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OCCASIONAL PAPERS

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California Academy of Sciences

No. 91, 26 pages.

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Catalog of Specimens in the Type Collection
of the Department of Geology,
California Academy of Sciences

ECHINODERMATA

By

Victor A. Zullo

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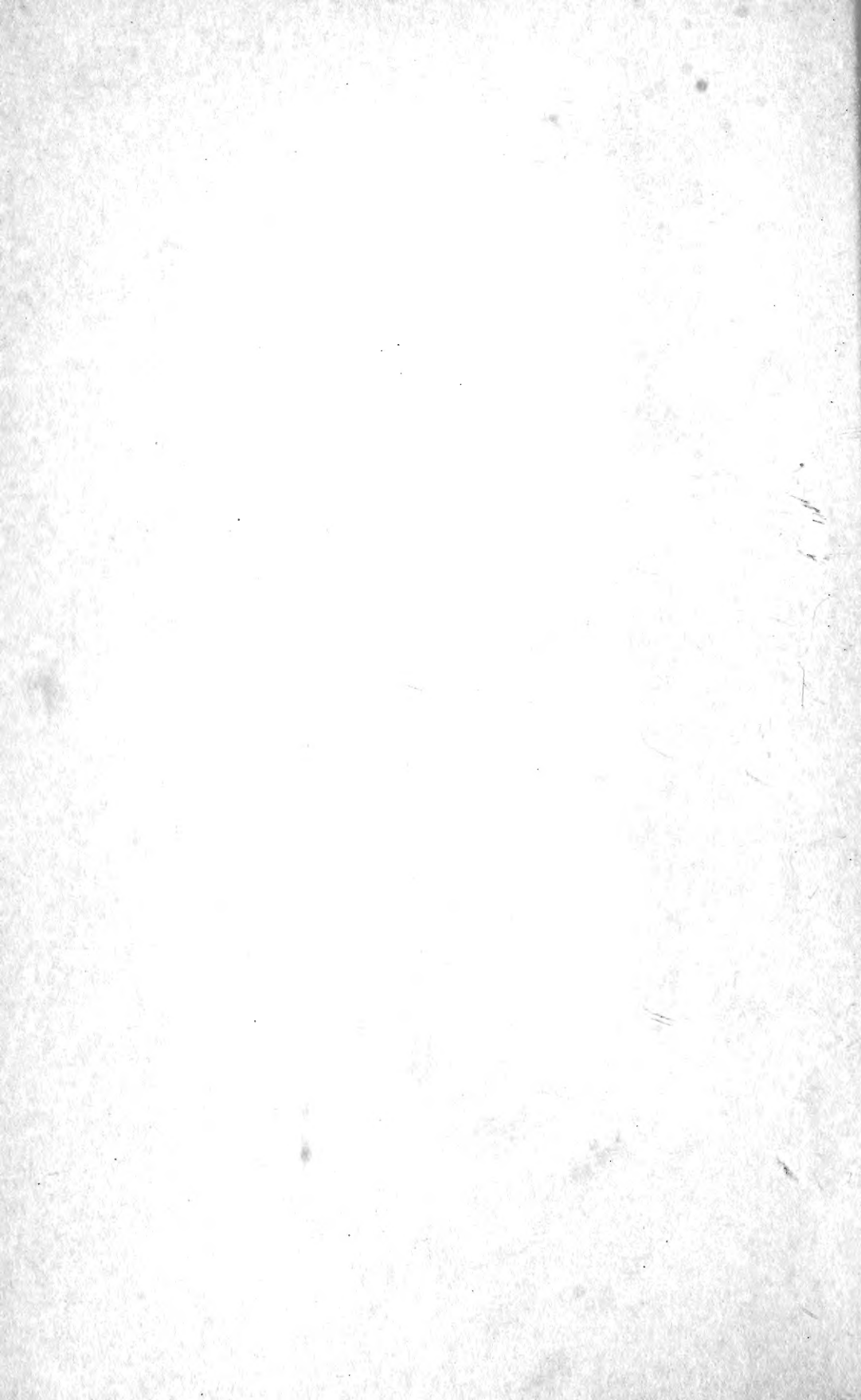
Leo G. Hertlein

*California Academy of Sciences
San Francisco, California 94118*

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INTRODUCTION

This is the second part of a catalog of the primary and secondary types in the collection of the Department of Geology, California Academy of Sciences. The first, dealing with the Cephalopoda, was published in 1970 as Occasional Paper no. 82 of the California Academy of Sciences.

The specimens listed in this catalog fall into one of the following categories:

Primary Types (after the 1961 Code)

Holotype—the single specimen designated or indicated as “the type specimen” of a nominal species-group taxon at the time of the original publication.

Paratype—every specimen in the type series, other than the holotype.

Cotype—a term formerly used for either syntype or paratype. The International Commission on Zoological Nomenclature does not recommend the usage of this term.

Syntype—every specimen in a type series in which no holotype has been designated.

Lectotype—one of several syntypes, designated after the original publication of a species-group name, as “the type specimen” of the taxon bearing that name.

Paralectotype—any one of the original syntypes remaining after the selection of a lectotype.

Neotype—a single specimen designated as the type specimen of a nominal species-group taxon of which the holotype (or lectotype), and all paratypes, or all syntypes are lost or destroyed.

Virtual Paratype—specimens which are known to have been examined and utilized by the author as part of the type series, but which were not so indicated at the time of original publication.

Secondary Types

Hypotype—a subsequently described or figured specimen that adds significantly to the knowledge of the species-group taxon.

Plesiotype—an obsolete term for hypotype.

Plastotypes

The prefix “plasto” used in conjunction with one of the above mentioned type categories indicated a replica of a type in another collection.

CATALOG FORMAT

References to specimens are listed alphabetically by species-group name. Data for each reference are arranged as follows:

species Author, **Genus (Subgenus)** Type and type number
 Reference: author (if not original reference), year, publication, pagination, illustrations, month and day (in parentheses).
 Locality description: age, formation, abstract of locality, county, state, or country.

Editorial comments are enclosed in brackets. With rare exception, no attempt has been made to update or revise genus-group assignments, or to indicate synonymy. The species-group catalog is followed by an index to generic and subgeneric names used in the catalog.

ACKNOWLEDGMENTS

We wish to thank Miss Elaine Jannis for her help in the preparation of the manuscript.

ECHINODERMATA

alamedensis Kew, **Hemiaster** Plasto-Holotype 6078
 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 144, pl. 40, figs. 5a–d (September 28).
 Upper Cretaceous, Chico Formation, Shepherd Canyon, Contra Costa Hills, Alameda County, California.

- alaskense** Durham, *Echinarachnius* Plasto-Holotype 10474
 Plasto-Paratype 10475
 Topotype [Virtual Paratype] 10476
 1957, Jour. Paleont., vol. 31, no. 3, p. 628, pl. 72, figs. 6, 8 (May).
 Pliocene, southeast shore of Cenotaph Island, Lituya Bay, Alaska.
- alta** Clark, *Eoagassizia* Plasto-Holotype 6948
In Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2,
 p. 116, pl. 12, figs. 5–7, text figs. 11a–b (April 19).
 Eocene, “Domengine” [probably Sierra Blanca stage], Point of Rocks area,
 north end of Temblor Range, Kern County, California.
- altus** Kew, *Astrodapsis* Plasto-Holotype 7696
 1915, Univ. Calif. Publ. Bull. Dept. Geol., vol. 8, no. 20, p. 371, pl. 40, figs. 3a–b (March 2).
 Upper Miocene, upper San Pablo Group, Mt. Diablo region, Contra Costa
 County, California.
- andersoni** Twitchell, *Echinarachnius* Plesiotype [Hypotype] 6928
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
 57, pl. 21, figs. 11–12 (April 19).
 Miocene, lower Temblor or upper Vaqueros, Temblor beds north of Cantua
 Creek, Fresno County, California.
- angelensis** Durham, *Encope* Paratypes 7846–7847
 1950, Geol. Soc. Amer. Mem. 43, pt. 2, p. 43 (August 10).
 Upper Pliocene, south end of Angel de la Guarda Island, Gulf of California,
 Mexico.
- anticelli** Conrad, *Astrodapsis* [= *A. antiselli* Conrad]
 Plasto-Plesiotype [Hypotype] 4679
 Waring, 1914, Calif. State Mining Bur., Bull. 69, Map Folio, text on inside of back cover,
 pl. 1, fig. 37 (October).
 Lower upper Miocene, Santa Margarita Formation, 3 miles north of San
 Lucas, east side of Salinas Valley, Monterey County, California.
- antillarum** Cotteau, *Macropneustes* [see *M. dubius* Israelsky, 1924]
 Hypotype 374
 Kew, *in* Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 128, pl. 24,
 fig. 1; pl. 26, figs. 1a–b (July 30).
 Upper Oligocene or lower Miocene, 25 miles northwest of Tecolutla, about 12
 miles northeast of Coazintla, Mexico.
- antiselli** Conrad, *Astrodapsis* Plasto-Hypotypes 7690–7691
 Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 81, pl. 19, figs. 2a–c (Sep-
 tember 28).
 Upper Miocene, upper San Pablo Group, Salinas Valley, Monterey County,
 California.

