988

Amblypygidae Srivastava, 1988: 150. Type-genus: *Amblypygus* Agassiz, 1840.

Family [Kutchypygidae Srivastava, 1988]

[Kutchypygidae Srivastava, 1988]: 150. Type-genus: [*Kutchypygus* Srivastava, 1988]. {Nomen nudum; text refers to an unpublished paper, which apparently was not published subsequently}.

Genus [*Kutchypygus* SRIVASTAVA, 1988]

[*Kutchypygus* SRIVASTAVA, 1988]:150. {Nomen nudum, no type species mentioned, no description provided; text refers to an unpublished paper, which apparently was not published subsequently; on p. 151 a *Kutchypygus bermotensis* SRIVASTAVA is mentioned}.

Eocene

[*K. bermotensis* SRIVASTAVA, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <unknown> {nomen nudum}.

Superorder Mesostomata VADET, 1997

Mesostomata VADET, 1997: 136, 138. {included family: Desorellidae VADET, 1997}.

Family Desorellidae LAMBERT, 1911

= Desorellidae VADET, 1997: 136, 138. Type-genus: *Desorella* COTTEAU, 1855. {included genera: *Pachyclypus* DESOR, 1856; indicated as new in VADET (1997: 136), but was established in 1911 by LAMBERT (1911: 30) already}.

Superorder Sarthostomata VADET, 1999b

Sarthostomata VADET, 1999b: 87. {included genera: *Pyrinodia* POMEL, 1883}.

Suborder Uncertain

Genus *Echinogalerus* KÖNIG, 1825

Paleocene

E. raingeardi TESSIER & ROMAN, 1973: 147-149; fig. 7; pl. 1, figs 4-7. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Paleocene, Thanetian) <HT: IPM 1972-9B>.

Superorder Neognathostomata Smith, 1981

Cohort Irregularia LATREILLE, 1825

Order Clypeasteroida A. AGASSIZ, 1872

Suborder Clypeasterina A. Agassiz, 1872

Family Clypeasteridae L. Agassiz, 1835

Genus *Clypeaster* Lambert, 1801

Recent

C. isolatus Serafy, 1971: 166-168; figs 1a-e, 2a-j, 3a-c. [R.V. Anton Brunn, Cruise 12, Stat. MV-65-IV-37, off San Felix Island, SE Pacific, 26°16' S, 80°06' W, depth 75 m] (Recent) <HT: USNM E11361; PT: USNM, MCZ, BMNH, AM nos. not given (60 specimens)>.

C. kieri Pawson & Phelan, 1979: 796-800; figs 1A-F. [International Indian Ocean Expedition, Anton Bruun Cruise 4B, Stat. 202A (17°25' N, 71°39' E to 17°21' N, 71°41' E, depth 96-106 m), Stat. 202B (17°41' N, 71°33' E to 17°45' N, 71°32' E, depth 90 m), Stat. 202C (18°27' N, 71°13' E to 18°38' N, 71°09' E, depth: 84-97 m), off Bombay, Indian Ocean] (Recent) <HT: USNM E18188 (Anton Bruun Cruise 4B Stat. 202A); PT: USNM E 18189-18191>.

Pleistocene

C. chiangchunshanensis Wang, 1985: 163-167; fig. 3e, 10; pl. 3, fig. 2; pl. 4, fig. 3; pl. 6, figs 1a-b. [Toukoshan Fm., Chiangchunshan, Miaoli-hsien, northern Taiwan] (Late Pleistocene) <HT: NTUG-(E)-0076>.

C. paishatunensis Wang, 1985: 167-169; fig. 3d, 11; pl. 2, figs 3a-c. [Toukoshan Fm., Paishatun, Miaoli-hsien, northern Taiwan] (Late Pleistocene) <HT: NTUG-(E)-0095>.

Pliocene

C. maanliaoensis Wang, 1985: 161-163; fig. 3c, 8; pl. 4, fig. 4; pl. 8, figs 1a-b. [Pitoushan Fm., Maanliao, Taichung-hsien, central Taiwan] (Late Pliocene) <HT: NTUG-(E)-0073>.

C. maoadentroensis Kier, 1992: 17-18; pl. 4, figs 5-7; text-figs 3, 4a. [Mao Adentro Limestone, locality NMB 17022, Rio Cana Section, Doninican Republic] (Early Pliocene) <HT: NMB M9746>.

C. pitouensis Wang, 1985: 169-174; fig. 3g, 13, 14; pl. 7, figs 1-3; pl. 8, figs 2a-b, 3a-b. [Erhchiu Fm., Pitou-chiao, Taipei-hsien, northern Taiwan] (Early Pliocene) <HT: NTUG-(E)-0095>.

Miocene

C. butleri McNamara & Kendrick, 1994: 44-46; figs 17A-D. [Poivre Fm., "The Ledge" Barrow Island, Western Australia] (Middle Miocene) <HT: WAM 75.970; PT: WAM 75.972, 75.973, 82.271, 82.330, 94.428, 94.430, 82.412>.

C. dondolii FISCHER, 1985: 201; fig. 5/1; pl. 3, figs 1-2, 8. [Turrúcares Fm., Pendiente, SW del Cerro Candelaria, Costa Rica] (Middle Miocene) <HT: ECG CO-93>.

C. gombosae MIHÁLY, 1990a: 238-239; pl. 2: fig. 2; pl. 3; fig. 1; pl. 4: fig. 1. [Sámsonhaza Fm., Gomb Hill, Kemence, Hungary] (Lower Badenian {=Langhian}) <HT: MÁFI Coll. Ech. 340>.

C. hothiensis Srivastava. [India] (*Ostrea latimarginata* Zone, Miocene) <types unknown> {nomen nudum; mentioned in SRIVASTAVA (1988: 153)}.

C. kurangaensis JAIN, 2002: 123-124; pl. 5, figs 3-4. [Gaj Fm., Kuranga Railway Station, Kathiawar, Gujarat, India] (Early Miocene) <HT: GSI 20764; PT: GSI 20765>.

C. papilionensis KOTCHETOFF, KOTCHETOFF & VEIGA FERREIRA, 1975: 75-78; [Pendedo cliff, north of Cap d'Espichel, Portugal] (Tortonian, Miocene) <not given>.

C. tauricus DESOR var. *elatior* MARCOPOULOS-DIACANTONI, 1972: 149-150. [Stafidokefala, south-west of Agios Georgios Sitias, Lsithi Prefecture, Crete Island, Greece] ("Helvetian") <ST: 1972/12, 1972/13, repository unknown>.

C. paraensis BRITO, 1979: 734; pl. 1, figs 1-3. [Pirabas Fm., Ilha de Fortaleza, baía de Pirabas, Pará, Brazil] <HT: MN 5382-I>.

C. yeni WANG, 1985: 155-161; fig. 3f, 5, 6; pl. 4, fig. 2; pl. 5, figs 1a-b. [Kuanyinshan Sandstone, Wu-chi River, near Kantsulin, Kuohsing-hsiang, Nantou-hsien, central Taiwan] (Middle Miocene) <HT: CGS-E-83024>.

C. yingkoensis WANG, 1985: 151-155; fig. 3b, 4; pl. 3, figs 1a-c; pl. 4, fig. 1. [Nankang Sandstone, Yingko, Taipei-hsien, northern Taiwan] (Middle Miocene) <HT: NTUG-(E)-0073>.

Family Fossulasteridae PHILIP & FOSTER, 1971

Fossulasteridae PHILIP & FOSTER, 1971: 681-682. Type-genus: *Fossulaster* LAMBERT & THIÉRY, 1925. {included genera: *Scutellinoides* DURHAM, 1955; *Willungaster* PHILIP & FOSTER, 1971}.

Genus *Fossulaster* LAMBERT & THIÉRY, 1925

Miocene

F. changi WANG, 1994: 234-235; figs 11A-D; pl. 5, figs 1-2. [Morgan Limestone, Murray Cliffs, South Australia] (Miocene) <HT: YPM 33657; PT: YPM 33646>.

F. durhami WANG, 1994: 233-234; figs 8A-B, 9, 10; pl. 4, figs 2a-c. [Morgan Limestone, Murray Cliffs, South Australia] (Miocene) <HT: YPM 33645>.

F. exiguus Philip & Foster, 1971: 686-687; text-fig. 7; pl. 128: fig.3; pl. 132: figs 2, 3, 6, 8, 9, 11. [Melton Limestone, Tickera, Yorke Peninsula, South Australia] (Longfordian, Lower Miocene) <HT: NMV P27952; PT: NMV P27949, UNE 11759, 12002-05>.

Genus *Orbispala* Irwin, 1995

Orbispala Irwin, 1995: 189-191. Type-species: *Orbispala occultoforma* Irwin, 1995. [Australia] (Miocene).

Miocene

O. occultoforma Irwin, 1995: 191-194; figs 3A-M. [Zeally Limestone Mb., Puebla Fm.; Cliffs of Jan Juc to Torquay, Victoria, South Australia] (Late Early Miocene) <HT: NMV P139064; PT: NMV P139065-139080>.

Genus *Philipaster* Wang, 1994

Philipaster Wang, 1994: 227. Type-species: *Scutellina morgani* Cotteau, 1891. [Australia] (Late Oligocene)

Genus *Prowillungaster* Wang, 1994

Prowillungaster Wang, 1994: 229. Type-species: *Prowillungaster major* Wang, 1994. [South Australia] (Oligocene-Miocene).

Oligocene-Miocene

P. major Wang, 1994: 229; figs 5A-D; pl. 2, figs 1-4; pl. 3, figs 1-2. [Mannum Fm., Murray Cliffs, South Australia and Point Addis Limestone, Airey's Inlet, Victoria, Australia] (Oligocene and Early Miocene) <HT: YPM 33662; PT: YPM 33663, 33652, 33648, 33653, 33654>.

P. minor Wang, 1994: 229-231; figs 5E-F; pl. 3, figs 3a-b. [Mount Gambir Limestone, Marte, Mt. Gambier, South Australia] (Miocene) <HT: YPM 33655; PT: YPM 33656>.

Genus *Willungaster* Philip & Foster, 1971

Willungaster Philip & Foster, 1971: 687-688. Type-species: *Willungaster scutellaris* Philip & Foster, 1971. [South Australia] (Oligocene-Miocene).

Oligocene-Miocene

W. scutellaris PHILIP & FOSTER, 1971: 688-689; text-fig. 8; pl. 127: fig. 2; pl. 131: figs 1-5, 7; pl. 133: figs 7, 9. [Port Vincent Limestone, Edithburg, Yorke Peninsula, South Australia] (Janjukian, Upper Oligocene of Longfordian, Lower Miocene) <HT: NMV P27951; PT: UNE 11765-67, 12006-08>.

Family Scutellinoididae IRWIN, 1995

Scutellinoididae IRWIN, 1995: 194. Type-genus: *Scutellinoides* DURHAM, 1955.

Order Laganoida JENSEN, 1982

Laganoida JENSEN, 1982: 95. {included families: Laganidae A. AGASSIZ, 1873, Astriclypeidae STEFANINI, 1911, Rotulidae GRAY, 1855, Mellitidae STEFANINI, 1911, Dendrasteridae LAMBERT, 1889, Echinarachniidae LAMBERT, 1914, Fibulariidae GRAY, 1855}

Suborder Laganina MORTENSEN, 1948

Family Neolaganidae DURHAM, 1954

Genus *Tetradiella* LIAO & LIN, 1981

Tetradiella LIAO & LIN, 1981: 482. Type-species: *Tetradiella sinica* LIAO & LIN, 1981. [China] (Pliocene).

Pliocene

T. sinica LIAO & LIN, 1981: 482-283; figs 1-2; pl. 1, figs 1-7. [Beibuwan, Guangxi Province, China] (Pliocene) <no holotype defined and no repository given; specimens located at NIGP>.

Family Fibulariidae GRAY, 1855

JENSEN (1982: 95) placed this family into the order Laganoida JENSEN, 1982.

Genus *Cenofibula* Gàsser, 1994

Cenofibula Gàsser, 1994: 13-14. Types-species: *Cenofibula castriauliensis* Gàsser, 1994.

Eocene

C. castrianliensis Gàsser, 1994: 14-15; figs 2a-c, 3. [Castellolí, near Igualada, Barcelona Province, Spain] (Bartonian) <HT: MGSB 55225.a>.

Genus *Echinocyamus* van Phelsum, 1774

Recent

E. insularis Mironov & Sagaidachny, 1984: 192-193; fig. 6: 1a.c; pl. 1, fig. 4. [Dimitri Mendeleev Station 582 (27°07' S, 109°26' W, depth 50 m), 589 (26°27' S, 105°29' W, depth 60-80 m); Isle Paschi and Sala-y-Gomez, Southeastern Pacific Ocean] <HT: IOANSSR N XV-65-19>.

E. *insularis macroproctus* Mironov & Sagaidachny, 1984: 193-194; fig. 6: 2a-b. [Dimitri Mendeleev Station 1256 (29°30' S, 167°52' E, depth 50-66 m); Isle Norfolk, Southwestern Pacific Ocean] <HT: IOANSSR N XV-65-20>.

Oligocene

E. nummulicus bernaniensis Srivastava, 1978: 423-424; pl. 1: figs 6-7. [about 1.6 km N 65° E of Ber Mota (23°27'45" N, 68°38'25" E), Kutch, India] (*Nummulites subclipeus*-zone, Ber Nani Stage, Middle Oligocene) <HT: DGUL K1145> {raised to species level by Srivastava (1988: 152)}.

E. raoi Srivastava, 1978: 424-426; pl. 1: figs 8-9. [about 1.6 km N 65° E of Ber Mota (23°27'45" N, 68°38'25" E), Kutch, India] (*Nummulites subclipeus*-zone, Ber Nani Stage, Middle Oligocene) <HT: DGUL K1204>.

E. wilsoni Kier, 1997: 8; figs 4A-E. [Belgrade Fm., Belgrade quarry, North Carolina, USA] (Late Oligocene) <HT: USNM 398476; PT: USNM 398477-398479; 492097-492100>.

Eocene

E. gurnahensis Roman & Strougo, 1994: 34-37; fig. 5; pl. 1, figs 3-5; pl. 3, figs 4-7, 13. [Thebes Fm., Gebel Gurnah, Egypt] (Ypresian) <HT: MNHN R10688>.

E. hungaricus Szörényi, 1952: 289-290, 291-292; figs 1-8, 13-14. [Gánt, Zámoly, Hungary] (Early Eocene) <ST: MÁFI Ech-338 according to Boda, 1964>.

E. jaisalmerensis Srivastava & Mathur, 1996: 54-55; fig. 3; pl. 1, figs 1-9. [Bandah Fm., near Ramgarth, Jaisalmer district, Rajasthan, India] (Middle Eocene) <HT: GSI 20684>.

E. pannonicus Szörényi, 1952: 290-291, 292-293; figs 9-12. [Gánt, Zámoly, Hungary] (Early Eocene) <ST: MÁFI Ech-337 according to Boda, 1964>.

Subgenus *Lepidocyamus* Mironov & Sagaidachny, 1984

Lepidocyamus Mironov & Sagaidachny, 1984: 194. Type-species: *Echinocyamus crispus* Mazzetti, 1893. [Indic Ocean and Red Sea] (Recent).

Genus *Fibularia* Lamarck, 1816

Recent

F. japonica Shigei, 1982: 11-15; figs 1-48. [off Misaki Marine Biological Station, Sagami Bay (sublittoral); 3 km off Futamachiya (35°06.5' N, 139°35.0' E, depth ca. 70 m), Sagami Bay; east of Iki Island (33°45.1' N, 129°57.5' E, depth 45 m); off Tomioka (Amakusa), W. Kyushu (ca. 30 m depth); off Oki Islands (between Dogo and Dozen, depth ca. 60 m); Suruga Bay (sublittoral zone); off Boso Peninsula (34°51.2' N, 139°55.6' E, 34°51.1' N, 139°55.2' E, depth 100 m); Japan] (Recent) <HT: MMBS Fib. 1 (from Sagami Bay)>.

Pliocene

F. gassusensis Elattaar, 2001b: 88-91; figs 5A1-3, 7A-F; pl. 2, figs 7-10. [Sharm El Arab Member, Shagra Formation, Wadi Gassus, 10 km SW Safaga, Red Sea coast, Egypt] (Late Pliocene) <HT: AUSGM E (the specimen figured on pl. 2, figs 8-10, no number mentioned); PT: AUSGM E (the specimen figured on pl. 2, fig. 7, no number mentioned)>.

F. wizrensis Elattaar, 2001b: 86-87; figs 5C1-3; pl. 2, figs 1-3. [Sharm El Arab Member, Shagra Formation, Wadi Wizr, 41 km SW Quseir, Red Sea coast, Egypt] (Late Pliocene) <HT: AUSGM E (the specimen figured on pl. 2, figs 1-3, no number mentioned)> {based on a single specimen}.

Miocene

F. damensis Kier, 1972a: 90-91; pl. 59, figs 2-10; pl. 60, fig. 1. [Dam Fm., localities S-137, S-178, S-553, S-568 and S-1392, Saudi Arabia] (Miocene) <HT: USNM 170481; PT: USNM 170482-170484>.

F. depressa Jain, 2002: 124-126; pl. 5, figs 5-6; pl. 7, fig. 2. [Gaj Fm., 0.5 km east of Lowrali, Kathiawar, Gujarat, India] (Middle Miocene) <HT: GSI 20769; PT: GSI 20767-68>.

F. guavarensis Srivastava, 1978: 426-427; pl. 1: figs 10-14. [about 2.5 km SW of Guvar (23°38'10" N, 68°32'30" E), Kutch, India] (*Ostrea gajensis*-zone, Lower Miocene) <HT: DGUL K1237> {mis-spelled *Fibularia guvarensis* in Srivastava (1988: 153)}.

Eocene

F. khargahensis Azab & Elattaar, 1999: 850-853; tab. 7; pl. 1: figs 8-10. [Gebel Um El Ghanayem, ca. 3 km E of Ain Dabadib, and Gebel El Teir, Kharga area, Egypt] (*Linthia* (*Lutetiaster*) *cavernosa* Zone, Early Libyan, Early Eocene) <repository and specimen nos. not given>.

Genus *Marginoproctus* Budin, 1980

Marginoproctus Budin, 1980: 306. Type-species: *Marginoproctus djakonovi* Budin, 1980. [Northern Pacific] (Recent).

Recent

M. djakonovi Budin, 1980: 306-308; figs 1-8. ["Витязь"-cruise ("Vityaz"-cruise), Stat. 1856 (56°25' N, 143°19' E, depth 80 m), 5640 (44°4' N, 148°57' E, depth 800 m), "Жемчуг"-cruise ("Zhemchg"-cruise) Stat. 33 (54°35' N, 165°34' W, depth 212 m), 251 (51°47' N, 158°7' E, depth 60 m), 1947-1948 (50°03' N, 155°51' E; 50°14' N, 155°54' E; 50°44' N, 156°40' E; 49°52' N, 155°37' E, depth 70-300 m), East Kamchatka, Commander and Kurile Islands and Sea of Okhtosk] (Recent) <HT: IOANSSR XV-69-17 ("Vityaz"-cruise, Stat. 1856)>.

Genus *Mortonia* Gray, 1852

Miocene

M. lowraliensis Jain, 2002: 126-127; pl. 5, figs 13-23; pl. 7, figs 3-5. [Gaj Fm., 0.5 km east of Lowrali, Kathiawar, Gujarat, India] (Middle Miocene) <ST: GSI 20770-78>.

Genus *Scutellina* L. Agassiz, 1841

Cretaceous

S. supramarginalis Engel, 1976: 55-56; figs 1a-f. [Maastricht, The Netherlands] (Cretaceous or Eocene) <HT+PT: Mus. Teyler, Haarlem 16053>.

Infraorder Fibularina SMITH, 1984

Fibularina SMITH, 1984: 171, 173. Type-genus: *Fibularia* LAMARCK, 1816.

Family Laganidae A. AGASSIZ, 1873

JENSEN (1982: 95) placed this family into the order Laganoida JENSEN, 1982.

Genus *Peronella* GRAY, 1855

Pleistocene

P. mai WANG, 1982b: 150-154; pl. 3, figs 4-5, 7. [Cholan Fm., Chungkang River near Sanwan, Miaoli County, northern Taiwan] (Late Pliocene to Early Pleistocene) <HT: NTUG-[E]-0112>.

P. lesueuri augusta PLEDGE & SADLER, 1990: 103-104; figs 1a-b. [Port Augusta, South Australia] (Late Pleistocene) <HT: SAM P24854>.

P. miaoliensis WANG, 1982b: 154-155; pl. 4, figs 4-6, 8. [Toukoshan Fm., between Nansheh and Kungssuliao (Kôshiryô), Miaoli County, northern Taiwan] (Pleistocene) <HT: NTUG-[E]-0114>.

P. toukoshanensis WANG, 1982b: 149-150; pl. 3, figs 1-3, 6. [Toukoshan Fm., probably Miaoki County, northern Taiwan] (Pleistocene) <HT: NTUG-[E]-0243>.

Pliocene

P. ova MCNAMARA, 1996: 195-196; figs 2A-J. [Roe Calcarenite, Roe Plains, Madura district, Western Australia] (Late Pliocene) <HT: WAM 94.854; PT: WAM 82.2103-82.2121, 82.2255, 82.2273-2283, 94.855, 94.856, 82.2095-6, 82.2135-2143, 82.2241-2248, 94.848-854, 82.2151, 85.1876>.

Miocene

P. changchihkengensis WANG, 1982b: 148-149; pl. 4, figs 1-3, 7. [Changchihkeng Fm., Changchihkeng (Chôsjiko), Chiayi County, southern Taiwan] (Late Miocene) <HT: NTUG-[E]-0111>.

Eocene

P. tschimanica PORETSKAYA, in AKOPJANA, 1974: 361-362; pl. 186, figs 2a-в; pl. 187, figs 4a-б. [Ciman, Armenia] (Late Eocene) <HT: LGU 306/3>.

Family unknown

Genus *Tridium* Tandon & Srivastava, 1980

Tridium Tandon & Srivastava, 1980: 1. Type-species: *Tridium kieri* Tandon & Srivastava, 1980. [India] (Eocene) {Tandon & Srivastava (1980: 1) placed this genus within the suborder Laganina Mortensen, 1948 in a new, unnamed family with affinities to the family Fibulariidae}.

Middle Eocene

T. kieri Tandon & Srivastava, 1980: 2-3; figs 1-2; pl. 1, figs 1-6. [Near Guvar, Kutch, India] (*Nummulites beaumonti* Zone, Middle Eocene) <HT: DGUL K651; PT: DGUL K652, K653>.

Suborder Scutellina Haeckel, 1896

Superfamily Scutellidea Smith, 1984

Scutellidea Smith, 1984: 171, 173. Type-genus: *Scutella* Lamarck, 1816.

Family Scutellidae Gray, 1825

Genus *Mennerella* Shmidt in Shmidt & Sinyelnikova, 1971

Mennerella Shmidt in Shmidt & Sinyelnikova, 1971: 909 [EN: 72-73]. Type-species: *Mennerella ovata* Shmidt in Shmidt & Sinyelnikova, 1971. [western Kamchatka] (Miocene).

Miocene

M. ovata Shmidt in Shmidt & Sinyelnikova, 1971: 909-910 [EN: 73]; pl. 1: figs 2a-б. [Upper Kakertok Suite, Kavran Series, Kavran River, Kavran-Utkholok Bay, western Kamchatka] (Middle to Late Miocene) <HT: CGM Kol. 10255 No. 5>.

Genus *Scutella* Lamarck, 1816

Miocene

S. aegyptiaca Ali, 1998: 543-544; fig. 3A. [Marmarica Fm., Gebel west El Migahhiz, Siwa Oasis, Egypt] (Langhian-Serravalian) <HT: GM-GDEMU, no specimen no.>.

S. conica ALI, 1998: 544; figs 3B-C. [Marmarica Fm., Gebel west El Migahhiz, Siwa Oasis, Egypt] (Langhian-Serravalian) <HT: GM-GDEMU, no specimen no.>.

S. kalksburgensis WIESBAUR, 1874: 164-165. [Kalksburg near Vienna, Austria] (Badenian {= Langhian-Serravalian}, Middle Miocene) <no specimen no.> {considered a junior subjective synonym of *Parascutella gibbercula* (DE SERRES, 1829) by KROH (2005: 90)}

S. marchettii TAVANI, 1939: 37-38; pl. 2 (4), fig. 13. [Sollum Egypt] (Miocene) <no specimen no.>.

S. muelleri MIHÁLY, 1985: 241, 260-261; pl. 3, figs 5-6; pl. 4, fig. 1. [Leitha Limestone, Gyakorló út [Street], 10th district, Budapest, Hungary] (Late Badenian (= Early Serravallian), Middle Miocene) <HT: MAFI Ech 358> {considered a junior subjective synonym of *Parascutella gibbercula* (DE SERRES, 1829) by KROH (2005: 91)}

S. romani MIHÁLY, 1985: 240-241, 260; pl. 2, figs 4-6. [Leitha Limestone, Kerepesti út [Street], 10th district, Budapest, Hungary] (Late Badenian (= Early Serravallian), Middle Miocene) <HT: MAFI Ech 1; PT: MAFI Ech 2> {considered a junior subjective synonym of *Parascutella gibbercula* (DE SERRES, 1829) by KROH (2005: 91)}.

S. vindobonensis altus MIHÁLY, 1990a: 237-238; pl. 1: figs 1-2; pl. 2: fig. 1. [Budapest XIV, Hungary] (Upper Badenian {=Serravalian}) <HT: MÁFI Coll. Ech. 400> {considered a junior subjective synonym of *Parascutella gibbercula* (DE SERRES, 1829) by KROH (2005: 90)}.

Family Protoscutellidae DURHAM, 1955

Genus *Protoscutella* STEFANINI, 1924

Eocene

P. mississippiensis rosehillensis KIER, 1980: 38-40; fig. 16; pl. 12, figs 1-5. [Castle Hayne Limestone, Rose Hill locality 11, locality 35, North Carolina, USA] (Middle Eocene) <HT: USNM 264062; PT: USNM 264061, 264063>.

Family Eoscutellidae DURHAM, 1955

Genus *Eoscutella* GRANT & HERTLEIN, 1938

Eocene

E. mirandae PARMA, 1985: 37-38; figs 3-4; pl. 1, figs 1-3. [Cerro Blanco, Santa Cruz Province, Argentinia] ("Patagoniano", Eocene?) <HT: CPBA 12902>.

Subgenus *Tigilella* Shmidt, 1975

Eoscutella (*Tigilella*) Shmidt, 1975: 30. Type-species: *E*. (*Tigilella*) *kamtschatica* Shmidt, 1975. [Kamchatka] (Eocene).

Eocene

E. (*Tigilella*) *kamtschatica* Shmidt, 1975: 30-31; un-numbered text-fig. on p. 30; pl. 5: figs a-e. [Kavran River, Kavran-Utkholok Bay, western Kamchatka] (Late Eocene) <HT: VNIGRI I/803>.

Family Dendrasteridae Lambert, 1889

Genus *Dendraster* L. Agassiz, 1847

Pliocene

D. sullivani Durham & Morgan, 1978: 303-305; figs 4a-g, 5. [UCMP loc. 3399, San Gregorio Beach, California] (Early Pliocene) <HT: UCMP 14450; PT: UCMP 14448, 14451-14456; CAS 58177-58179>.

Genus *Merriamaster* Lambert, 1911

Pliocene

M. weaveri Durham & Morgan, 1978: 301-303; figs 3a-g. [UCMP loc. 3399, San Gregorio Beach, California] (Early Pliocene) <HT: UCMP 14259; PT: UCMP 14443-14447, 14449; CAS 58175-58176>.

Family Echinarachniidae Lambert, 1914

Jensen (1982: 95) placed this family into the order Laganoida Jensen, 1982.

Genus *Astrodapsis* Conrad, 1856

Miocene

A. bajasurensis Squires & Demetrion, 1993: 259-262; fig. 2. [Isidro Fm., CSUN locality 1495, near mouth of Arroyo Mezquital, north central Baja California Sur, Mexico] (Middle Miocene) <HT: IGM 5926; PT: IGM 5927-5933, LACMIP 11595-11599>.

A. ilyinensis SHMIDT in SHMIDT & SINYELNIKOVA, 1971: 911 [EN: 76]; pl. 1: figs 3a-б. [Il'inskaya [Ilinsk] Suite, Kavran Series, Nepropusk Point, Tochilo section, Grand Otel' area, western Kamchatka] (Early to Middle Miocene) <HT: CGM Kol. 10255 No. 28> {Re-described by SHMIDT (1984) and transferred to *Pseudoastrodaspis*}.

Genus *Echinarachnius* GRAY, 1825

Miocene

E. astrodapsoides WAGNER, 1974: 110; pl. 1: figs 5-8. [Unga Fm., Bear Lake, Alaska Peninsula] (Middle to Upper Miocene) <HT: USNM 181139; PT: USNM 181140, 181141, UA 2435, UCMP 14085>.

E. plafkeri WAGNER, 1974: 111-112; pl. 3: figs 5-7. [Yakataga Fm., Icy Point, Lituya District, eastern Gulf of Alaska] (Upper Miocene) <HT: USNM 181142; PT: USNM 181143>.

E. ungaensis WAGNER, 1974: 112-115; pl. 1: figs 9-11. [Bear Lake Fm., Bear Lake, Alaska Peninsula] (Middle or Upper Miocene) <HT: USNM 181144>.

Genus *Faassia* SHMIDT in SHMIDT & SINYELNIKOVA, 1971

Faassia [*Neoscutella*] SHMIDT in SHMIDT & SINYELNIKOVA, 1971: 911 [EN: 73-76]. Type-species: *Faasia globosa* SHMIDT in SHMIDT & SINYELNIKOVA, 1971. [western Kamchatka] (Middle Miocene) {named *Neoscutella* in figure captions and table}.

Miocene

F. globosa SHMIDT in SHMIDT & SINYELNIKOVA, 1971: 910 [EN: 76]; pl. 1: figs 1a-в. [Middle Etolon [Etolonsk] Suite, Kavran Series, Nepropusk Point, western Kamchatka] (Late Miocene) <HT: CGM Kol. 10255 No. 6> {re-described by SHMIDT (1984)}.

Genus *Kewia* NISIYAMA, 1935

Pliocene

K. kehoei WAGNER, 1974: 117; pl. 3: figs 8-10. [Bear Lake, Alaska Peninsula] (Early Pliocene) <HT: UA 2427>.

K. tachilniensis WAGNER, 1974: 119; pl. 2: figs 9-11. [Tachilni Fm., Walrus Peak, Cape Tachilni area, Alaska Peninsula] (Early Pliocene) <HT: USNM 181148; PT: USNM 181149>.

Miocene

K. elegantula Shmidt in Shmidt & Sinyelnikova, 1971: 912 [EN: 75]; pl. 1: figs 6a-б. [Middle Etolon [Etolonsk] Suite, Kavran Series, Nepropusk Point, western Kamchatka] (Late Miocene) <HT: CGM Kol. 10255 No. 12> {mentioned in figure caption only; re-described by Shmidt (1984)}.

K. etolonica Shmidt in Shmidt & Sinyelnikova, 1971: 911-912 [EN: 76]; pl. 1: figs 4a-б. [Etolon [Etolonsk] Suite and Kakertok Suite, Kavran Series, Nepropusk Point and Kavran River, western Kamchatka] (Middle to Late Miocene) <HT: CGM Kol. 10255 No. 14> {re-described by Shmidt (1984)}.

K. kannoi Wagner, 1974: 116-117; pl. 2: figs 1-4. [Narrow Cape Fm., Narrow Cape, Kodiak Island, Alaska] (Middle Miocene) <HT: UA 2428; PT: UA 2429-33>.

K. lituyaensis Wagner, 1974: 118-119; pl. 2: figs 12-15. [Yakataga Fm., Icy Point, Lituya Bay area, eastern Gulf of Alaska] (Late Miocene) <HT: USNM 181145; PT: USNM 181146-47, UA 2436, UCMP 14084>.

K. minima Shmidt in Shmidt & Sinyelnikova, 1971: 912 [EN: 75]; pl. 1: fig. 5a. [Upper Kakertok Suite, Kavran Series, Kavran River, Kavran-Utkholok Bay, western Kamchatka] (Middle to Late Miocene) <no type information provided> {mentioned in figure caption only}.

Oligocene

K. marquamensis Linder, Durham & Orr, 1988: 953-954; figs 5.1-5.8. [Scott Mills Fm., Abiqua Mb., Butte Creek and Marquam Mb., Wilhoit, Marion County, Oregon, USA] (Late Oligocene) <HT: UCMP 38207; PT: UCMP 38208-A – 38208-F>.

Genus *Remondella* Durham, 1955

Wagner (1974: 120) placed this genus into the family Dendrasteridae Lambert, 1889.