- antiselli** Conrad, **Astrodapsis** Hypotype 5755
 Reed, 1933, *Geology of California*, Amer. Assoc. Petrol. Geol., Tulsa, Oklahoma, p. 288, fig. 58, no. 8 (May).
 Upper Miocene, upper Santa Margarita, Quailwater Creek, San Luis Obispo County, California.
- antiselli** Conrad, **Astrodapsis** Plasto-Hypotype 184
 Grant & Hertlein, 1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 70, pl. 16, figs. 3-4 (April 19).
 Upper Miocene, Santa Margarita Formation, 2 miles south of San Lucas, Monterey County, California.
- arnoldi** Pack, **Astrodapsis antiselli** Plasto-Holotype 6074
 1909, *Univ. Calif. Publ. Bull. Dept. Geol.*, vol. 5, no. 18, p. 279, pl. 24, figs. 1-2 (July 21).
 Upper Miocene, Santa Margarita Formation(?), Salinas Valley, Monterey County, California.
- ashleyi** Arnold, **Dendraster** Plasto-Plesiotype [Hypotype] 8409
 Grant & Hertlein, 1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 80, pl. 11, fig. 1; pl. 30, fig. 4 (April 19).
 Pliocene, Las Chollas Valley, San Diego County, California.
- blanpiedi** Grant & Hertlein, **Brissopsis** Holotype 7171
 Paratypes 7172-7173
 1938, *Amer. Midland Nat.*, vol. 19, no. 2, p. 484, pl. (p. 485), figs. 5-6, 8-10 (March).
 Oligocene or lower Miocene, Bucatunna Formation, about 8 miles north of Raleigh, Sec. 32, T. 4 N., R. 8 E., Smith County, Mississippi.
- bowersi** Weaver, **Clypeaster** Plasto-Holotype 6084
 1908, *Univ. Calif. Publ. Bull. Dept. Geol.*, vol. 5, no. 17, p. 271, pl. 21, fig. 1; pl. 22, fig. 1 (December 28).
 Miocene (?), Colorado Desert, California.
- bowersi** Weaver, **Clypeaster** Hypotype 7854
 Durham, 1950, *Geol. Soc. Amer. Mem.* 43, pt. 2, p. 40, pl. 42, fig. 9; pl. 46, figs. 1-2 (August 10).
 Middle Pliocene, Santa Antonita Point, Baja California, Mexico.
- brewerianus** (Rémond), **Astrodapsis** Plasto-Hypotype 7686
 Plasto-Neotype 7698
 Kew, 1920, *Univ. Calif. Publ. Bull. Dept. Geol.*, vol. 12, no. 2, p. 91, pl. 13, figs. 5a-c (September 28).
 Middle Miocene, Briones Formation, Walnut Creek, Contra Costa County, California.
- burgeri** Grant & Hertlein, **Echinoneus** Paratype 6918
 1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 104, pl. 23, fig. 7 (April 19).
 Pliocene, basal Imperial Formation, about 1 mile north 40° east of Carrizo Mountain summit, Imperial County, California.

- californicus** Kew, **Astrodapsis** Plasto-Holotype 6085
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 93, pl. 18, fig. 2 (September 28).
Upper Miocene, Santa Margarita Formation, 9 miles north of Coalinga, Fresno County, California.
- californicus** Anderson, **Rhynchopygus** Plesiotype [Hypotype] 6925
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2; p. 109, pl. 4, fig. 7; pl. 30, fig. 7 (April 19).
Upper Eocene, Devils Den area, Kern County, California.
[Text figs. 9a–b are reproductions of the type figures of *Cassidulus californicus* Anderson, 1905. The types of this species apparently were lost in the 1906 fire.]
- californicus** Clark, **Spatangus** Plesiotype [Hypotype] 6915
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 132, pl. 10, fig. 5; pl. 30, fig. 5 (April 19).
Recent, dredged near Cedros Island, Baja California, Mexico.
- casseli** Grant & Hertlein, **Dendraster** Plasto-Holotype 7181
Paratype 6921
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 81, pl. 1, figs. 1–3; pl. 30, fig. 3 (April 19).
Upper Pliocene, Santa Susana quadrangle, Los Angeles County, California.
- casseli** Grant & Hertlein, **Dendraster** Plasto-Hypotypes 12720–12722
Emerson & Hertlein, 1964, Trans. San Diego Soc. Nat. Hist., vol. 13, no. 17, p. 365, figs. 5a–c (December 30).
Pliocene, northeast side of Isla San José, along shore north and south of Arroyo de la Aguada, Gulf of California, Mexico.
- casseli** Grant & Hertlein, **Dendraster** Plasto-Hypotype 13087
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 120, pl. 22, fig. 7 (July 7).
Pliocene, San Diego Formation, clay quarry at end of Arroyo Drive, San Diego, California.
- cazonesensis** Kew, **Scutella** Holotype 369
In Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 132, pl. 19, fig. 1 (July 30).
Upper Oligocene or lower Miocene, near Cazonos River, Region de Papantla, northeastern Mexico.
- cedrosensis** Israelsky, **Dendraster** Holotype 913
1923, Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 14, no. 11, p. 379, pl. 69, figs. 2a–c (November 7).
Pliocene, Cedros Island, Baja California, Mexico.

- cierboensis** Kew, *Astrodapsis tumidus* Plasto-Syntypes 7685 and 7688
Kew, 1915, Univ. Calif. Publ. Dept. Geol., vol. 8, no. 20, p. 370, pl. 39, figs. 5a-b (September 28).
Upper Miocene, lower San Pablo Group, San Pablo Bay region, Contra Costa County, California.
- clevei** Cotteau, *Agassizia* [see *A. regia* Israelsky, 1924] Hypotype 363
Kew, in Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 128, pl. 17, figs. 1a-b (July 30).
Upper Oligocene or lower Miocene, one mile north of Salitre, northeastern Mexico.
- clevei** Cotteau, *Schizaster* [see *Paraster tampicoensis* Israelsky, 1924] Hypotype 367
Kew, in Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, table, p. 128, pl. 18, figs. 1a-c (July 30).
Upper Oligocene or lower Miocene, Nuevo Rancho, northeastern Mexico.
- coalingaensis** Kew, *Astrodapsis* Plasto-Holotype 6089
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 96, pl. 16, figs. 2a-b (September 28).
Upper Miocene, Santa Margarita Formation, Sec. 12, T. 18S., R. 14E., north of Coalinga, Fresno County, California.
- coalingaensis** Twitchell, *Merriamaster* Plesiotype [Hypotype] 5705
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 66, pl. 23, fig. 1 (April 19).
Pliocene, *Pecten coalingaensis* zone, Kettleman Hills, Kings County, California.
- concaus** Cotteau, *Clypeaster* cf. [see *Clypeaster sanrafaelensis* Israelsky, 1924] Hypotype 372
Kew, in Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, table, p. 128, pl. 21, fig. 3; pl. 22, fig. 2 (July 30).
Upper Oligocene or lower Miocene, one mile northwest of Tampico, northeastern Mexico.
- coosensis** Kew, *Scutella* Holotype 446
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 65, pl. 8, figs. 1a-b (September 28).
Eocene, in sea cliffs about ¼ mile south of Cape Arago, Coos County, Oregon.
[The locality cited by Kew is incorrect. See Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 189.]
- coosensis** Kew, *Scutella* Plasto-Hypotype 7395
Turner, 1938, Geol. Soc. Amer. Spec. Paper 10, p. 41, pl. 5, fig. 1 (June 1).
Eocene, lower Coaledo, cove in southwest corner of Cape Arago, Coos County, Oregon.

- coreyi** Grant & Hertlein, *Lytechinus* Plasto-Holotype 7182
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 24, pl. 20, fig. 7
(April 19).
Lower Miocene, Vaqueros, Santa Rosa Island, California.
- corona-formis** Israelsky, *Coelopleurus* Holotype 912
1923, Univ. Calif. Publ. Dept. Geol. Sci., vol. 14, no. 11, p. 378, pl. 69, figs. 1a-c (November 7).
Pliocene, Cedros Island, Baja California, Mexico.
- crassus** Kew, *Astrodapsis arnoldi* Plasto-Holotype 7681
Plasto-Paratype 7694
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 85, pl. 23, fig. 1; pl. 24, figs. 1a-c (September 28).
Lower Pliocene, lower Etchegoin (Jacalitos) Formation, south of Pancho Rico Creek, and Pence Enrico Canyon, Monterey County, California.
- cretaceus** Cragin, *Scutellaster* Plasto-Holotype 4286
1895, Amer. Geol., vol. 15, no. 2, p. 90 (February).
Cretaceous, Pierre Formation, Fox Hills division, east slope of Shook's Run on Platt Avenue, Colorado Springs, Colorado.
[As demonstrated by Durham, 1953, Jour. Paleont., vol. 27, no. 1, p. 147, this locality is incorrect. The specimen is from the Pliocene, Merced Formation, San Francisco County, California and is a subjective synonym of *S. interlineatus* (Stimpson).]
- cubensis** Cotteau, *Clypeaster* [see *C. pileus* Israelsky, 1924] Hypotype 370
Kew, in Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 132, pl. 20, fig. 1; pl. 21, fig. 1 (July 30).
Upper Oligocene or lower Miocene, Tuxpan, State of Vera Cruz, northeastern Mexico.
- cumminsi** Kew, *Metalia* Holotype 371
In Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 133, pl. 21, fig. 2; pl. 22, fig. 1; pl. 23, fig. 1 (July 30).
Upper Oligocene or lower Miocene, 12 miles east of San Rafael on Zarizal River, northeastern Mexico.
- cuyamanus** Kew, *Astrodapsis* Plasto-Holotype 7684
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 97, pl. 19, figs. 1a-b (September 28).
Upper Miocene, Santa Margarita Formation, Branch Canyon, Cuyama Valley, Santa Barbara County, California.
- decagonale** Lesson, *Laganum* cf. Plesiotype [Hypotype] 5208
Israelsky, 1933, Philippine Journ. Sci., vol. 50, no. 3, p. 304, pl. 1, fig. 5 (March).
Pliocene, Malumbang Formation, locality unknown. [Philippine Islands.]
- depressum** (Lesson), *Jacksonaster* Hypotypes 9963-9963E
Durham, 1955, Univ. Calif. Publ. Geol. Sci., vol. 31, no. 4, p. 143, fig. 31c (November 21).
Recent, Marivales Harbor, Luzon, Philippine Islands.