Pliocene

R. waldroni Wagner, 1974: 120-121; pl. 3: figs 1-4. [Tachilni Fm., Cape Tachilni, Alaska Peninsula] (Early Pliocene) <HT: UA 2425; PT: USNM 181153-55, UCMP 14086-87>.

Miocene

R. asiatica Shmidt, 1984: 149; pl. 26: figs 6a, б, г. [Etolon [Etolonsk] Suite, Kavran Series, north-eastern part of the Tochilinsky Region [Section], western Kamchatka] (Middle Miocene) <HT: VNIGRI kol. 820, no. 1>.

R. kamtschatica Shmidt, 1984: 149-150; pl. 27: figs 13a, б. [Etolon [Etolonsk] Suite, Kavran Series, north-eastern part of the Tochilinsky Region [Section], western Kamchatka] (Middle Miocene) <HT: VNIGRI kol. 820, no. 2>.

Genus *Vaquerosella* Durham, 1955

Miocene

V. coreyi Durham, 1955: 167. (Miocene) <HT: UCMP 31712; PT: UCMP 11027> {new name for *Scutella norrisi* Loel & Corey, 1932 not Kew, 1920}.

Family Monphorasteridae Lahille, 1896

Genus *Amplaster* Martínez, 1984

Amplaster Martínez, 1984: 506. Type-species: *A. coloniensis* Martínez, 1984. [Uruguay] (Late Miocene).

Miocene

A. alatus Rossi de García & Levy, 1989: 90-92; fig. 1; pl. 1: figs 1-4. [Monte León Formation, Chubut Province, Patagonia, Argentinia] (Late Oligocene to Early Miocene) <HT: SGNP 15.527; PT: SGNP 15.528-31> {placed into *Lunulaster* Parma & Martínez, 1995 by Parma & Martínez (1995: 65)}.

A. coloniensis Martínez, 1984: 506-507; figs 1-4. [Camacho Fm. at Barranca de Los Loros, Uruguay] (Late Miocene) <HT: MNA-CPO 3426; PT: MNA-CPO 3425>.

A. ellipticus Mooi, Martínez & Parma, 2000: 269-270; fig. 4.2. [Camacho Fm. at Barranca de Los Loros and El Manzano, Uruguay] (Upper Miocene) <HT: FCDP 2205; PT: MNA-CPO 3425>.

Genus *Lunulaster* Parma & Martínez, 1995

Lunulaster Parma & Martínez, 1995: 65. Type-species: *Amplaster alatus* Rossi de García & Levy, 1989. [Monte León Formation, Chubut Province, Patagonia, Argentinia] (Late Oligocene to Early Miocene).

Family Mellitidae Stefanini, 1911

Jensen (1982: 95) placed this family into the order Laganoida Jensen, 1982.

Genus *Encope* L. Agassiz, 1840

Miocene

E. gatunensis Toula, 1911: 489-491; pl. 30 (I), fig. 2. [upper part of the Gatun Formation, from the base of the second lock of the Panama canal, Gatún, Panama} (Tortonian, Late Miocene) <HT: NHMW 1933/0018/0006 (ex coll. K&K techn. Hochschule)> {species based on a very fragmentary specimen; revised age based on Collins et al. (1996)}

E. michoacanensis Durham, 1994: 113-114; fig. 1; pl. 1, figs 1-3; pl. 2, figs 1, 3. [near La Mira, Michoacán, Mexico] (Late Early Miocene) <IGM 2939; PT: IGM 2940-2943>.

Subgenus *Echinadesma* Phelan, 1972

Pliocene-Recent

Encope (*Echinadesma*) Phelan, 1972: 126-128. Type-species: *Encope micropora* L. Agassiz, 1841. [North and South America] (Pliocene-Recent). {other species included: *Encope emarginata* (Leske, 1778); *Encope perspectiva* L. Agassiz, 1841; *Encope secoensis* Cooke, 1961; *Encope wetmorei* A.H. Clark, 1946}.

Genus *Leodia* Gray, 1851

Pliocene

L. divinata Mooi & Peterson, 2000: 1085-1089; figs 2, 3.1-3.3, 4.1, 4.2. [Mare Fm., FCB-14 (Mencher´s locality 292), Caracas, Venezuela] (Lower? Pliocene) <HT: CASG 67946>.

Genus *Mellita* L. Agassiz, 1841

Recent

M. eduardobarrosoi Caso, 1981: 142-144; figs 1-35; tabs 1-2. [Playa del Revolcadero (Acapulco, Gro.), Playa Encantada (Guerrero, Gro.), and Playa de San Benito (Tapachula, Chiapas, Chis), Pacific Coast, Mexico] (Recent) <ST: UNAM, Colección de Equinodermos del Centro de Ciencias del Mar y Limnología, no specimen nos. given>.

M. isometra Harold & Telford, 1990: 1002-1005; figs 11-13. [East coast of North America, from Nantucket, Massachusetts to Fort Lauderdale, Florida] (Recent)

<HT: USNM E27948; PT: LACM 84-236.1, 84-236.2; MCZ 12050, 12051; USNM E37949 – E37953; ZMUC EE220-2, EE220-3>.

Family Astriclypeidae STEFANINI, 1911

JENSEN (1982: 95) placed this family into the order Laganoida JENSEN, 1982.

Genus *Amphiope* L. AGASSIZ, 1840

Miocene

A. caupianensis CHAVANON, 1974: Vol.1: 142-143, Vol.2: 98; figs 64-70; pl. 10: figs 5a-b. [Caupian (Saint Médard en Jalles), Aquitaine Basin, Western France] (Early Miocene) <ST: Castex colln, no repository nos given for types; figured specimen: 20.C.14>.

A. miocenica ALI, 1998: 545-546; fig. 3D. [Marmarica Fm., Gebel west El Migahhiz, Siwa Oasis, Egypt] (Langhian-Serravalian) <HT: GM-GDEMU, no specimen no.>.

Genus *Astriclypeus* VERRILL, 1867

Pleistocene

A. miaoliensis WANG, 1986: 170-175; figs 10, 11; pl. 7, figs 1-5; pl. 8, figs 1-2; pl. 9, figs 7. [Toukoshan Fm., Wuhu, Miaoli-hsien, northern Taiwan] (Late Pleistocene) <HT: NTUG-(E)-0068; PT: NTUG-(E)-0189 – 0191>.

Pliocene

A. pitouensis WANG, 1986: 166-170; figs 9a-b; pl. 6, figs 2-5; pl. 9, fig. 3. [Erhchiu Fm., Pitou, Taipei-hsien, northern Taiwan] (Early Pliocene) <HT: CGS-E-83026; PT: CGS-E-83027, 83028>.

Miocene

A. elegans WANG, 1986: 158-166; figs 7, 8a-e; pl. 3, figs 1-4; pl. 4, figs 1-6; pl. 5, figs 1-6; pl. 6, fig. 1; pl. 8, fig. 3; pl. 9, fig. 2. [Nankang Sandstone; Shuinantung, Kengtsuliao and Shen-AO; Taipei-hsien, northern Taiwan] (Middle Miocene) <HT: NTUG-E-80017; PT: NTUG-E-80018, 80020 – 80022, 80148, 81053, 81063, 81064, 83029, NTUG-(E)-0167, 0165, CGS-E-83034 – 83037>.

A. yeliuensis WANG, 1986: 152-158; figs 5, 6a-e; pl. 1, figs 1-3; pl. 2, figs 1-5. [Taliao Fm., Yeliu Park, Taipei-hsien, northern Taiwan] (Early Miocene) <HT: NTUG-E-81046; PT: NTUG-E-81043 – 81045, 81052>.

Oligocene

A. waiwulunemsis Wang, 1983: 115-118; pl. 1, figs 1-2; pl. 2, fig. 3. [Wuchihshan Fm., Waiwulun-Ao, Chilung City, northern Taiwan] (Late Oligocene) <HT: NTUG-E-80031; PT: NTUG-E-80033>.

Genus *Echinodiscus* Leske, 1778

Cenozoic

E. colchesterensis Smuts, 1988: 94-97; figs 2a-d, 3b-c. [Alexandria Fm., Colchester Cliff, Colchester, South Africa] (Late Tertiary) <HT: GSP A8817; PT: GSP A8819-8826, A9000-9001>.

Miocene

E. yeliuensis Wang, 1982a: 151-156; pl. 1, figs 1-2; pl. 2, figs 1-4; pl. 3, figs 1-6; pl. 4, fig. 1. [Taliao Fm., Yeliu, Keelung City, Northern Taiwan] (Aquitanian) <HT: NTUG-E-81029; PT: NTUG-E-81030, 81032, 81033, 81049>.

Oligocene

E. hsianglanensis Wang, 1986: 176-180; fig. 12; pl. 9, figs 1, 4-6. [Fangchiao Fm., Hsiaohsianglan, Taipei-hsien, northern Taiwan] (Late Pleistocene) <HT: CGS-E-83031; PT: CGS-E-83032, 83033, 83039>.

Paleocene-Eocene

E. tiliensis Wang, 1984a: 107-110; pl. 1, figs 1a-b. [Tachien Sandstone, Tili Village, Hsini-hsiang, Nantou-hsien, Central Taiwan] (Late Paleocene-Early Eocene) <HT: NTUG-E-0236>.

Genus *Kieria* Mihály, 1985

Kieria Mihály, 1985: 243, 261. Type-species: *Kieria semseyana* Mihály, 1985 [Hungary] (Miocene) {according to Kroh (2005: 97, 100) the genus *Kieria* is based upon juvenile specimens of *Amphiope*}.

Miocene

K. semseyana Mihály, 1985: 243, 261; pl. 4, figs 2-6. [Leitha Limestone, Gyakorló út [Street], 10th district, Budapest, Hungary] (Late Badenian (= Early Serravallian), Middle Miocene) <HT: MAFI Ech 355; PT: MAFI Ech 356, 357> {according to Kroh (2005: 97, 100) the genus *Kieria* is based upon juvenile specimens of *Amphiope* and this species possibly is a junior synonym of *Amphiope bioculata* (Des Moulins, 1837)}.

Family Abertellidae DURHAM, 1955

Genus *Abertella* DURHAM, 1953

Miocene

A. complanata BRITO, 1981a: 3-5; fig. 1-2. [Pirabas Fm., Capanema, Jazida B-9, Estado do Pará, Brasil] (Lower Miocene) <HT: MNRJ 5460-I>.

A. gualichensis MARTÍNEZ, REICHLER & MOOI, 2005: 1230-1232;figs 2.1-2.4; figs 3.1, 3.2. [Gran Bajo del Gualicho Formation, Salina del Gualicho, Río Negro Province, Argentina] (Late Early – Early Middle Miocene) <HT: MACN-Pi 4714; PT: MACN-Pi 4705, 4706, 4709>.

Family Scaphechinidae BEADLE, 1991

Scaphechinidae BEADLE, 1991: 327. Type-genus: *Scaphechinus* A. AGASSIZ, 1863. [Japan, Formosa] (Miocene-Recent) {attributed to MOOI (1987), which is an unpublished Ph.D. thesis}.

Genus *Scaphechinus* A. AGASSIZ, 1863

Recent

S. brykovi BUDIN, 1983: 55-56; pl. 3: fig. 3. [Peter the Great Bay, Sea of Japan] (Recent) <HT: IMBFE 3108/5>.

Family Uncertain

Genus *Samlandaster* LAMBERT & THIÉRY, 1914

Bartonian

S. dineuri ROMAN, 1989: 300-303; pl. 1, figs 4, 12-13. [Sables roux, à la base de la formation des Sables d'Auvers; Saint-Vaast-lès-Mello, Oise, lie-dit Barisseuse, Paris Basin, France] (Auversien, Early Bartonian) <HT: IPM R09016; PT: IPM R09017>.

Genus *Sinaechinocyamus* Liao, 1979

Sinaechinocyamus Liao, 1979: 67, 70-71. Type-species: *Sinaechinocyamus planus* Liao, 1979. [Yellow Sea] (Recent).

Recent

S. planus Liao, 1979: 67-69, 71-72; figs 1-3, 4.1-4.4; pl. 1: figs 1-4. [Northern Huang Hai (37°50' N, 124°E, depth 72 m, muddy sand bottom), Yellow Sea] (Recent) <HT: IOAS E00931; PT: IOAS E00932> {according to Mooi (1990b: 143) *Sinaechinocyamus* is a member of the suborder Scutellina related to *Scaphechinus*}.

Superfamily Taiwanasteritida Wang, 1984b

Taiwanasteritida Wang, 1984b: 134. {families included: Fibulariidae Gray, 1855; Taiwanasteridae Wang, 1984b; Mooi (1990b: 142-143) rejected this superfamily}.

Family Taiwanasteridae Wang, 1984b

Taiwanasteridae Wang, 1984b: 134. Type-genus: *Taiwanaster* Wang, 1984b. (Early Pliocene to Recent) {Mooi (1990b: 142-143) rejected this family}.

Genus *Taiwanaster* Wang, 1984b

Taiwanaster Wang, 1984b: 134-135. Type-species: *Taiwanaster mai* Wang, 1984b. [Taiwan] (Recent) {according to Mooi (1990b: 139) this genus is a junior synonym of *Sinaechinocyamus* Liao, 1979}.

Recent

T. mai Wang, 1984b: 135-143; figs 4c, 5c, 6a-f, 9a-b; pl. 1, figs 1-3; pl. 2, figs 1-6; pl. 3, figs 1, 3-4; pl. 4, figs 1-4; pl. 5, figs 1-4. [Taiwan Strait near Yunlin-hsien, Taiwan] (Recent) <HT: NTUG-E-81070; PT: NTUG-E-81071, 81072, 81075-81077, 81082-81087>.

Pliocene

T. gutingkengensis Wang, 1984b: 147-151; figs 5a, 8a-c; pl. 8, figs 1-4. [Lower Gutingkeng Fm., Gutingkeng, Kaohisung-hsien, southern Taiwan] (Latest Pliocene) <HT: NTUG-E-81088; PT: NTUG-E-81089-81093>.

T. pitouensis WANG, 1984b: 143-147; figs 5b, 7a-d; pl. 3, fig. 2; pl. 6, figs 1-6; pl. 7, figs 1-2. [Erhchiu Fm., Pitou-chiao, northern Taiwan] (Early Pliocene) <HT: CGS-E-82001; PT: CGS-E-82002-82004, 82006, 82007, 82026, 82027>.

Superorder Atelostomata ZITTEL, 1879

Order Menopygoida Vadet, 1995

Superorder Microstomata SMITH, 1984

Microstomata SMITH, 1984: 171, 173 {includes Cassiduloida and Clypeasteroida}.

Order Cassiduloida CLAUS, 1880

Genus *Pronucleolites* BARRAS, 2006

Pronucleolites BARRAS, 2006: 60-61. Type-species: *Clypeus orbicularis* PHILLIPS, 1829. [Europe] (Jurassic) {regarded as stem-group cassiduloid by BARRAS (2006)}.

Early Jurassic

P. ? *crickleyensis* BARRAS, 2006: 67-69; text-figs 37a-b, 38; pl. 5: figs 4-6. [Inferio Oolite, Crickley, Gloucestershire, England] (*murchisoniae* zone, Aalenian) <HT: BGS GSM 119711>.

Family Galeropygidae LAMBERT, 1911

Genus *Eogaleropygus* JESIONEK-SZYMAŃSKA, 1978

Eogaleropygus JESIONEK-SZYMAŃSKA, 1978: 191. Type-species: *Pygaster microstoma* LAMBERT, 1933. [Morocco] (Middle Toarcian).

Genus *Galeropygus* COTTEAU, 1856

Jurassic

G. parviphyllus BARRAS, 2006: 58-59; text-figs 32a-b; pl. 5: figs 1-3. [unknown, unknown (? England)] (unknown, possibly Jurassic) <HT: NHM E 42916>.

Genus *Hyboclypeus* L. Agassiz, 1839

Middle Jurassic

H.? *pavyi* Robert, 1994: 67-68; pl. 2: figs 8-10. [Calcaires siliceux à chailles; Brétignelles, près Druyes, Dept. Yonne, France] (*Antecedens* subzone, *Plicatilis* zone, Middle Oxfordian) <HT: Philippe Robert coll'n No. 604> {based on an internal mould}.

Genus *Pygomalus* Pomel, 1883

Late Jurassic

P. azemati Devriès, 1972: 45-46; pl. 2: figs 1-6. [Puig Santa Magdalena, north-east of Novelda, Province Alicante, Spain] (Late Kimmeridgian/Tithonian) <HT (by monotypy): coll. J.Azema, Paris [no specimen no. provided]>.

Family Clypeidae Lambert, 1898

Genus *Angusticlypeus* Vadet, 1997

Angusticlypeus Vadet, 1997: 48. Type-species: *Clypeus angustiporus* Agassiz in Agassiz & Desor, 1847. [Europe] (Bajocian-Callovian) {other species included: *C. altus* Mac Coy, 1848; *C. babeaui* Cotteau, 1870; *C. davoustianus* Cotteau in Davoust, 1856; *C. mulleri* Wright, 1859; *C. rathieri* Cotteau, 1849}.

Genus *Bothryopneustes* Fourtau, 1924

Upper Jurassic

B. inflata Kier, 1972a: 64-66; fig. 31; pl. 34, figs 1-7; pl. 41, fig. 6. [Upper Dhruma Fm., locality KK9-95-112, Saudi Arabia] (Callovian) <HT: USNM 170426; PT: USNM 170427-170429>.

B. kauffmani Kier, 1972a: 63-64; fig. 30; pl. 35, figs 1-7; pl. 36, figs 1-5. [Upper Dhruma Fm., locality KK9-112-113, Saudi Arabia] (Callovian) <HT: USNM 170430; PT: USNM 170431-170432>.

Middle Jurassic

B. dhrumaensis KIER, 1972a: 61-62; fig. 28; pl. 33, figs 1-6. [Middle Dhruma Fm., localities KK8-30-44, KK9-35-98, L-921, L-922, S-1045 and S-1154, Saudi Arabia] (Bathonian) <HT: USNM 170421; PT: USNM 170422-170423>.

B. arabica KIER, 1972a: 62-63; fig. 29; pl. 32, fig. 5; pl. 33, figs 7-10. [Middle Dhruma Fm., localities KK8-35-46 and L-920, Saudi Arabia] (Bathonian) <HT: USNM 170420; PT: USNM 170424-170425>.

Genus *Clypeus* LESKE, 1778

Middle Jurassic

C.ederlei ROBERT, 1994: 68-69; pl. 14: figs 1-3. [Les Rochers du Parc, près de Mailly-la-Villec, Yonne, France] (*Bifurcatus* subzone, *Transversarium* zone, Middle to Late Oxfordian) <HT: Robert Ederlé coll'n, Perrigny (Yonne) No. 514>.

Genus *Colliclypeus* SMITH *in* SMITH & BENGGTSON, 1991

Colliclypeus SMITH *in* SMITH & BENGGTSON, 1991: 37-38. Type-species: *Conoclypus nettoanus* WHITE, 1887. [Brasil] (Early Cretaceous).

Genus *Kieripygurus* VADET, 1997

Kieripygurus VADET, 1997: 59. Type-species: *Pygurus jurensis* MARCOU in AGASSIZ & DESOR, 1847. [Europe] (Callovian-Valanginian) {other species included: *P. geryvillensis* PERON & GAUTHIER in COTTEAU, PERON & GAUTHIER, 1888; *P. rostratus* AGASSIZ, 1839; *P. tenuis* DESOR in AGASSIZ & DESOR, 1847}.

Genus *Mercieripygurus* VADET, 1997

Mercieripygurus VADET, 1997: 58. Type-species: *Mepygurus hausmanni* (KOCH & DUNKER, 1837). [Europe] (Oxfordian).

Genus *Pygurus* L. Agassiz, 1839

Referred to a new family, Pyguridae, by Vadet (2007).

Albian

P. (*P.*) *mendelssohni* Greyling & Cooper, 1993: 13-17; figs 2-7. [Makhatini Flats, SE Jozini Dam, Zululand, South Africa] (Upper Albian) <HT: DNSM-PCZ4649; DNSM-PZ4562-66, 4639, 4660>.

Barremian

P. (*P.*) *posteroexpansus* Tanaka, 1984b: 190-192; text-fig. 2; pl. 1, figs 3a-c. [Haidate Grp., SE Nakaosaka, Mie-machi, Ono-gun, Oita Prefecture, Japan] (Upper? Barremian) <HT: GSJ F6076A, B>.

Lower Cretaceous

P. (*P.*) *yamamaensis* Kier, 1972a: 72; pl. 46, figs 9-11; pl. 47, figs 1-5. [Yamama Fm., localities KK1-41, L-901, L-902, L-905, L-910, L-908. KK3-45 and S-1262, Saudi Arabia] (Neocomian) <HT: USNM 170456; PT: USNM 170457-170459>.

Late Jurassic

P. (*P.*) *arabicus* Kier, 1972a: 66-68; fig. 33; pl. 38, fig. 4-7. [Upper Dhruma Fm., Atash Mb., locality L-926, Saudi Arabia] (Late Jurassic) <HT: USNM 170436>.

P. (*P.*) *andinus* Larrain & Biró-Bagóczky, 1985: 1410-1413; figs 3, 4.1-4.4. [Baños del Flaco Fm., Río Maitenes, Cajón del Fierro, Chile] (Upper Tithonian) <HT: CPUC RM./85-5; PT: CPUC RM./85-1 – RM./85-3>.

Middle Jurassic

P. beineuensis Poretskaya, 1972: 291-292; figs 62-63; pl. 60: figs 12a-в. [Kuvali-Tjube, Tuarkyrsibiyru, western Turkmenistan] (Late Callovian, Middle Jurassic) <HT: LGU 1/296>.

Family Pyguridae Vadet, 2007

Pyguridae Vadet, 2007: 180-181. Type-genus: *Pygurus* Agassiz, 1840. (Jurassic).

Family Nucleolitidae L. Agassiz & Desor, 1847

Genus *Baudhuinipygus* VADET, 1997

Baudhuinipygus VADET, 1997: 76. Type-species: *Echinobrissus haimei* WRIGHT, 1859. [Europe] (Portlandian) {other species included: *Nucleolites brodiei* (WRIGHT, 1859)}.

Genus *Catopygus* L. Agassiz, 1836

Cretaceous

C. altus SZÖRÉNYI, 1955: 69-70, 207-208; pl. 9, figs 5, 7. [calcaire compact à Orbitolines, calcaire gris lamelleux, Alsópere, Olaszfalu-Eperkeshegy, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/293 (from Alsópere)>.

C. dilatatus TZANKOV, 1984: 77; pl. 31, figs 7, 7a-b. [Dar-Boaz, Provadia, Bulgaria] (Maastrichtian) <HT: USC CR_2 1280>.

C. loevisiformis TZANKOV, 1984: 76-77; pl. 31, figs 6, 6a-b. [Choumen, Bulgaria] (Maastrichtian) <HT: USC CR_2 1279>.

C. neocylindricus SZÖRÉNYI, 1955: 70-72, 208-210; fig. 24; pl. 9, figs 13-28. [calcaire compact à Orbitolines, calcaire gris lamelleux, Bakonynána (carrière de la vallée Gaja, côte E du mont Judenberg), Pénzeskut-Körisgyörpuszta, and Olaszfalu-Villóhegy, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/265 (from Bakonynána)>.

C. subcircularis sulcatus SAVCHINSKAYA, 1974: 316-317; pl. 98, figs 17-22. [Northern Don Basin, Russian SFSR] (*Belemnitella longei*-zone, Late Campanian) <HT: not given>.

Genus *Hungaresia* SZÖRÉNYI, 1955

Hungaresia SZÖRÉNYI, 1955: 76, 215. Type-species: *Hungaresia hungarica* SZÖRÉNYI, 1955 [Eastern Europe] (Mid-Cretaceous). {other species included: *Hungaresia minor* SZÖRÉNYI, 1955}.

Mid-Cretaceous

H. minor SZÖRÉNYI, 1955: 78, 216-217; pl. 11, figs 1-5. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/344>.

H. hungarica SZÖRÉNYI, 1955: 77-78, 215-216; fig. 25; pl. 10, figs 14-22. [bane de calcaire marneux jaune et bane de calcaire à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, and Sümeg (grande carrière de Gerine), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/338 (from Sümeg)>.

Genus *Nucleolites* Lamarck, 1801

(Genus *Echinobrissus* Gray, 1825; objective junior synonym of *Nucleolites* Lamarck, 1801)

Cretaceous

N. elongatus Chiplonkar & Badve, 1972: 142-143; pl. 12: figs 17, 22. [Deola-Chirakhan Marl, Chirakhan (22°22'30" N, 75°07' E), India] (Cenomanian) <HT: MACSG CH 401>.

E. faasi Shmidt & Simakov, 1953: 43-44; figs 10a-в; pl. 2: figs 16-18. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Early Turonian) <HT: VNIGRI 38/336>.

E. gultschensis Shmidt & Simakov, 1953: 42-43; figs 9a-г; pl. 2: figs 19-26. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Late Turonian) <HT: VNIGRI 17/336>.

E. (*Nucleolites*) *pannonicus* Szörényi, 1955: 73-74, 211-212; pl. 10, figs 1-5. [bane de marne jaune et grise du groupe de calcaires à Hippurites, Sümeg-Kövesdomb, and Sümeg (grande carrière de Gerine), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/302 (from Sümeg)>.

Late Jurassic

N. strictiporus Vadet, 2007: 204-205; illustr. on p. 205. [Hesdin l'Abbé, Boulonnais, France] (Oxfordian, Late Jurassic) <HT: Vadet colln V5140; PT: MHNB 662, 1007-1014, Vadet colln V2999-V3006, 3878, 3879, 5377, 5378, 7281, 7282, 7301-7307>.

E. volgensis Gerasimov, 1955: 23-24; pl. 4: figs 6, 7a, б, 8a, б, 9, 10a, б, 11, 12. [Righthand side of River Volga, near the villages Glebovo, Mostovo and Koprino, Yaroslavskog Oblast, USSR] (Early Volgian (= Middle Tithonian), zone of *Virgatites virgatus*) <HT: GMM 855-4>.

Genus *Oolopygus* d'Orbigny, 1857

Late Cretaceous

O. globulorostratus Savchinskaya, 1974: 317-318; pl. 100, figs 1-5. [Northern Don Basin, Russian SFSR] (*Belemnitella longei*-zone, Late Campanian) <HT: not given>.

Genus *Plagiochasma* Pomel, 1883

Maastrichtian

P. lammersmaxi Jagt & van der Ham in Jagt, 2000: 252-254; pl. 17, figs 1-3, 10. [lowermost Meerssen Mb., Maastricht Fm., ENCI-Maastricht Quarry, Maastricht, The Netherlands] <HT: NHMM TL 1985/1>.

Early Cretaceous

P. nadorense Vadet, Marignac, Nicolleau & Reboul, 2007: 32-33; pl. 16: figs 2-3; pl. 17: figs 1-2. [Sidi Bouzid, N of Safi, Morocco] (Late Berriasian to Early Valanginian, Early Cretaceous) <HT: Reboul coll. 308>.

Genus *Primipygus* Vadet, 2007

Primipygus Vadet, 2007: 192. Type-species: *Nucleolites richardsoni* Paris in Richardson & Paris, 1908. [France] (Bajocian, Jurassic). {objective junior synonym of *Notopygus* Pomel, 1883; considered to be a subjective junior synonym of *Pseudosorella* Etallon, 1859, p. 415 by Smith (2008 – The Echinoid Directory, accessed 14/07/2008)}.

Genus *Pygaulus* L. Agassiz, 1847

Turonian

P. aksuensis Shmidt & Simakov, 1953: 38; figs 5a-б; pl. 2: figs 4-6. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Early Turonian) <HT: VNIGRI 14/336> {referred to *Pygorrhynchus* by Egorov (1972: 59)}.

P. faasi Shmidt & Simakov, 1953: 36-37; figs 4a-в; pl. 1: figs 18-20. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Early Turonian) <HT: VNIGRI 10/336> {referred to *Pygorrhynchus* by Egorov (1972: 59)}.

Cenomanian

P. richardi Nastaj, 1985: 19-22; figs 1a-b, 2a-b, 3a-; pl. 1, figs 3a-c, 4a-b. [Brzozówka, near Korzkiew, near Cracow, Poland] (Cenomanian) <HT: Department of the Institute of Geology and Mineral Deposits, University of Mining and Metallurgy, Cracow, no specimen no. given>.

Late Cretaceous

P. cyclotus Yang Shengqiu, 1991: 116-117; pl. 10; figs 1-10. [Upper Kukebai Fm., 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Late Cretaceous) <HT: NIGP, no holotype defined>.

Genus *Pygopistes* Pomel, 1883

Paleocene

P. parrasae Parma & Casadio, 2005: 1076-1078; figs 5.2-5.4, 7, 8. [Roca Formation, Casa de Piedra and Cerros Bayos, La Pampa Province, Argentinia; Bajo Hondo, Río Negro Province, Argentinia] (NP2-NP3 alcareous nannofossil zone, Early Danian, Paleocene) <HT: PMOZ 4087 (from Casa de Piedra); PT: PMOZ 4088, GHUNLPam 22154 (both from Casa de Piedra), GHUNLPam 22009-22014 (from Cerros Bayos), CPBA 6334 (from Bajo Hondo)> {redescribed by del Rio et al. (2007: 260-261)}.

Genus *Pygorhynchus* L.Agassiz, 1839

(Genus *Botriopygus* d'Orbigny, 1856;
objective junior synonym of *Pygrhynchus* L. Agassiz, 1839)

Cretaceous

[*P. acutus* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

B. baconicus Szörényi, 1955: 64-65, 202-203; pl. 7, figs 1-4. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/224>.

P. clypeiformis Deviries, 1973: 67-68; pl. 2, figs 7-9. [Kef el Mekene, map sheet Ain Regada, Algeria] (Barremian, Early Cretaceous) <no types defined, material in the colln of A. Devries>.

P. debensis Deviries, 1973: 68-69; pl. 2: figs 10-12. [Kef ed Deb, map sheet Ain Regada, Algeria] (Barremian, Early Cretaceous) <no types defined, material in the colln of A. Devries>.

B. latipetalus Szörényi, 1955: 63, 200-201; pl. 7, figs 11-12, 14-15. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/247>.

B. neoataxensis Szörényi, 1955: 63-64, 201-202; pl. 7, figs 6, 8, 10, 13. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/244>.

B. ovalis Szörényi, 1955: 64, 202; pl. 7, figs 5, 7, 9. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/235>.

B. pappi Szörényi, 1955 [Barnabás, 1937]: 61, 198; pl. 6, figs 13-15. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <NT: GIH Eb/183> {Szörényi (1955) cites Barnabás (1937) as author of this

species, but this paper seems to be an unpublished Ph.D. thesis, unless earlier published descriptions are found, SZÖRENYI (1955) is to be considered as author of this species}.

B. pappi elongatus SZÖRÉNYI, 1955: 62, 199-200; pl. 6, figs 1, 3, 6, 10. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/205>.

B. pappi kutassyi SZÖRÉNYI, 1955 [BARNABÁS, 1937]: 61-62, 199; pl. 6, figs 5, 7-8. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <NT: GIH Eb/187> {SZÖRÉNYI (1955) cites BARNABÁS (1937) as author of this species, but this paper seems to be an unpublished Ph.D. thesis, unless earlier published descriptions are found, SZÖRENYI (1955) is to be considered as author of this subspecies}.

B. petalodes planus SZÖRÉNYI, 1955: 62-63, 200; pl. 6, figs 2, 4, 9, 11-12. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/250>.

B. subquadratus SZÖRÉNYI, 1955: 65-66, 203-204; pl. 8, figs 1-4, 6. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/219>.

B. suemegensis [*sümegensis*] SZÖRÉNYI, 1955: 66-67, 204-205; pl. 8, figs 8, 11, 13, 15. [groupe de calcaires à *Hippurites*, Sümeg (carrière de Gerine), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/218>.

B. variabilis SZÖRÉNYI, 1955: 67, 205-206; pl. 8, figs 5, 7, 9-10, 12, 14, 16. [bane à *Botriopygus* du groupe de calcaires à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/212>.

Family Echinolampadidae GRAY, 1851

Genus *Arnaudaster* LAMBERT, 1918

Maastrichtian

A. cylindriformis SMITH, 1995: 219-222; fig. 73-75; pl. 25: figs 11-12; pl. 29: figs 1-9. [. [Simisima Fm., Jebel Buhays and Jebel Rawdah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE4334; PT: BMNH EE4324, EE4331-33, EE3378-81>.

Genus *Echinolampas* Gray, 1825

Recent

E. alexandri forma *arctambulacrum* Dollfus & Roman, 1981: 106; pl. 35, figs 3-5. [Station 17, Red Sea] (Quarternary – Recent) <HT: not given>.

Miocene

E. antunesi Gonçalves, 1971: 308-310; figs 1-2. [Farol des Lagostas, niveau II of Antunes, 1964, région côtière au Nord de Luanda, Angola, Africa] (Middle to Late Miocene) <HT: MMGL no repository no. given> {based on a single, damaged specimen}.