- depressus** Kew, **Astrodapsis arnoldi** Plasto-Holotype 6076
 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 85, pl. 23, figs. 2a–c (September 28).
 Lower Pliocene, lower Etchegoin (Jacalitos) Formation, Coalinga District, Fresno County, California.
- diabloensis** Kew, **Astrodapsis brewerianus** Plasto-Holotype 6075
 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 92, pl. 13, fig. 6 (September 28).
 Middle Miocene, Briones Formation, $\frac{1}{2}$ mile northeast of Las Trampas Peak, Contra Costa County, California.
- diabloensis** Kew, **Schizaster** Plasto-Holotype 6079
 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 150, pl. 41, figs. 5a–c (September 28).
 Middle Eocene, Meganos Group, northeast of Wall Point, south side of Mount Diablo, Contra Costa County, California.
- diabloensis** Kew, **Schizaster** Plasto-Hypotype 7174
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 120, footnote (April 19).
 Eocene, Llajas Formation, north of Simi Valley, Ventura County, California.
- dickersoni** Israelsky, **Laganum** Syntypes 5205–5207
 1933, Philippine Jour. Sci., vol. 50, no. 3, p. 302, pl. 2, figs. 1–9 (March).
 Pliocene, Malumbang Formation, between junction of Pinnacanauan and Nat-telag Rivers, Cagayan, northern Luzon, Philippines.
- diegoensis** Kew, **Dendraster** Holotype 5300 [not Univ. Calif. 12257]
 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, pp. 119–120, pl. 29, fig. 2; pl. 30, figs. 2a–b (September 28).
 Upper Pliocene, San Diego Formation, Pacific Beach, San Diego County, California.
 [This specimen resembles in every way specimens from the Pleistocene deposits on the western side of Bay Point, in Mission Bay, San Diego, and consequently it is probable that the type locality, if at Pacific Beach, is in the Pleistocene deposits, rather than the underlying Pliocene beds.]
- diegoensis** Kew, **Dendraster** Hypotype 5752
 Reed, 1933, Geology of California, Amer. Assoc. Petrol. Geol., Tulsa, Oklahoma, p. 287, fig. 58, no. 2 (May).
 Pleistocene, west side of Crown Point, north side of Mission Bay, San Diego County, California.
- dröbachiensis** Müller, **Strongylocentrotus** Plesiotype [Hypotype] 6938
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 33, pl. 4, fig. 6 (April 19).
 Recent, near town of Campbell River, British Columbia, Canada.

- dubius** Israelsky, **Macropneustes** [see **M. antillarum** Cotteau of Kew, in Dickerson & Kew, 1917] Holotype 374
1924, Proc. Calif. Acad. Sci., 4th ser., vol. 13, no. 8, p. 143, pl. 3, fig. 1 (March 18).
Upper Oligocene or lower Miocene, Tuxpan beds, Tampico region, Mexico.
- dumblei** Kew, **Lovenia** Holotype 364
Cotypes [Paratypes] 365–366A
In Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 136, pl. 17, figs. 2a–c (July 30).
Upper Oligocene or lower Miocene, Nuevo Rancho, 35 kilometers northwest of Tuxpan, near Cerro Azul, Mexico, 1 mile north of Salitre, Mexico, Salitre Ranch, northeastern Mexico.
- dumblei** Israelsky, **Schizaster** [see **S. scherzeri** Gabb of Kew, in Dickerson & Kew, 1917] Holotype 368
1924, Proc. Calif. Acad. Sci., 4th ser., vol. 13, no. 8, p. 141 (March 18).
Oligocene, San Rafael beds, Tampico region, Mexico.
- ecuadorensis** Clark, **Encope** Paratype 9921
1948, Allan Hancock Pacific Exped. (Univ. South. Calif.), vol. 8, no. 5, p. 333 (December 29).
Recent, Salango Island, Ecuador, 3 fathoms.
- elevatus** Israelsky, **Paleopneustes** [see **Eupatagus** species of Kew, in Dickerson & Kew, 1917] Holotype 1649
1924, Proc. Calif. Acad. Sci., 4th ser., vol. 13, no. 8, p. 144, pl. 4, figs. 1a–b (March 18).
Oligocene, San Rafael beds, Tampico region, Mexico.
- elsmerensis** Durham, **Dendraster** Paratypes 7732–7732A
1949, Amer. Jour. Sci., vol. 247, p. 50 (January).
Lower Pliocene, Pico Formation, Elsmere Canyon, near Newhall, Los Angeles County, California.
- europacificus** Clark, **Clypeaster** Plesiotype [Hypotype] 6944
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 45, pl. 26, figs. 1–2; pl. 30, fig. 10 (April 19).
Recent, 16°38' N., 99°27'30" W. to 16°39' N., 99°24'30" W., about 32 miles west of Dulce Bay, Mexico, 20–45 fathoms.
- excentricus** Eschscholtz, **Dendraster** Hypotype 4276
Hertlein, 1951, Calif State Div. Mines, Bull. 154, pt. 4, no. 17, p. 191, fig. 2 (December).
Recent, from beach south of Fleishhacker's pool, San Francisco County, California.
- fairbanksi** Arnold, **Echinarachnius** Hypotype 5738
Hanna & Hertlein, 1941, Calif. Dept. Nat. Resources, Div. Mines, Bull. 118, Preprint of Pt. 2, p. 172, fig. 63–11 (September 11).
Lower Miocene, Vaqueros, Sespe Canyon, between Sespe and Piedra Blanca Creeks, about 18 miles north of Nordhoff (Ojai), Ventura County, California.

- fairbanksi** Arnold, *Scutella* Plesiotype [Hypotype] 5754
 Reed, 1933, Geology of California, Amer. Assoc. Petrol. Geol., Tulsa, Oklahoma, p. 288, fig. 58, no. 14 (May). Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 58, pl. 14, fig. 5 (April 19), as *Echinarachnius fairbanksi*.
 Lower Miocene, Vaqueros, Torrey Canyon, 4½ miles south of Piru, Ventura County, California.
- fernandoensis** Pack, *Astrodapsis* Plasto-Holotype 6077
 1909, Univ. Calif. Publ. Bull. Dept. Geol., vol. 5, no. 18, p. 279, pl. 24, fig. 3 (July 21).
 Lower Pliocene(?), Fernando Formation, Elsemere Cañon, Los Angeles County, California.
- fragilis** Clark, *Encope* Paratype 9919
 1948, Allan Hancock Pacific Exped. (Univ. South. Calif.), vol. 8, no. 5, p. 335 (December 29).
 Recent, Petatlan Bay, Mexico, 5–10 fathoms.
- fragilis** Jackson, *Strongylocentrotus* Plesiotype [Hypotype] 6946
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 34, pl. 29, fig. 1 (April 19).
 Recent, dredged off Cortez Banks, Baja California, Mexico, in 40–60 fathoms.
- franciscanus** Agassiz, *Strongylocentrotus* Plesiotype [Hypotype] 6936
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 34, pl. 2, fig. 6 (April 19).
 Recent, dredged in Beechers [Bechers] Bay, Santa Rosa Island, California, 50–75 feet.
- franciscanus** Agassiz, *Strongylocentrotus* Hypotype 13070
 Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 111, pl. 19, fig. 28 (July 7).
 Pliocene, Pacific Beach, San Diego County, California.
- fresnoensis** Kew, *Astrodapsis arnoldi* Plasto-Holotype 6073
 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 87, pl. 23, figs. 3a–c (September 28).
 Lower Pliocene, lower Etchegoin (Jacalitos) Formation, Coalinga district, Fresno County, California.
- gabbi** Rémond, *Clypeaster* Plesiotypes [Hypotypes] 2821–2822
 [Yates], 1903, Bull. South. Calif. Acad. Sci., vol. 2, no. 7, p. 87, pl. 7, fig. 5, 2 specimens (October 6).
 Pliocene, San Miguel Island, Santa Barbara County, California.
- galapagensis** Döderlein, *Eucidaris thouarsii* Plesiotypes [Hypotypes] 6942–6943, 6953
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 8, pl. 2, figs. 3–5 (April 19).
 Recent, beach along west side of South Seymour Island; and on Hood Island, Galápagos Island, Ecuador.

gibbosus Agassiz & Desor, **Caenocentrotus**

Plesiotypes [Hypotypes] 6910–6911

Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 29, pl. 10, figs. 3–4 (April 19).

Recent, Narborough and Albarmarle Islands, Galápagos Islands, Ecuador.

gibbosus Kew, **Dendraster hesperis**

Plasto-Holotype 6093

1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 126, pl. 26, figs. 2a–b (September 28).