E. (*Isolampas*) *bonomii* Venzo, 1934: 114-116; pl. 1, figs 9, 9a-b. [Monte Brione, Italy] ("Aquitanian Veneto", Early Miocene) <HT: ? Instituto Geologico della R. Univ. Pisa> {based on a single specimen}.

E. duncani McNamara, 1987a: 109-110; figs 1a-c. [Bairnsdale Limestone Mb., Gippsland Limestone, Bairnsdale, Victoria, Southern Australia) (Bairnsdalian, Middle Miocene) <HT: BMNH E1107> {name preoccupired; McNamara (1989: 257), proposed *E. laubei* as replacement name}.

E. gregoryi gregoryi McNamara & Philip, 1980c: 8; pl. 4, figs 4-6. [Muddy Creek Fm., Clifton Bank, South Australia] (Balcombian, Middle Miocene) <HT: NMV P55477>.

E. gregoryi corrugata McNamara & Philip, 1980c: 8; pl. 4, figs 7-9. [Bairnsdale Limestone, South Australia] (Middle Miocene) <HT: NMV P18379>.

E. laubei McNamara, 1989: 257. [Bairnsdale Limestone Mb., Gippsland Limestone, Bairnsdale, Victoria, Southern Australia) (Bairnsdalian, Middle Miocene) <HT: BMNH E1107> {nomen novum for *E. duncani* McNamara, 1987a non Cotteau, 1891}.

E. (*Hypsoclypus*) *liae* Tavani, 1939: 42; pl. 3 (5), fig. 2. [Umm er Rzem, Cyrenaica, Libya] (Langhian) <no specimen no.>.

E. schultzi Kroh, 2005: 119-122; fig. 43.5, 51; pl. 54, figs 2-3; pl. 55, figs 1-3; pl. 56, figs 1-2. [Zogelsdorf Formaton, train station Eggenburg, Lower Austria, Austria] (Late Eggenburgian (= Early Late Burdigalian), Early Miocene) <HT: formerly at the Krahuletz Museum (Eggenburg, Austria), now lost; NT: NMHW 2003z0040/0001> {nomen novum pro *E. laurillardi acuminata* Schaffer, 1912, preoccupied by *E. acuminata* Abich, 1882 (= *E. laurillardi* sensu Laube, 1871, non Agassiz in Agassiz & Desor, 1847)}.

E. tumulus McNamara & Kendrick, 1994: 42-44; figs 16A-D. [Poivre Fm.; Eagle's Nest, Northern Flacourt Bay and Cape Maloet; Barrow Island, Western Australia] (Middle Miocene) <HT: WAM 82.269; PT: WAM 82.207-20, 82222-251, 82.274, 82.259-269, 82.282-288>.

Oligocene

[*E. chiplonkari* TANDON]. [Kutch, India] (*Lepidocyclina* (*Eulepidina*) Zone, Oligocene) <types unknown> {nomen nudum; mentioned in SRIVASTAVA (1988: 152); not established in TANDON (1973), which is an abstract only}.

E. cookei SRIVASTAVA & SINGH, 1999: 30-31; pl. 5, figs 5-8. [Near Guvar, Kachchh, India] (*Lepidocyclina* (*Eulepidina*) Zone, Rupelian) <HT: DGUL KTE 241; PT: DGUL KTE 307, KTE 318, KTE 319, KTE 357, 358>.

E. guvarensis SRIVASTAVA & SINGH, 1999: 32; pl. 6, figs 7-8; pl. 7, figs 1-3. [Guvar, Kachchh, India] (*Lepidocyclina* (*Eulepidina*) Zone, Rupelian) <HT: DGUL KTE 328; PT: DGUL KTE 321, KTE 325, KTE 335> {mentioned previously as nomen nudum in SRIVASTAVA (1988: 152)}.

[*E. kieri* SRIVASTAVA, 1988]: 152. [India] (*Nummulites subclypeus* Zone, Oligocene) <types unknown> {nomen nudum; also mentioned in SRIVASTAVA, MISHRA & SRIVASTAVA (1992: Tab. 1), first mentioned in the unpublished Ph.D. thesis of Dinesh K. SRIVASTAVA (pers. comm. 16.X.2007)}.

E. posterocrassa curtata MCNAMARA & PHILLIP, 1980: 3; pl. 1, figs 7-9. [Port Vincent Limestone, Adelaide Cement Holdings Quarry, N Wool Bay, Yorke Peninsula, South Australia] (*Guembelitria stavensis* Zone, Oligocene) <HT: NMV P55451; PT: NMV P55452-53>.

E. tandoni SRIVASTAVA & SINGH, 1999: 29-30; pl. 4, figs 5-7; pl. 5, figs 1-4. [Jhadwa, Kachchh, India] (*Nummulites fichteli* Zone to *Nummulites subclipeus* Zone, Lattdorfian-Rupelian) <HT: DGUL KTE 279; PT: DGUL KTE 233, KTE 341, KTE 342, KTE 347, KTE 354>.

Eocene

E. bastai ELATTAAR & STROUGO, 2001: 70-72; figs 6a-6g. [mouth of Wadi Gharandal, west-central Sinai, Egypt] (Late Eocene) <HT: ASUGM 278E (figs 6d, 6e); PT: ASUGM 278E (figs 6f, 6g)>.

[*E. cooki* SRIVASTAVA, 1988]: 151. [India] (*Nummulites maculatus* Zone, Middle Eocene) <types unknown> {nomen nudum; mentioned also in SRIVASTAVA, MISHRA & SRIVASTAVA (1992: Tab. 1), first mentioned in the unpublished Ph.D. thesis of Dinesh K. SRIVASTAVA (pers. comm. 16.X.2007); later published as *E. cookei* in SRIVASTAVA & SINGH (1999)}.

E. daralagezensis PORETSKAYA, in AKOPJANA, 1974a: 362-363; pl. 187, figs 3а-б. [Rind, Armenia] (Late Eocene) <HT: LGU 306/2>.

E. garoensis SRIVASTAVA, SINGH, TIWARI & JAUHRI, 2008: 514; pl. 1: figs 1-9. [Siju Limestone Dhapsagiri village, South Garo Hills, Meghalaya, India] (Late Lutetian to Early Bartonian) <HT: LUGD I/2020; PT: LUGD I/2020_a>.

[*E. granti* Srivastava, 1988]: 151. [India] (*Nummulites maculatus* Zone, Middle Eocene) <types unknown> {nomen nudum; mentioned also in Srivastava, Mishra & Srivastava (1992: Tab. 1), first mentioned in the unpublished Ph.D. thesis of Dinesh K. Srivastava (pers. comm. 16.X.2007)}.

[*E. jhadwensis* Srivastava, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <types unknown> {nomen nudum; mentioned also in Srivastava, Mishra & Srivastava (1992: Tab. 1), first mentioned in the unpublished Ph.D. thesis of Dinesh K. Srivastava (pers. comm. 16.X.2007)}.

E. jigniensis Srivastava, Mishra & Srivastava, 1992: 99-101; pl. 1, figs 1-4; pl. 2, figs 1-5. [Jigni village, Rajauri District, Jammu & Kashmir, India] (Middle Eocene) <HT: NRF-2/353; PT: NRF.2/354, 2/355, 2/356>.

E. khariensis Srivastava & Singh, 1999: 26-27; pl. 2, figs 1-5. [Khari, Kachchh, India] (Middle Eocene) <HT: DGUL KTE 283; PT: DGUL KTE 284, KTE 286, KTE 287, KTE 296, KTE 297, KTE 298>.

E. lakiensis Sawar, 1988: 76-80; figs 1a-c, 2a-c, 3a-c. [Laki Hills, Khithar Range, District Dadu, Sindh, Pakistan] (Late Cretaceous & Eocene) <HT: PUPCE No. 64> {based on 3 poorly preserved specimens}.

E. lipiformis Srivastava & Singh, 1999: 27-28; pl. 2, figs 6-8. [Near Pipur, Kachchh, India] (*Asterocyclina alticostata* Zone, Middle Eocene) <HT: DGUL KTE 677; PT: DGUL KTE 388, KTE 678, KTE 679>.

[*E. merhi* Srivastava, 1988]: 151. [India] (*Nummulites maculatus* Zone, Middle Eocene) <types unknown> {nomen nudum; mentioned also in Srivastava, Mishra & Srivastava (1992: Tab. 1), first mentioned in the unpublished Ph.D. thesis of Dinesh K. Srivastava (pers. comm. 16.X.2007)}.

E. pipurensis Srivastava & Singh, 1999: 28-29; pl. 3, figs 1-3. [Near Pipur, Kachchh, India] (*Nummulites maculatus* Zone, Middle Eocene) <HT: DGUL KTE 274; PT: DGUL KTE 268, KTE 275>.

E. qattamiaensis Ali, 1983: 57-58; pl. 1, figs 1-5. [Cairo-Building stone Fm., Gebel Qattamia, Egypt] (Upper Lutetian) <HT: USNM 341264>.

E. rotundus Mamedov & Melikov, 1976: 164-165; fig. 6; pl. 1, figs 4а, 4б, 4в. [In-Arieh (Tahanabat), Republic Mali] (Middle Lutetian, Eocene) <HT: AzINEFTEKHIM 14/69>

E. tachanabatensis Mamedov & Melikov, 1976: 161-164; figs 4-5; pl. 1, figs 3а, 3б, 3в. [In-Arieh (Tahanabat), Republic Mali] (Middle Lutetian, Eocene) <HT: AzINEFTEKHIM 12/69>

E. tanypetalis Harper & Shaak, 1974: 1166-1168; text-figs 2A-B; pl. 1, figs 1-4. [Ocala Limestone, Suwannee River, Lafayette County, Florida, USA] (Jacksonian, Late Eocene) <HT: BYU 1466; PT: UFS 3378, 3900>.

E. yadongensis Mu & Wu, 1976: 364; pl. 3: figs 13-15; pl. 4: figs 4-5. [Zongpu Grp., Duila, Yadong County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Paleocene-Eocene) <ST: 27134, 27135 (repository not given; persumably NIGP)>.

Genus *Pseudocatopygus* Cotteau & Gauthier, 1895

In the *Treatise* (Kier, 1966: U508) this taxon is considered as synonymous to *Parapygus* Pomel, 1883

Cretaceous

P. bucharensis Shmidt & Simakov, 1953: 39-40; figs 6a-в; pl. 2: figs 7-10. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Senonian) <HT: VNIGRI 40/336> {referred to *Catopygus* by Egorov (1972: 59)}.

Genus *Rostropygus* Szörényi, 1955

Rostropygus Szörényi, 1955: 67-68, 206. Type-species: *Rostropygus annae* Szörényi, 1955. [Hungary] (Mid-Cretaceous) {In the *Treatise* (Kier, 1966: U508) this taxon is considered as synonymous to *Parapygus* Pomel, 1883}.

Cretaceous

R. annae Szörényi, 1955: 68, 206-207; pl. 9, figs 1-4, 6. [groupe de calcaires à *Hippurites*, Sümeg (carrière située sur la partie N de la colline Kövesdomb), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/259>.

Family Faujasiidae Lambert, 1905

Genus *Domechinus* Kier, 1962

Late Cretaceous

D. sinensis Mu & Wu, 1976: 365; pl. 4: figs 8-13. [Zongshan Fm., north of Zongshan (= Mt. Zong), Gangba County (south slope of Jidula), Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <HT (by monotypy): 27138 (repository not given; persumably NIGP)>.

D. vialovi Moskvin, 1984: 65-67; figs 2a-в; pl. 1: figs 1a-e, 2. [Central Kyzylkumy, Tokhtatau Mt., Uzbekistan] (Maastrichtian, Late Cretaceous) <HT: MGU 242/1>.

Genus *Faujasia* d'Orbigny, 1856

Late Cretaceous

[*F. praeacutus* Egorov, 1972]: 61. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

Genus *Gongrochanus* Kier, 1962

Maastrichtian

G. ariyalurensis Srivastava, 2003: 60-63; pl. 1, figs 1-8. [Kallankurichchi Fm. and Ottakovil Fm., 3.2 km E of Ariyalur, Tamil Nadu, India] (Maastrichtian) <HT: TCE 151; PT: TCE 155, 158, 160, 161, 163 to 167>.

G. chiplonkari Badve & Aziz, 1983: 237; figs 3d, e. [Ottakovil Fm., Ariyalun Grp., Ottakovil Area, South India (Lower to Middle Maastrichtian) <HT: MACSG 1439; PT: MACSG 1440-1447>.

G. stoliczkai Badve & Aziz, 1983: 237-238; figs 3f, g-j. [Ottakovil Fm., Ariyalun Grp., Ottakovil Area, South India (Lower to Middle Maastrichtian) <HT: MACSG 1448; PT: MACSG 1449-1456>.

G. kieri Badve & Aziz, 1983: 238; figs 3h, i. [Ottakovil Fm., Ariyalun Grp., Ottakovil Area, South India (Lower to Middle Maastrichtian) <HT: MACSG 1457; PT: MACSG 1458-1466>.

G. ottakoviensis Badve & Aziz, 1983: 239; figs 4a, b. [Ottakovil Fm., Ariyalun Grp., Ottakovil Area, South India (Lower to Middle Maastrichtian) <HT: MACSG 1467; PT: MACSG 1468-1478>.

G. circularis Badve & Aziz, 1983: 239; figs 4c, d, e. [Ottakovil Fm., Ariyalun Grp., Ottakovil Area, South India (Lower to Middle Maastrichtian) <HT: MACSG 1477; PT: MACSG 1478-1486>.

G. tamilnaduensis Badve & Aziz, 1983: 240; figs 4 f, g. [Ottakovil Fm., Ariyalun Grp., Ottakovil Area, South India (Lower to Middle Maastrichtian) <HT: MACSG 1487; PT: MACSG 1488-1528>.

Late Cretaceous, undifferentiated

G.? *acutus* Mu & Wu, 1976: 366; pl. 5: figs 5-8. [Zongshan Fm., Dongripu, Gangba County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <HT (by monotypy): 27141 (repository not given; persumably NIGP)>.

Genus *Hardouinia* HAIME *in* D'ARCHIAC & HAIME, 1853

Late Cretaceous

H. nuratensis MOSKVIN, 1984: 67-68; figs 3a-в; pl. 1: figs 3a-д, 4. [Western forehills of the southern Nuratau Mts., Uzbekistan] (Maastrichtian) <HT: MGU 242/3>.

Genus *Himalayechinus* MU & WU, 1976

Himalayechinus MU & WU, 1976: 366. Type-species: *Himalayechinus typicus* MU & WU, 1976 [China] (Late Cretaceous) {probably synonymous to *Faujasia* (A. SMITH, pers. comm. Nov. 2007); other species included: *Himalayechinus longus* MU & WU, 1976; *Himalayechinus minimus* MU & WU, 1976}.

Late Cretaceous

H. longus MU & WU, 1976: 367; pl. 5: figs 18-21. [Zongshan Fm., north of Zongshan (= Mt. Zong), Gangba County (south slope of Jidula), Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <HT (by monotypy): 27144 (repository not given; persumably NIGP)>.

H. minimus MU & WU, 1976: 367; pl. 6: figs 1-6. [Zongshan Fm., north of Zongshan (= Mt. Zong), Gangba County (south slope of Jidula), Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27145, 27146 (repository not given; persumably NIGP)>.

H. typicus MU & WU, 1976: 366-367; pl. 5: figs 9-17. [Zongshan Fm., north of Zongshan (= Mt. Zong), Gangba County (south slope of Jidula), Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27142, 27143 (repository not given; persumably NIGP)>.

Genus *Petalobrissus* LAMBERT, 1916

SMITH (1995: 202) placed this genus in the family Cassidulidae AGASSIZ & DESOR, 1847.

Maastrichtian

P. rawdahensis SMITH, 1995: 202-206; fig. 64-65; pl. 24: figs 1-12. [Jebel Rawdah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE3485; PT: BMNH EE3467-84, EE3486-87, EE4321-22> {SMITH & JEFFERY (2000:174) placed this species in the subgenus *Paralampas* DUNCAN & SLADEN, 1882}.

P. (*Paralampas*) *platisternus* Smith & Jeffery, 2000: 172-174; text-fig 71A-E. [Jebel Rawdah, Oman-United Arab Emirates border region] (*A. fresvillensis* zone, mid Maastrichtian) <HT: BMNH EE4341; PT: BMNH EE3505-10, EE3512-28, EE3530, EE3532, EE3535, EE3537-41>.

Late Cretaceous

[*P. tadjikistanensis* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

Genus *Progongrochanus* Aziz & Badve, 2001

Progongrochanus Aziz & Badve, 2001: 45. Type-species: *Progongrochanus ariyalurensis* Aziz & Badve, 2001. [India] (Albian to Campanian, Cretaceous) {other species included: *Progongrochanus bellus* Aziz & Badve, 2001, *Cassidulus crassus* Stoliczka, 1873, *Cassidulus oldhaminus* Stoliczka, 1873, *Nucleolites* (*Pygorhynchus*) *plantus* Forbes, 1846, *Nucleolites* (*Pygorhynchus*) *testudo* Forbes, 1846}.

Maastrichtian

P. ariyalurensis Aziz & Badve, 2001: 45-46; pl. 1: figs 1-3. [Kallankurichchi Formation, Ariyalur Group, Kallankurichchi, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Hauericeras rembda*-zone, Early Maastrichtian) <HT: MACSG-1951; PT: MACSG-1952-1969>.

P. bellus Aziz & Badve, 2001: 46-47; pl. 1: figs 4-5. [Kallankurichchi Formation, Ariyalur Group, Kallankurichchi, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Hauericeras rembda*-zone, Early Maastrichtian) <HT: MACSG-1970; PT: MACSG-1971-2000>.

Genus *Stigmatopygus* d'Orbigny, 1856

Smith & Wright (2000: 435) placed this genus in the subfamily Stigmatopyginae Smith & Wright, 2000.

Maastrichtian

S.? *pulchellus* Smith, 1995: 212-215; fig. 69-70; pl. 27: figs 1-8. [Jebel Rawdah, Oman/United Arabian Emirates Border Region] <HT: BMNH EE4314; PT: BMNH EE3324-25, EE3329-30, EE3332-33, EE4312-13>.

Subfamily Stigmatopyginae SMITH & WRIGTH, 2000

Stigmatopyginae SMITH & WRIGTH, 2000: 435. Type-genus: *Stigmatopygus* D'ORBIGNY, 1856. (Middle Jurassic (Bajocian) to Upper Eocene) {other genera included: *Gongrochanus* KIER, 1962; *Hardouinia* HAIME in D'ARCHIAC & HAIME, 1853; *Platypygus* DE LORIOL, 1902; *Procassidulus* LAMBERT, 1918; and *Ochetus* POMEL, 1883}.

Family Archiaciidae COTTEAU & TRIGER, 1869

Genus *Archiacia* L. AGASSIZ, in AGASSIZ & DESOR, 1847

Cretaceous

A. hungarica SZÖRÉNYI, 1955: 82-87, 221-224; figs 26-33; pl. 11, figs 12-36. [groupes de manes argileuses, Zirc-Tündérmajor, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/348>.

A. magna SZÖRÉNYI, 1955: 87-88, 224; pl. 11, figs 37-41. [calcaire à Réquiénies, Zirc-Tündérmajor, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/398>.

Genus *Acriaster* SMITH in SMITH & BENGGTSON, 1991

Acriaster SMITH in SMITH & BENGGTSON, 1991: 46. Type-species: *Acriaster sergipensis* SMITH in SMITH & BENGGTSON, 1991. [Brazil] (Albian).

Albian

A. sergipensis SMITH in SMITH & BENGGTSON, 1991: 47-48; figs 38-39; pl. 8, figs H-K. [?Maruim Mb., Riachuelo Fm., Brazil] (?Upper Albian) <HT: USNM 448097>.

Family Cassidulidae L. AGASSIZ & DESOR, 1847

Genus *Cardiopygus* AZIZ & BADVE, 2001

Cardiopygus AZIZ & BADVE, 2001: 49. Type-species: *Cardiopygus cardus* AZIZ & BADVE, 2001. [India] (Maastrichtian).

Maastrichtian

C. cardus Aziz & Badve, 2001: 49-50; pl. 2: figs 1-3. [Kallankurichchi Formation, Ariyalur Group, Ariyalur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Hauericeras rembda*-zone, Early Maastrichtian) <HT: MACSG-2001>.

Genus *Cassidulus* Lamarck, 1801

Eocene

C. santolayae Sillero *in* Santolaya & Sillero, 1994: 21-22; unnumbered fig. on p. 22. [Sierra de Horna, Province Alicante, Spain] (Lutetian, Middle Eocene) <HT: Collection Sillero, Alicante> {re-described in López & Sillero (2006: 162)}.

Paleocene

C. kieri Adegoke, 1977: 58-60; pl. 5: figs 1-14. [Ewekoro Fm., Ewekoro quarry, Ewekoro, 50 km N Lagos, Nigeria] (Paleocene) <HT: UIMG 145; PT: UIMG 164-165, USNM 174760-174762>.

Genus *Hypsopygaster* Bajarunas, 1915

Paleocene

H. bajarunasi Kadil'nikova & Moskvin, 1984: 37; pl. 6, figs 7. [Sullukapinskaya Fm., Mangyshlak Peninsula, Mt. Aksyrtau, U.S.S.R.] (Upper Paleocene) <HT: PIN 4011/7> {pagination of English translation, Russian original not seen}.

H. rostriformis Kadil'nikova & Moskvin, 1984: 36; pl. 6, figs 5-6. [Western Mangyshlak region, Kapam ravine, U.S.S.R.] (Lower Paleocene) <HT: PIN 4011/5> {pagination of English translation, Russian original not seen}.

Genus *Limpasiaster* Aziz & Badve, 2001

Limpasiaster Aziz & Badve, 2001: 50. Type-species: *Limpasiaster ariyalurensis* Aziz & Badve, 2001. [India] (Maastrichtian) {other species included: *Limpasiaster pentagonalis* Aziz & Badve, 2001; *Limpasiaster quadralis* Aziz & Badve, 2001}.

Late Cretaceous

L. ariyalurensis Aziz & Badve, 2001: 50-51; pl. 2: figs 4-6. [Kallankurichchi Formation, Ariyalur Group, Ariyalur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Hauericeras rembda*-zone, Early Maastrichtian) <HT: MACSG-2002; PT: MACSG-2003-2008>.

L. pentagonalis AZIZ & BADVE, 2001: 52; pl. 3: figs 4-6. [Kallankurichchi Formation, Ariyalur Group, Ariyalur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Hauericeras rembda*-zone, Early Maastrichtian) <HT: MACSG-2059; PT: MACSG-2060-2098>.

L. quadralis AZIZ & BADVE, 2001: 51-52; pl. 3: figs 1-3. [Kallankurichchi Formation, Ariyalur Group, Ariyalur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Hauericeras rembda*-zone, Early Maastrichtian) <HT: MACSG-2009; PT: MACSG-2010-2058>.

Genus *Nucleopygus* L. AGASSIZ, 1840

Paleocene

N. salgadoi PARMA, 1989: 94-96; pl. 1: figs 1-6. [Roca Formation, Casa de Piedra, at the border between the Río Negro and La Pampa provinces, Argentinia] (Paleocene) <HT: MOZ P 3020>.

Maastrichtian

N. magnus SMITH, 1995: 216-219; fig. 71-72; pl. 28: figs 1-7. [Simisima Fm., Jebel Buhays, Jebel Faiyah, Jebel Rawdah and Jebel Thanais, Oman/United Arabian Emirates Border Region] <HT: BMNH EE4339; PT: BMNH EE3340, EE3356, EE3358, EE3363, EE3365, EE3367-68, EE4327, EE4335-38>.

Late Cretaceous

N. bashibulakensis YANG SHENGQIU, 1991: 117-118; pl. 11, figs 1-13. [Upper Kukebai Fm., Kuzigongsu, 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Late Cretaceous) <HT: NIGP 88371>.

N. gangbensis MU & WU, 1976: 368; pl. 7: figs 1-9. [Zongshan Fm., north of Zongshan (= Mt. Zong), Gangba County (south slope of Jidula), Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27151, 27152 (repository not given; persumably NIGP)>.

N. platypetalus YANG SHENGQIU, 1991: 118-119; pl. 12, figs 1-9. [Upper Kukebai Fm., Kuzigongsu, 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Late Cretaceous) <HT: NIGP, no holotype defined>.

N. calcalosus YANG SHENGQIU, 1991: 118; pl. 13, figs 1-12. [Upper Kukebai Fm., Kuzigongsu, 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Late Cretaceous) <HT: NIGP, no holotype defined>.

Mid-Cretaceous

N. parvus Szörényi, 1955: 74-75, 213; pl. 10, figs 6-8. [marne glauconieuse, carrière située à côté de la route Bakonynána-Alsópere, and Pénzeskut-Körisgyörpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/318 (from Bakonynána-Alsópere)>.

N. peltitipos Szörényi, 1955: 75-76, 213-214; pl. 10, figs 9-13. [marne glauconieuse, Bakonynána, and Pénzeskut-Körisgyörpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/322 (from Pénzeskut-Körisgyörpuszta)>.

Genus *Ochetus* Pomel, 1883

[=*Ochetes* Kier,1962]

Smith & Wright (2000: 435) placed this genus in the subfamily Stigmatopyginae Smith & Wright, 2000, within the family Faujasiidae Lambert, 1905.

Cenomanian

O. pauli Smith & Wright, 2000: 439; text-fig. 173; pl. 138, figs 10-12. [White Hart Pit, Wilmington, Devon, England] (*N. carcitanense* zone, Lower Cenomanian) <HT: BMNH EE6377; PT: BMNH EE80644>.

Genus *Paralampas* Duncan & Slanden, 1882

In the *Treatise* (Kier, 1966: U515) this taxon is considered as synonymous to *Rhynchopygus* d'Orbigny, 1856.

Paleocene

P. rancureli Tessier & Roman, 1973: 149-151; fig. 8; pl. 1, figs 8-11; pl. 3, fig. 2. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Paleocene, Thanetian) <HT: IPM 1972-9Cc>.

Genus *Rhyncholampas* A. Agassiz, 1869

Miocene

R. candidoi Garrafielo Fernandes & Carreira Morais, 1994: 55-57; figs 1-4. [Pirabas Formation, Praia de Atalaia, Município de Salinópolis, Estado do Pará, Brazil] (Early Miocene) <HT: MPEG 1160>.

R. chipolanus Oyen & Portell, 1996: 62-66; pl. 1, figs 1a-b; pl. 2, figs 2a-b. [Chipola Fm., Chipola River, Calhoun County, Florida] (Early Miocene) <HT: UF 66633>.

Oligocene

R. gouldii newbernensis Kier, 1997: 6; fig. 3; pl. 5, figs 1-7. [Trent Fm., New Bern quarry, North Carolina] (Late Oligocene) <HT: USNM 398324; PT: USNM 398325, 492065-492096>.

Eocene

R. smithi Srivastava, Singh, Tiwari & Jauhri, 2008: 514-515; pl. 2: figs 1-8; pl. 3: figs 5-8. [Siju Limestone Dhapsagiri village, South Garo Hills, Meghalaya, India] (Late Lutetian to Early Bartonian) <HT: LUGD I/2023; PT: LUGD I/2024 to I/2026>.

R. strougoi Azab & Elattaar, 1999: 854; tab. 10; pl. 1: figs 22-26. [El Guss Abu Said, Farafra area, Egypt] (Prenaster alpinus Zone, Early Libyan, Early Eocene) <repository and specimen nos. not given>.

Subgenus *Galerolampas* Cotteau, 1889

In the *Treatise* (Kier, 1966: U515) this taxon is considered as synonymous to *Rhyncholampas* A. Agassiz, 1869.

Paleocene

R. (*G.*) *tinrhertensis* Amard, Collignon & Roman, 1983: 93-95; fig. 10; pl. 17, figs 1-6. [Oudeiat Chouikh, Tinrhert occidental, Algeria] (Late Paleocene) <HT: MNHN 1975-15 AB 202-8>.

Genus *Rhynchopygus* d'Orbigny, 1856

Eocene

R. ? *janchrisorum* Holmes, 2004: 211-213; figs 2A-F, 3A, B, 4A-C, 5, 6A. [Muloowurtie Fm., "Sliding Rocks", Yorke Peninsula, South Australia] (Aldingian, Priabonian, Late Eocene) <HT: NMV P145616; PT: NMV P312113-P312115>.

Upper Cretaceous

R. arumaensis Kier, 1972a: 72-73; pl. 45, figs 1-77. [Aruma Fm., locality KK11, Saudi Arabia] (Campanian) <HT: USNM 170452; PT: USNM 170453>.

Family Clypeolampadidae Kier, 1962

Genus *Vologesia* Cotteau & Gauthier, 1895

Maastrichtian

V. rowdahensis Ali, 1989a: 406; figs 5(1-3). [Simsima Fm., Gebel El Rowdah, United Arab Emirates] (Late Maastrichtian) < MGD-UAA > {no type specimen defined}.

Family Pliolampadidae Kier, 1962

Genus *Calilampas* Squire & Demetrion, 1996

Calilampas Squires & Demetrion, 1996: 512-514. Type-species: *Calilampas californiensis* Squire & Demetrion, 1996. [USA] (Eocene).

Eocene

C. californiensis Squire & Demetrion, 1996: 514, fig. 5.1-5.7, 6, 7. [Bateque Fm., Baja California Sur, Mexico; Llajas Fm., Simi Valley, Southern California, USA] (Middle Lower Eocene) <HT: IGM 6387; PT: IGM 6388-6391, LACMIP 11532>.

Genus *Eurhodia* Haime in d'Archaic & Haime, 1853

Mooi (1990a: 693-695) placed this genus in the family Cassidulidae L. Agassiz & Desor, 1847

Recent

E. relicta Mooi, 1990: 690-693; figs 1-4. [continental shelf off Surinam, South America] <HT: USNM E20480; PT: USNM E12971>.

Eocene

E. baumi Kier, 1980: 23-24; fig. 6; pl. 6, figs 5-8. [Castle Hayne Limestone, Rose Hill locality 11, North Carolina, USA] (Middle Eocene) <HT: USNM 264043>.

E. rugosa ideali Kier, 1980: 26-28; figs 7, 9; pl. 7, figs 7-9. [Castle Hayne Limestone, localities 2, 5, 8, Rose Hill locality 11, Ideal Cement Company quarry localities 12, 26, 28, North Carolina, USA] (Middle Eocene) <HT: USNM 264046>.

E. rugosa depressa Kier, 1980: 28-29; figs 7, 10; pl. 7, figs 10-12. [Castle Hayne Limestone, Maple Hill (East Coast Construction Company quarry) localities 10, 34, North Carolina, USA] (Middle Eocene) <HT: USNM 264047>.

Genus *Gitolampas* Gauthier, 1889

Eocene

G. mcnamarae Srivastava, Singh, Tiwari & Jauhri, 2008: 515-516; pl. 3: figs 1-4. [Siju Limestone Dhapsagiri village, South Garo Hills, Meghalaya, India] (Late Lutetian to Early Bartonian) <HT: LUGD I/2027>

Genus *Pseudopygaulus* Coquand, 1862

Eocene

P. romani Azab & Elattaar, 1990: 216-221; figs 3-5; pl. 1: figs 1-15. [Wadi Abu Gelbana, Gebel Haridi, Wadi Matmar, Wadi El Gabrawi, Tell El-Amarna, and Beni Hassan, Nile Valley, between Minia and Sohag, Egypt] (Late Libyan, Early Eocene) <HT: specimen illustrated in pl. 1: figs 1-7 (from Wadi Abu Gelbana), no repository given>.

Paleocene

P. malavoyi Tessier & Roman, 1973: 152-155; figs 9-14; pl. 1, figs 15-18; pl. 2, figs 1-3; pl. 3, fig. 3. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Paleocene, Thanetian) <HT: IPM 1972-9Df>.

Genus *Studeria* Duncan, 1891

Paleocene

S.? frescoensis Tessier & Roman, 1973: 155-156; pl. 1, figs 12-14; pl. 3, fig. 4. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Paleocene, Thanetian) <HT: IPM 1972-9Ea>.

Genus *Tamililampus* Aziz & Badve, 2001

Tamililampus Aziz & Badve, 2001: 52-54. Type-species: *Tamililampus tumidus* Aziz & Badve, 2001. [India] (Maastrichtian).

Maastrichtian

T. tumidus Aziz & Badve, 2001: 54; pl. 3: figs 7-8. [Kallankurichchi Formation, Ariyalur Group, Ariyalur, Tamil Nadu region, Trichinopoly Basin, Southern India] (Hauericeras rembda-zone, Early Maastrichtian) <HT: MACSG-2009 (probably type error for 2099 as no. 2009 is mentioned as holotype of *Limpasiaster quadralis* Aziz & Badve, 2001 also)>.

Family Apatopygidae Kier, 1962

Genus *Apatopygus* Hawkins, 1920

Miocene

A. mannumensis Holmes, 1999: 57-60; figs 3B, 3E, 4A-E, 7B, 7E. [Mannum Fm., Murray River, South Australia] (Longfordian, Early Miocene) <HT: NMV P148496; PT: NMV P148385-148395>.

Oligocene

A. gaudensis Gatt, 2005: 104-109; figs 1, 1a, 2, 2a, 3, 3a, 4, 5. [Lower Coralline Limestone Fm. and Lower Globigerina Limestone Formation, Qammieh, northwestern Malta; numerous sites along the southern and western coast of Gozo, Maltese Islands, Central Mediterranean] (Late Chattian, Oligocene to Aquitanian, Early Miocene*) <HT: Michael Gatt coll. (Rabat, Malta) E.574; PT: Michael Gatt coll. E.1695, E.1701, E.1705> {*According to the revised age dates Foresi et al. (2008) the Lower Globigerina Limestone Formation is of Late Chattian age, thus restricting the occurrence of *A. gaudensis* Gatt, 2005 to the Late Oligocene}.

Eocene

A. vincentinus (Tate, 1891): 280. [reported as coming from "Aldinga", but according to Holmes (1999: 55) they probably come from the Tortachilla Limestone, north of Blanche Point, Maslin Bay, South Australia] (Johannian – Aldingan, Middle to early Late Eocene) <LT: SAM T266H; PLT: SAM T266A-G, I, J> {originally referred to the genus *Echinobrissus*; not mentioned in Lambert & Thiéry (1909-25); revised by Holmes (1999), who designated the lectotype}.

Genus *Porterpygus* Baker, 1983

Porterpygus Baker, 1983: 164. Type-species: *Porterpygus kieri* Baker, 1983. [New Zealand] (Recent).

Recent

P. kieri Baker, 1983: 164-168; figs 3, 10-28. [Three Kings Is., New Zealand] (Recent) <HT: NMNZ Ech. 3707; PT: NMNZ Ech. 3708-10>.

Miocene

P. devlinensis Holmes, 1999: 60-64; figs 3C, 6A-G, 7C, 7F. [Mannum Fm., Murray River, South Australia] (Longfordian, Early Miocene) <HT: NMV P148399; PT: NMV P148396-148398, 148400 and 148401>.

Family Claviasteridae ALI, 1992a

Claviasteridae ALI, 1992: 72. Type-genus: *Claviaster* D'ORBIGNY, 1855. [Northern Africa and France] (Late Cretaceous).

Family Plesiolampadidae SMITH & JEFFERY, 2000

Plesiolampadidae SMITH & JEFFERY, 2000: 246-247. Type-genus: *Plesiolampas* DUNCAN & SLADEN, 1882. {other genera included: *Oriolampas* MUNIER-CHALMAS, 1882; *Termieria* LAMBERT, 1931; and *Pseudopygaulus* COQUAND, 1862}.

Family Clitopygidae VADET, 2007

Clitopygidae VADET, 2007: 211-212. Type-genus: *Clitopygus* POMEL, 1883. [Europe] (Jurassic).

Family Infraclypeidae SAUCÈDE, MOOI & DAVID, 2007

Infraclypeidae SAUCÈDE, MOOI & DAVID, 2007: 352-353. Type-genus: *Infraclypeus* GAUTHIER, 1875 in COTTEAU, PERON & GAUTHIER, 1873-1891. {other genera included: *Pyrinodia* POMEL, 1883; *Desorella* COTTEAU, 1855; *Pachyclypus* DESOR, 1858}.

Family Uncertain

Genus *Echinanthus* LESKE, 1778

AMARD, COLLIGNON & ROMAN (1983: 110) placed this genus into the family Pliolampadidae.

Eocene

E. reguanti REGUANT, ROMAN & VILLATTE, 1972: 903-905; pl. 33, figs 9a-d, 10a-b, 11a-b. [Niveau m1 of REGUANT (1967) = "marnes de Banyoles", 4 km N of Sau, Region of Vic, Barcelona, Spain] (Biarritzien inférieur, Middle Eocene) <HT: MNHN 1970-6 (AA03-1)>.

Paleocene

E. schweinfurthi devriesi Amard, Collignon & Roman, 1983: 110-112; fig. 11-12; pl. 17, figs 7-16. [Ed Dahna, Tademait oriental, Algeria] (Early Paleocene) <HT: MNHN 1975-15 AB 709-21>.

Order Holasteroida Durham & Melville, 1957

Genus *Smithiaster* Barras, 2007

Smithiaster Barras, 2007: 158; figs 5a, b; pl. 2: figs 8a-c. Type-species: *Dysaster loryi* Gras, 1852. [France & North Africa] (Oxfordian to Kimmeridgian, Late Jurassic) {stem group holasteroid}.

Family Collyritidae d'Orbigny, 1853

Genus *Collyrites* Desmoulins, 1835

Middle Jurassic

C. analis dimota Vialov, 1945: 468-469; figs a-e. [Balkhan Mt., Western Turkmenistan] (Callovian, Jurassic) <HT: coll'n Vasiljevski, current repositroy unknown>.

C. cheveti Vadet, Nicolleau & Pineau, 1998: 55-56; 1 fig., pl. 17. [l'Assise de Carreaux, environs de Mortagne au Perche, Sarthe, France] (Callovian) <HT: V 5124; Type series: V 3830-31, 5123, 5126-5132>.

Genus *Collyropsis* Gauthier, 1896

Albian

C. ovoides Devriès, 1972: 46-47; pl. 2: figs 7-12. [Sierra de Crevilente, Province Alicante, Spain] (Albian, Late Cretaceous) <ST: coll. J. Azema, Paris [no specimen no. provided]>.

Berriasian

C. ultimus Solovjev, 1971: 63-64; fig. 28a-б; pl. 10, figs 2a-б, 3a-в. [Kutsky, SE Crimea, Ukraine] (Berriasian, Early Cretaceous) <HT: PIN 2282/1>.

Genus *Orbignyana* EBRAY, 1860

Late Jurassic

O. cordiformis DEVRIÈS, 1972: 43-45; pl. 1: figs 1-5; pl. 3: figs 1-8. [northern slope of Puig Santa Magdalena, north-east of Novelda, Province Alicante, Spain] (Late Kimmeridgian/Tithonian) <HT (by monotypy): coll. J. Azema, Paris, no. 750>.

Genus *Pyrgorhytis* POMEL, 1883

Jurassic

P. klairi VADET & RÉMY, 2004: 17-19; 8 unnumbered figs on pp. 18-19. [Calcaire gréseux à oolithes ferrugineuses, environs de Sedan, Ardennes, France] (*sauzei* zone, Early Bajocian) <HT. Rémy coll. 972; PT: Rémy coll. 817-818, 922-924, 971, 1006-1009; Vadet coll. 6262-6274, 6278-6284>.

P. magnus SOLOVJEV, 1971: 47; pl. 2, figs 3а-в, 4а-г. [Janysharsky Horizon, Kara-Dag (Kordonnaya Balka), SE Crimea, Ukraine] (Middle Callovian) <HT: PIN 2275/5>.

Genus *Tetraromania* SOLOVJEV, 1971

Tetraromania SOLOVJEV, 1971: 64. Type-species: *Dysaster ovulum* DESOR, 1842. [Ukraine] (Berriasian to Barremian) {other species included: *Collyrites jaccardi* DESOR, 1869}.

Subfamily Collyropsinae SOLOVJEV, 1966

Collyropsinae SOLOVJEV, 1966: 45-46. Type-genus: *Collyropsis* GAUTHIER, 1896.

Family Disasteridae GRAS, 1848

Genus *Metaporinus* L. AGASSIZ, 1844

Middle Jurassic

M. drogiacus ROBERT, 1991: 22; pl. 5. [Calcaires à chailles; Brétignelles, près Druyes, Dept. Yonne, France] (*Antecedens* subzone, *Plicatilis* zone, Middle Oxfordian) <HT: Philippe Robert coll'n No. 604> {based on an internal mould; re-described in ROBERT (1994: 54; pl. 6: figs 2, 10); original paper not seen, based on data in ROBERT (1994)}

Genus *Proacrolusia* Poretskaya, 1974b

Proacrolusia Poretskaya, 1974b: 86-87. Type-species: *P. kelatensis* Poretskaya, 1974b. [Turkmenistan] (Late Jurassic).

Late Jurassic

P. kelatensis Poretskaya, 1974b: 87; figs a-e; pl. 1: figs 1-4. [Kopet Dag, Turkmenistan] (Late Jurassic) <HT: LGU 327/1; PT: LGU 327/2 to 327/17>.

Family Holasteridae Pictet, 1857

Genus *Cardiaster* Forbes, 1850

Cretaceous

C. bolschechetensis Shmidt, 1976: 154-155; pl. 1: figs 3a-б, 5. [Borehole 4, Large Kheta, side brance of Jounig River, Russian SFSR] (Early Santonian, Late Cretaceous) <HT: /8846 [sic! – number of specimen appears to be incomplete, repository not given]>.

C. cotteauanus latohumilis Savchinskaya, 1974: 319-320; pl. 102, figs 1-5. [Northern Don Basin, Russian SFSR] (*Belemnitella longei*-zone, Late Campanian) <HT: not given>.

C. pseudoplanus [*protoplanus*] Smith & Wright, 2003: 488-489; text-figs 196A, 196B, 202, 203; pl. 153: figs 5-9. ["*Rhynchonella curvieri* Bed" [pars], Tingley's Pit, Wouldham and Lydden zigzag, East of Dover, Kent, England] (I. labiatus Zone, Early Turonian and T. lata Zone, Middle Turonian, Late Cretaceous) <HT: BMNH E16899 (from Wouldham); PT: BMNH E9799> {in the abstract this species is called *Cardiaster protoplanus*}.

Genus *Crassiholaster* Smith & Wright, 2003

Crassiholaster Smith & Wright, 2003: 556. Type-species: *Spatangus subglobosus* Leske, 1778. [Europe] (Cenomanian, Cretaceous) {other species included: *Holaster bischoffi* Renevier, 1868; *Echinocorys sphaericus* Schlueter, 1869; *Crassiholaster sulciproctus* Smith & Wright, 2003}.

Cenomanian

C. subglobosus forma *norfolkensis* Smith & Wright, 2003: 559-561; text-figs 234, 235; pl. 177: figs 13-16. [Lower Inoceramus Bed, Hunstanton, Norfolk, and Welton Parish Pit, near Alford, Lincolnshire, England] (M. dixoni Zone, Early Cenomanian, Late

Cretaceous) <HT: none defined; ST: BMNH E42595, E42620, E42622, E42651-52, E42654-56, E75478, E81606-608, E81610>.

Crassiholaster sulciproctus Smith & Wright, 2003: 563-564; text-figs 237A, B; pl. 179: figs: 12-16. [Grey Chalk facies, Dover, Kent, England] (Middle or Late Cenomanian, Late Cretaceous) <HT: BMNH E38901> {based on a single specimen}.

Genus *Echinocorys* Leske, 1778

Paleocene

E. ancileformis Moskvin & Shimanskaya, 1981: 135-136; fig. 2а-г; pl. 1, fig. 3; pl. 2, figs 1а-б. [west Ustyurt, Kazakhstan] (Upper Paleocene) <HT: MSU 226/7>.

E. australis Foster & Philip, 1978: 815-816; text-fig. 5; pl. 92: figs 1, 3, 6; pl. 93: figs 2, 4. [Wadera Calcarenite, Toothawarra Creek, Carnarvon Basin, Western Australia] (Middle to Late Paleocene) <CPC F4818>.

E. kongieli Moskvin & Shimanskaya, 1993: 56; figs 2з; 3н; 4: 1а-в. [Michurino, Crimea, Ukraine] (Danian) <HT: MSU 267>.

E. schafferi Kühn, 1930: 551; pl. 1: fig. 3. [Bruderndorf Formation, Haidhof near Ernstbrunn, Lower Austria, Europe] (Upper Danian) <HT: NHMW 1930V11> {placed into the synonymy of *Echinocorys scutata* forma *ovata* (Leske, 1778) by Kroh (2001: 398-399)}

E. schwetzovi Moskvin & Shimanskaya, 1981: 134-135; fig. 2е, з; pl. 1, figs 2а-б. [Urta Mt., Western Georgia] (Upper Paleocene) <HT: MSU 226/4>.

E. sulcata cognatus Moskvin & Shimanskaya, 1981: 129-132; fig. 1а-д; pl. 1, figs 1а-в. [Usak, Kazakhstan] (Lower Paleocene) <HT: MSU 226/1>.

E. sulcata orbiculata Moskvin & Shimanskaya, 1993: 54; figs 5: 2а-в. [Tus-Bair, Mangyshlak, Kazakhstan] (Danian) <HT: MSU 268>.

E. turanica Moskvin & Shimanskaya, 1981: 136-137; fig. 2д-ж; pl. 2, figs 1а-в, 3. [Ustyurt, Kazakhstan] (Upper Paleocene) <HT: MSU 226/10>.

Maastrichtian

E. balcanicus Tzankov, 1984: 90-91; pl. 38, figs 2, 2a-b; pl. 50, figs 2, 2a-b. [Dermantzi, de Vratza, Bulgaria] <HT: USC CR_2 1292>.

E. elongatus Tzankov, 1984: 92; pl. 39, figs 2, 2a-b. [Drumevo, de Provadia, Bulgaria] <HT: USC CR_2 1294>.

E. kharagoulensis Gongadze, 1976: 39-41; pl. 1: figs 1a-c. [southwestern part of the Kharagouli [Charagoulski] Syncline, southern border of the Dzirula Massif, Georgia]

(Late Maastrichtian, Cretaceous) <HT: TGU Gongadze Coll'n 4/26> {re-described in Gongadze (1979: 80-81; pl. 12, figs 1a-b)}.

E. stomias McNamara, 1987b: 421-425; figs 1-3. [Miria Fm., Giralia Range, Western Australia] (Late Maastrichtian) <HT: WAM 84.442; PT: WAM 82.3088, 84.420, 84.441, 84.443, 86.1388, NMV P102120, P102398, RUCA 20152>.

E. terminata Moskvin & Shimanskaya, 1997: 70-71; figs 1: 1а-б, 2, 3, 4а-б; figs 2а-в. [Mangyshlak, Kazhakstan] (Late Maastrichtian, Late Cretaceous) <HT: MSU 269(1)>.

Campanian

E. zejszneri Mączyńska, 1984: 454-455; pl. 206, fig. 1a-d; pl. 207, fig. 1a-d. [Poskwitów koło Krakowa, Miechów Trough, Outer Carpathians, Poland] (Campanian) <HT: MZ VIII/Ee-854> {see also Mączyńska in Malinowska (1989: 312)}.

Cenomanian

E. euxinus Shimanskaya, 1974: 151-152; figs 1а-д, 2а-г. [Mount Sel'Bulkhra, SW Crimea] (Cenomanian, Late Cretaceous) <HT: MSU 1/38>.

Genus *Eoholaster* Solovjev, 1989

Eoholaster Solovjev, 1989: 150. Type-species: *Eoholaster poslavskae* Solovjev, 1989. [Ukraine] (Berriasian) {other species included: *Toxaster laffittei* Devries, 1960}.

Berriasian

E. poslavskae Solovjev, 1989: 150-153; fig. 1а-д; unnumbered pl., figs 1а-г, 2а-г, 3а-в. [south-western Crimea, Ukraine] (Berriasian) <HT: PIN 2276/7>.

Genus *Galeola* Quenstedt, 1874

In the *Treatise*, Wagner & Durham (1966: U528) considered *Galeola* a subjective synonym of *Echinocorys* Leske, 1778.

Campanian

G. papillosa basiplana Ernst, 1971: 219-222; Text-fig. 20a, 21, 23 (fig. 2-6). [Teutonia quarry, Misburg, near Hannover, northern Germany] (Early Campanian) <HT: Coll. Ernst; presumably in the MBE collection now (2005)>.

Genus *Garumnaster* LAMBERT, 1906

Paleocene

G. lamberti KÜHN, 1930: 552; pl. 1: figs 6-7. [Bruderndorf Formation, Bruderndorf, Lower Austria, Europe] (Upper Danian) <HT: NHMW 1930V9> {placed into the synonymy of *Echinocorys scutata* forma *pyrenaica* SEUNES, 1888 by KROH (2001: 400)}

Genus *Giraliaster* FOSTER & PHILIP, 1978

Giraliaster FOSTER & PHILIP, 1978: 804-805. Type-species: *Giraliaster jubileensis* FOSTER & PHILIP, 1978. [Australia & New Zealand] (Palaeogene).

Oligocene

G. bellissae FOSTER & PHILIP, 1978: 813-814; pl. 91: figs 4-6. [Prydes Gully Mb., Otekaike Limestone, North Ottago, New Zealand] (Dunttroonian-Waitakian, Late Oligocene) <HT: NZGS EC849>.

Paleocene

G. jubileensis FOSTER & PHILIP, 1978: 805-808; text-figs 3, 4a; pl. 89: figs 1-6. [Cardabia Grp., Jubilee Bore, Carnarvon Basin, Western Australia] (Middle or Late Paleocene) <HT: WAM 73.362; PT: WAM 73.363-64>.

Genus *Guettaria* GAUTHIER, 1888

Maastrichtian

G. fecunda SCHULZ, 1983: 718; fig. 2d; pl. 1, figs 2-3. [Moos-Graben, Siegsdorf, Bavaria, Germany] (Late Early Maastrichtian) <HT: BSPG 1977 XXI/22>.

Campanian

G. schamchorensis MELIKOV, in ALI-ZADE, 1988: 198; figs 35-37; pl. 6б, figs 2а-г. [Schamchor, Lower Caucasus, Azerbaijan] (Late Campanian) <HT: AzINEFTEK-HIM 201/2>.

Genus *Hagenowia* DUNCAN, 1889

Santonian

H. blackmorei anterior ERNST & SCHULZ, 1971: 140-141; figs 8: 1a-c, 2a-c; pl. 14, figs 2-3. [Breitenburg-Schinkel pit, Lägerdorf, Northern Germany] (Base of the *rogalae*/

westfalicagranulata-zone, Middle Santonian) <HT: GPIH 121; PT: coll. Diersche and coll. Schulz>.

Genus *Hemipneustes* Agassiz, 1836

Maastrichtian

H. arabicus Ali, 1989a: 408; figs 6(1-3), 7. [Simsima Fm., Gebel El Rowdah, United Arab Emirates] (Late Maastrichtian) < MGD-UAA > {no type specimen defined}.

Late Cretaceous

H. duncani Sawar, 1989: 376-380; figs 1a-c, 2a-c. [Laki Hills, District Dadu, and Nathiagali, District Abbottabad, Khithar Range, Sind, N.W.F.P., Pakistan] (Late Cretaceous or Eocene) <HT: PUPCE No. 63 (from the Laki Hills)> {based on 2 poorly preserved specimens}.

H. indicus Aziz & Badve, 1990: 326-330; figs 2a-d. [Kallankurichchi Formation, Ariyalur Group, Ariyalur (11°09' N, 79°07'30" E), Tiruchirapalli District, Tamil Nadu region, Trichinopoly Basin, Southern India] (Maastrichtian, Late Cretaceous) <HT: MACSG-2104; PT: MACSG-2105-2107>.

Genus *Holaster* L. Agassiz, 1836

Late Cretaceous

[*H. sanglakensis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

H. tanamensis Shmidt, 1976: 153-154; pl. 1: figs 1а-в, 2а-в. 4а-б. [Krasnojarskiy Kr., Tanama Valley, near mouth of Yennisey [Enisei] River, Russian SFSR] (Early Santonian, Late Cretaceous) <HT: I/8846 [repository not given]>.

Mid-Cretaceous

H. hungaricus Szörényi, 1955: 93-95, 229-230; fig. 37; pl. 12, figs 10-12; pl. 13, figs 8-9. [marne à *Turrilites*, Olaszfalu, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/440>.

H. pseudonodulosus Szörényi, 1955: 95, 230-231; pl. 13, figs 1, 3-7. [marne à *Turrilites*, Jásd, and Lókút, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/412 (from Lókút)>.

H. subquadratus Szörényi, 1955: 95-96, 231; pl. 13, figs 10-13. [marne glauconieuse e marne à *Turrilites*, Pénzeskut-Körisgyörpuszta, Lókút, and Kisgyón-

Rákoshegy, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/434 (from Pénzeskut-Körisgyörpuszta)>.

Genus *Infulaster* WRIGHT & WRIGHT, 1948

Late Cretaceous

I. praecursor SMITH & WRIGHT, 2003: 513-514; text-figs 210, 211; pl. 157: figs 1-5. [Kiplingcotes, pit 1, and Drymere pit, near Swaffham, Norfolk, England] (*S. plana* Zone, Late Turonian, Late Cretaceous) <HT: BMNH EE6771 (from Kiplingcotes); PT: BMNH EE6762, EE6763, EE6766, EE6768>.

Genus *Lampadocorys* POMEL, 1883

Late Cretaceous

L. ennisi SMITH & WRIGHT, 2003: 566-567; text-fig. 238; pl. 182: figs 1-5. [Lower Chalk, Speeton, Yorkshire, England] (Late Cenomanian, Late Cretaceous) <HT: BMNH EE6952; PT: EE6730>.

L.? *estermanni* KROH & JAGT, 2004: 553-556; text-figs 3b, c, e,f; pl. 1: figs 1-6; pl. 2, figs 1-6. [Gschliefgraben tectonic window, near Gmunden, Upper Austria] (standard nannoplankton zones CC18–CC23, Middle to Late Campanian) <HT: NHMW 2003z0067/0001; PT: 2003z0067/0002>.

Genus *Medjesia* JEFFERY, 1997b

Medjesia JEFFERY, 1997b: 244-247. Types-species: *Enallopneustes meslei* GAUTHIER, 1892. [Tunesia] (Cenomanian).

Genus *Offaster* DESOR, 1858

Maastrichtian

O. granulosus KUTSCHER, 1978a: 630-631; pl. 3, figs 1-4. [Saßnitz, Rügen, Germany] (Late Early Maastrichtian) <HT: SGWG 59> {renamed *O. rugius* REICH, VILLIER & KUTSCHER, 2004 because of primary homonymy with *Offaster granulosus* LAMBERT, 1931}.

O. rugius REICH, VILLIER & KUTSCHER, 2004: 499. [Complex V, north of Saßnitz, Jasmund Peninsula, Rügen, Germany] (Late Early Maastrichtian) <HT: SGWG 59> {nomen novum for *Offaster granulosus* KUTSCHER, 1978a, p. 630 non LAMBERT, 1931}.

Santonian

O. nuciformis Ernst, 1971: 209-214; Text-fig. 17a-f, 18 (figs 1a-d, 2a-e). [Bülten-Adenstedt quarry, near Peine, northern Germany] (Late Mid-Santonian) <HT: GPIH type cataloge no. 122>.

Cretaceous

O. granulosus Lambert, 1931: M3-M4; pl. 1, figs 14-15. [Road from Zougouldak to Devrek and Marnes de Bartine near Guv-Tepessi, région d'Héraclée, Anatolia, Turkey] (Cretaceous) <HT: not given>.

Genus *Plesiocorys* Pomel, 1883

Late Cretaceous

P. (*P.*) *basiprocta* Smith & Wright, 2003: 512; text-fig. 209; pl. 161: fig. 9. [Bulford, Wiltshire, England] (Micraster coranguinum Zone, Early Santonian, Late Cretaceous) <HT: BMNH EE6762>.

P. (*P.*) *transiens* Smith & Wright, 2003: 509-510; text-figs 202, 203, 207; pl. 162: figs 1-8. [Cuxton (Kent), Dover (Kent), Sussex, Guildford (Surrey), and Louth (Lincolnshire), England] (*S. plana* Zone, Late Turonian to basal Coniacian, Late Cretaceous) <HT: BMNH E16896 (from Cuxton, Kent); PT: BMNH 4740a-b, 30143, 75922, E9788-89, E41792>.

Genus *Plesiohemipneustes* Smith & Wright, 2003

Plesiohemipneustes Smith & Wright, 2003: 483. Type-species: *Holaster revestensis* Lambert in Lambert & Thiéry, 1924 [England and France] (Cenomanian, Cretaceous) {assigned to the family Hemipneustidae by Smith & Wright (2003)}.

Genus *Protocardiaster* Smith & Wright, 2003

Protocardiaster Smith & Wright, 2003: 476. Type-species: *Spatangus truncatus* Goldfuss, 1829. [Western Europe] (Cenomanian to Early Coniacian, Late Cretaceous) {other species included: *Cardiaster cotteauanus* d'Orbigny, 1855}.

Genus *Pseudanachys* Pomel, 1883

Campanian

P. tumida Tanaka, 1984b: 192-193; text-fig. 3; pl. 1, figs 4a-c; pl. 2, figs 1a-c. [Chinomigawa Fm., Upper Yezo Grp., Higashimachi, Urakawa-cho, Urakawa-gun, Hokkaido, Japan] (Middle Campanian) <HT: YCM U611-1; PT: YCM U611-2>.

Cenomanian

P. alpina de Villoutreys & Bidar, 1973: 1977-1979; fig. 1; pl. 1, figs 1-2. [Ravin de Font de la Poule, la Mure, Alpes-de-Haute-Province, France] (Middle Cenomanian, base of *Rotomagense* zone) <HT: Muséum d'Histoire Naturelle de Nice, coll. Thomel no. 17182>.

Genus *Pseudholaster* Pomel, 1883

Late Cretaceous

P. mangyschlakensis Shmidt in Shmidt, Gorbatov & Zhelezko, 1979: 106; figs 2: 3a-в. [Besakty, Mangyshlak, Kazhakstan] (Early Cenomanian) <ST: CGM 3/II569, 4/II569> {as *Pseud̲oholaster* [sic!] *mangyschlakensis*}.

Mid-Cretaceous

P. baconicus Szörényi, 1955: 97-100, 232-234; figs 38-40; pl. 13, figs 14-15; pl. 14, figs 1-16. [marne glauconieuse et calcaire gris lamellé, Bakonynána (carrière de la vallée Gaja), Bakonynána (pente Est du mont Judenberg), Bakonynána (carrière située à l'Est du ruisseau Gaja), Bakonynána (carrière près de la route de Felsöpere), Szápármalom à l'Est de Csörpuszta, Pénzeskút-Körisgyörpuszta, Jásd, Olaszfalu-Villóhegy, Olaszfalu-Eperkeshegy, and carrière à l'est de la novelle route Csörpuszta à Inotapuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/415 (from Bakonynána, carrière de la vallée Gaja)>.

P. blackdownensis Smith & Wright, 2003: 469; pl. 148: figs 1-5. [Blackdown Greensand, Blackdown, Devon, England] (*P. inflatum* Zone, Late Albian, Early Cretaceous) <HT: BMNH E1334; PT: BMNH EE8218>.

P. caseyi Smith & Wright, 2003: 453-455; text-figs 177, 178; pl. 140: figs 4-7. [Red Bed, Sandling Junction, Hythe, Kent, England] (*H. jacobi* Zone, Late Albian, Early Cretaceous) <HT:BGS GSM Zm 32>.

P. depressus Smith & Wright, 2003: 468-469; text-fig. 185; pl. 148: figs 6-7. [Blackdown Greensand, Blackdown, Devon, England] (*P. inflatum* Zone, Late Albian, Early Cretaceous) <HT: BGS GSM 110500>.

Genus *Rispolia* Lambert, 1917

Cretaceous

R. hungarica Szörényi, 1955: 100-101, 235-236; pl. 15, figs 1-4, 6. [marne glauconieuse, Bakonynána (carrière de la vallée Gaja), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/428>.

Genus *Stegaster* Pomel, 1883

Smith, Gallemí, Jeffery, Ernst & Ward (1999: 110) place this genus within the family Stegasteridae Lambert, 1913.

Paleocene

S. palaeocenicus Smith & Gallemí in Smith, Gallemí, Jeffery, Ernst & Ward, 1999: 113-114; figs 25a-b; pl. 5, figs 4-6. [Aristregui & Larumbe, Navarra, Spain] (Late Danian) <MGB 37351>.

Genus *Seunaster* Lambert in Blayac, 1912

In the *Treatise*, Wagner & Durham (1966: U533) considered *Seunaster* a subjective synonym of *Stegaster* Pomel, 1883.

Coniacian

S. (*Seunaster*) *schmidti* Egoyan, 1955: 165-167; pl. 3, figs 1a-г. [Vedi River, between Aziz-Kend and Dashnov, Vedin Region, Armenia] (Coniacian) <HT: repository not given>.

Senonian

S. bulgaricus Tzankov, 1984: 101; pl. 45, figs 2, 2a-c. [Kondel, Dragoman, de Sofia, Bulgaria] (Lower Senonian) <HT: USC CR_2 1302>.

Genus *Tholaster* Seunes, 1890

Campanian

T. carvalhoi Greyling & Cooper, 1995: 68-71; figs 6-9. [Praia Egito, near Quimbala, 70 km N of Lobito, Angola] (Marroti zone, Middle Campanian) <HT: SAfM-PCA2240>.

Cretaceous

T. fourmarieri LAMBERT, 1931: M8 ; pl. 1, figs 5-6. [Marnes de Bartine near Guv-Tepessi, région d'Héraclée, Anatolia, Turkey] (Cretaceous) <HT: not given>.

Subfamily Cardiotaxinae SMITH & JEFFERY, 2000

Cardiotaxinae SMITH & JEFFERY, 2000: 287. Type-genus: *Cardiotaxis* LAMBERT, 1917. {other genera included: *Infulaster* WRIGHT & WRIGHT, 1948; *Hagenowia* DUNCAN, 1889}.

Subfamily Pseudholasterinae SMITH & JEFFERY, 2000

Pseudholasterinae SMITH & JEFFERY, 2000: 289. Type-genus: *Pseudholaster* POMEL, 1883. {other genera included: *Hemipneustes* L. AGASSIZ, 1836; *Giraliaster* FOSTER & PHILIP, 1978}.

Family Corystidae FOSTER & PHILIP, 1978

Corystidae FOSTER & PHILIP, 1978: 792-793. Type-genus: *Corystus* POMEL, 1883. [Australia, New Zealand] (Cenozoic) {emended to Corystusidae to remove homonymy with a crustacean family (BOYKO, 2008; ICZN Opinion 2238)}.

Genus *Cardabia* FOSTER & PHILIP, 1978

Cardabia FOSTER & PHILIP, 1978: 798. Type-species: *Cardabia bullarensis* FOSTER & PHILIP, 1978. [Australia] (Paleocene).

Paleocene

C. *bullarensis* FOSTER & PHILIP, 1978: 798-799; pl. 90: figs 3-4; pl. 91: figs 1-3. [Cardabia Grp., Giralia Anticline, Carnarvon Basin, North West Division, Western Australia] (Middle or Late Paleocene) <HT: WAM 73.361; PT: WAM 73.365-66>.

Genus *Huttonechinus* FOSTER & PHILIP, 1978

Huttonechinus FOSTER & PHILIP, 1978: 799. Type-species: *Macropneustes spatangiformis* HUTTON, 1873. [Australia] (Oligocene).

Late Cretaceous

H. antarctica Néraudeau, Crame & Kooser, 2000: 462-463; fig. 4.1-2, 9. [Lachman Crags Mb., Santa Marta Fm., Marambio Grp., northern James Ross Island, Antarctica] (Late Santonian-Early-Campanian) <HT: BAS D.8615.55>.

Family Plexechinidae Mooi & David, 1996

Plexechinidae Mooi & David, 1996: 946-947. Type-genus: *Plexechinus* A. Agassiz, 1896. [circum-Antarctic and Southern Pacific] (Recent).

Genus *Plexechinus* A. Agassiz, 1896

Recent

P. sulcatus David & Mooi, 2000: 167-171; figs 1a-c, 2a-d, 3, 4a-g. [R/V "Marion Dufresne", MD03-station 17, northwest of Kerguelen Islands; 47°24,9' S, 66°04' E] (Recent) <HT: MNHN EcEs 9343; PT: MNHN EcEs 9344>.

Family Urechinidae Duncan, 1889

Genus *Antrechinus* Mooi & David, 1996

Antrechinus Mooi & David, 1996: 946. Type-species: *Urechinus mortenseni* David & Mooi, 1990. [circum-Antarctic and West Pacific] (Recent) {other species included: *Urechinus drygalskii* Mortensen, 1905 and *Plexechinus nordenskjoldi* Mortensen, 1905}.

Genus *Pilematechinus* A. Agassiz, 1904

Recent

P. belyaevi Mironov, 1975: 208-210; figs 1а-д, 2.4, 2.7-2.9. [R/V Akademik Kurchatov 14th cruise Stat. 1259 (19°04' N, 80°30' W, depth 5800-6500 m), 1267 (19°38' N, 76°37' W, depth 6740-6780 m), Caribbean Sea] (Recent) <HT: IOANSSR XV-69-10 (from R/V Akademik Kurchatov 14th cruise Stat. 1259)>.