Upper Pliocene, upper Etchegoin Formation, Coalinga district, Fresno County, California.

gibbosus Kew, **Dendraster (Calaster) oregonensis** [see **Anorthoscutum oregonense quaylei** Grant & Hertlein, 1938]

Plasto-“Cotype” [Syntype] 7416

1920, Publ. Univ. Calif. Bull. Dept. Geol., vol. 12, no. 2, p. 134, pl. 33, figs. 3b–c (September 28).

Upper Pliocene, Wildcat Series, near Shively, Humboldt County, California.

gibbsii Rémond, **Dendraster**

Plesiotype [Hypotype] 5715

Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 88, pl. 14, fig. 6 (April 19).

Pliocene, *Pecten coalingaensis* zone, Kettleman Hills, Kings County, California.**gibbsii** Rémond, **Dendraster**

Hypotype 5753

Reed, 1933, Geology of California, Amer. Assoc. Petrol. Geol., Tulsa, Oklahoma, p. 288, fig. 58, no. 5 (May).

Pliocene, Etchegoin, near Coalinga, Fresno County, California.

gibbsii Rémond, **Scutella**

Plasto-Holotype 6090

1863, Proc. Calif. Acad. Nat. Sci., 1st ser., vol 3, p. 13 (April).

Pliocene, Kern Lake, Buena Vista County, California.

grandis Kew, **Astrodapsis**

Plasto-Syntype 6087

1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 100, pl. 17, figs. 1a–b (September 28).

Upper Miocene, Santa Margarita Formation, north of Coalinga, Fresno County, California.

grandis Agassiz, **Encope**

Hypotype 916

Israelsky, 1923, Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 14, no. 11, p. 381, pl. 70, fig. 1; pl. 71, fig. 1; pl. 72, fig. 2 (November 7).

Pleistocene, terrace near settlement of Magdalena Bay, Baja California, Mexico.

granti Durham, **Dendraster**

Paratypes 2431–2431A, 7848–7850

1950, Geol. Soc. Amer. Mem. 43, pt. 2, p. 41 (August 10).

Middle Pliocene, Arroyo de Arce, north of Arroyo de Gua, Baja California, Mexico.

- granti** Durham, **Dendraster** cf. **D.** Plasto-Hypotype 12723
Emerson & Hertlein, 1964, Trans. San Diego Soc. Nat. Hist., vol. 13, no. 17, p. 365, fig. 5f
(December 30).
Pliocene, along shore north and south of Arroyo de la Aguada, Isla San José,
Gulf of California, Mexico.
- hannai** Grant & Hertlein, **Paleoechinoneus** Holotype 6920
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 105, pl. 23, figs.
4-5 (April 19).
Upper Cretaceous, about 4 miles north of San Antonio del Mar, and almost
due north of extreme tip of Cabo Colnett, Baja California, Mexico.
- hemphilli** Israelsky, **Lovenia** Cotypes [Syntypes] 918-919
1923, Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 14, no. 11, p. 384, pl. 74, figs. 1a-2
(November 7).
Pliocene, San Diego Formation, Pacific Beach, San Diego County, California.
- hemphilli** Israelsky, **Lovenia** Plasto-Hypotype 13086
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 130, pl. 24, fig.
18 (July 7).
Pliocene, San Diego Formation, Pacific Beach, 20-30 feet below end of Loring
Street, San Diego County, California.
- holmani** Grant & Hertlein, **Paleopneustes** Plasto-Holotype 7180
Obverse impression of Holotype 6952
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 112, pl. 25, figs.
1-2 (April 19).
Lower Pliocene, Repetto Formation, Standard Oil Company well, Temple 19,
Montebello Oil Field, Los Angeles County, California.
- humilis** Kew, **Dendraster gibbsii** Plasto-Holotype 6091
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 124, pl. 25, figs. 3a-b (Septem-
ber 28).
Upper Pliocene, upper Etchegoin Formation, Coalinga district, Fresno
County, California.
- humilis** Kew, **Dendraster gibbsii** Plesiotype [Hypotype] 6924
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
88, pl. 1, fig. 4 (April 19).
Pliocene, Pacific Beach, San Diego, California.
- humilis** Kew, **Dendraster gibbsii** Hypotype 13085
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 120, pl. 22, fig. 5
(July 7).
Pliocene, San Diego Formation, Pacific Beach, San Diego County, California.
- incisa** Agassiz, **Arbacia** Plesiotype [Hypotype] 6916
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
19, pl. 4, fig. 1; pl. 30, fig. 13 (April 19).
Recent, San Bartolomé Bay (Turtle Bay), Baja California, Mexico.

- incisa** Agassiz, **Arbacia** Hypotype 13077
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 108, pl. 26, figs. 6, 8, 10 (July 7).
Pliocene, San Diego Formation, Pacific Beach, San Diego County, California.
- interlineatum** Stimpson, **Anorthoscutum** Hypotype 4275
Hertlein, 1951, Calif. State Div. Mines, Bull. 154, pt. 4, p. 191, fig. 2, no. 16 (December).
Pliocene, Merced Formation, beach south of Fleishhacker's pool, San Francisco County, California.
- interlineatus** (Stimpson), **Scutellaster** Hypotype 9964
Durham, 1955, Univ. Calif. Publ. Geol. Sci., vol. 31, no. 4, p. 159, pl. 3, figs. 1-2 (November 21).
Pliocene, Bolinas Inlet, Marin County, California.
- interlineatus** Stimpson, **Scutellaster** Hypotypes 13118-13119
Richardson, 1968, Pacific Discovery, vol. 21, no. 2, p. 33, 2 figs. (April).
Pliocene: beach near Fleishhacker's pool, San Francisco County, California;
Bolinas Inlet, Marin County, California.
- irregularis** Clark, **Encope** Paratype 9922
1948, Allan Hancock Pacific Exped. (Univ. South. Calif.), vol. 8, no. 5, p. 332 (December 29).
Recent, Octavia Bay, Colombia, 2 fathoms.
- israelskyi** Jordan & Hertlein, **Astrodapsis** Holotype 2086
Paratypes 2087-2089
1926, Proc. Calif. Acad. Sci., 4th ser., vol. 15, no. 14, p. 424, pl. 27, figs. 4, 6 (July 22).
Pliocene, southeast side of Cedros Island, off Baja California, Mexico.
- israelskyi** Grant & Hertlein, **Lenita** Holotype 6930
Paratypes 6931-6933
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 49, pl. 8, figs. 6-7, 9 (April 19).
Eocene, ¼ mile north of Coal Mine Creek, Fresno County, California.
- jacalitosensis** Arnold, **Astrodapsis** Plasto-Hypotype 7692
Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 101, pl. 20, fig. 1b (September 28).
Lower Pliocene, lower Etchegoin (Jacalitos) Formation, south of Garza Creek, Coalinga district, Fresno County, California.
- joaquinensis** Anderson, **Pachecocrinus** Holotype 10578
Paratype 10579
1958, Geol. Soc. Amer. Mem. 71, p. 83, pl. 6, figs. 3a-b (June 6).
Upper Cretaceous, Maestrichtian, Moreno Formation, Section 4, T. 9S., R. 8E., Pacheco Pass quadrangle, and Section 28, T. 11S., R. 10 E., Ortigalita Peak quadrangle, Merced County, California.

- joaquinensis** Alex Clark, **Polydiadema?** Plasto-Holotype 7175
 1938, in Grant & Hertlein, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 17, pl. 15, figs. 8, 9 (April 19).
 Eocene, Domengine [Sierra Blanca stage], S.E. $\frac{1}{4}$ of sec. 33, T. 25 S., R. 18 W., M.D.B. & M., Cholame Quadrangle, northwestern Kern County, California.
- kanakoffi** Durham, **Mellita** Plasto-Holotype 13633
 Paratype 12368
 1961, Contrib. in Sci., Los Angeles County Mus., no. 48, p. 5, pl. 2, fig. 2; text fig. 1D (Plasto-Holotype no. 13633) (December 21).
 Recent, Piedra Blanca Bay, Costa Rica, 11 meters.
- kewi** Jordan & Hertlein, **Astrodapsis** Holotype 2090
 1926, Proc. Calif. Acad. Sci., 4th ser., vol. 15, no. 14, p. 425, pl. 27, figs. 2-3 (July 22).
 Pliocene, southeast side of Cedros Island, off Baja California, Mexico.
- kewi** Grant & Hertlein, **Brissus** Plasto-Holotype 7235
 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 128, pl. 12, figs. 1-2 (April 19).
 Lower Miocene, Santa Rosa Island, California.
- laevis** Clark, **Dendraster** Paratypes 9924-9925
 1948, Allan Hancock Pacific Exped. (Univ. South. Calif.), vol. 8, no. 5, p. 312 (December 29).
 Recent, north of Santa Barbara Island, California, 15-20 fathoms.
- laevis** Clark, **Encope** Paratype 9920
 1948, Allan Hancock Pacific Exped. (Univ. South. Calif.), vol. 8, no. 5, p. 327 (December 29).
 Recent, 11 miles northwest of Corinto, Nicaragua, 1-3 fathoms.
- latecarinatus** Leske, **Brissus** Plesiotype [Hypotype] 6951
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 129, pl. 13, fig. 5 (April 19).
 Recent, Ducie Island, $24^{\circ}40'20''$ S., $124^{\circ}48'$ W., South Pacific Ocean.
- lecontei** Merriam, **Schizaster** Hypotype 5751
 Reed, 1933, Geology of California, Amer. Assoc. Petrol. Geol., Tulsa, Oklahoma, p. 288, fig. 58, no. 17 (May).
 Upper Eocene, Tejon, Fig Tree Gulch, Marysville Buttes quadrangle, Sutter County, California.
- longifissa** Michelin, **Mellita** Hypotype 12369
 Durham, 1961, Contrib. in Sci., Los Angeles Co. Mus., no. 48, p. 7, pl. 2, fig. 1 (December 21).
 Recent, Petatlan Bay, about 6 miles south of Zihuatanejo, Guerrero, Mexico.
- loretoensis** Durham, **Encope** Paratype 7856
 1950, Geol. Soc. Amer. Mem. 43, pt. 2, p. 46 (August 10).
 Lower Pliocene, Arroyo de Gua, north of Loreto, Baja California, Mexico.