Genus *Urechinus* A. AGASSIZ, 1879

Recent

U. antipodeanus MCKNIGHT, 1974: 33-35; figs 4a-b. [NZOI Stat. G701 (46°20' S, 171°30' E, 1400 m depth), G704 (46°17' S, 172°37' E, 1600 m depth), G705 (46°04' S, 172°28.5' E, 1500 m depth), G706 (45°49' S, 172°30' E, 1550 m depth), New Zealand] (Recent) <HT: NZOI 184 (Stn G705); PT: NZOI P242 (Stn G705)>.

U. aoteanus MCKNIGHT, 1974: 35-37; figs 5a-b. [NZOI Stat. E903a (37°33' S, 172°05' E, 964-962 m depth), New Zealand] (Recent) <HT: NZOI 185; PT: NZOI P243>.

U. drygalskii perfidus MIRONOV, 1976: 146-147; figs 1б-ж; pl. 2, figs 1-2; pl. 4, figs 2, 4, 5, 7-9; pl. 5, figs 1-3. [R/V Vitayaz Stat. 3359 (51°30' N, 172°04' E, depth 5020 m), 5620 (44°48' N, 156°33' E, depth 5005-5045 m), 6088 (53°58'5 N, 157°36' W, depth 5740 m), 6142 (53°13'5 N, 163°43' W, depth 4990-5000 m), Northern Pacific Ocean, Bering Sea] (Recent) <HT: IOANSSR XV-69-11 (from R/V Vitayaz Stat. 5620)>.

U. mortenseni DAVID & MOOI, 1990: 76-81; figs 2-16. ["Eltanin" station 410, southwest of Elephant Island, South Shetland Islands, Antarctic Ocean] (Recent) <HT: USNM E40039; PT: USNM E11016> {placed into the genus *Antrechinus* MOOI & DAVID, 1996 by MOOI & DAVID, 1996: 946}.

U. parvus MIRONOV, 1978a: 219-220; figs 4б-в; pl. 3, figs 1, 3, 6-7. [16th Cruise R/V "Dimitri Mendeleyev" Stat. CT 1388, off South-west Australia; 2320-2360 m depth] (Recent) <HT: IOANSSR XV-69-15>.

U. planus MIRONOV, 1978a: 216-219; tab. 4; figs 2ж,з, figs 3а-в; pl. 1, figs 7-8; pl. 2, figs 1-2, 5-6. [16th Cruise R/V "Dimitri Mendeleyev" Stat. CT 1347, South of Tasmania; 1800-1820 m depth] (Recent) <HT: IOANSSR XV-69-14>.

Family Carnarechininae MIRONOV, 1993

Carnarechininae MIRONOV, 1993: 221. Type-genus: *Carnarechinus* MIRONOV, 1978a. (Recent).

Genus *Carnarechinus* MIRONOV, 1978a

Carnarechinus MIRONOV, 1978a: 209-211. Type-species: *Cystechinus clypeatus* A.AGASSIZ, 1879. [Southern Pacific Ocean] (Recent).

Family Pourtalesiidae A. AGASSIZ, 1881

Genus *Ceratophysa* Pomel, 1883

Recent

C. ceratopyga valvaecristata Mironov, 1976: 149-150; figs 2б-з; pl. 2, fig. 3; pl. 5, fig. 10. [R/V Vitayaz Stat. 3162 (43°15' N, 157°48' E, depth 5502 m), 3166 ? (44°43' N, 153°49' E, depth 5057 m), 3575 (38°02' N, 146°33' E, depth 5495 m), 4120 (53°37'7 N, 159°40'9 W, depth 6296-6328 m), 4213 ? (34°54' N, 123°56' W, depth 4200-4231 m), 5605 (46°10' N, 153°07' E, depth 4915-4985 m), 5624 (45°26' N, 154°12' E, depth 5200 m), 6088 (53°58'5 N, 157°36' W, depth 5740 m), 6142 (53°13'5 N, 163°43' W, depth 4990-5000 m), 6143 (51°40' N, 163°00' W, depth 4860 m), North Pacific Ocean] (Recent) <HT: IOANSSR XV-69-12 (from R/V Vitayaz Stat. 3575)>.

Genus *Echinocrepis* A.Agassiz, 1879

Recent

E. rostrata Mironov, 1973: 240-243; pl. 1, figs 1-6. [R/V Vitayaz Stat. 3359 (51°30' N, 172°04' E, depth 5020 m), 4147 (49°35' N, 133°57' W, depth 3470 m), 4158 (46°57' N, 143°59' W, depth 4661-4665 m), 4213 (34°54' N, 123°56' W, depth 4200-4231 m), 4265 (24°58' N, 113°25' W, depth 3315-3340 m), 5605 (46°10' N, 153°07' E, depth 4915-4985 m), 5634 (44°17' N, 149°33' E, depth 4690-4720 m), 6107 (57°38' N, 143°12' W, depth 3800 m), 6109 (56°13' N, 139°43' W, depth 3460 m), North Pacific Ocean] (Recent) <HT: IOANSSR no specimen no. given (from R/V Vityaz Stat. 4213)>.

Genus *Pourtalesia* A. Agassiz, 1869

Recent

P. heptneri Mironov, 1978b: 721-726; figs 1: 1-2, 4; figs 2-4. [“Витязь”-cruise (“Vityaz”-cruise) Stat. 6785 (5°34'4" S, 131°08' E, depth 7130 m), 7271 (5°37' S, 131°07.5' E, depth 7340-7335 m), Banda Trench, West Pacific] (Recent) <HT: IOANSSR XV-69-16>.

P. jeffreysi gibbosa Mironov, 1995a: 70-74; figs 1: 1-2, 2: 1-2. [Expedition of the Plavoochego Institute of Marine Research 1923-1924 Stat. 97 (79°50' N, 43°30' E, depth 334 m), 186 (77°44' N, 38°35' E, depth 230 m), 189 (78°10' N, 31°23' E, depth 225 m), “Седов”-cruise (“Sedob”-cruise) Stat. 25 (78°33' N, 63°10' E, depth 363 m), “Ломоносов”-cruise (“Lomonosob”-cruise) Stat. 7 (78°54' N, 70°14' E, depth 500 m), 12 (78°03' N, 79°47' E, depth 426 m), “Садко”-cruise 1935 (“Sadko”-cruise) Stat. 33 (80°55' N, 72°29' E, depth 520 m), 35 (81°11' N, 66°53' E, depth 520 m), 39 (80°43' N, 68°08' E, depth 542 m), “Садко”-cruise 1936 (“Sadko”-cruise) Stat. 10

(80°50'4" N, 71°47' E), 11 (80°23'8" N, 70°09'5" E, depth 582 m), "Литке"-cruise ("Litke"-cruise) Stat. 13 (82°11' N, 60°37' E, depth 923 m), 29 (81°18' N, 9°36' E, depth 1301 m), "Лена"-cruise ("Sena"-cruise) Stat. 2 (81°32' N, 5°15' E, depth 760 m), "Севастополъ"-cruise ("Sevastopol"-cruise) Stat. 1380 (67°54' N, 14°18' E, depth 1270 m), Arctic Ocean] (Recent) <HT: ZI 1/22940 (from "Lomonosob"-cruise Stat. 12)>.

P. jeffreysi lata Mironov, 1995a: 74-76; figs 2: 3, 4. ["Литке"-cruise ("Litkye"-cruise) Stat. 37 (82°39' N, 33°30' E, depth 2899 m), "Объ"-cruise ("Ob"-cruise) Stat. 45 (79°47' N, 1°41' W, depth 2800 m), "Polarstern"-cruise Stat. 32 (78°43' N, 132°33' E, depth 3011-3028 m), 54 (79°12' N, 119°56' E, depth 3076-3081 m), Arctic Ocean] (Recent) <HT: ZI 22941 (from "Polarstern"-cruise Stat. 54)>.

P. thomsoni Mironov, 1976: 152; figs 3г-д; pl. 3, figs 1-7; pl. 5, figs 3-6, 8, 11, 13. [R/V Vitayaz Stat. 4213 (34°54' N, 123°56' W, depth 4200-4231 m), 4265 (24°58' N, 113°25' W, depth 3315-3340 m), 6117 (56°12' N, 139°12'1 W, depth 3350-3370 m), North Pacific Ocean, West American and Alaskan Coast] (Recent) <HT: IOANSSR XV-69-13 (from R/V Vitayaz Stat. 4265)>.

P. vinogradovae Mironov, 1995b: 67-68; figs 6: 1A-D. ["Академик Курчатов"-cruise ("Akademik Kurchatov"-cruise) Stat. 896 (56°52' S, 24°53' W, depth 5530-5651 m), 909 (60°13' S, 44°00' W, depth 5450-5480 m), 914 (56°21' S, 50°48' W, depth 5670-6070 m), 916 (56°29' S, 50°51' W, depth 4664-5631 m), "Дмитрий Менделеев"-cruise ("Dmitrig Mendeleyev"-cruise) Stat. 1290 (54°33' S, 159°24' E, depth 5450-5410 m), 1292 (54°48.7' S, 159°10.4' E, depth 5400 m), 1306 (59°12' S, 158°32' E, depth 6210-6100 m), ? 4086 (60°50' S, 41°07' W, depth 6120-6290 m, tentative record based on fragments), ? 4090 (60°52' S, 40°56' W, depth 6145-5550 m, tentative record based on fragments), Antarctic, Sout-West Atlantic Ocean] (Recent) <HT: IOANSSR, no specimen no. given (from "Akademik Kurchatov"-cruise Stat. 914)>.

Genus *Echinosigra* Mortensen, 1907

Subgenus *Echinosigra* Mortensen, 1907

Recent

E. amphora Mironov, 1974a: 245-249; figs 1а, б, г-е, и, л, м, 2а-г, ж, з, к; pl. 1, figs в-е; pl. 2, figs а-з. [see respective ssp., North west Pacific] (Recent) <HT: IOANSSR XV-60-3 (from R/V Vityaz Stat. 3114)>.

E. amphora amphora Mironov, 1974a: 246-247; figs 1а, г, д, м, 2г, к; pl. 1, figs г-е. [R/V Vitayaz Stat. 2074 (42°32' N, 150°41' E, depth 5140 m), 2119 (46°08' N, 155°16' E, depth 5070-5090 m), 3114 (48°51' N, 160°01' E, depth 5511, 5670-5680 m), 3156 (39°57' N, 165°08' E, depth 5535 m), 3166 (44°43' N, 153°49' E, depth 5057 m),

3225 (37°51' N, 144°13' E, depth 5290-5390 m), 3363 (48°15' N, 169°39' E, depth 6272-6282 m), 3575 (38°02' N, 146°33' E, depth 5495 m), 3886 (32°11' N, 143°10' E, depth 5680-5690 m), 5621 (45°18' N, 156°00' E, depth 5035-5210 m), 5624 (45°26' N, 154°12' E, depth 5200 m), North-west Pacific Ocean] (Recent) <HT: IOANSSR XV-60-3 (from R/V Vityaz Stat. 3114)>.

E. amphora antarctica Mironov, 1974a: 248; figs 2ж, з. [R/V Ob Stat. 57 (64°03' S, 161°59' E, depth 2937 m), Pacific Antarctic Ridge, Ross Sea] (Recent) <HT: IOANSSR XV-69-6 (from R/V Ob Stat. 57)> {Mironov (1997: 185) raised this ssp. to species level}.

E. amphora fabrefacta Mironov, 1974a: 247-248; figs 2а-в; pl. 1, fig. в; pl. 2, figs а, б. [R/V Vitayaz Stat. 6097 (57°00' N, 148°18' W, depth 4740 m), 6106 (58°15' N, 142°36' W, depth 3610 m), 6107 (57°38' N, 143°12' W, depth 3800 m), 6143 (51°40' N, 163°00' W, depth 4860 m), Northern Pacific, Alaskan Coast] (Recent) <HT: IOANSSR XV-69-4 (from R/V Vityaz Stat. 6107)> {Mironov (1997: 183) raised this ssp. to species level}.

E. amphora indica Mironov, 1974a: 248; figs 1е, л; pl. 2, figs в-е. [R/V Vitayaz Stat. 4535 (9°58' S, 107°56' E, depth 6820-6850 m), 5168 (8°42' S, 105°31' E, depth 6433 m), Indian Ocean] (Recent) <HT: IOANSSR XV-69-5 (from R/V Vityaz Stat. 4535)>.

E. amphora valvaedentata Mironov, 1974a: 249; figs 1б, и; pl. 2, figs ж, з. [R/V Akademik Kurchatov Stat. 896 (56°52' S, 24°59' W, depth 5530-5651 m), 909 (60°13' S, 44°00' W, depth 5450-5480 m), 916 (56°29' S, 50°51' W, depth 4664-5631 m), Falkland Islands, South Atlantic] (Recent) <HT: IOANSSR XV-69-7 (from R/V Akademik Kurchatov Stat. 916)> {Mironov (1997: 183) raised this ssp. to species level}.

E. mortenseni Mironov, 1974b: 1804-1805; pl. 1, figs 5-6, 13; pl. 2, fig. з. ["Витязь"-cruise (Vityaz-cruise), Stat. 3364 (48°21.2' N, 169°54.1' E; depth 2915-3015 m), Northern Pacific] (Recent) <HT: IOANSSR XV-69-8>.

E. (*E.*) *phiale partita* Mironov, 1997: 176-177, figs 3A-D, H. [R/V Dmitrig Myendeleev Stat. 1276 (48°5' S, 171°42' E, depth 1100-1200 m), 1281 (53°23' S, 167°07.8' E, depth 1026 m), 1347 (44°06.6' S, 145°56' E, depth 1800 m), Subantarctic] (Recent) <HT: IOANSSR XV-69-30 (from R/V Dmitrig Myendeleev Stat. 1276)>.

E. porrecta Mironov, 1974b: 1805; pl. 1, figs 3-4, 7, 11-12; pl. 2, fig. и. ["Дмитрий Менделеев"-cruise ("Dmitrig Mendeleyev"-cruise), Stat. 525; "Витязь"-cruise ("Vityaz"-cruise), Stat. 4868 (11°16.9' N, 70°59' E, depth 2623 m), 5153; "Академик Курчатов"-cruise ("Akademik Kurchatov"-cruise), Stat. 22_1 (12°21.9' N, 61°12.4' E, depth 3614-3800 m), 22_2 (12°22.1' N, 61°15.9' E, depth 2280-2920 m), 28-29 (5°25.9' S, 68°34.8' E, depth 4800-5100 m); Cocos-Keeling Basin, Chagos Archipelago; depth: 2623-5200 m] (Recent) <HT: IOANSSR XV-69-9 (from "Akademik Kurchatov"-cruise, Stat. 28-29)>.

E. (*E.*) *vityazi* Mironov, 1997: 178-180, figs 6A-C, E, K. [R/V Vityaz Stat. 4954 (9°34.9' N, 90°54.4' E, depth 3485 m), 7325 (1°51.5' S, 144°40.8' E, depth 2550-2580 m), R/V Dmitrig Myendeleev Stat. 1235 (11°30.5' S, 152°11.7' E, depth 3070-3080 m), 1253 (29°28.5' S, 164°55.1' E, depth 3400 m), 1254 (30°00.0' S, 169°02.6' E, depth 2970-3020 m, Indo-Pacific Ocean] (Recent) <HT: IOANSSR XV-69-31 (from R/V Vityaz Stat. 4954)>.

Subgenus *Echinogutta* Mironov, 1997

Echinogutta Mironov, 1997: 180. Type-species *Echinosigra amphora amphora* Mironov, 1974a. (Recent) {*Echinocutta* [sic!] in the heading of the paragraph, but *Echinogutta* elswhere in the text; other species included: *Echinosigra amphora indica* Mironov, 1974a, *Echinosigra fabrefacta* Mironov, 1974a, *Echinosigra valvaedentata* Mironov, 1974a, *Echinosigra antarctica* Mironov, 1974a}.

Genus *Rictocystis* Mironov, 1996

Rictocystis Mironov, 1996: 1113-1114. Type-species: *Rictocystis jensenae* Mironov, 1996. [Indian Ocean and Western Pacific] (Recent):

Recent

R. jensenae Mironov, 1996: 1114-1117; figs 3-5. ["Galathea" cruise Stat. 474 (9°49' S, 114°13' E, depth 3920-3940 m), "Академик Курчатов"-cruise ("Akademik Kurchatov"-cruise) Stat. 25 (4°32.5' S, 63°19.6' E, depth 4430-4440 m), "Витязь"-cruise ("Vityaz"-cruise) Stat. 6775 (5°54.7' N, 128°30' E, depth 4920 m), "Дмитрий Менделеев"-cruise ("Dmitrig Mendeleyev"-cruise) Stat. 1235 (11°30.5' S, 152°11.7' E, depth 3070-3080 m); Indian Ocean and Western Pacific] (Recent) <HT: ZMUC ECH-1 (from "Galathea" cruise Stat. 474)>.

Genus *Solenocystis* Mironov, 2008

Solenocystis Mironov, 2008: 13-16. Type-species: *Solenocystis imitans* Mironov, 2008. [North Atlantic] (Recent).

Recent

S. imitans Mironov, 2008: 16-18; figs 2A-C, 7A-D, 8A-I, 9C. [RV G.O. Sars, MAR-ECO expedition, St. 72/386 (27 July 2004, 53°16' N, 35°31' W, 2555-2517 m), Northern Atlantic Ocean] (Recent) <HT: MZUB MAR-ECO 008141> {based upon a single specimen}.

Family Somaliasteridae Wagner & Durham, 1966

A cladistic analysis of this group carried out by Jeffery (1999:1038-1039) shows that this family should be placed into the Spatangoida instead of Holasteroida.

Genus *Iranianster* Cotteau &Gauthier, 1895

Upper Cretaceous

I. affinidouvillei Kier, 1972a: 74-77; figs 37D, 39D, 44; pl. 52, figs 4-7; pl. 53, figs 1-6. [Lower Aruma Fm., locality KK11, Saudi Arabia] (Campanian) <HT: USNM 170467; PT: USNM 170466, 170468-9, 170504, 170507>.

I. affinimorgani Kier, 1972a: 77-81; figs 38A, 39E, 43, 44; pl. 52, figs 1-3. [Lower Aruma Fm., locality KK11, Saudi Arabia] (Campanian) <HT: USNM 170462; PT: USNM 170463-170465, 170505>.

I. bowersi Kier, 1972a: 81-84; figs 38B, 40; pl. 54, figs 1-6. [Lower Aruma Fm., locality S-289, S-290, S-291, S-1234 and S-1419, Saudi Arabia] (Campanian) <HT: USNM 170470; PT: USNM 170471, 170506>.

I. omanensis Jeffery, 1999: 1032-1034; text-fig. 4a-c; pl. 1, figs 6-8. [Simsima Fm., Jebel Lahjan, Yanqul, Oman] (Maastrichtian) <HT: BMNH E82606; PT: BMNH E82603-E82605, E82607>.

Family Uncertain

Genus *Coraster* Cotteau, 1886

Jeffery in Smith & Jeffery (2000: 354) placed the genus into the family Corasteridae Lambert in Lambert & Thiéry, 1924 in the order Spatangoida Claus, 1876.

Paleocene

C. urmaensis Moskvin, 1982: 106; figs 1j-l; pl. 10, figs 4a-e, 5a-e. [Urma, Dagestan] (Upper Paleocene) <HT: PIN 3939/4> {Jeffery in Smith & Jeffery (2000: 355-356) placed this species into the synonymy of *C. vilanovae* Cotteau, 1886}.

Genus *Cottreaucorys* LAMBERT, 1920

Paleocene

C. kollmanni KROH, 2004: 313-317; fig. 2: 1a-d; pl. 1, figs 1a-d. [Bruderndorf Formation, Haidhof, near Ernstbrunn, Lower Austria, Austria] (Late Danian, Paleocene) <HT: NHMW 2004z0075/0004> {based on a single specimen}.

Genus *Nordenskjoeldaster* LAMBERT, 1910

Campanian

N. ? *australis* NÉRAUDEAU, CRAME & KOOSER, 2000: 460-462; fig. 4.7-8. [Rabot Point Mb., Santa Marta Fm., Marambio Grp., Rabot Point, James Ross Island, Antarctica] (Lower to Mid-Campanian) <HT: BAS DJ.662.6>.

Superfamily Orthosternata SMITH & JEFFERY, 2000

Orthosternata SMITH & JEFFERY, 2000: 264. {taxa included: Corystidae FOSTER & PHILIP, 1978; *Basseaster* LAMBERT, 1936; *Galeaster* SEUNES, 1889; and *Garumnaster* LAMBERT, 1936}.

Order Collyritoida VADET, 2007

Collyritoida VADET, 2007: 217. Type-family: Collyritidae D'ORBIGNY, 1853. (Jurassic).

Order Spatangoida CLAUS, 1876

Suborder Toxasterina FISCHER, 1966

Family Toxasteridae LAMBERT, 1920

Genus *Douvillaster* LAMBERT, 1917

Cretaceous

D. subtrigonalis SZÖRÉNYI, 1955: 118-119, 253-254; fig. 44; pl. 21, figs 1-5. [marne glauconieuse, Bakonynána (carrière de la vallée Gaja, pente de l'Est du mon Judenberg, carrières situées à l'Est du ruisseau Gaja et à côté de la route de Felsöpere), and Bakonynána-Csigahegy, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/531 (from Bakonynána)>.

Genus *Epiaster* d'Orbigny, 1854

This genus was considered as junior synonym of *Heteraster* d'Orbigny, 1853 in the Treatise (Fischer, 1966: U553)

Cenomanian

E. brevipetalus Smith & Wright, 2008: 633-635; text-figs 249, 275, 276A, B; pl. 207: fig. 2; pl. 209: figs 1-2. [Grey Chalk, Dover, Kent, and Isle of Wight, UK] (*S. dispar* Zone, Late Albian and *C. subglobosus* Zone, Middle Cenomanian) <HT: BMNH E1170; PT: BGS GSM 119609, BMNH E1092>.

E. romani Collignon, 1983: 270; pl. 6, fig. 8. [coupe de Gavbasht, Kazhdumi, Iran] (Cenomanian) <HT: CFP 8005-175>.

Aptian

E. zonarius Tanaka *in* Tanaka & Obata, 1982: 132-135; text-figs 8-9; pl. 2, figs 5; pl. 3, figs 1a-e, 2a-b, 3. [Hiraiga Fm., Hideshima, Miyako City, Iwate Prefecture, Honshu, Japan] (Upper Aptian) <HT: GSJ F6138; PT: GSJ F6139>.

Albian

E. miyakoanus Tanaka *in* Tanaka & Obata, 1982: 129-132; text-figs 6-7; pl. 2, figs 1a-e, 2a-c, 3a-e, 4a-b. [Aketo Fm., Raga, Tanohatamura, Shimohei-gun, Iwate Prefecture, Honshu, Japan] (Lower Albian – middle (?) Upper Aptian) <HT: NSM PA12129; PT: GSJ F6142, NSM PA12130a>.

Mid-Cretaceous, undifferentiated

E. angulosus Szörényi, 1955: 106-107, 241-242; pl. 16, figs 2, 5-6, 9, 14. [marne à *Turrilites*, Olaszfalu-Eperkeshegy, Jásd-Doboshegy, Bakonynána (carrière de la vallée Gaja), and Bakonynána-Heuberg, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/450 (from Olaszfalu, pente Est de l'Eperkeshegy)>.

E. baconicus Szörényi, 1955: 112-113, 248; pl. 20, figs 15, 19. [marne à *Turrilites*, Pénzeskút, and Lókút, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/484 (from Pénzeskút)>.

E. hemiasteriformis Szörényi, 1955: 111-112, 247; pl. 19, figs 8-10; pl. 20, figs 1-2. [marne à *Turrilites* et marne glauconieuse, Olaszfalu-Eperkeshegy, Bakonynána-Judenberg, carrières à l'Est du ruisseau Gaja, and Jásd-Doboshegy, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/457 (from Olaszfalu-Eperkeshegy)>.

E. hungaricus Szörényi, 1955: 107-108, 242-243; pl. 16, fig. 12; pl. 17, figs 1-4. [marne à *Turrilites*, Olaszfalu (à droite de la route d'Eplény), Jásd (route de Csösz), Jásd-Doboshegy, Jásd-Szentkút, and Bakonynána-Csigahegy, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/459 (from Olaszfalu, à droite de la route d'Eplény)>.

E. hungaricus carinatus SZÖRÉNYI, 1955: 108-109, 244; pl. 18, figs 1-2, 4-6. [marne à *Turrilites*, Bakonynána-Judenberg (carrière située à l'Est du ruisseau Gaja), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/473>.

E. hungaricus intermedius SZÖRÉNYI, 1955: 108, 243-244; pl. 17, figs 5-9. [marne à *Turrilites*, Jásd (route de Csösz), Jásd-Doboshegy, and Bakonynána, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/469 (from Jásd-Doboshegy)>.

E. hungaricus rotundatus SZÖRÉNYI, 1955: 109, 244-245; pl. 18, figs 3, 7-9. [marne à *Turrilites*, Jásd (route de Csösz), Jásd-Doboshegy, and Várpalota-Csöszpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/462 (from Jásd, route de Csösz)>.

E. pseudodistinctus SZÖRÉNYI, 1955: 110, 245-246; pl. 19, figs 1-4. [marne à *Turrilites*, Olaszfalu (à côté de la route de Veszprém), Olaszfalu-Eperkeshegy, Jásd (route de Csösz), Jásd-Doboshegy, and Bakonynána, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/479 (from Olaszfalu, à côté de la route de Veszprém)>.

E. pseudodistinctus oblongus SZÖRÉNYI, 1955: 111, 246; pl. 19, figs 5-6. [marne à *Turrilites* et marne glauconieuse, Olaszfalu-Eperkeshegy, Jásd (route de Csösz), Jásd-Doboshegy, and Bakonynána (ravine du ruisseau Gaja), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/479 (from Olaszfalu-Eperkeshegy)>.

E. pseudodistinctus rotundiformis SZÖRÉNYI, 1955: 111, 246-247; pl. 19, figs 7, 11-12. [marne à *Turrilites*, Jásd (ravine au bord du chemin creux menant vers l'usine d'électricité), Olaszfalu-Eperkeshegy, and Olaszfalu (côté Est du mont Eperkeshegy, à côté de la route), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/481 (from Jásd)>.

Genus *Heteraster* D'ORBIGNY, 1853

Mid-Cretaceous

H. zircensis SZÖRÉNYI, 1955: 113-118, 249-252; figs 41-43; pl. 20, figs 3-14, 16-18, 20; pl. 21, figs 6-10. [groupe de marnes argileuses, Zirc-Tündérmajor, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/485>.

Barremian

H. bungoensis TANAKA & NODA *in* TANAKA et al., 1984: 448-450; text-figs 2-3; pl. 82, figs 3-6; pl. 83, fig. 4. [Haidateyama Group, Honjomura, Minamiamabe-gun, Oita Prefecture, Kyushu, Japan] (Lower Barremian) <HT: GSJ F6013; PT: GSJ F6014, F6036, F6033A, B, F6039A, B>.

H. debensis DEVIRIES, 1973: 69-71; pl. 1: figs 26-28; pl. 3: figs 1-4. [Kef ed Deb, map sheet Ain Regada, Algeria] (Barremian, Early Cretaceous) <no types defined, material in the coll'n of A. Devries>.

H. heckeri Melikov, 1989: 157-160; figs а-в; pl. 1, figs 1-6. [Azerbaijan] (Barremian) <HT: AZIOC 775/15ф/4 >.

H. magnus Poretskaya, 1961: 104; pl. 20, figs 1а-д, 3, 4а, в, 5. (Barremian) <unknown> {cited and illustrated in Melikov (in Ali-zade,1988: 187, pl. 1, figs 6а-в), but reference missing from list}.

H. renngarteni Poretskaya, 1961: 171; pl. 19, figs 4а-д, 5, 6а-в. (Barremian-Aptian) <unknown > {cited and illustrated in Melikov (in Ali-zade,1988: 186, pl. 1, figs 3а-в), but reference missing from list}.

Subgenus *Enallaster* d'Orbigny, 1853

In the Treatise (Fischer 1966: U553), *Enallaster* is considered a junior synonym of *Heteraster*.

Early Cretaceous

H. (*E.*) *hemiheterus* Smith & Wright, 2008: 575-576; text-figs 241B, D; pl. 184: figs 4-5. [*Perna* Beds, Redhill, Surrey, UK] (*P. fissicostatus* Zone, Early Aptian) <HT: BMNH E8585; PT: BMNH E8586 to E8589>.

Genus *Proisaster* Aziz & Badve, 2001

Proisaster Aziz & Badve, 2001: 57. Type-species: *Proisaster coramandeli* Aziz & Badve, 2001. [India] (Campanian).

Campanian

P. coramandeli Aziz & Badve, 2001: 57-58; pl. 5: figs 4-6. [Sillakudi Formation, Ariyalur Group, Mallur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Karapadites karapadense*-zone, Campanian) <HT: MACSG-2142>.

Genus *Toxaster* d'Orbigny, 1853

Campanian

T. cauveriae Aziz & Badve, 2001: 55; pl. 4: figs 4-6. [Sillakudi Formation, Ariyalur Group, Mallur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Karapadites karapadense*-zone, Campanian) <HT: MACSG-2128; PT: MACSG-2129-2131>.

T. compressa [*compresa*] Aziz & Badve, 2001: 55-57; pl. 4: figs 7-9. [Sillakudi Formation, Ariyalur Group, Mallur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Karapadites karapadense*-zone, Campanian) <HT: MACSG-2132; PT: MACSG-

2133-2137> {spelled "*compresa*" in heading, but "*compressa*" elswhere in the paper (plate descriptions, differential diagnoses)}.

T. jugamis AZIZ & BADVE, 2001: 57; pl. 5: figs 1-3. [Sillakudi Formation, Ariyalur Group, Mallur, Tamil Nadu region, Trichinopoly Basin, Southern India] (*Karapadites karapadense*-zone, Campanian) <HT: MACSG-2138; PT: MACSG-2139-2141>.

Berriasian

T. bajarunasi LOBATSCHEVA in PORETSKAYA & LOBATSCHEVA, 1988: 172-173; pl. 36: figs 2а-в, 3а, б, 4. [Sorbulak, West Karatau; Dzhaprakty mountain, East Karatau; Doshchan; Dzharmyui village; and Karakuduk, Karasyaz-Taspasskaya Anticline, Mangyshlak, Kazhakstan] (Berriasian) <HT: CNIGR 27/11107>.

T. granosus var. *kouensis* LOBATSCHEVA, 1961: 157; pl. 1: fig. 5. [Sorbulak, West Karatau and Dzhaprakty mountain, East Karatau, Karasyaz-Taspasskaya Anticline, Mangyshlak, Kazhakstan] (Berriasian) <unknown> {elevated to species rank and re-described by PORETSKAYA & LOBATSCHEVA (1988: 172)}.

T. priscus TANAKA, 1984b: 193-195; text-figs 4a-c, 5a-d; pl. 2, figs 2a-d, 3a-b. [Koyamada Fm., Soma Grp., Yamashita, Kashima-machi, Soma-gun, Fukushima Prefecture, Japan] (Berriasian) <HT: GSJ F6185A, B; PT: GSJ F6134>.

Hauterivian

T. crassisulcatus CLAVEL, 1989: 176-178; figs 11a-h; pl. 1, figs 2a-c. [Le Landeron; Cressier; Valangin; Menthiéres, Hauteville (Ain), Censeau (Jura); Mont-de-Musièges and Salève (Haut-Savoie), France] (Base de la Zone à Radiatus, Hauterive) <HT: FSL 196109; PT: FSL 196114, 196115, 196116, 196124, 196125>.

T. remanei CLAVEL, 1989: 174-176; figs 10a-f; pl. 1, figs 1a-c. [Montlebon, Doubs; Le Landeron; Cressier; Valangin; Villier-le-Lac; Mont-de-Musièges and Mont-Clergeon, France] (Zone à Radiatus, Hauterive) <HT: FSL 196106; PT: FSL 196107, 196108, 196122, 196123>.

Genus *Pliotoxaster* FOURTAU, 1907

In the Treatise (FISCHER, 1966: U551) *Pliotoxaster* is considered a junior synonym of *Toxaster*.

Albian

P. angustisulcus SMITH & WRIGHT, 2008: 590-592; text-figs 249, 251, 252; pl. 190: fig. 5; pl. 191: figs 1-3. [Blackdown Greensand, Blackdown, Devon, UK] (*M. inflatum* Zone, Late Albian) <HT: BMNH E4941; PT: BMNH E2536, E4942, BGS GSM 110505, 110509>.

Suborder Hemiasterina Fischer, 1966

Family Hemiasteridae Clark, 1917

Genus *Hemiaster* Agassiz in Agassiz & Desor, 1847

Late Cretaceous

[*H. aktaschensis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

H. amudariensis Shmidt & Simakov, 1953: 65-66; figs 25a-г. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Senonian) <HT: VNIGRI 115/336> {referred to *Parahemiaster* [nomen nudum] by Egorov (1972: 60)}.

H. anisopetalus Smith & Wright, 2008: 616-617; text-figs 266A, B, 267; pl. 203: fig. 2a-c. [Upper Chalk, Dover, Kent, UK] (*Micraster cortestudinarium* Zone, Coniacian, Late Cretaceous) <HT: BMNH E37783>.

H. arachnius Deviries, 1973: 71-73; pl. 2: figs 13-15. [Envir. De Lambèse, Algeria] (Cenomanian, Late Cretaceous) <HT: Colln Heintz 402 (repository unknown)> {Deviries (1973: 71) attributes this name to Gauthier (in coll.), but being a manuscript name this name should be attributed to Devries (1973) according to the ICZN rules}.

H. arcticus Shmidt, 1976: 155-156; pl. 1: figs 7a-б. [Krasnojarskiy Kr., Tanama Valley, near mouth of Yennisey [Enisei] River, Russian SFSR] (Early Santonian, Late Cretaceous) <ST: 8/8846, plus further specimens without number [repository not given]>.

[*H. bedakensis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

H. cearensis Brito, 1981b: 406-407; pl. 2: figs 1-2. [Jandaira Formation, Praia do Retiro Grande, Aracati, Ceará, Brazil] (Zone of *Hoplitoides* and *Mammites*, Early Turonian) <HT: IGUFP 591 (two casts of that specimens are housed at IGUFRJ 330)>.

[*H. costatus* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*H. curukensis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

H. gissarensis Shmidt & Simakov, 1953: 68-69; fig. 27; pl. 7: figs 4-6. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Late Turonian) <HT: VNIGRI 125/336>.

H. himalayensis Mu & Wu, 1976: 372; pl. 10: figs 3-10. [Gangba Grp., 7 km east of Gangba, Gangba County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27165, 27166 (repository not given; persumably NIGP)>.

H. javanicus Shmidt & Simakov, 1953: 69-71; figs 28а-в; pl. 3: figs 6-7; pl. 4: fig. 1; pl. 8: figs 5-7. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Late Turonian) <HT: VNIGRI 128/336>.

[*H. kafirniganensis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

H. kunlunensis Yang Shengqiu, 1991: 121-122; pl. 16, figs 1-11. [Upper Kukebai Fm., Kuzigongsu, 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Late Cretaceous) <HT: NIGP 88413>.

[*H. pectenis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*H. planus* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*H. rochatensis* Egorov, 1972]: 59. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

H. rostratus Deviries, 1973: 73-74; pl. 2: figs 16-18. [Envir. De Batna (Abattoir), Algeria] (Turonian, Late Cretaceous) <HT: Coll'n Heintz 405 (repository unknown)>.

H. sibiricus Shmidt, 1976: pl. 1: fig. 6. [Tscheljabiusk Basin, western Ural, Russian SFSR] (Maastrichtian, Late Cretaceous) <HT: possibly 9/8846, the figured specimen [repository not given]> {only mentioned in plate descripton, but not in the main text}.

H. simakovi Shmidt & Simakov, 1953: 63-65; figs 24а-ж; pl. 4: figs 2-6. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Senonian) <HT: VNIGRI 014a/336>.

H. subameliae Deviries, 1973: 74-75; pl. 3: figs 5-10. [Ouled Braham, N of Ain Rafa, Algeria] (Cenomanian, Late Cretaceous) <type-material: Coll'n V. Gauthier (repository unknown, no number given)>.

H. subbibansensis Deviries, 1973: 82-84; pl. 5: figs 7-12. [Djebel Bel Kfife and Wadi Cheria, map sheet Ain Beida, Algeria] (Late Cretaceous) <type-material: Coll'n Université de Bâle (no numbers given)>.

H. subconicus Deviries, 1973: 75-76; pl. 3: figs 11-14. [Ahmar Khaddou, Bon Milane 4, Algeria] (Senonian, Late Cretaceous) <type-material: Coll'n V. Gauthier (repository unknown, no number given)>.

H. submirabilis Deviries, 1973: 76-77; pl. 5: figs 4-6. [El Kantara, Algeria] (Senonian, Late Cretaceous) <HT: Coll'n V. Gauthier 374 (repository unknown)>.

H. turkestanensis Shmidt & Simakov, 1953: 66-68; figs 26a-r; pl. 7: figs 1-3. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Turonian) <HT: VNIGRI 121/336>.

Mid-Cretaceous

H. baconicus Szörényi, 1955: 124-125, 259-260; fig. 45, pl. 22, figs 8, 12, 14, 17, 19, 22, 24-25, 27. [calcaire gris lamellé et marne glauconieuse, Bakonynána (carrière de la vallée Gaja), Bakonynána (carrière près de la route de Felsöpere), Olaszfalu-Villóhegy, Olaszfalu-Eperkeshegy, Csöszpuszta, Jásd, and Pénzeskút-Körisgyörpuszta, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/545 (from Bakonynána)>.

H. estepi Lucas, 2000: 101-105; figs 4A-N. [Old Hachita Member, U-Bar Formation, NMMNH locality L-3413 (UTM Zone 13, NAD27, 745525E, 3493350N), L-3414 (UTM 745871E, 3492987N), western flank of U-Bar Ridge, Big Hatchet Mountains, T32S, R16W, Hidalgo County, New Mexico, USA] (*Douvilleiceras mammillatum*-zone, Early Albian, Mid-Cretaceous) <HT: NMMNH P-26515 (from loc. L-34-14); PT: NMMNH P-26501, P-26508 (from loc. L-3413), 26517 (from loc. L-3414)>.

H. pulcher Szörényi, 1955: 125-126, 260-261; pl. 22, figs 9-10, 13, 18, 23. [groupe de calcaire à *Hippurites*, Sümeg (grande carrière de Gerine), Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/556>.

H. wayensis Larrain, 1985b: 1402-1405; figs 3.1-3.3, 4.1, 4.2, 5.1, 5.2. [El Way Fm., Antofagasta, Chile] (Aptian) <HT: MZUC 10811 W-32; PT: IIGA-6 W-33, IIGA-392 W-41, IIGA-394 W-42>.

Unknown age

H. rollandi var. *oblongus* Deviries, 1973: 86. [Algeria] (unknown) <no types defined, repository unknown>.

Subgenus *Bolbaster* Pomel, 1869

Jeffery in Smith & Jeffery (2000: 320) synonymized the *Bolbaster* Pomel, 1869 with *Hemiaster* Agassiz in Agassiz & Desor, 1847 because they considered the characters used to differentiate these two taxa are not substantive and commonly size related.

Miocene

H. (*B*.) *callidus* McNamara, 1987c: 346-347; text-figs 3, 4, 5B, 6C, 8, 10, 12B; pl. 47: figs 4-8; pl. 48: fig. 7. [Port Campbell Limestone, Sherbrooke River, Port Campbell, Victoria, Australia] (Bairnsdalian, Middle Miocene) <HT: NMV P100503 PT: NMV P100504-05, P100508-09>.

H. (*B*.) *verecundus* McNamara, 1987c: 340-342; text-figs 4, 8; pl. 45: figs 4-5; pl. 46: figs 1-2. [Puebla Fm., Fisherman's Steps, Torquay, Victoria, Australia] (Longfordian, Early Miocene) <HT: NMV P18578; PT: NMV P18761, P20145, P78458>.

Oligocene

H. (*B*.) *dolosus* McNamara, 1987c: 338-340; text-figs 4, 8; pl. 45: figs 1-3, Port Willunga Fm., Maslin's Beach, Aldinga, South Australia] (Willungan, Early Oligocene) <HT: NMV P53172; PT: SAM P26557-59, WAM 86.1206-1209>.

Eocene

H. (*B*.) *subidus* McNamara, 1987c: 336-338; text-figs 3, 4, 5A, 6A, 8, 10, 11A, 12A; pl. 44: figs 1-5; pl. 48: fig. 8. [Tortachilla Limestone, Maslin Beach-Port Willunga district, south of Adelaide, South Australia] (Aldingan, Late Eocene) <HT: SAM P26554; PT: SAM P26555-56, NMV P20484, P53211>.

Paleocene

B. argentinensis del Río, Martínez, Stilwell & Concheyro, 2007: 261-264; figs 5E, F, 6D-F. [Jagüel Formation, Malargue Group, Cerros Bayos section (37°40' S, 67°30' W), southern hills of the Salitral Agua de La Perra, 22 km NNE of Colonia 25 de Mayo, Departamento Puelen, La Pampa Province, Argentinia] (Danian, NP1 Zone, Early Paleocene) <HT: GHUNL Pam-22890; PT: GHUNL-Pam 22891, 22892>.

Late Cretaceous

B. compressus Mu & Wu, 1976: 372-373; pl. 10: figs 19-23. [Zongshan Fm., Zongshan (= Mt. Zong), Gangba County, Jo-mo glang-ma (Mount Jolmo Lungma Region), Everest Massif, China] (Late Cretaceous) <ST: 27169-27170 (repository not given; persumably NIGP)>.

H. (*B*.) *hattaensis* Ali, 1989a: 409-410; figs 6(5-8). [Simsima Fm., Gebel El Rowdah, United Arab Emirates] (Late Maastrichtian) < MGD-UAA > {no type specimen defined}.

Subgenus *Leymeriaster* Lambert & Thiéry, 1924

Jeffery in Smith & Jeffery (2000:328) elevated *Leymeriaster* Lambert & Thiéry, 1924 to genus rank.

Maastrichtian

H. (*L.*) *eluvialis* VAN DER HAM, 1995: 156-159; text-fig. 3, 4a; pl. 1, figs 1-5; pl. 2, figs 1-6; pl. 3, figs 1-5. [Gulpen Fm. and Maastricht Fm., Maastricht Area, SE Netherlands, NE Belgium] (Late Maastrichtian) <HT: NHMM 1993050; PT: 6 specimens in private collections>.

Campanian

H. (*L.*) *polygonalis* TANAKA, 1984a: 435-437; text-figs 7-8; pl. 81, figs 1-2. [Shichi Shale Mb., Anaga Fm., Lower Subgroup of the Izumi Group, Shichiminami, Seidan-cho, Mihara-gun, Hyogo Prefecture, Japan] (Campanian) <HT: GSJ F6063A, B; PT: GSJ F6072>.

Subgenus *Malwaster* CHIPLONKAR & BADVE, 1974

Late Cretaceous

H. (*M.*) CHIPLONKAR & BADVE, 1974: 52. Type-species: *Opissater subsimilis* FOURTAU, 1918. [India] (Albian to Maastrichatian).

Subgenus *Mecaster* POMEL, 1883

Paleocene

H. (*M.*) *majungensis* TANAKA in TANAKA, KANIE & OBATA, 1979: 36-37; fig. 9; pl. 1, figs 6a-d; pl. 2, fig. 1. [C^{10} Fm., Majunga area, Northwestern Madagascar] (Danian) <HT: NSM.PA 11994; PT: NSM.PA 11995>.

Santonian

M. arnonensis NEUMANN, 1999: 178-182; fig. 3A-E, 4; pl. 1, figs E-L. [Khurayj Limestone Fm., Wadi al Mujib, south of Dhiban, Jordan] (Santonian) <HT: MBE 2883; PT: MBE 2884>.

Cenomanian

H. (*M.*) *mikasaensis* TANAKA, 1984a: 196-198; text-figs 6a-c; pl. 3, figs 1a-e, 2a-c, 3a-b. [Mikasa Fm., Middle Yezo Grp., Ohashi bridge, Ikushumbetsu River, Mikasa City, Central Hokkaida, Japan] (Lower Cenomanian) <HT: NSM-PA5392; PT: NSM-PA5393; GSJ F6144A, B>.

H. (*M.*) *rarus* CHIPLONKAR & BADVE, 1972: 146-147; pl. 12: figs 2, 6. [Deola-Chirakhan Marl, Sitapuri (22°20' N, 75°05'30" E), India] (Cenomanian, Late Cretaceous) <HT: MACSG Si 238/69>.

Genus *Aliaster* VALDINUCCI, 1974

Aliaster VALDINUCCI, 1974: 454-462. Type-species: *Opissaster lovisatoi* COTTEAU, 1895. [Mediterranean] (Neogene) {other species included: *Hemiaster cotteaui* WRIGHT, 1855; *Opissaster jourdyi* PERON & GAUTHIER, 1891; *Opissaster cotteri* de LORIOL l896; *Opissaster almerai* LAMBERT, 1906; *Trachyaster aichinoi* CHECCHIA RISPOLI, 1927}.

Genus *Ditremaster* MUNIER-CHALMAS, 1855

Oligocene

D. aslaniani PORETSKAYA, in AKOPJANA, 1974a: 363-364; pl. 186, figs 4a-г. [Armenia] (Early to Middle Oligocene) <HT: LGU 306/8>.

Eocene

D. mereirensis AZAB, 1989: 180-182; pl. 1: figs 1-12. [Midawara Fm., El Mereir Plateau, 14 km south-east of El Sheik Fadl village, Central Egypt (holotype); Gebel Qarara; North Wadi El Sheik; Wadi El Fagirah; Wadi El Rokham; Minqar El Rayan; El Midawara; El Mishgiga; all in Central Egypt] (Earl Mokattamian, Middle Eocene) <HT: repository and number not mentioned (figured on pl. 1: figs 1-4)>.

Genus *Kupeia* McKNIGHT, 1974

Kupeia McKNIGHT, 1974: 37-38. Type-species: *Kupeia toi* McKNIGHT, 1974. [off New Zealand] (Recent).

Recent

K. toi McKNIGHT, 1974: 38-40; figs 6a-b. [NZOI Stat. D221 (40°06' S, 171°16' E, 688 m depth), D222 (40°38' S, 170°46' E, 651 m depth), D226 (39°54' S, 168°40' E, 823 m depth), D245 (39°54' S, 172°00' E, 532 m depth), E883 (36°00' S, 172°52' E, 999-1046 m depth), New Zealand] (Recent) <HT: NZOI 186 (Stn E883); PT: NZOI P244 (Stn E883), P245 (Stn D221)>.

Genus *Opissaster* POMEL, 1883

HENDERSON (1975: 19-20) placed this genus into the family Schizasteridae.

Miocene

O. tainui HENDERSON, 1975: 22-23; pl. 3, figs 6-9. [Table Mt., Tahora, North Taranaki; Gum Farm, Gower River, North Canterbury; and near Ethleton School, Ethleton,

North Canterbury, New Zealand] (Tongaporutuan, Late? Miocene) <HT: NZGS EC.400; PT: NZGS EC.700-703>.

Genus [*Parahemiaster* Egorov, 1972]

Parahemiaster Egorov, 1972: 60. Type-species: none specified. (Late Cretaceous) {Nomen nudum according to ICZN Art. 13.3 (type species fixation missing); included species: *Hemiaster stella* Morton; *Hemiaster nucleus* Desor; *Parahemiaster akkaptschigensis* (Shmidt); *Parahemiaster bobkovae* (Shmidt); *Parahemiaster soluni* (Shmidt); *Parahemiaster djabarovi* Egorov, 1972; *Parahemiaster djalilovi* Egorov, 1972; *Parahemiaster iljakensis* Egorov, 1972; *Parahemiaster lucundus* Egorov, 1972; *Parahemiaster moskvini* Egorov, 1972; *Parahemiaster schmidtae* Egorov, 1972; *Parahemiaster subrotundus* Egorov, 1972}.

Late Cretaceous

[*P. djabarovi* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. djalilovi* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. iljakensis* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. lucundus* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. moskvini* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. schmidtae* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. subrotundus* Egorov, 1972]: 60. [Tadzhikistan] (Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

Genus *Psephoaster* McNAMARA, 1987c

Psephoaster McNAMARA, 1987c: 347. Type species: *Psephoaster klydonos* McNAMARA, 1987c. [Australia] (Eocene-Miocene).

Miocene

P. klydonos McNAMARA, 1987c: 350; text-figs 7C, 10, 13C; pl. 48: figs 1-3. [Mannum Fm., Murray River, South Australia] (Longfordian, Early Miocene) <HT: SAM P24631; PT: SAM P565, P8933, WAM 86.296, SAM P22017, NMV P13167>.

Oligocene

P. apokryphos McNAMARA, 1987c: 348-50; text-figs 7B, 13BA; pl. 47: figs 9, 11-12; pl. 48: figs 4-6. [Jan Juc Fm., Torquay, Victoria, Australia] (Janjukian, Late Oligocene) <HT: NMV P100506; PT: NMV P100507>.

Eocene

P. lissos McNAMARA, 1987c: 347-48; text-figs 7A, 10, 13A; pl. 47: figs 3, 10. [Kingscote Limestone, Kingscote, Kangaroo Island, South Australia] (Aldingian, Late Eocene) <HT: SAM P26560; PT: SAM P26561>.

Genus *Pseudowashitaster* TANAKA, 1982

Pseudowashitaster TANAKA in TANAKA & KOZAI, 1982: 346-348. Type-species: *Pseudowashitaster mysticus* TANAKA in TANAKA & KOZAI, 1982. [Japan] (Barremian) {other species included: *Washitaster japonicus* TANAKA & OKUBO, 1954}.

Lower Cretaceous

P. mysticus TANAKA in TANAKA & KOZAI, 1982: 348-351; text-figs 3-4; pl. 55, figs 5-7; pl. 56, figs 1-2. [Yunoki Fm., Yunoki, Kahoku-cho, Kami-gun, Kochi Prefecture, Japan] (Upper Barremian) <HT: GSJ 6017; PT: GSJ 6018A, B, GSJ 6019>.

Family Palaeostomatidae LOVÉN, 1867

Genus *Homoeaster* Pomel, 1883

Danian

H. conicus ILIEVA, 1998: 138; pl.1, figs 1a-g. [Byala, Varna District, Bulgaria] (Early Danian) <HT: MGU 360>.

Genus *Leiostomaster* Lambert, 1920

Campanian

L. angolanus Greyling & Cooper, 1995: 63-68; figs 2-5. [Praia Egito, near Quimbala, 70 km N of Lobito, Angola] (Marroti zone, Middle Campanian) <HT: SAfM-PCA2309; PT: SAM-PCA2369, 2392, 2393, 2284>.

Genus *Orthaster* Moskvin, 1982

Orthaster Moskvin, 1982: 102. Type-species: *Orthaster dagestanensis* Moskvin, 1982. [Europe, Asia] (Campanian-Paleocene) {Jeffery in Smith & Jeffery (2000: 357) placed the genus into the family Corasteridae Lambert in Lambert & Thiéry, 1924}.

Paleocene

O. dagestanensis Moskvin, 1982: 104; figs 1a-c; pl. 10, figs 1a-e. [Dzhinabichay River, Dagestan] (Lower Paleocene) <HT: PIN 3939/1>.

O. okhliensis Moskvin, 1982: 105; figs 1g-i; pl. 10, figs 3a-e. [Urma, Dagestan] (Upper Paleocene) <HT: PIN 3939/3> {Jeffery in Smith & Jeffery (2000: 357) placed this species into the synonymy of *O. dagestanensis* Moskvin, 1982}.

Campanian

O. alievi Moskvin, 1982: 105; figs 1d-f; pl. 10, figs 2a-c. [Alikuliushagy, Bazarchay River, Lesser Caucasus] (Upper Campanian) <HT: PIN 3939/2>.

Genus *Palaeostoma* Lovén in A. Agassiz, 1872

Pliocene

P. kairukuensis Lindley, 2003: 156-158; figs 1d-i, 2. [Kairuku Fm., NW of Aru're village, east coast of Yule Island, Central Province, Papua New Guinea] (Lower Pliocene) <HT: UPNG F1186; PT: UPNG F1185>.

Family Pericosmidae Lambert, 1905

Genus *Pericosmus* L. AGASSIZ, 1847

Recent

P. porphyrocardius MCNAMARA, 1984: 89-95; figs 1-3. [NNW Port Hedland, Northwestern Australia and ENE of Raine Island, Queensland, Australia] (Recent) <HT: WAM 729.83; PT: WAM 730.83, 731.83, 732.83, 733.83, 734.83; AM J17014; BMNH 1983.3.4.1>.

Miocene

P. borraeus HENDERSON, 1975: 58-59; pl. 17, figs 4-6. [Pakaurangi Point, Kaipara Harbour, New Zealand] (Altonian, Early Miocene) <HT: AU E.315>.

P. celsus MCNAMARA & PHILIP, 1984: 329-331; figs 7-9. [Mannum Fm., Mannum, South Australia] (Longfordian, Early Miocene) <HT: SAM P23823; PT: NMV P18354>.

P. (*P.*) *hsui* WANG, 1984c: 251-254; pl.: figs 1-9; pl. 2: figs 1-6. [Nankang Sandstone, Shuinantung, Taipei-hsien, northern Taiwan] (Middle Miocene) <HT: CGST E-83003; PT: CGST E-83004 to E-83008>.

P. quasimodo MCNAMARA & PHILIP, 1984: 332-335; figs 10-13. [Rutledge Marl Mb., Port Campbell Limestone, Ingles Creek, Port Campbell, Victoria, Australia] (Bairnsdalian, Middle Miocene) <HT: NMV P55512; PT: NMV P55503, 55504>.

P. scaevus HENDERSON, 1975: 59-60; pl. 18, figs 1-3. [Mt. Brown Lst., Weka Pass, New Zealand] (Awamoan, Early Miocene) <HT: CM zfe.33>.

P. torus MCNAMARA & PHILIP, 1984: 336-338; figs 14-16. [Batesford Limestone, Batesford, Victoria, Australia] (Batesfordian, Early to MiddleMiocene) <HT: NMV P20072; PT: NMV P20071, 20073, 20074, 55502, 55505>.

Eocene

P. annosus HENDERSON, 1975: 60; pl. 16, figs 1-2. [Waiareka Tuff, South Aorere Point, New Zealand] (Kaiatan, Late Eocene) <HT: OU 4760>.

P. farresi CARRASCO, 2003: 25-27; figs 2 a-f. [Gurb de la Plana, near Vic, 65 km N of Barcelona, Spain] (Eocene) <HT: MGSB 67676; PT: MGSB 67276>.

Subgenus *Lambertona* SÁNCHEZ ROIG, 1953

HENDERSON (1975: 24) restored this taxon to genus rank and referred it to the family Schizasteridae.

Miocene

L. perplexa Henderson, 1975: 26-27; text-fig. 5b; pl. 6, figs 1-2; pl. 7, figs 1-3. [Blackhead, Dunedin; west side of Burnt Hill, Canterbury; Bushy Park, Palmerston; and Caversham Sdst., Matanaka, New Zealand] (Otaian or Altonian to Waiauan, Miocene) <HT: OU 8845; PT: AU E.311a-c; OU 6835, 8550>.

Oligocene

L. perdita Henderson, 1975: 27-28; text-fig. 5a; pl. 8, figs 1-2. [Canterbury, New Zealand] (? Oligocene to Early Miocene) <HT: CM zfe.288>.

Family Paleopneustidae A. Agassiz, 1904

Genus *Eopericosmus* Markov & Solovjev, 2001

Eopericosmus Markov & Solovjev, 2001: 16, 81-82. Type-species: *Eopericosmus typicus* Markov & Solovjev, 2001. [Kazhakstan] (Paleocene) {other species included: *Brissopsis alta* Hutton, 1873}.

Paleocene

E. sveshnikovi Markov & Solovjev, 2001: 22-26, 83-84; fig. 4а-б; pl. 1, figs 1а-б, 2а-в. [Mangyshlak, Kazhakstan] (Montian, Early Paleocene) <HT: PIN 4772/49>.

E. typicus Markov & Solovjev, 2001: 17-22, 82-83; fig. 3а-д; pl. 1, figs 3а-г, 4. [Mangyshlak, Kazhakstan] (Montian, Early Paleocene) <HT: PIN 4772/2>.

Superfamily Paleopneustoidea Markov & Solovjev, 2001

Paleopneustoidea Markov & Solovjev, 2001: 80. {included families: Paleopeustidae, Prenasteridae, Schizasteridae}.

Family Schizasteridae Lambert, 1905

Genus *Abatus* Troschel, 1851

Eocene

A. kieri McKinney, McNamara & Wiedman, 1988: 502-503; figs 3, 1-2. [Eastern Seymour Island, Antarctic Peninsula] (Late Eocene) <HT: USNM 416181; PT: USNM 416182>.

Genus *Agassizia* L. AGASSIZ & DESOR, 1847

Miocene

A. algarbiensis FERREIRA, 1962: 293-295; pl. 1, figs 1-6. [Forte de S. João de Ferragudo, Algarve, Portugal] (Middle Miocene) <ST: Museu dos Serviços Geológicos de Portugal, repository no. not given>.

A. eugeniae BRITO & RAMIRES, 1974: 270-272; pl. 3, figs 1-5; pl. 4, figs 1-3. [Pirabas Fm., procedentes de Capanema, Pará, Brazil] (Lower Miocene) <HT: MN 5236-I; PT: MN 5237-I>.

A. (*A.*) *powersi* KIER, 1972a: 97-98; pl. 64, figs 1-8; pl. 65, figs 1-2. [Dam Fm., localities S-357, S-360, S-361 and S-568, Saudi Arabia] <HT: USNM 170497; PT: USNM 170498-499>.

Subgenus *Anisaster* POMEL, 1886

Eocene-Oligocene

Ag. (*An.*) *arabica* KIER, 1972a: 96-97; pl. 65, figs 3-8; pl. 66, figs 1-3. [localities S-761 and S1603, Saudi Arabia] (Eocene-Oligocene?) <HT: USNM 170501; PT: USNM 170500>.

Ag. (*An.*) *wilmingtonica inflata* KIER, 1980: 44; fig. 19; pl. 15, figs 8-10. [Santee Limestone, Georgetown localities 37, 44, South Carolina, USA] (Middle Eocene) <HT: USNM 264073>.

Genus *Aguayoaster* SÁNCHEZ ROIG, 1952

Eocene

A. schickleri DONOVAN & ROWE, 2000: 656-658; fig. 2. [Swanswick Fm., Pimento Hill, Beecher Town, Jamaica] (mid Middle to low Upper Eocene) <HT: BMNH EE 6340>.

Genus *Amphipneustes* KOEHLER, 1900

Recent

A. davidi MADON-SENEZ, 2002: 52-55; figs 1a-d, 2a-b, 3a-e. [Belgian & Dutch Antarctic Expedition 1959-196, Iris Mission (70°19' S, 24°12' E to 70°17' S, 24°06' E), and Belgian & Dutch Antarctic Expedition 1964-1965, Glacier Bay, Stat. 219 (70°18'5" S, 23°58'0" E), Stat. 223 (70°13'2" S, 23°55'1" E), Antarctic Ocean, 207 and 216 m

depth] (Recent) <HT: MNHN EcEh 9362 (female); PT: MNHN EcEh 9363-9369 (3 males, 4 females)>.

A. mironovi Markov, 1991: 154-155; figs A-C. ["Академик Курчатов"-cruise ("Akademik Kurchatov"-cruise), Stat. 870 (55°08' S, 25°03' W, depth 4689-4704 m), South Sandwich Islands, South East Atlantic Ocean] (Recent) <HT: IOAN, no specimen no. given> {re-described in Markov (1994: 86-88; figs 25a)}.

Genus *Brachysternaster* Larrain, 1985a

Brachysternaster Larrain, 1985a: 121. Type-species: *Brachysternaster chesheri* Larrain, 1985a. [South Shetland Islands] (Recent).

Recent

B. chesheri Larrain, 1985a: 121-123; figs 1-8. [USNS Eltanin Stat. 410, South Shetland Islands (61°18'-61°20' S, 56°09'-56°10' W, depth 220-240 m), Stat. 437 (62°50'-62°51' S, 60°40'-60°35' W, depth 267-311 m); RV Eastwind Stat. EW-66-009 (62°43.1' S, 62°17.1' W, depth 305 fathoms), Stat. EW-66-009A (62°43.1' S, 62°17.5' W, depth 560 m), Stat. EW-66-038 (61°14.8' S, 54°48' W, depth 105 fathoms)] (Recent) <HT: USNM E11025 (male spec.; Eltanin Stat. 410); PT: USNM E11254 (female spec.; RV Eastwind Stat. EW-66-038), E11136 (juvenile; Eltanin Stat. 410)>.

Genus *Brisaster* Gray, 1855

Recent

B. tasmanicus McKnight, 1974: 40; figs 7a-b. [NZOI Stat. E399 (46°10' S, 171°33' E, 1222 m depth), E788 (44°00' S, 168°11' E, 1184-1193 m depth)] (Recent) <HT: NZOI 187 (Stat. E788); PT: NZOI P246 (Stat. E399)>.

Paleocene

B. latus Markov, 1994: 23-24, 34, **72-73**; figs 19е, 19з; pl. 3, figs 6а-б. [Усак (Usak), Mangyshlak Peninsula, Kazakhstan] (Mons, Paleocene) <HT: PIN N 4351/336>.

B. micropetalus Markov, 1994: 23, 33-34, **69-72**; figs 19а-д, ж; pl. 3, figs 2а-г, 3а-б, 4. [Усак (Usak), Mangyshlak Peninsula, Kazakhstan] (Danian, Paleocene) <HT: PIN N 4351/295>.

B. moskvini Markov, 1994: 68-69; figs 19а; pl. 3, figs 5а-б. [щелъе Шахбагата, Mangyshlak Peninsula, Kazakhstan] (Danian, Paleocene) <HT: PIN N 4351/286>.

Genus *Calzadaster* CARRASCO, 2005

Calzadaster CARRASCO, 2005: 50-51. Type-species: *Calzadaster friasi* CARRASCO, 2005. [South-western Europe] (Eocene).

Eocene

C. friasi CARRASCO, 2005: 51-54; figs 2, 3a-d, 4; pl. 1: figs A-E. [Sant Julià de Vilatorta, 60 km N Barcelona, Spain] (Late Lutetian, Middle Eocene) <HT: MGSB 67754a; PT: MGSB 67754b>.

Genus *Caribbaster* KIER, 1984b

Caribbaster KIER, 1984b: 67-68. Type-species: *Prenaster loveni* COTTEAU, 1875. [Cuba and Jamaica] (Eocene) {other species included: *Schizaster dyscritus* ARNOLD & CLARK, 1927}.

Genus *Diploporaster* MORTENSEN, 1950

Miocene

D. flemingi HENDERSON, 1975: 18-19; text-figs 2a-b; pl. 2, figs 3-6. [Waikuku Lst., North Cape and Pakaurangi Fm., Northland, New Zealand] (Otaian – Tongaporutuan, Miocene) <HT: AU E.332; PT: NZGS EC.470, AU E.313>.

Genus *Hemifaorina* JEANNET & MARTIN, 1937

Paleocene

H.? rex MCNAMARA, 1993a: 333-335; figs 1, 2A. [Kings Park Fm., Caisson N6 L3, Swan River, Perth, Western Australia] (Lower Paleocene; planktonic foraminiferal zone P4) <HT: WAM 71.1518; PT: WAM 71.1502-71.1507>.

Genus *Kina* HENDERSON, 1975

Kina HENDERSON, 1975: 28. Type-species: *Kina gracilis* HENDERSON, 1975. [New Zealand] (Eocene-Oligocene).

Paleogene

K. gracilis HENDERSON, 1975: 28-29; text-fig. 7; pl. 8, fig. 7; pl. 9, figs 1-3. [Culverden; Kahurangi Lighthouse; Bullock Creek; and Waihao Lst., Eaihao River, New Zealand]

(Kaiatan to Waitakian, Late Eocene to Oligocene) <HT: CM zfe.276; PT: NZGS EC.423, 454, 495, 570, 574>.

Genus *Linthia* Desor, 1853

Oligocene

L.? *summesbergeri* Kroh, 2005: 161-163; fig. 71; pl. 68, figs 2-7. [Ebelsberg Formation, Weikerlsee, in the eastern part of Linz, Upper Austria, Austria] (Egerian (Chattian to Aquitanian), Late Oligocene to Early Miocene) <HT: NHMW 2003z0026/1187a (cast of the aboral side on a slab together with 3 other specimens, two of which are designated as paratypes); PT: NHMW 2003z0026/1178, 1187b (cast of the aboral side), 1187c (cast of the oral side), 1190 (cast of the aboral side), 1212 (cast of the oral side; 1213 is the corresponding mould), 1226 (cast of the oral side)>.

Eocene

L. africana Mamedov & Melikov, 1976: 157-158; pl. 1, figs 1а, 1б, 1в. [In-Arieh, Republic Mali] (Middle Eocene) <HT: AzINEFTEKHIM 2/69>

L. (*L.*) *harmatuki* Kier, 1980: 45-46; figs 20-21; pl. 16, figs 1-2; pl. 17, figs 1-2. [Castle Hayne Limestone, Maple Hill localities 10, 34, North Carolina; Santee Limestone, Georgetown locality 37, South Carolina; USA] (Middle Eocene) <HT: USNM 264076; PT: USNM 264074, 264075>.