- lymani** Waring, **Amphiura** Plasto-Holotype 4996
1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 4, p. 58, pl. 9, fig. 13 (July 30).
Upper Cretaceous, Chico Formation, Chico area, Bell's Canyon north of Simi Fault, California.
- major** Kew, **Astrodapsis** Plasto-Syntype 6082
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 102, pl. 15, figs. 1a, 1c (September 28).
Lower Pliocene, uppermost San Pablo Group, south side of Mount Diablo, Contra Costa County, California.
- malumbangensis** Israelsky, **Clypeaster** Holotype 5216
1933, Philippine Jour. Sci., vol. 50, no. 3, p. 301, pl. 1, fig. 1 (March).
Pliocene, Malumbang Formation, 100 meters west of river at San Miguel Barrio, and 2 kilometers west of Palompon, west coast of Leyte, Philippine Islands.
- margaritanus** Kew, **Astrodapsis** Plasto-Syntype 6083
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 103, pl. 22, fig. 1a (September 28).
Upper Miocene, Santa Margarita Formation, near Santa Margarita, San Luis Obispo County, California.
- martinezensis** Kew, **Schizaster** Plasto-Holotype 6088
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 153, pl. 42, figs. 2a-d (September 28).
Lower Eocene, Martinez Group, Muir Station, south of Martinez, Contra Costa County, California.
- mercedensis** Anderson, **Cassidulus** Holotype 10577
1958, Geol. Soc. Amer. Mem. 71, p. 85, pl. 6, figs. 2a-b (June 6).
Upper Cretaceous, Garzas Creek, Pacheco Pass quadrangle, Stanislaus County, California.
- merriami** Anderson, **Astrodapsis** "Cotypes" ["Syntypes"] 53-54B
1905, Proc. Calif. Acad. Sci., 3rd ser., Geol., vol. 2, no. 2, p. 193, pl. 14, fig. 34 (December 4). [Type lost in 1906 Fire.]
Lower Miocene: *Turritella ocoyana* zone, Monterey Group, Coalinga district, Fresno County; and/or north of Temblor Ranch, Kern River, Kern County, California.
- merriami** Arnold, **Cidaris** Paratype 9367
1908, Proc. U. S. Nat. Mus., vol. 34, no. 1617, p. 359 (August 8).
Cretaceous, between headwaters of San Lorenzo River and Pescadero Creek, Santa Cruz County, California.
- merriami** Anderson, **Echinarachnius** Hypotype 5707
Hanna & Hertlein, 1941, Calif. Dept. Nat. Resources, Div. Mines, Bull. 118, Preprint of Pt. 2, p. 174, fig. 63-20. (September 11).
Middle Miocene, Temblor, north of Cantua Creek, Fresno County, California.

- merriami** Anderson, **Scutella** Hypotype 5750
 Reed, 1933, Geology of California, Amer. Assoc. Petrol. Geol., Tulsa, Oklahoma, p. 288, fig. 58, no. 11 (May).
 Middle Miocene, Temblor, Cantua Creek district, Fresno County, California.
- merrilli** Israelsky, **Peronella** [see **Clypeaster** species a of
 Dickerson, 1922] Holotype 5209
 1933, Philippine Jour. Sci., vol. 50, no. 3, p. 304, pl. 2, figs. 17-19 (March).
 Pliocene, Malumbang Formation, Bondoc Peninsula, west side of Ragay Gulf,
 Tayabas Province, Luzon, Philippine Islands.
- mexicana** Jackson, **Lovenia** Holotype 2314
 Paratype 2291
 1937, Proc. U. S. Nat. Mus., vol. 84, no. 3015, p. 236, pl. 15, figs. 2-3 (June 12).
 Oligocene, Mesón Formation, Rancho Nuevo, 2.5 kilometers west-southwest
 of Mesón, Canton Tuxpan, Veracruz, Mexico.
- mexicanus** Clark, **Dendraster** Paratype 9923
 1948, Allan Hancock Pacific Exped. (Univ. South. Calif.), vol. 8, no. 5, p. 313 (December
 29).
 Recent, Rosario Bay, Baja California, Mexico, 15 fathoms.
- mexicanus** Kew, **Macropneustes** Holotype 375
In Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 134, pl. 24, fig.
 3; pl. 25, figs. 1a-b (July 30).
 Upper Oligocene or lower Miocene, hill at extreme north end of La Puerte
 Range, Topila, Mexico.
- micropora** Agassiz, **Encope** Plesiotype [Hypotype] 6941
 Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
 98, pl. 29, fig. 6 (April 19).
 Recent, South Seymour Island, Galápagos Islands, Ecuador.
- milleri** Grant & Hertlein, **Lytechinus?** Plasto-Holotype 7234
 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 24, pl. 15, figs. 1-2
 (April 19).
 Lower Miocene, Vaqueros, northeast quarter of Lompoc quadrangle, about 5
 miles due east of Santa Maria, San Luis Obispo County, California.
- morlini** Grant & Hertlein, **Schizaster** Holotype 10303
 Paratype 10304
 1956, Bull. South. Calif. Acad. Sci., vol. 55, pt. 2, p. 107, pl. 29, figs. 1-8 (August 31).
 Pliocene, southern slope of Coyote Mountain, Imperial County, California.
- nipponicus** Nisiyama, **Astrodapsis** Paratype 5250
 1948, Jour. Paleont., vol. 22, no. 5, p. 602 (September).
 Mio-Pliocene, basal part of Suenomatsuyama Formation, Suenomatsuyama
 Group, southern margin of Mabechigawa tributary, Ninohe District, Iwate
 Prefecture, Japan.

- notabilis** Clark, **Mellita** Hypotype 12367
Durham, 1961, Contrib. in Sci., Los Angeles Co. Mus., no. 48, p. 7 (December 21).
Recent, Corinto, Nicaragua.
- oregonensis** (W. B. Clark), **Dendraster** (**Calaster**) Hypotypes 449-450
Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 132, pl. 33, figs. 2a-b
(September 28).
Upper Miocene [Pliocene], "Merced" [Empire] Formation, Fossil Point,
Coos Bay, Coos County, Oregon.
- ornatus** Kew, **Astrodapsis** Plasto-Syntypes 7680, 7687
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 105, pl. 21, figs. 1a-d (September 28).
Upper Miocene, Santa Margarita Formation, San Juan River district, San
Luis Obispo County, California.
- pabloensis** Kew, **Scutella** Plasto-Holotype 7733
1915, Univ. Calif. Publ. Bull. Dept. Geol., vol. 8, no. 20, p. 369, pl. 39, figs. 6a-b (March 2).
Upper Miocene, lower San Pablo Group, Contra Costa County, California.
- pacifica** Agassiz, **Brissopsis** Plesiotype [Hypotype] 6914
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
126, pl. 14, fig. 4 (April 19).
Recent, off La Jolla, California, 1500 feet.
- pacificus** Agassiz, **Cassidulus** Plesiotypes [Hypotypes] 6926, 6945
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
108, pl. 13, fig. 6; pl. 29, figs. 4-5; pl. 30, fig. 6 (April 19).
Recent: Acapulco, Mexico; on beach about 1 mile west of Tagus Cove, Albermarle Island, Galápagos Islands, Ecuador.
- pacificus** Kew, **Dendraster** Syntype 448
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 128, pl. 33, figs. 1a-b (September 28).
Upper Pliocene, San Diego Formation, Pacific Beach, San Diego County,
California.
- palmeri** Durham, **Abertella** Paratypes 10470-10470A
1957, Jour. Paleont., vol. 31, no. 3, p. 626 (May).
Early (?) Miocene, "upper Caribe Formation," Rio Salinas, western Peten
Province, Guatemala.
- parma** (Lamarck), **Echinarachnius** Hypotype 9531
Durham, 1957, Jour. Paleont., vol. 31, no. 3, p. 629, pl. 72, fig. 5 (May).
Recent, Point Barrow, Alaska.
- parma** (Lamarck), **Echinarachnius** Plesiotypes [Hypotypes] 6922-6923
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
62, pl. 9, figs. 1-2 (April 19).
Recent, English Bay Beach, St. Paul Island, Alaska.