L. maliensis Mamedov & Melikov, 1976: 159-161; figs 1-3; pl. 1, figs 2а, 2б, 2в. [In-Arieh (Tahanabat), Republic Mali] (Middle Lutetian, Eocene) <HT: AzINEFTEKHIM 10/69>

L. monteroae Kier, 1984b: 76-77; pl. 40, figs 1-4. [Palmer loc. 1085; E of Arroyo Blanco, 150 m, in road of Majagua, CamagÜey Province, Cuba] (Eocene) <HT: ANSP 16656>.

L. pulchra McNamara, 1985a: 162-164; fig. 1. [Tortachilla Limestone, southern Maslin Beach, South Australia] (Late Eocene) <HT: NMV P20455; PT: GSWA F5828; WAM 66.637, 85710, 85.711>.

Paleocene

L. bajsarensis Bajarunas in Markov, 1994: 58-61; figs 15д, 16а-д; pl. 1, figs 3а-г; pl. 2, figs 1а-г, 2-3. [Байсарлы (Bagsarly), Mangyshlak Peninsula, Kazakhstan] (Mons, Paleocene) <HT: PIN N 4351/84>.

L. brevipetala Markov, 1994: 61-62; figs 15в-г; pl. 1, figs 2. [Кенырли (Kyendyrli), Mangyshlak Peninsula, Kazakhstan] (Mons, Paleocene) <HT: PIN N 4351/76>.

L. ghiroboensis Tessier & Roman, 1973: 157-158; pl. 2, figs 4-7. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Paleocene, Thanetian) <HT: IPM 1972-9F>.

Maastrichtian

L. (*L.*) *madagascariensis* TANAKA in TANAKA, KANIE & OBATA, 1979: 41-43; fig. 12a-c; pl. 3, figs 2a-d, 3, 4. [C^9 Fm., Majunga area, Northwestern Madagascar] (Maastrichtian) <HT: NSM.PA 11996; PT: NSM.PA 11997, 11998>.

L. romani BRITO, 1981c: 576; pl. 3, figs 1-6. [Gramame Fm., Pedreira da Fábrica de Cimento Poty, Paulista, Permanbuco, Brazil] (Maastrichtian) <HT: DGM do DNPM 5569; PT: DGM do DNPM 5570>.

Genus *Neoproraster* MARKOV, 1994

Neoproraster MARKOV, 1994: 82-83. Type-species: *Neoproraster bajarunasi* MARKOV, 1994. [Kazakhstan] (Paleocene-Eocene).

Palaeogene

N. bajarunasi MARKOV, 1994: 24-25, 34, 85-86; figs 24д-з; pl. 4, figs 3а-г. [Санды (Sandyk), Mangyshlak Peninsula, Kazakhstan] (Early Eocene) <HT: PIN N 4351/388>.

N. usakensis MARKOV, 1994: 83-84; figs 24а-г; pl. 4, figs 2а-б. [Усак (Usak), Mangyshlak Peninsula, Kazakhstan] (Mons, Paleocene) <HT: PIN N 4351/385>.

Genus *Prenaster* DESOR, 1853

Eocene

P. desori caucasica PORETSKAYA, in AKOPJANA, 1974: 364-365; pl. 185, figs 2а-в, 3. [Armenia] (Late Eocene) <HT: LGU 306/20>.

P. synapticus HENDERSON, 1975: 20-21; text-figs 3; pl. 2, figs 7, 9-12. [Waiareka Volacanics, Lorne Railway Station, New Zealand] (Kaiatan, Late Eocene) <HT: NZGS EC.456; PT: NZGS EC.699>.

Genus *Proraster* LAMBERT, 1895

Paleocene

P. oedumi STOKES, 1975: 24. [Kjabenhavens Havn, Knippelsbro, Copenhague, Denmark] (Late Danian) <HT: Ødum coll. 7647> {replacement name for *Micraster desori* ØDUM, 1926 non HÉBERT, 1856}.

Late Cretaceous

P. granti Kier, 1972a: 84-87; fig. 45; pl. 47, figs 6-7; pl. 48, figs 1-6. [Aruma Fm., locality S-748, Saudi Arabia] (Campanian) <HT: USNM 170461; PT: USNM 170460>.

P. magnus Markov, 1994: 66-67; figs 18а-б; pl. 3, figs 1а-б. [Камысты (Kamysty), Mangyshlak Peninsula, Kazakhstan] (Maastrichtian) <HT: PIN N 4351/547>.

Genus *Protenaster* Pomel, 1883

Fischer (1966: U576) regarded *Protenaster* as subgenus of *Prenaster* Desor, 1853; McNamara (1985b:312-313) rejects this.

Oligocene

P. philipi McNamara, 1985b: 322-324; text-fig. 7; pl. 34: figs 6-7. [Waurn Ponds Limestone, Waurn Ponds, Victoria, Australia] (Janjukian, Late Oligocene) <HT: MUGD 1690; PT:NMV P4776, P19990, P63040, P63059, P63064>.

Eocene

P. preaustralis McNamara, 1985b: 321; text-figs 5-6; pl. 33: figs 6-8; pl. 34: figs 1-5. [Tortachilla Limestone, Maslin Beach – Port Willunga district, South Australia] (Late Eocene) <HT: SAM P24519; PT: SAM P24520-24523, NMV P71348, P71349>.

Genus *Pseudolinthia* Markov, 1994

Pseudolinthia Markov, 1994: 80. Type-specis: *Pseudolinthia triporata* Markov, 1994. [Kazakhstan] (Paleocene).

Paleocene

P. triporata Markov, 1994: 25-26, 34-35, 80-81; figs 23а-в; pl. 4, figs 1а-б. [Капам (Kapam), Mangyshlak Peninsula, Kazakhstan] (Danian, Paleocene) <HT: PIN N 4351/362>.

Genus *Schizaster* Agassiz, 1836

Subgenus *Schizaster* Agassiz, 1836

Pliocene

S. (*S.*) *alphonsei* Lindley, 2003: 154-156; figs 1a-c. [Kairuku Fm., NW of Aru're village, east coast of Yule Island, Central Province, Papua New Guinea] (Lower Pliocene) <HT: UPNG F1179>.

Miocene

S. scherzeri GABB, 1881: 348; pl. 45: figs 28, 28a-b. [above Paquare, on the Reventazon River and at Sapote, Costa Rica] (Miocene) <repository and specimen nos. not given>.

Oligocene

S. (S.) *halli* MCNAMARA & PHILIP, 1980a: 52-53; figs 3 A-D. [Table Cap Beds, Table Cap; Cape Grim Beds, Cape Grim, Tasmania] (Janjukian (Late Oligocene) to Longfordian (Early Miocene)) <HT: NMV P19036; PT: NMV P53219, P53220>.

Eocene

S. archiaci complanatus CHAVANON, 1974: Vol.1: 237; pl. 16: figs 2a-d. [Saint-Palais and Couquèques, Aquitaine Basin, western France] (Middle to Late Eocene) <ST: Castex coll'n, Degrange-Touzin coll'n, Fabre coll'n; no repository nos given for types; figured specimen: 28.C.7>.

S. (*S.*) *caddoensis* ZACHOS in ZACHOS & MOULINEUX, 2003: 499; figs 6.4-6.7. [Reklaw and Weches Formations, Claiborne Group, Localities 81 and 82, Cherokee and Milam Counties, and Locality 54, Nacogdoches County, Texas, USA] (Middle Eocene) <HT: TMM 2000TX1 (from Locality 54); PT: BEG 17749 (from Locality 81)>.

S. formelli KIER, 1984b: 43-44; pl. 24, figs 1-7. [Palmer loc. 687a, 24 km E of Camagüey on Maraguan road from Guanabanito River, Camagüey Province, Cuba] (Eocene) <HT: ANSP 16675a; PT: ANSP 16675b>.

S. haleifiensis ROMAN & STROUGO, 1988: 148. [Bir Haleifia, Sinai, Egypt] (Priabonian). {replacement name for *S. humei* LAMBERT, 1932 non FOURTAU, 1909}.

S. rindensis PORETSKAYA, in AKOPJANA, 1974a: 366; pl. 188, figs 1a-б. [Rind, Armenia] (Late Eocene) <HT: LGU 306/39>.

S. (*S.*) *stenzeli* ZACHOS in ZACHOS & MOULINEUX, 2003: 499-501; figs 6.9, 6.13. [Weches Formation, Claiborne Group, Localities 32, 33, 34, 36, Leon County, Texas, USA] (Middle Eocene) <HT: TMM 1988TX1 (from Locality 34); PT: TMM 1988TX2, 1988TX3 (from Locality 34), 2006TX1 (from Locality 36)>.

Palaeogene

S. tarimensis YANG SHENGQIU, 1991: 123; pl. 17, figs 1-8; pl. 20, figs 1-4. [Wulagen Fm. Bashibulake, Wuqia County, Tarim Basin, China] (Early Tertiary) <HT: NIGP 88424>.

Subgenus *Dipneustes* Arnaud, 1891

Miocene

S. (*D.*) *fosteri* McNamara & Philip, 1980a: 58-59; figs 7 A-B. [?Mannum Fm., Murray River at Swan Reach, South Australia] (?Longfordian (Early Miocene)) <HT: NMV P55472>.

Subgenus *Ova* Gray, 1825

Recent

S. (*O.*) *myorensis* McNamara & Philip, 1980b: 133-140; figs 5A-E, 7A-c, 8A-C, 9A. [Myora, Moreton Bay, Queensland, Australia] (Recent) <HT: QM G12063; PT: QM G3870-1, 11826-8, 12064-6, 12094, 12428-48, 3809>.

S. (*O.*) *portjacksonsensis* McNamara & Philip, 1980b: 141-143; figs 9B, 10A-Gport Jackson, Australia] (Recent) <HT: AM J1732; PT: AM J1731>.

Subgenus *Paraster* Pomel, 1869

Recent

P. doederleini Chesher, 1972: 44866; figs 1-7, 9, tabs. 1-2. [Pillsbury Stat. 402 (8°51' N, 77°02' W, off northern Columbia, depth 73 m), Pillsbury Stat. 399 (9°01' N, 76°39' W, off northern Columbia, depth 147 m); White Shoal, Dry Tortugas, Florida; RHCK 45, off Aligator Reef, Florida Keys; Gerda Stat. 683 (25°52' N, 77°53,5' W, Northwest Providence Channel, Bahama Islands, depth 250 m)] (Recent) <ST: MCZ 8396-8397, 9398, USNM E11376-E11378>.

S. (*P.*) *ovatus* Lindley, 2004: 131-132; figs 6a-d. [Cape Gazelle, New Britain, East New Britain Province, Papua New Guinea] (Recent) <HT: ANU 60653>.

Pliocene

S. (*P.*) *ashrafi* Ali, 1985: 289; figs 7B-E. [Wadi Gabir, Western Egypt] (Early Pliocene) <HT: USNM 339745; PT: USNM 339746>.

Miocene

[*S.* (*P.*) *jhadwensis* Tandon & Srivastava, 1988]: 153. [India] (*Spiroclypeus ranjanae* Zone, Miocene) <unknown> {nomen nudum, name mentioned only}.

Eocene

S. (*P*.) *incorrectus* ELATTAAR & STROUGO, 2001: 74-76; figs 8i-8l, 9c. [Bir Haleifiya, west-central Sinai, Egypt] (Late Eocene) <n/a> {nomen novum pro *Schizaster humei* LAMBERT, 1932, non FOURTAU, 1909}.

S. (*P*.) *susana* ZACHOS in ZACHOS & MOULINEUX, 2003: 501-503; figs 6.10–6.12, 6.14, 6.15. [Caddell Formation and Moodys Branch Formation, Jackson Group, Localities 1, 2 and 3; Angelina and San Augustine Counties, Texas; and Montgomery Landing, Grant County, Louisiana, USA] (Late Eocene) <HT: TMM 886TX1; PT: TMM 886TX2, 886TX3 (all from Locality 2)>.

S. (*P*.) *tatei* MCNAMARA & PHILIP, 1980a: 51-52; figs 2 A-E. [Tortachilla Limestone, Maslin Beach – Port Willunga district, South Australia] (Late Eocene) <HT: NMV P55467; PT: NMV P55468, P55470>.

Paleocene

S. (*P*.) *carinatus* MCNAMARA & PHILIP, 1980a: 50-51; figs 1 A-C. [Pirie Calcarenite, Giaralia Range, Carnarvon Basin, Western Australia] (Middle to Late Paleocene) <HT: CPC 4822; PT: CPC 4823, 4824> {JEFFERY in SMITH & JEFFERY (2000: 336) suggested that this species might be a synonym of *Paraster chargensis* (WANNER, 1902)}.

S. (*P*.) *rougeriei* TESSIER & ROMAN, 1973: 158-160; pl. 2, figs 8-16. [Falaises à l'ouest de l'ancien de Fresco, Côte d'Ivorie] (Paleocene, Thanetian) <HT: IPM 1972-9BGc>.

Palaeogene

S. (*P*.) *extumidus* YANG SHENGQIU, 1991: 124; pl. 19, figs 6-7. [Upper Qimugen Fm., Kuzigongsu, 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Early Tertiary) <HT: NIGP, no holotype defined>.

Genus *Schizocosmus* MARKOV, 1990

Schizocosmus MARKOV, 1990: 55. Type-species: *Pericosmus abatoides* CLARK, 1925. [South Atlantic Ocean] (Recent).

Genus *Tripylus* PHILIPPI, 1845

Recent

T. beatriceae LARRAIN, 1986: 116-118; figs 2a-f, 3a-c. [RV "Eltanin" Sta. 126 and 353, south east of Cape Horn] (Recent) <HT: USNM E11008; PT: USNM E11018, E14618>.

Genus *Waurnia* McNamara & Philip, 1984

Waurnia McNamara & Philip, 1984: 341-342. Type-species: *Pericosmus nelsoni* McCoy, 1882. [Waurn Ponds Limestone, Victoria, Australia] (Oligocene).

Subfamily Brisasterinae Markov, 1994

Brisasterinae Markov, 1994: 65. Type-genus: *Brisaster* Gray, 1855. [Australia, New Zealand] (Cenomanian-Recent) {included genera: *Proraster* Lambert, 1895; *Pseudolinthia* Markov, 1994; *Neoproraster* Markov, 1994; *Amphipneustes* Koehler, 1900; *Schizocosmus* Markov, 1990}.

Family Aeropsidae Lambert, 1896

Genus *Sphenaster* Jeffery in Smith, Gallemí, Jeffery, Ernst & Ward, 1999

Sphenaster Jeffery in Smith, Gallemí, Jeffery, Ernst & Ward, 1999: 131. Type-species: *S. larumbensis* Jeffery in Smith, Gallemí, Jeffery, Ernst & Ward, 1999.

Paleocene

S. larumbensis Jeffery in Smith, Gallemí, Jeffery, Ernst & Ward, 1999: 131-132; figs 42a-d; pl. 11, figs 8-12. [Coraster Beds, Larumbe, Navarra, Spain] (Lower Thanetian) <HT: BMNH EE6073> {based on a single specimen}.

Suborder Micrasterina Fischer, 1966

Family Micrasteridae Lambert, 1920

Genus *Brissopneustes* Cotteau, 1886

In Jeffery (1998: 150) the genus *Brissopneustes* is considered as a junior synonym of *Cyclaster* Cotteau in Cotteau & Leymerie, 1856.

Paleocene

B. vindobonensis Kühn, 1930: 553-554; pl. 1: figs 8-10. [Bruderndorf Formation, Bruderndorf, Lower Austria, Europe] (Upper Danian) <HT+PT: NHMW 1930V8> {placed into the synonymy of *Cyclaster aturicus* (Seunes, 1888) by Kroh (2001: 404)}.

Maastrichtian

B. ruegensis [nom. corr. pro *rügensis*] KUTSCHER, 1978b: 1027-1028, pl. 2, figs 1-5. [Saßnitz, Quarry Wittenfelde, Rügen, Germany] (Late Early Maastricht) <HT: SGWG 60/1>.

Genus *Diplodetus* SCHLÜTER, 1900

Subgenus *Protobrissus* LAMBERT, 1907

Paleocene

D. (*Protobrissus*) *kurkurensis* AZAB & ELATTAAR, 1999: 863-864; tab. 23; pl. 3: figs 16-19. [Gebel El Borga (W of Daraw), Gebel Gharra (W ofAswan) and Kurkur section (at the entrance oh Wadi Kurkur), Kurkur area, Egypt] (*Gitolampas abundans* Zone, Late Paleocene) <repository and specimen nos. not given>.

P. rionensis MOSKVIN, 1964: 199-201; figs 10-11; pl. 4: figs 3а, б; pl. 5: figs 1а-в, 2а-д. [Western Georgia] (Late Paleocene) <not given> {referred to *Pseudogibbaster* by MOSKVIN (1983)}.

Genus *Isomicraster* LAMBERT, 1901

Late Cretaceous

I. babatakensis EGOROV, 1972: 60. [Tadzhikistan] (Maastrichtian, Late Cretaceous) <repository unknown> {nomen novum pro *Epiaster nobilis* SHMIDT, non STOLICKA}.

Genus *Jordaniaster* NEUMANN, 1999

Jordaniaster NEUMANN, 1999: 176. Type-species: *J. husseini* NEUMANN, 1999. [Jordan] (Cenomanian).

Cenomanian

J. husseini NEUMANN, 1999: 176-178; fig. 2A-D; pl. 1, figs A-D. [Rumeimin Fm., Wadi Salihi, near Rumeimin, north of Amman, Jordan] (Lower Cenomanian) <HT: MBE 2882>.

Genus *Micraster* L. Agassiz, 1836

Campanian-Maastrichtian

M. amnicus Greyling, 1996: 25-32; figs 2-7. [St. Lucia Fm., ESE Mtubatuba, Zululand, South Africa] (Campanian-Maastrichtian) <HT: DNSM-PCZ5892; PT: DNSM-PCZ1685-87, 5887-89>.

Campanian

M. coranguinum simpsoni Stokes, 1975: 65-66; fig. 29f; pl. 3, figs 1-5. [Saltdean, Sussex and Kent, England] (*Marsupites* and *O. pilula* Zone, Lower Campanian) <HT: R. Simpson coll. S54>.

M. coravium Poslavskaya, 1959: 289; pl. 22, figs 1a-д (97). (Early Campanian) <no repository information provided> {cited and illustrated in Melikov (in Ali-zade,1988: 208, fig. 60, pl. 8, figs 4a-д), cited by Kier & Lawson (1978: 110) as *M. coravium* Moskvin, 1959, unclear wheter this is the same species or a homonym}.

M. solignaci Stokes, 1975: 79; fig. 30e; pl. 11, figs 3-6. [Koudiat Melhab, Tunesia] (Campanian) <HT: coll. Lambert, no specimen no. given>.

M. westlakei Stokes, 1975: 81; fig. 30h; pl. 12, figs 4-6. [Tichbourne Farm, Hampshire, England] (*B. mucronata* Zone, Upper Campanian) <HT: CWUS 3320; PT: CWUS 3321-22>.

Santonian

M. (*M.*) *maleckii* Hynda & Mączyńska, 1979: 22-23; figs 1a-g, 2a-d; pl. 1, figs 1-2; pl. 2, figs 1-3; pl. 3, figs 1-2. [Korzkiew near Cracow, Southern Poland] <HT: PASME MZ VIII Ee960>.

Coniacian

M. (*M.*) *praerogalae* Olszewska-Nejbert, 2007: 23-55; textf-fig. 54; pl. 27: figs 1a-d. [Shakh-Bogota, about 15 km south of Sarytash, Mangyshlak, Kazakhstan] (*Magadiceramus subquadratus* Zone, Late Coniacian, Late Cretaceous) <HT: IGPUW/E/01/677; PT: IGPUW/E/01/678>.

Late Cretaceous, undifferentiated

M. turkestanensis Shmidt & Simakov, 1953: 71-72; fig. 29; pl. 4: figs 12-14. [Uzbekistan-Tajikistan-Kyrgyzstan border region, Central Asia] (Senonian) <HT: VNIGRI 134/336> {transferred to *Sogdiaster* by Egorov (1972: 59)}.

Subgenus *Gibbaster* GAUTHIER, 1887

Santonian

M. (*G.*) *sonorensis* BUITRÓN, 1971: 40-41; pl. 12, figs 3, 5, 7-9. [Cerro de Las Conchas, Arivechi, Sonora, Mexico] (Santonian ?, Late Cretaceous) <HT: IGMUC 2280>.

Genus *Ovulaster* COTTEAU, 1884

SMITH, GALLEMÍ, JEFFERY, ERNST & WARD (1999: 130) placed this genus into the family Corasteridae LAMBERT in LAMBERT & THIÉRY, 1924.

Paleocene

O. protodecimae GIUSBERTI, FANTIN & BUCKERIDGE, 2005: 457-459; figs 2a-b; pl. 1: figs 1-12; pl. 2: figs 6-9. [Scaglia Rossa Formation, Forada creek, near the village Villa di Villa, Lentiai, Belluno, Venetian Prealps, NE Italy] (calcareous nannoplankton zones NP1 and NP4, Danian, Early Paleocene) <HT: MGPD 28877; PR: MGPD 28878, 29013, 29014>.

Maastrichtian

O. reticulatus SMITH & GALLEMÍ in SMITH, GALLEMÍ, JEFFERY, ERNST & WARD, 1999: 130; figs 39a-d, 40a-b; pl. 10, figs 6-10. [Sarasate, Navarra, Spain] (Lower Maastrichtian) <HT: BMNH EE6236; PT: BMNH EE6074>.

Senonian

O. elevatus TZANKOV, 1984: 114-115; pl. 49, figs 4, 4a-c. [Kondel, Dragoman, de Sofia, Bulgaria] <HT: USC CR_2 1319>.

Genus *Plesiaster* POMEL, 1883

Late Cretaceous

[*P. gibberiensis* EGOROV, 1972]: 60. [Tadzhikistan] (Maastrichtian, Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

[*P. tschaltauensis* EGOROV, 1972]: 60. [Tadzhikistan] (Maastrichtian, Late Cretaceous) <no specimens mentioned> {nomen nudum (no description, illustration, or reference to such included)}.

P. vancouverensis SMITH & MCGUGAN, 1996: 104-107; text-figs 3-5. [Haslam Fm., French Creek, Vancouver Island, British Columbia, Canada] (uppermost Santonian-lowermost Campanian) <HT: BMNH EE5078; PT: BMNH EE5076-77, EE5079-83>.

Genus *Pseudogibbaster* Moskvin, 1983

Pseudogibbaster Moskvin, 1983: 115; figs 2-3. Type-species: *Protobrissus akkajensis* Moskvin & Poslavskaya, 1959. [Crimea, Caucasus and Trans-Caspina Region] (Paleocene) {other species included: *Micraster depressus* Kongiel, 1937; *Micraster tercensis* Cotteau; *Protobrissus indolensis* Poslavskaya & Moskvin, 1960; and *Protobrissus rionensis* Moskvin, 1964}.

Genus *Sogdiaster* Egorov, 1972

Sogdiaster Egorov, 1972: 59. Type-species: *Micraster turkestanensis* Shmidt, 1953. [former USSR] (Late Cretaceous).

Superfamily Brissidea Stockley, Smith, Littlewood, Lessios & Mackenzie-Dodds, 2005

Brissidea Stockley, Smith, Littlewood, Lessios & Mackenzie-Dodds, 2005: 457, 458; fig. 2. {included families: Brissidae, Spatangidae, Loveniidae}.

Family Brissidae Gray, 1855

Genus *Amoraster* McNamara & Ah Yee, 1989

Amoraster McNamara & Ah Yee, 1989: 178-179. Type-species: *A. paucituberculata* McNamara & Ah Yee, 1989. [South Australia] (Miocene).

Miocene

A. paucituberculata McNamara & Ah Yee, 1989: 179-181; figs 2a-b, 3a-b, 4a-e. [Port Campbell Limestone, Portland, Victoria, South Australia] (Bairnsdalian-Mitchellian, Middle-Late Micoene) <HT: WAM 87.303; PT: WAM 85.1271, 87.522, 87.523>.

A. tuberculata McNamara & Ah Yee, 1989: 181-183; figs 6a-d. [Mannum Fm., Murray River, South Australia] (Longfordian, Early Micoene) <HT: WAM 87.116; PT: WAM 86.322b, d-g>.

Genus *Antiqubrissus* Szörényi, 1955

Antiqubrissus Szörényi, 1955: 126-127, 261-262. Type-species: *Antiqubrissus suemegensis* [*sümegensis*] Szörényi, 1955. [Hungary] (Mid-Cretaceous).

Cretaceous

A. suemegensis [nom. corr. pro *sümegensis*] SZÖRÉNYI, 1955: 127, 262; pl. 22, figs 15-16, 20-21, 26. [groupe de calcaire à *Hippurites*, Sümeg-Kövesdomb, Bakony Mts., Hungary] (Mid-Cretaceous) <HT: GIH Eb/557>.

Genus *Apoxypetalum* McNAMARA, 1993b

Apoxypetalum McNAMARA, 1993b: 40-42. Type-species: *Apoxypetalum chenjafra* McNAMARA, 1993b. [Australia] (Oligocene).

Oligocene

A. chenjafra McNAMARA, 1993b: 42-44; figs 2-4. [Waurn Ponds Limestone, Blue Circle Southern Cement Quarry, Reservoir Road, Waurn Ponds, Victoria, Australia] (Janjukian, Late Oligocene) <HT: NMV P135991; PT: NMV P135989, P135990; P135992; P135993; WAM 92.374-382>.

Genus *Brissalius* COPPARD, 2008

Brissalius COPPARD, 2008: 3. Type-species: *Brissalius vannoordenburgi* COPPARD, 2008. [Philippines] (Recent) {referred to the family Brissopsidae by COPPARD (2008)}.

Recent

B. vannoordenburgi COPPARD, 2008: 3-6; figs 1a-g, 2a-g, 9a-p. [off Siquijor Island, Philippines (depth 200 m)] (Recent) <HT: BMNH 2008.618; PT: BMNH 2008.619>.

Genus *Brissopatagus* COTTEAU, 1863

Recent

B. relictus SHIGEI, 1975c: 333-338; figs 1-10, 11a-b, 12, 13a-b, 14-16. [Sagami Bay, Japan Sea, Soyo-Maru Stat. T8 (35°01'0" N, 139°08'0" E), depth 117 m] (Recent) <HT: MMBS Echi 1101>.

Eocene

B. cotteaui LÓPEZ & SILLERO, 2006: 203-204; figs 214a-c. [La Negreta, Tangel, Province Alicante, Spain] (*Schizaster vilanovae* zone, Lutetian, Middle Eocene) <HT: C. Sillero coll'n E-550>.

B. depressus LÓPEZ & SILLERO, 2006: 204-205; figs 215, 215A. [Villafranqueza, Province Alicante, Spain] (Lutetian, Middle Eocene) <HT: C. Sillero coll'n E-554>.

B. lucentinus López & Sillero, 2006: 205-206, figs 216a-d. [Tangel, Province Alicante, Spain] (*Schizaster vilanovae* zone, Lutetian, Middle Eocene) <HT: C. Sillero coll'n E-545>.

B. palamoensis López & Sillero, 2006: 206; figs 217a-d. [Villafranqueza, Province Alicante, Spain] (*Schizaster vilanovae* zone, Lutetian, Middle Eocene) <HT: C. Sillero coll'n E-543; PT: C. Sillero coll'n E-547>.

B. parvus López & Sillero, 2006: 206-207; figs 218a-b. [Cerro de Garachico, Villafranqueza, Province Alicante, Spain] (*Schizaster vilanovae* zone, Lutetian, Middle Eocene) <HT: C. Sillero coll'n E-551>.

B. pulchellus López & Sillero, 2006: 207-208; figs 219a-d, 220A-F, un-numbered fig. on p. 207. [Tangel, Province Alicante, and Cantera de los Morteros, Province Aspe, Spain] (*Schizaster vilanovae* zone, Lutetian, Middle Eocene) <HT: C. Sillero coll'n E-549; PT: C. Sillero coll'n E-552, C.López coll'n AM42>.

B. silleroi Santolaya in Santolaya & Sillero, 1994: 13-14; two unnumbered figs on p. 14. [Villafranqueza, Tangel, Province Alicante, Spain] (Lutetian, Middle Eocene) <ST: Collections Sillero, Alicante & Santolaya, Lejona> {re-described in López & Sillero (2006: 208-209)}.

Genus *Brissopsis* Agassiz in Agassiz & Desor, 1847

Miocene

B. australis McNamara, Philip & Kruse, 1986: 63; figs 7A-E. [Puebla Fm., "Ledge", Torquay, Victoria, Australia] (Longfordian, Early Miocene) <HT: NMV P18557; PT: NMV P18555>.

Genus *Brissus* Gray, 1825

Pliocene

B. greifatensis Elattaar, 2001a: 656; fig. 7A; pl. 5: figs 1-4. [Sharm El Arab Member, Shagra Formation, Mersa Um Greifat, S of Wadi Wizr,and Wadi Wizr, 41 km SW Quseir, Red Sea coast, Egypt] (Early-Late Pliocene) <3 syntypes, no numbers mentioned, AUSGM E collection>.

B. shaimaae Ali, 1985: 292; figs 4A-C. [Wadi Gabir, Western Egypt] (Early Pliocene) <HT: USNM 339749; PT: USNM 339750>.

Miocene

B. daviesi Jain, 2002: 127-128; pl. 6, figs 4-9. [Gaj Fm., 4.75 km southeast of Rajitpur, Kathiawar, Gujarat, India] (Early Miocene) <HT: GSI 20787; PT: GSI 20784-86>.

B. fosteri McNamara, Philip & Kruse, 1986: 56-59; figs 1-3, 4A. [Mannum Fm., Yarra Glen, South Australia] (Longfordian, Early Miocene) <HT: NMV P55535; PT: NMV P55534, P55536>.

Oligocene

B. bridgeboronensis Carter, 1987: 1043-1045; figs 2.1-2.3. [Bridgeboro Quarry, Mitchell County, Georgia, USA] (Lower Oligocene) <HT: USNM 402062>.

Genus *Cyclaster* Cotteau, 1856

Oligocene

C. azemati Devriès, 1972: 52-54; pl. 1: figs 6-10; pl. 2: figs 9-15. [Horna and Monteagudo, Province Alicante, Spain] (Oligocene) <ST: coll. J. Azema, Paris [no specimen no. provided], coll. J. Leclerc, Paris [no specimen no. provided]>.

Maastrichtian

C. galei Jeffery, 1997a: 704-705; text-figs 16, 18A-C; pl. 10, figs 5-8. [Koshak and Kyzylsai, Mangyshlak, Kazakhstan] (Uppermost Maastrichtian) <HT: BMNH EE5575; PT: BMNH EE5576, EE5626>.

C. platornatus Kutscher, 1978b: 1028-1030; pl. 3, figs 1-5. [Rügen, Germany] (Late Early Maastrichtian) <HT: SGWG 60/2>.

Genus *Eupatagus* L. Agassiz, 1847

Subgenus *Eupatagus* L. Agassiz, 1847

Recent

E. flindersi Baker & Rowe, 1990: 291-292; figs 15, 25-27, 91-95. [S. of Goat Id, Victoria, Australia, N. of Eddystone Pt. and Ringarooma Bay, Tasmania] (Recent) <HT: NMNZ 4235; PT: QVM 1985/15/1, 1975/15/2>.

Miocene

E. cetus Kruse & Philip, 1985: 173; fig. 8a-b; pl. 4, figs 4-8. [Mannum Fm., Murray cliffs, Swan Reach to Mannum and Wongulla, South Australia] (Early Miocene) <HT: NMV P18311; PT: NMV P18144, P18142>.

[*E. coronalis* Philippe, 1989]: 32. [Rhône Basin, France] (Miocene) <not given> {no description, figures or repository are given → *nomen nudum*}.

E. ludbrookae Kruse & Philip, 1985: 174; fig. 10a-b; pl. 3, fig. 5; pl. 4, figs 1-3. [Mannum Fm., Murray cliffs, Swan Reach, Mannum and Wongulla; Morgan Limestone, Morgan; all in South Australia] (Early Miocene) <HT: NMV P18241; PT: NMV P55498>.

Oligocene – Miocene

E. collabus Kruse & Philip, 1985: 171; fig. 6a-b; pl. 1, figs 11-13; pl. 2, figs 1-4. [numerous localities in South and West Australia; type from Mannum Fm., Murray cliffs, Swan Reach to Mannum, South Australia] (Late Oligocene – Early Miocene) <HT: NMV P18135; PT: NMV P55484>.

Oligocene

E. planulatus Kruse & Philip, 1985: 175; fig. 11a-b; pl. 4, figs 9-11. [Port Willunga Fm., Aldinga and Port Vincent Limestone, Surveyor Point, Yorke Peninsula, both South Australia] (? Oligocene) <HT: NMV P20492; PT: AUGD S23(3)>.