- patellaris** Leske, **Lenita** Plesiotype [Hypotype] 6929
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 49, pl. 8, fig. 8 (April 19).
Upper Eocene, Brussels, Belgium.
- peltooides** Anderson & Martin, **Astrodapasis** Holotype 102 [missing]
1914, Proc. Calif. Acad. Sci., 4th ser., vol. 4, no. 3, p. 52, pl. 2, fig. 2 (December 30).
Upper Miocene, *Trophon* zone, Santa Margarita Formation, east of Jacalitos Creek, Coalinga, Fresno County, California.
- peltooides** (Anderson & Martin), **Astrodapasis arnoldi** Topotype 451
Plasto-Hypotype 7682
Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 88, pl. 15, figs. 2a–b, 3 (September 28).
Lower Pliocene, lower Etchegoin (Jacalitos) Formation, Coalinga district, Fresno County, California.
- pentagonalis** Israelsky, **Dendraster** Syntypes 914–915
1923, Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 14, no. 11, p. 380, pl. 69, figs. 3–4b (November 7).
Pliocene, Cedros Island, Baja California, Mexico.
- perplexa** Clark, **Hesperocidaris** Hypotypes 13072–13076
Plasto-Hypotype 13071
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 105, pl. 24, figs. 6–7, 9–10, 12, 14 (July 7).
Pliocene, San Diego Formation, Eagle Street, just north of Quince Street, and just east of Reynard Way, San Diego, California; Pacific Beach, San Diego County, California.
- perrini** Weaver, **Merriamaster** Plesiotype [Hypotype] 6917
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 68, pl. 15, fig. 11; pl. 30, fig. 9 (April 19).
Pliocene, *Pecten coalingaensis* zone, North Dome, Kettleman Hills, Kings County, California.
- pileus** Israelsky, **Clypeaster** [see **C. cubensis** Cotteau of Kew, in Dickerson & Kew, 1917] Holotype 370
1924, Proc. Calif. Acad. Sci., 4th ser., vol. 13, no. 8, p. 138, pl. 2, fig. 2; pl. 3, fig. 2 (March 18).
Upper Oligocene or lower Miocene, Tuxpan beds, Tampico region, Mexico.
- pulvinata** Lamarck, **Astropyga** Plesiotype [Hypotype] 6940
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 15, pl. 28, figs. 2, 5 (April 19).
Recent, Acapulco Bay, Mexico.
- putnami** Israelsky, **Oligopygus** Lectotype 5211
Paralectotype 5210
Topotypes [Virtual Paralectotypes] 5214–5215
1933, Trans. San Diego Soc. Nat. Hist., vol. 7, no. 22, p. 275, pl. 18, figs. 1–4. Lectotype

and Paralectotype selected from Syntypes by Kier, 1968, *Smithson. Miscell. coll.*, vol. 152, no. 2, publ. 4702, p. 80, pl. 20, fig. 4, text figs. 36a-b.

Upper Eocene, 12 kilometers northeast of Abasola, Tamaulipas, Mexico.

quaylei Grant & Hertlein, *Anorthoscutum oregonense*

[see *Dendraster oregonensis gibbosus* Kew, 1920]

Plasto-Syntype [Paralectotype] 7416

Plesiotype [Hypotype] 6919

Grant & Hertlein, 1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 93, pl. 21, fig. 13; pl. 30, fig. 11 (April 19) [new name for *Dendraster oregonensis gibbosus* Kew, 1920].

Pliocene, upper Wildcat Formation, near Shively, Humboldt County, California, on coast a few hundred yards north of Little River Beach, or about 3½ miles south of Trinidad, Humboldt County, California.

ragayana Israelsky, *Peronella*

Holotype 5212

Paratype 5213

1933, *Philippine Jour. Sci.*, vol. 50, no. 3, p. 305, pl. 2, figs. 13-16 (March).

Pliocene, Malumbang Formation, Bondoc Peninsula, west side of Ragay Gulf, Tayabas Province, Luzon, Philippine Islands.

rarus Israelsky, *Spatangus*

Holotype 917

1923, *Univ. Calif. Publ. Bull. Dept. Geol. Sci.*, vol. 14, no. 11, p. 383, pl. 73, figs. 1a-c (November 7).

Pliocene, Pacific Beach, San Diego County, California.

regia Israelsky, *Agassizia* [see *A. clevei* Cotteau of Kew, in

Dickerson & Kew, 1917]

Holotype 363

1924, *Proc. Calif. Acad. Sci.*, 4th ser., vol. 13, no. 8, p. 142 (March 18).

Upper Oligocene or lower Miocene, Tuxpan beds, Tampico region, Mexico.

roseus Agassiz, *Toxopneustes*

Plesiotype [Hypotype] 6935

Grant & Hertlein, 1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 26, pl. 17, figs. 1-2 (April 19).

Recent, Isabel Island, Mexico.

rotundus Agassiz, *Clypeaster*

Plesiotype [Hypotype] 6937

Grant & Hertlein, 1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 46, pl. 21, fig. 10; pl. 30, fig. 14 (April 19).

Recent, off Cape San Lucas, Baja California, Mexico, 20-25 fathoms.

sanrafaelensis Israelsky, *Clypeaster* [see *C. cf. C. concavus*

Cotteau of Kew, in Dickerson & Kew, 1917]

Holotype 372

1924, *Proc. Calif. Acad. Sci.*, 4th ser., vol. 13, no. 8, p. 139, pl. 2, figs. 1a-b (March 18).

Oligocene, San Rafael beds, Tampico region, Mexico.

schencki Grant & Hertlein, *Astrodapsis*

Holotype 6896

1938, *Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci.*, vol. 2, p. 76, text fig. 8 (April 19).

Upper Miocene, San Miguel quadrangle, Monterey County, California.

- schencki** Israelsky, **Pericosmus** Holotype 5217
1933, Philippine Jour. Sci., vol. 50, no. 3, p. 306, pl. 3, figs. 1-2; pl. 4, fig. 1 (March).
Pliocene, Malumbang Formation, Bondoc Peninsula, west side of Ragay Gulf,
Tayabas Province, Luzon, Philippine Islands.
- scherzeri** Gabb, **Schizaster** [see **S. dumblei** Israelsky, 1924] Hypotype 368
Kew, *in* Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, p. 129, pl.
18, fig. 2; pl. 19, fig. 2; pl. 20, fig. 2 (July 30).
Upper Oligocene or lower Miocene, Tuxpan, State of Veracruz, northeastern
Mexico.
- scrippsae** Zullo & Allison, **Salenia** Paratype 12621
In Zullo, Kaar, Durham, & Allison, 1964, Palaeontology, vol. 7, pt. 2, p. 339 (July).
Recent, southwest end of Nasca Ridge, about 1280 kilometers off the coast of
Chile in the southeastern Pacific Ocean, 200-350 meters.
- scrobiculata** Valenciennes, **Agassizia** Plesiotype [Hypotype] 6927
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
114, pl. 29, figs. 2-3; pl. 30, fig. 12 (April 19).
Recent, on shore, Gulf of Fonseca, San Salvador-Honduras boundary.
- scutelliformis** Kew, **Astrodapsis** Plasto-Holotype 7697
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 107, pl. 21, fig. 2 (September
28).
Upper Miocene, Santa Margarita Formation, north of Coalinga, Fresno
County, California.
- semigibbosus** Howe, **Dendraster (Calaster) oregonensis** Plasto-Holotype 640
1922, Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 14, no. 3, p. 102, pl. 7, fig. 3 (Septem-
ber 8).
Pliocene, Empire Formation, Cape Blanco, Curry County, Oregon.
- semituberculatus** Agassiz & Desor, **Lytechinus** Plesiotypes [Hypotypes] 6912-6913
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p.
25, pl. 15, figs. 3-5 (April 19).
Recent, west side of South Seymour Island, and west side of Albemarle Island,
Galápagos Islands, Ecuador.
- similaris** Grant & Hertlein, **Dendraster vizcainoensis** Plasto-Holotype 7237
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 90, pl. 27, figs. 1-2;
pl. 28, fig. 8 (April 19).
Upper Pleistocene, Palos Verdes Formation or equivalent, near Los Cerritos
Station, near Signal Hill, Long Beach, California.

- spatagus(?)** Linnaeus, **Metalia** Plasto-Plesiotype [Hypotype] 1822
Hanna, 1926, Proc. Calif. Acad. Sci., 4th ser., vol. 14, no. 18, p. 480, pl. 24, fig. 1 (March 23).
Pliocene, east end of Coyote Mountain, Imperial County, California.
- spatiosus** Kew, **Astrodapsis arnoldi** Plasto-Holotype 6086
1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 89, pl. 22, figs. 2a-b (September 28).
Lower Pliocene, lower Etchegoin (Jacalitos) Formation, Sargent Canyon, Salinas Valley, Priest Valley quadrangle, Monterey County, California.
- species **a**, Kew, **Clypeaster** Hypotype 373
In Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, table, p. 128, pl. 23, fig. 2; pl. 24, fig. 2 (July 30).
Upper Oligocene or lower Miocene, north end of La Puerte Range, Topila, Mexico.
- species **a**, Dickerson, **Clypeaster** [see **Peronella merrilli**
Israelsky, 1933] Plesiotype [Hypotype] 5209
1922, Philippine Jour. Sci., vol. 20, no. 2, pp. 213, 228, pl. 13, figs. 3a-b (February).
Pliocene, Malubang Formation, Bondoc Peninsula west side of Ragay Gulf, Tayabas Province, Luzon, Philippine Islands.
- species, Hertlein & Grant, **Echinometra** Hypotype 13078
1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 114, pl. 26, figs. 4-5 (July 7).
Pliocene, San Diego Formation, Pacific Beach, San Diego County, California.
- species, Kew, **Eupatagus** [see **Paleopneustes elevatus**
Israelsky, 1924] Hypotype 1649
In Dickerson & Kew, 1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 5, table, p. 128 (July 30).
Upper Oligocene or lower Miocene, north end of La Puerte Range, Topila, Mexico.
- [species], "Sand Dollar" [**Scutellaster**] Hypotype 10561
Anonymous, 1958, Sunset Magazine, vol. 120, no. 3, fig., p. 64 (March).
"Pleistocene" [Pliocene], Bolinas Inlet, California.
- species, Waring, **Scutella?** Plasto-Plesiotype [Hypotype] 4937
1917, Proc. Calif. Acad. Sci., 4th ser., vol. 7, no. 4, p. 58, pl. 9, fig. 14 (July 30).
Upper Cretaceous, Chico area, Bell's Canyon north of Simi Fault, Ventura County, California.
- stalderi** Weaver, **Schizaster(?)** Plasto-Holotype 6080
1908, Univ. Calif. Publ. Bull. Dept. Geol., vol. 5, no. 17, p. 274, pl. 21, fig. 3 (December 28).
Pliocene, presumably Wildcat series, Humboldt County, California.
- stevensi** Grant & Hertlein, **Eupatagus** Paratypes 7176-7178
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 134 (April 19).

Upper Eocene, Reyes Creek, upper Cuyama Valley, Ventura County, California.

- sverdrupi** Durham, **Encope** Paratype 7855
1950, Geol. Soc. Amer. Mem. 43, pt. 2, p. 48 (August 10).
Lower Pliocene, Santa Inez Bay, Baja California.
- tampicoensis** Israelsky, **Paraster** [see **Schizaster clevei** Cotteau
of Kew, in Dickerson & Kew, 1917] Holotype 367
1924, Proc. Calif. Acad. Sci., 4th ser., vol. 13, no. 8, p. 140 (March 18).
Upper Oligocene or lower Miocene, San Rafael beds, Tampico region, Mexico.
- tenuis** Kew, **Encope** Plasto-Hypotypes 13088–13089
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 126, pl. 23, figs.
7, 13; pl. 24, fig. 11; pl. 25, fig. 4 (July 7).
Pliocene, San Diego Formation, clay quarry at end of Arroyo Drive at 31st
Street; and Logan Avenue, San Diego, California.
- terminalis** Grant & Hertlein, **Echinocyamus** Holotype 7168
Paratypes 7167–7167A, 7179
1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 48, text figs. 5–6b
(April 19).
Recent, off Guadalupe Island, Baja California, Mexico, 9–15 fathoms.
- thouarsii** Valenciennes, **Eucidaris** Plesiotype [Hypotype] 6939
Grant & Hertlein, 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 7,
pl. 2, fig. 1 (April 19).
Recent, Espiritu Santo Island, Gulf of California, Mexico.
- thouarsii** Valenciennes, **Eucidaris** cf. **E.** Plasto-Hypotypes 13068–13069
Hertlein & Grant, 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 103, pl. 24, figs.
20–21 (July 7).
Pliocene, San Diego Formation, northwest corner of Sec. 8, T. 19 S., R. 2 W.,
southwestern San Diego County, California.
- townsendi** (Agassiz), **Brisaster** Hypotypes 6949–6950
Clark, 1937, Trans. San Diego Soc. Nat. Hist., vol. 8, no. 28, p. 367, pl. 24, figs. 10–12 (De-
cember 15).
Recent, Howe Sound, British Columbia, Canada, 70 fathoms.
- tumidus** Rémond, **Astrodapsis** Plasto-Hypotypes 9814–9815
Hertlein, 1951, Calif. State Div. Mines, Bull. 154, nos. 12–13, pt. 4, p. 191, fig. 2 (Decem-
ber).
Upper Miocene, San Pablo Formation, Third Street and Pinole Avenue,
Rodeo, Contra Costa County, California.
- tumidus** Rémond, **Astrodapsis** Plasto-Hypotype 7689
Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 108, pl. 14, figs. 3a–c
(September 28).
Upper Miocene, upper San Pablo Group, south side of Mount Diablo (7689
only), Contra Costa County, California.

- tumidus** Rémond, **Astrodapsis** Hypotype 5706
 Hanna & Hertlein, Calif. Dept. Nat. Resources, Div. Mines, Bull. 118, Preprint of pt. 2, p. 172, fig. 63-9 (September 11).
 Upper Miocene, Neroly Formation, "Shell Ridge," 1¼ miles northeast of Walnut Creek, Contra Costa County, California.
- tumidus** Rémond (small thick form), Kew, **Astrodapsis** Plasto-"Holotype" 7693
 1915, Univ. Calif. Publ. Bull. Dept. Geol., vol. 8, no. 20, p. 370, pl. 40, figs. 1a-b (March 2). Specimen cited as Holotype in Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 110, pl. 14, figs. 4a-b (September 28).
 Upper Miocene, upper San Pablo Group, San Pablo Bay-Mount Diablo region, Contra Costa County, California.
- vaquerosensis** Loel & Corey, **Scutaster** Paratype 6759
 1932, Univ. Calif. Publ. Bull. Dept. Geol. Sci., vol. 22, no. 3, p. 179 (December 31).
 Lower Miocene, Vaqueros, west side of Grimes Canyon, Santa Clara Valley, Ventura County, California.
- vaquerosensis** Kew, **Scutella** Cotype [Syntype] 447
 1920, Univ. Calif. Publ. Bull. Geol., vol. 12, no. 2, p. 77, pl. 9, figs. 1a-b (September 28).
 Lower Miocene, upper Vaqueros Formation, Vaqueros Creek, San Luis Obispo County, California.
- venturaensis** Kew, **Dendraster** Hypotype 5938
 Hanna & Hertlein, 1941, Calif. Dept. Nat. Resources, Div. Mines, Bull. 118, Preprint of pt. 2, p. 174, fig. 64-5 (September 11).
 Upper Pliocene, above *Crepidula* and *Chrysodomus* zone, Las Posas Valley, Santa Paula quadrangle, Ventura County, California.
- vizcainoensis** Grant & Hertlein, **Dendraster** Paratype 6947
 1938, Publ. Univ. Calif. at Los Angeles, Math. & Physic. Sci., vol. 2, p. 90 (April 19).
 Quaternary, Puerto de Santo Domingo, Bahía de Sebastián Vizcaino, northern Baja California, Mexico.
- whitneyi** Rémond, **Astrodapsis** Hypotype 5923
 Hanna & Hertlein, 1941, Calif. Dept. Nat. Resources, Div. Mines, Bull. 118, Preprint of pt. 2, p. 172, fig. 63-3 (September 11).
 Upper Miocene, Santa Margarita Formation, 1 to 1¼ miles north of road along Quailwater Creek, San Luis Obispo County, California.
- whitneyi** Rémond, **Astrodapsis** Plasto-Hypotypes 7683, 7695
 Kew, 1920, Univ. Calif. Publ. Bull. Dept. Geol., vol. 12, no. 2, p. 111, pl. 16, figs. 1a-b; pl. 17, fig. 2 (September 28).
 Upper Miocene, upper San Pablo Group, Contra Costa County, California.
- woynari** Hertlein & Grant, **Brisaster townsendi** Plasto-Holotype 13044
 Paratype 13090
 1960, Mem. San Diego Soc. Nat. Hist., vol. 2, pt. 2a, p. 132, pl. 26, figs. 1, 2, 3 (Plasto-Holotype No. 13044) (July 7).

Pliocene, San Diego Formation, in clay quarry at end of Arroyo Drive, San Diego, California.

yoloensis Anderson, **Echinocorys**

Holotype 10580

1958, Geol. Soc. Amer. Mem. 71, p. 85, pl. 6, figs. 1a-d (June 6).

Upper Cretaceous, north end of Pleasant Valley south of Putah Creek, Yolo County, California.

LIST OF GENERA

Abertella	tumidus
palmeri	whitneyi
Agassizia	Astropyga
clevei	pulvinata
regia	Brisaster
scrobiculata	townsendi
Amphiura	woynari
lymani	Brissopsis
Anorthoscutum	blanpiedi
interlineatum	pacifica
quaylei	Brissus
Arbacia	kewi
incisa	latecarinatus
Astrodapsis	Caenocentrotus
altus	gibbosus
anticelli	Calaster
antiselli	gibbosus
arnoldi	oregonensis
brewerianus	semigibbosus
californicus	Cassidulus
cierboensis	mercedensis
coalingaensis	pacificus
crassus	Cidaris
cuyamanus	merriami
depressus	Clypeaster
diabloensis	bowersi
fernandoensis	cf. concavus
fresnoensis	cubensis
grandis	europacificus
israelskyi	gabbi
jacalitosensis	malumbangensis
kewi	pileus
major	rotundus
margaritanus	sanrafaelensis
merriami	species
nipponicus	Coelopleurus
ornatus	corona-formis
peltoides	Dendraster
schencki	ashleyi
scutelliformis	casseli
spatiosus	cedrosensis

diegoensis	stevensi
elsmerensis	Hemiaster
excentricus	perplexa
gibbosus	Jacksonaster
gibbsii	depressum
granti	Laganum
cf. granti	cf. decagonale
humilis	dickersoni
laevis	Lenita
mexicanus	israelskyi
oregonensis	patellaris
pacificus	Lovenia
pentagonalis	dumblei
semigibbosus	hemphilli
similaris	mexicana
venturaensis	Lytechinus
vizcainoensis	coreyi
Echinarachnius	semituberculatus
alaskense	?Lytechinus
andersoni	milleri
fairbanksi	Macropneustes
merriami	antillarum
parma	dubius
Echinocorys	mexicanus
yoloensis	Mellita
Echinocyamus	kanakoffi
terminalis	longifissa
Echinometra	notabilis
species	Merriamaster
Echinoneus	coalingaensis
burgeri	perrini
Encope	Metalia
angelensis	cumminsi
ecuadorensis	?spatagus
fragilis	Oligopygus
grandis	putnami
irregularis	Pachecocrinus
laevis	joaquinensis
loretoensis	Paleoechinoneus
micropora	hannai
sverdrupi	Paleopneustes
tenuis	elevatus
Eoagassizia	holmani
alta	Paraster
Eucidaris	tampicoensis
galapagensis	Pericosmus
thouarsii	schencki
cf. thouarsii	Peronella
Eupatagus	merrilli
species	ragayana