E. rostratus zitteli Henderson, 1975: 45-46; text-figs 10a-e; pl. 11, figs 5-6; pl. 12, figs 1-3. [Cape Farwell, west Nelson; and many other localities, New Zealand] (Whaingaroan – Altonian, Oligocene to Early Miocene) <LT: NHMW 1970/1336; PLT: NHMW 1959/335/50, 1970/1337> {*nomen novum* for *Hemipatagus formosus* Zittel, 1864 non de Loriol, 1863}.

E. (*E.*) *singhi* Srivastava, 1981: 39-40; pl. 1, figs 5-8. [near Ber Mota village, Kutch, India] (*Lepidocyclina* (*Eulepidina*) zone, Middle Oligocene) <HT: DGUL KTE 1021; PT: DGUL KTE 1022, KTE 1023>.

E. (*E.*) *tandoni* Srivastava, 1981: 40-41; pl. 1, figs 9-11. [near Ber Mota village, Kutch, India] (*Eupatagus* (*E.*) *rostratus* zone, Late Oligocene) <HT: DGUL KTE 1030; PT: DGUL KTE 1031-34> {tranferred to subgenus *Gymnopatagus* by Srivastava (1988: 152)}.

Eocene

E. batequensis Squires & Demetrion, 1992: 46-48; figs 142-145. [Bateque Fm., CSUN-locality 1470, Arroyo San Juan de Abajo, Baja California Sur, Mexico] (Eocene) <HT: IGM 5923 (= LACMIP 8863); PT: IGM 5924 (= LACMIP 8864)>.

E. lawsonae Kier, 1980: 53; pl. 21, figs 1-4. [Castle Hayne Limestone, Ideal Cement Company quarry localities 12, North Carolina, USA] (Middle Eocene) <HT: USNM 264086>.

E. (*E.*) *rajasthanensis* Srivastava & Singh, 2008: 85-87; figs 2a-g. [Khuiala Formation, about 625 m west of Habur, Jaisalmer district, Rajasthan, India] (Early Eocene) <HT: BSIP 7097/BSIP/39528; PT: BSIP 7097/BSIP/39529 to 7097/BSIP/39547>.

E. texanus Zachos in Zachos & Moulineux, 2003: 504; figs 7.1-7.3. [Weches Formation, Claiborne Group, Localities 24, 30, 42, 57, 62, 73, 75, 77, 80; Houston, Leon, Nacog-

doches, Sabine, and San Augustine Counties, Texas, USA] (Middle Eocene) <HT: TMM 1987TX1; PT: TMM 1987TX2, 1987TX3, 2013TX1 (all from Locality 42)>.

E. wilsoni KIER, 1980: 51-53; figs 25-26; pl. 20, figs 7-11. [Castle Hayne Limestone, Ideal Cement Company quarry localities 12, 16, North Carolina, USA] (Middle Eocene) <HT: USNM 264084; PT: USNM 264085>.

Subgenus *Gymnopatagus* DÖDERLEIN, 1901

Recent

G. parvipetalus BAKER & ROWE, 1990: 288-291; figs 10-13. [N.E. of Cape Brett, New Zealand, 596-604 m] (Recent) <HT: NZOI H452>.

Genus *Fernandezaster* SÁNCHEZ ROIG, 1952

Miocene

F. durhami FISCHER, 1985: 205-206; figs 5/9, 6a-c; pl. 3, fig. 4. [Turrúcares Fm., Pendiente, SW del Cerro Candelaria, Costa Rica] (Middle Miocene) <HT: ECG CO-97>.

Genus *Gualtieria* DESOR, in AGASSIZ & DESOR, 1847

Eocene-Oligocene

G. alicantina SANTOLAYA, 1993: 44-46; figs 1-8. [Villajoysa, Agost and La Romana, Alicante, Spain] (Eocene-Oligocene) <no types defined, repository unknown>.

Subgenus *Blaviaster* LAMBERT, 1920

Eocene

G. (*B.*) *grossouveri productus* CHAVANON, 1974: Vol.1: 269; pl. 18: figs 2a-d. [Blayais and Couquèques, Aquitaine Basin, western France] (Middle to Late Eocene) <ST: Castex colln, Fabre colln; no repository nos given for types; figured specimens: 33.C.31, 33.C.32>.

Genus *Hysteraster* MCNAMARA & BARRIE, 1993

Hysteraster MCNAMARA & BARRIE, 1993: 140. Type-species: *Hysteraster paragrapsimus* MCNAMARA & BARRIE, 1993. [South Australia] (Miocene).

Miocene

H. paragrapsimus McNamara & Barrie, 1993: 140-145; figs 1-4. [Morgan Limestone, Murray River cliffs, downstream from Waikerie at Broken Cliffs, South Australia] (Early to early Middle Miocene) <HT: SAM P32322; PT: SAM P32323, P24260; MV 18039>.

Genus *Macropneustes* L. Agassiz, 1847

Subgenus *Deakia* Pavay, 1875

Palaeogene

M. (*D.*) *xinjiangensis* Yang Shengqiu, 1991: 125-126; pl. 19, figs 1-5. [Upper Qimugen Fm., Kuzigongsu, 5 km E Bashibulake, Wuqia County, Tarim Basin, China] (Early Tertiary) <HT: NIGP 88439>.

Genus *Meoma* Gray, 1851

Subgenus *Schizobrissus* Pomel, 1869

Eocene

[*M.* (*S.*) *chiplonkari* Srivastava, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <repository unknown> {nomen nudum}.

[*M.* (*S.*) *cooperi* Srivastava, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <repository unknown > {nomen nudum}.

[*M.* (*S.*) *misrai* Srivastava, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <repository unknown> {nomen nudum}.

[*M.* (*S.*) *singhi* Srivastava, 1988]: 151. [India] (*Asterocyclina alticostata* Zone, Middle Eocene) <repository unknown > {nomen nudum}.

Genus *Plagiobrissus* Pomel, 1883

(pro *Plagionotus* Agassiz & Desor, 1847 non Mulsant, 1842)

Pliocene

Plagionotus holmesii McCrady in Tuomey & Holmes, 1855: 9-10; pl. 3: figs 2, 2a. [Smith's, Goose Creek, South Carolina, USA] (Pliocene) <ST: Museum, College of Charleston, South Carolina, [specimen no. not given]> {based on test fragments}.

Plagionotus ravenelianus McCRADY in TUOMEY & HOLMES, 1855: 10-11; pl. 3: figs 3, 3a. [The Groove, Cooper River, South Carolina, USA] (Pliocene) <ST: Museum, College of Charleston, South Carolina, [specimen no. not given]> {based on test fragments}.

Genus *Rhynobrissus* AGASSIZ, 1872

Recent

R. tumulus McNAMARA, 1982a: 351-358, figs 1-5. [20°40' S, 115°26' E, beach E of Cape Dupuy, NE coast of Barrow Island, Western Australia] (Recent) <HT: WAM 1047-81; PT: WAM 1048-81, 1049-81, 1050-81, 1051-81, BMNH 1981.10.27.1, AM J14770-J14772>.

Genus *Taimanawa* HENDERSON & FELL, 1969

Oligocene

T. rostrata HENDERSON, 1975: 50-51; pl. 14, figs 1-3. [Hazelburn, South Canterbury, New Zealand] (Duntroonian – Waitakian, Oligocene) <HT: NZGS EC.389>.

Eocene

T. prisca HENDERSON, 1975: 49-50; pl. 13, figs 4-6; pl. 14, fig. 6. [Gentle Annie Rock and Perpendicular Point, Punakaikai District, Westland, New Zealand] (Kaiatan – ? Runangan, Late Eocene) <HT: NZGS EC.587; PT: NZGS EC.392, 576, 583-4, 586, 588, 592-9>.

Family Spatangidae GRAY, 1825

Genus *Maretia* GRAY, 1855

Pliocene

M. planulata abbassi ALI, 1985: 294-295; figs 12A-B. [Wadi Abu Abraiki, Western Egypt] (Early Pliocene) <HT: USNM 339748>.

Miocene

M. ranjitpurensis JAIN, 2002: 130-132; pl. 6, figs 11-14. [Gaj Fm.; 4.75 km southeast of Rajitpur; Kuranga Railway Station; and 2.5 km west-southwest of Bhatvadia, all in Kathiawar, Gujarat, India] (Early Miocene) <HT: GSI 20791; PT: GSI 20790, 20792-93>.

Oligocene

M. carolinensis Kier, 1997: 11-13; fig. 6; pl. 9, figs 8-9; pl. 10, figs 1-7; pl. 11, figs 1-2. [Trent Fm., Polocksville state quarry, North Carolina, USA] (Late Oligocene) <HT: USNM 398338; PT: USNM 398337, 398339-398341, 492101-492124>.

Genus *Metalia* Gray, 1855

Recent

M. angustus de Ridder, 1984: 621-623; pl. 2, figs A-D. [Nouvelle-Calédonie] (Recent) <MNHN ECES 8286; PT: MNHM ECES 8287>.

M. kermadecensis Baker & Rowe, 1990: 293-295; figs 34-35. [Raoul Id., Kermadecs, 90-120 m] (Recent) <HT: NMNZ 3425>.

M. sternalis var. *lata* Dollfus & Roman, 1981: 124. [Red Sea] (Recent) <HT: not given>.

M. sternalis var. *jousseaumei* Dollfus & Roman, 1981: 124; pl. 41, figs 2-5. [Red Sea] (Recent) <HT: EM, specimen no. not given>.

Miocene

M. harshadae Jain, 2002: 128-130; pl. 6, fig. 10; pl. 7, fig. 1. [Gaj Fm., 4.75 km southeast of Rajitpur, Kathiawar, Gujarat, India] (Early Miocene) <ST: GSI 20788-89>.

Genus *Megapneustes* Gauthier in Fourtau, 1899

Eocene

M. jaisalmerensis Srivastava, Rana & Singh, 2008: 32-35; pl. 1: figs 1-3, 5-8. [Khuiala Formation, Gharollia Hill section, situated about 2 km northwest of village Pariwar (= Parivar), Jaisalmer district, Rajasthan, India (27°15' N, 70°45' E)] (Early Eocene) <HT: GU/R/KE/2023; PT: GU/R/KE /2024 to GU/R/KE/2026 and GU/R/KE /F – 2027 to GU/R/KE /F to 2031>.

Genus *Peraspatangus* Philip & Foster, 1971

Peraspatangus Philip & Foster, 1971: 689-690. Type-species: *Peraspatangus brevis* Philip & Foster, 1971. [Australia] (Miocene) {other species included: *P. depressus* Philip & Foster, 1971}.

Miocene

P. brevis Philip & Foster, 1971: 690-692; text-figs 9b-d; pl. 126: fig. 3; pl. 133: fig. 1, 2, 4-6, 8. [Bochara Limestone, junction Grange Burn – Muddy Creek, Hamilton district, Victoria, Australia] (Batesfordian, Lower Miocene) <HT: NMV P27956; PT: NMV P27955, UNE 11758>.

P. depressus Philip & Foster, 1971: 692-693; text-figs 9a; pl. 128: fig. 2; pl. 132: fig. 1, 4, 5, 7; pl. 133: fig. 3. [Rutledge Marl Mb., Port Campbell Limestone, Ingle's Creek, Port Campbell, Victoria, Australia] (Bairnsdalian, Middle Miocene) <HT: NMV P27953; PT: NMV P27954>.

Genus *Spatangobrissus* Clark, 1923

Attributed to the family Maretiidae by Holmes, Ah Yee & Krause (2005).

Recent

S. incus Baker & Rowe, 1990: 295-297; figs 17, 36-41. [E. of Flinders Island, Bass Strait, between Wilson's Promontory and Glennie Island, Victoria and S. of Bemm River, Victoria, Australia] (Recent) <HT: TM: H515; PT: MV F52356, F52357>.

Miocene

S. dermodyorum Holmes, Ah Yee & Krause, 2005: 94-95; figs 6A-E, 7A-C, 8A-E. [Glenforslan Fm., Morgan Grp., 7 km NNE Murray River Lock 1, Blanchetown, South Australia] (Batesfordian, Middle Miocene) <HT: NMV P312570; PT: NMV P312571-P312573>.

Genus *Spatangus* Gray, 1825

Recent

S. mathesoni McKnight, 1968: 102-107; figs 10-11. [Stat. D 221 (40°06' S, 171°16' E, depth 686 m), D 224 (40°47' S, 169°41' E, depth 903 m), D 226 (39°54' S, 168°40' E, depth 823 m), D 231 (37°53' S, 169°45' E, depth 772 m), Tasman Sea] (Recent) <HT: NZOI 27 (Stat. D 226); PT: NZOI P 42, P 43 (Stat. D 231)>.

Subgenus *Phymapatagus* Lambert, 1910

Eocene

S. (*P.*) *granditubercula*tus Lewis, 1989: 34-39; figs 11, 12 a-c; pl. 7: figs 1 a-e, 2 a-c. [Barton-on-Sea, Hampshire, England] (Bartonian) <HT: BMNH E 76821; PT: E 37320-3, E 76817-20, E 76459>.

Genus *Trachypatagus* Pomel, 1869

Miocene

T. nehalae Ali, 1989b: 60; fig. 8a-d. [Marmarlca Limestone, Wadi El Habis, W of Mersa Matruh, Egypt] (Langhian-Serravallian, Middle Miocene) <HT: MUGM 8619; PT: MUGM 8620>.

Subfamily Eurypataginae Kroh, 2007

Eurypataginae Kroh, 2007: 174. Type-genus: *Eurypatagus* Mortensen, 1948. [Indo-Pacific Ocean] (Miocene to Recent) {other genera included: *Paramaretia* Mortensen, 1950, ? *Platybrissus* Grube, 1866}.

Family Loveniidae Lambert, 1905

Genus *Araeolampas* Serafy, 1974

Araeolampas Serafy, 1974: 43. Type-species: *Homolampas fulva* A. Agassiz, 1879 [Northern Atlantic] (Recent) {other species included: *Araeolampas atlantica* Serafy, 1974}.

Recent

A. atlantica Serafy, 1974: 44-46; figs 1a-c, 2a-b. [Albatross Stat. 2105 off Virginia (37°50' N, 43°03.8' W, depth 2575 m); Atlantis Stat. 20 off the Azores (37°50.5' N, 26°00' W, depth 2585 m); west of Dry Tortugas, Gulf of Mexico (depth 3545 m); Pillsbury Stat. P-120 west of Georgia (31°48' N, 76°38' W, depth 1920 m), Stat. P-292, west of Gabon, Gulf of Guinea (0°12' N, 5°11' E, depth 3595 m), Stat. P-1429, norht of Haiti (21°19.2' N, 73°45.5' W, depth 2532 m); all in the Atlantic Ocean] (Recent) <HT: USNM 24598 (from Albatross Stat. 2105)>.

Genus *Bahariya* ELBASSYONY, 2005

Bahariya ELBASSYONY, 2005: 321-324. Type-species: *Bahariya teetotumensi* ELBASSYONY, 2005. [Egypt] (Eocene) {considered a junior subjective synonym of *Gualtieria* L. AGASSIZ, 1847 by Smith, The Echinoid Directory (accessed 20.I.2009)}.

Eocene

B. teetotumensi ELBASSYONY, 2005: 324-326; pl. 1: figs 1a-d, 2-6; pl. 2: figs 1a-c, 2. [Mokattam Formation, Teetotum hill, E of Qazzun sand dunes, Teetotum section, NE plateau of Bahariya Oasis, Egypt] (Bartonian, Middle Eocene) <HT: specimen figured in pl. 1: figs 1a-; PT: 20 specimens (type material deposited at: ASU GM under 019-001 to 019-007, Ahmed EL-BASSIONY in litt., 23.04.2007)>.

Genus *Breynia* DESOR, 1847

Recent

B. neanika MCNAMARA, 1982b: 188-192; figs 12-13. [Arafura Sea; Albany Passage, Torres Strait; Bowen, Queensland, Northern Australia] <HT: AM J14324; PT: AM J14325, AM J14326a-d>.

Genus *Echinocardium* GRAY, 1825

(Genus *Amphidetus* L. AGASSIZ, 1836, objective junior synonym of *Echinocardium* GRAY, 1825)

Recent

E. meteorense MIRONOV, 2006: 120-125; figs 11A-I, 12A-I, 13A, 14A-C. [NE Atlantic Seamounts (Atlantis, Great Meteor, Seine); R/V "Moskovsky Universitet" Stat. 19-2, Seine Seamount, NE Atlantic Ocean (33°45' N, 14°20' W, depth 180-200 m); R/V "Akademik Petrovsky", Cruise 12, Stat. 36; R/V "Vityaz 2", Cruise 2, Stat. 154B; R/V "Meteor", Stat. 161a-KD62; R/V "Le Suroit", expedition "Seamount 2", Stat. DW 147, Stat. DW 189; R/V "Ikhtiandr", Cruise 8, Stat. 21A, unnamed seamount (11°37'5 S, 05°11'9 W, depth 300-450 m)] (Recent) <HT: IORAS XV-69-33 (from "Moskovsky Universitet" Stat. 19-2); PT: 2 specimens, no numbers given (from "Meteor" Stat. 161a-KD62 and "Akademik Petrovsky" Stat. 36 respectively)>.

Pliocene

A. ampliflorus MCCRADY in TUOMEY & HOLMES, 1855: 6-7; pl. 2: figs 2, 2a. [The Groove, Cooper River, South Carolina, USA] (Pliocene) <not given>.

E. kelloggi Kier, 1983: 500-501; fig. 1; pl. 1, figs 1-5. [Yorktown Fm., Lee Creek Mine, North Carolina, USA] (Lower Pliocene) <HT: USNM 186521>.

Miocene

E. biaense Mihály, 1985: 245-246, 262; pl. 5, figs 3-5. [Leitha Limestone, Bia, Alsómjor hegyoldal; Rákos District, Budapest; and Örs vezér tere site, all in Hungary] (Late Badenian (= Early Serravallian), Middle Miocene) <HT: MAFI Ech 115; PT: MAFI Ech 129, 427, 428> {according to Radwański & Wysocka (2001: 307) this species is a synonym of *Echinocardium peroni* Cotteau, 1877}.

E. leopolitanum Radwański & Wysocka, 2001: 304-306; pl. 3: figs 1a-c, 2a-c, 3a-c, 4a-c; pl. 4: figs 1a-c, 2-5, 6a, b; ül. 5: figs 1a-c, 2a, b, 3a, b; pl. 6: figs 1a-d, 2a-c, 3. [Gleboviti (= Chlebowice), near Bibrka, c. 30 km SE Lviv, Ukraine] (Early Badenian [= Langhian], Middle Miocene) <HT: Radwański, no repository no. given [pl. 6: fig. 1a-d]; PT: 2 specimens, Radwański, no repository no. given [pl. 6: fig. 2a-c, 3]>.

E. marylandiense Kier, 1972b: 16-18; fig. 6; pl. 7, figs 2-3; pl. 8, figs 1-2. [Choptank Fm., Scientists' Cliffs, Kenwood Beach, Calvert County, Maryland, USA] (Middle Miocene) <HT: USNM 174460>.

E. olisiponensis Kotchetoff, Kotchetoff & Veiga Ferreira, 1975: 67-75; pl. 3, figs 1-2; pl. 4, figs 3-4; pl. 5, figs 5-9. [Pendedo cliff, north of Cap d'Espichel, Portugal] ("Helvetian", Miocene) <not given>.

Genus *Lovenia* Desor, 1847

Recent

L. lata Shigei, 1981: 81-87; figs 1-9. [Aoyama-dashi, Sagami Bay, Japan] (Recent) <HT & PT: MMBS> {no specimen nos. given}.

Miocene

L. bagheerae Irwin in Irwin & Archbold, 1994: 10-12; figs 10A-L. [Port Campbell Limestone, Portland, Victoria, Australia] (Mitchellian, Tortonian, early Late Miocene) <HT: NMV P79247; PT: NMV P79233-P79270, P78918, P78927, P78935, P78941, P78943, P78953>.

Incertis sedis

Genus *Murraypneustes* Holmes, Ah Yee & Krause, 2005

Murraypneustes Holmes, Ah Yee & Krause, 2005: 92-93. Type-species: *Murraypneustes biannulatus* Holmes, Ah Yee & Krause, 2005. [South Australia] (Miocene).

Miocene

M. biannulatus HOLMES, AH YEE & KRAUSE, 2005: 93-94; figs 2A-F, 3A-C, 4A-B, 5. [Glenforslan Fm., Morgan Grp., 7 km NNE Murray River Lock 1, Blanchetown, South Australia] (Batesfordian, Middle Miocene) <HT: NMV P312370; PT: NMV P312371, P312372>.

Suborder Asterostomatina FISCHER, 1966

Family Asterostomatidae PICTET, 1857

Genus *Acanthotrema* BAKER & ROWE, 1990

Acanthotrema BAKER & ROWE, 1990: 312. Type-species: *Acanthotrema siculum* BAKER & ROWE, 1990. [Subantarctic Islands] (Recent) {BAKER (1998: 285) proposed the name *Kermabrissoides* for this genus, since the name *Acanthotrema* is preoccupied}.

Recent

A. siculum BAKER & ROWE, 1990: 312-314; figs 22-24, 84-87. [off Raoul Island, Kermadecs and off Norfolk Island] (Recent) <HT: NMNZ 4254; PT: NZOI P689>.

Genus *Antillaster* LAMBERT, 1909

Eocene

A. albeari KIER, 1984b: 135; pl. 80, figs 1-2; pl. 81, figs 1-2. [Palmer loc. 1003, N of Carretera Central, 3.5 km, on road to San Diego de los Baños, Pinar del Rio Province, Cuba] (Middle to Late Eocene) <HT: ANSP 16631>.

A. bagmanovi MCNAMARA & MELIKOV, 2002: 160-164; figs 2, 3a-b, 4, 5a-b, 6, 7. [Paradah Group, Daralik, Nakhichevan region, Azerbaijan] (Late Lutetian to Bartonian, Eocene) <HT: WAM 99.428; PT: 99.429, 99.432>.

Genus *Asterostoma* L. AGASSIZ, 1847

Eocene

A. pawsoni KIER, 1984b: 128-129; fig. 40; pl. 78, figs 1-6. [hillsides above the Yallahs River, St. Thomas, in the Lucky Hill region in St. Mary, and in the Spring Mount region, St. James, Jamaica] (Eocene) <HT: USNM 301378a; PT: USNM 301378b, 301378c>

Genus *Heterobrissus* Manzoni & Mazzetti, 1877

Recent

H. erinaceus Baker & Rowe, 1990: 307-309; figs 19, 73-77, 109-111. [off Cape Hawke, E. of Brush Island, E. of Sydney, E. of Sugarloaf Point, S.E. of Jervis Bay, New South Wales and E. of Peregian Beach, southern Queensland, Australia] (Recent) <HT: AM J11032; PT: AM J14450, J14452-8, J11082, J10823, J14460, J5819, J14461; NMNZ 6153, 5104, 1995>.

H. gigas Baker & Rowe, 1990: 309-310; figs 19, 78-80, 112-114. [E. of Brush Island, New South Wales, off Cape Everard, Victoria, E. of Kiama, off Broken Bay, off Sydney, off Collaroy, off Cape Hawke and between Sydney and Port Stephens, New South Wales, Australia] (Recent) <HT: AM J10824; PT: AM J6383, J10819-J10820, J10822, J10825, J10871, J11031, J12432, J14466, J14470, J14472-J14474; NMNZ 3921-3922>.

Genus *Kermabrissoides* Baker, 1998

Kermabrissoides Baker, 1998: 285. Type-species: *A. siculum* Baker & Rowe, 1990. {nomen nov. pro *Acanthotrema* Baker & Rowe, 1990 non Tavassos, 1928}.

Genus *Palaeotropus* Loven, 1874

Recent

P. uniporum Mironov, 2006: 117-119; figs 8A-D, 9A-G. [R/V "Akademik Mstislav Keldysh" Stat. 521 Atlantis Seamount, NE Atlantic Ocean (34°23'5-34°23'5 N, 29°59'6-29°59'1 W, depth 1560-1900 m)] (Recent) <HT: IORAS XV-69-32>.

Genus *Plesiozonus* de Meijere, 1902

Recent

P. tenuis David & de Ridder, 1989: 210-213; figs 4-6; pl. 3, figs 1-6. [Musorstom 2 st. 52; 14° 00,7' N, 120° 18,7' E; Philippines] (Recent) <HT: MNHN> {no specimen no. given}.

Order Neolampadoida Philip, 1963

Family Neolampadidae Lambert, 1918

Genus *Actapericulum* HOLMES, 1995

Actapericulum HOLMES, 1995: 120. Type-species: *Actapericulum bicarinatum* HOLMES, 1995. [South Australia] (Miocene).

Miocene

A. bicarinatum HOLMES, 1995: 120-124; figs 6A-M, 8I-L. [Zeally Limestone Mb., Puebla Fm., Point Danger, Torquay, Victoria; Gambier Limestone, at Mt. Gambier and near Nelson; Mannum Fm, near Bow Hill, South Australia] (Longfordian – ? Batesfordian, Burdigalian – Langhian, late Early Miocene) <HT: NMV P140924; PT: NMV P73689-P73703, P73710-P73724, P140925, P140926, P140929, P73683, P73684-P73688, P73704-P73709>.

Genus *Aphanophora* DE MEIJERE, 1903

Eocene

A.? *bassoris* HOLMES, 1995: 116-119; figs 2A-B, 3A-M, 5I-L. [Kingscote Limestone, Kingscote, Kangaroo Island, South Australia] (Aldingan, Bartonian?-Priabonian, Late Eocene) <HT: NMV P140922; PT: NMV P73675-P73682, P133073, P140923>.

Incertis sedis

Genus *Desorella* COTTEAU, 1855

Late Jurassic – Early Cretaceous

D. moravica BLASCHKE, 1911: 180-181; pl. 6: figs 11a, b. [whitish variant of Stramberk Limestone, Štramberk (= Stramberg), Czech Republic] (Tithonian to Berriasian,) <HT: NHMW 1910/0010/0036>.

Genus *Mizunamia* ISHIJIMA & HATAI, 1973

Mizunamia ISHIJIMA & HATAI, 1973: 67. Type-species: *Mizunamia tokiensis* ISHIJIMA & HATAI, 1973. [Japan] (Miocene).

Miocene

M. tokiensis ISHIJIMA & HATAI, 1973: 67 (description: on p. 65); fig. 1. [Akeyo Formation, Mizunami Group, Obora, west of Akeyo and Northeast of Toki, Toki-Mizunami Dis-

trict, Gifu Prefecture, Central Japan] (Miocene) <no types defined, material housed in the collection of Kotora Hatai> {problematic microfossil known from single cross section only, resembles echinoid spine cross section}.

Echinoid Traces
(formally named ichnotaxa)

Genus *Bichordites* Plaziat & Mahmoudi, 1988

Bichordites Plaziat & Mahmoudi, 1988: 223-224. Types-species: *Bichordites monastiriensis* Plaziat & Mahmoudi, 1988. [Tunisia] (Pleistocene). {echinoid burrows}.

Pleistocene

B. monastiriensis Plaziat & Mahmoudi, 1988: 224-225; text-figs 5a-c, 8a-e; pl. 1: figs A1-A3, B1-B3, C-F; pl. 2: fig. B. [Khnis Quartzose, abandoned quarry at Khnis, 7 km SW of Monastir, S of Hergla, East-Central Tunisia] (Thyrrenian, Late Pleistocene) <HT: UPS P.2201; PT: UPS P.2202-2216>.

Genus *Cardioichnus* Smith & Crimes, 1983

Cardioichnus Smith & Crimes, 1983: 90. Type-species: *Cardioichnus planus* Smith & Crimes, 1983. [Europe] (Cretaceous-Miocene). {echinoid burrows}.

Miocene

C. reniformis Mayoral & Muñiz, 2001: 71-75; figs 2A-D, 3A-C, 4A1-A2. [Lepe, SW Huelva Province, Guadalquivir Basin, Spain] (Late Miocene) <HT: GMUS LE11/Cr1 (figs 3A-C); PT: GMUS LE11/Cr2 (figs 4A1-A2)>.

Eocene

C. foradadaensis Plaziat & Mahmoudi, 1988: 225; text-figs 12d, 12f, 12 h; pl. 2: figs C, D. [Foradada-de-Toscar, Huesca, Northern Spain] (Late Ilerdian-Early Cuisian, Early Eocene) <HT: UPS 2217>.

C. ovalis Smith & Crimes, 1983: 91; fig. 7B. [exact locality unknown, near Czarna, Wiselka, Silesia, Poland] (Cretaceous-Eocene) <HT: BMNH T762>.

C. planus Smith & Crimes, 1983: 90-91; figs 7A, C. [Zollhaus Quarry, ca. 25 km W of Lake Thun, Prealps, Switzerland] (Ilerdian, Early Eocene) <HT: BMNH T763 (middle of three traces); PT: BMNH T763 (outer two traces)>.

Genus *Ereipichnus* Monaco, Giannetti, Caracuel & Yebenes, 2005

Ereipichnus Monaco, Giannetti, Caracuel & Yebenes, 2005: 344. Type-species: *Ereipichnus geladensis* Monaco, Giannetti, Caracuel & Yebenes, 2005. [Spain] (Albian) {echinoid burrows}.

Cretaceous

E. geladensis Monaco, Giannetti, Caracuel & Yebenes, 2005: 344; figs 3A-D, 4A-G. [Sa´caras Formation, Serra Gelada section (Prebetic of Alicante), Spain] (Early to Middle Albian) <HT: EGSG T109; PT: EGSG T110 to T112> {Ichnofossil, horizontal meandering burrows with backfill structure}.

Genus *Gnathichnus* Bromley, 1975

Gnathichnus Bromley, 1975: 738. Type-species: *Gnathichnus pentax* Bromley, 1975. [worldwide] (Jurassic to Recent). {echinoid grazing traces}.

Pleistocene

G. pentax Bromley, 1975: 738; pl. 85, figs 1-3; pl. 86, figs 3-5; pl. 87, figs 1-7; pl. 88, figs 1-7. [type-loc.: Sgourou Fm., Kritika, Rhodes, Greece – range: worldwide] (type-strat.: lowermost Pleistocene – range: Jurassic – Recent) <HT: MMH 13386; PT: IGS 115027, 115029> {echinoid grazing traces on bivalves, belemnites, echinoids and pebbles}.

Cretaceous

G. stellarum Breton, Néraudeau & Cuenca-Boulat, 1992: 220-223; pl. 88, figs 1-5. [Falaise du Caillard, Tulmont, Charentes-Maritimes, France] (Upper Campanian) <HT: MHNN 8562; PT: MHNN 8563-8566> {echinoid grazing traces on asteroid marginalia of *Metopaster*; junior synonym of *G. pentax* according to Radwanska, 1999: 356}.

Genus *Roderosignus* Michalík, 1977

Roderosignus Michalík, 1977: 340. Type-species: *Roderosignus quinqueradialis* Michalík, 1977 [Slovak Republic] (Late Triassic). {echinoid grazing traces}.

Triassic

R. quinqueradialis Michalík, 1977: 340-342; fig. 14.1-3. [Kössen Fm., Hybe, Low Tatra Hills, Slovak Republic] (Rhaetian, Late Triassic) <HT: SNM XXXX> {echinoid graz-

ing traces on the brachiopod *Rhaetina pyriformis*; junior synonym of *G. pentax* according to Radwanska, 1999: 356}.

Formally named Echinoid Growth Anomalies

forma aegra *disparradiata* Krüger, 2002: 176; figs 1-3; pl. 1. {deviation from pentamery (e.g. specimens with 3, 4, 6, or 7 ambulacral columns); documented for *Galerites* (*G.*) *vulgaris* (Leske, 1778) from Northern Europe; Krüger (2006: tab. 1) provided a list with numerous additional examples}.

forma aegra *inconstans* Krüger, 1993: 317; figs 2a-c, 5a-f, 11, 12, 13. {abnorm insertion of additional plates in ambulacral or interambulacral columns; documented for *Echinocorys gibbus oviformis*, *E. humilis*, *E. ovata*, *E. subglobosa*, *E. sulcata*, *E.* cf. *limburgica*, *Holaster subglobosus* from the Late Cretaceous of Northern Europe}.

forma aegra *insecta* Krüger, 2006: 59-60; figs 1-7. {abnorm pincing/constriction of the two poriferous zones in an ambulacral column; documented for *Arbacia aequituberculata*, *Echinolampas beaumonti*, *E. kleini*, *E. ovalis*, *Echinometra lucunter*, *Echinoneus cyclostomus*, *Encope grandis*, *Hemiaster batnensis*, *Lytechinus veriegatus*, *Micraster* (*Gibbaster*) *gibbus*, *M. stolleyi*, *Paracentrotus lividus*, *Phymechinus mirabilis*, *Spatangus purpureus*, and *Sphaerechinus granularis*}.

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