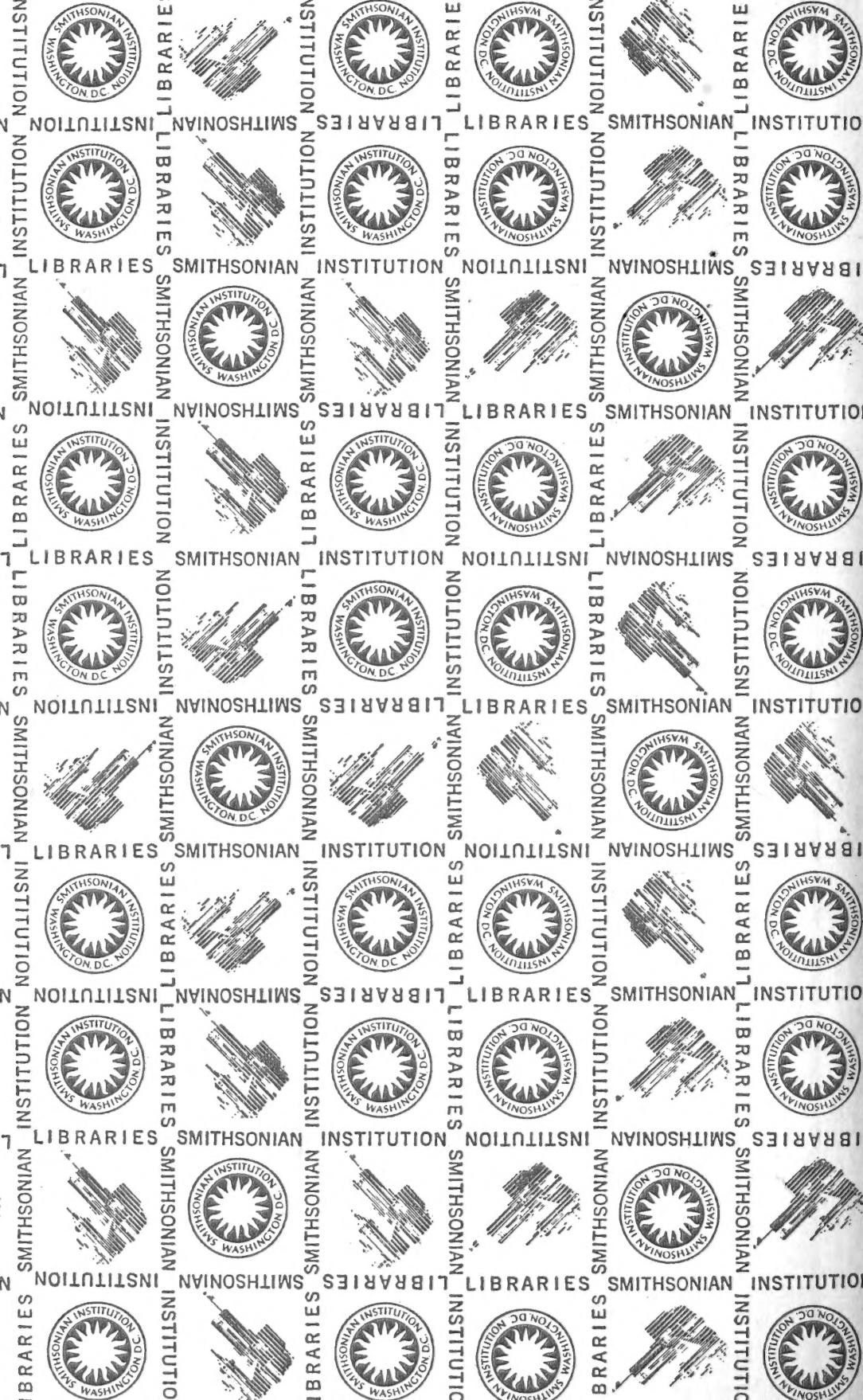
Polydiadema?	fairbanksi
joaquinensis	gibbsii
Rhynchopygus	merriami
californicus	pabloensis
Salenia	vaquerosensis
scrippsae	?Scutella
Schizaster	species
clevei	Scutellaster
diabloensis	cretaceus
dumblei	interlineatus
lecontei	species
martinezensis	Spatangus
morlini	californicus
scherzeri	rarus
?Schizaster	Strongylocentrotus
stalderi	dröbachiensis
Scutaster	fragilis
vaquerosensis	franciscanus
Scutella	Toxopneustes
cazonesensis	roseus
coosensis	

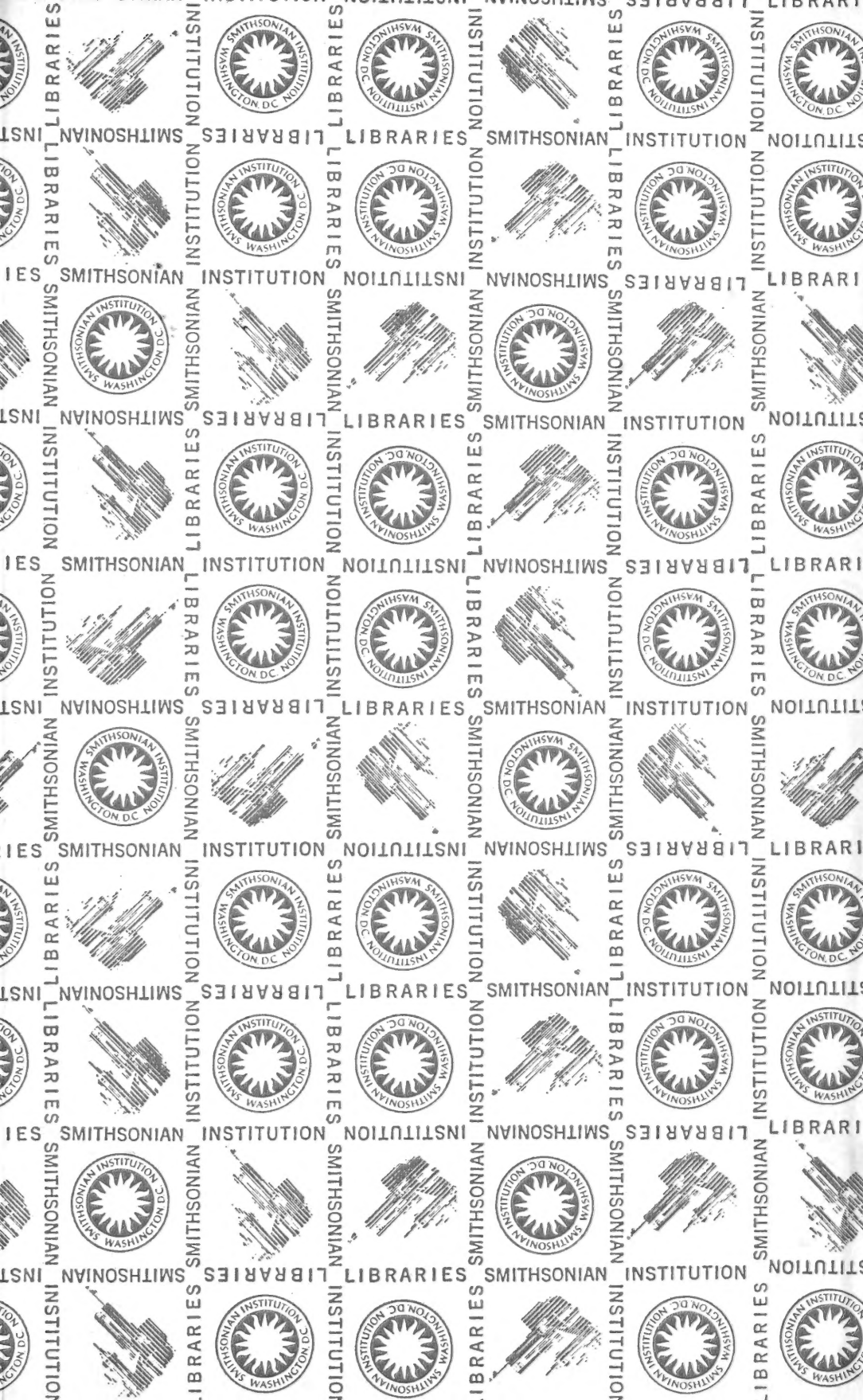
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