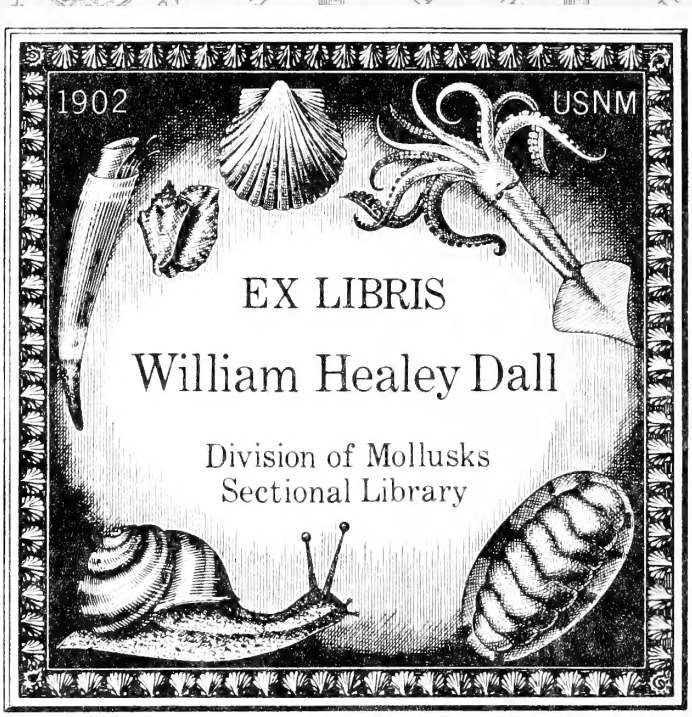
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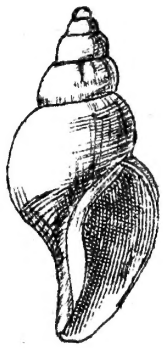


Distributional List

of the

WEST AMERICAN MARINE MOLLUSKS

from San Diego, California

to the Polar Sea

from the proceedings of

The CONCHOLOGICAL CLUB

of SOUTHERN CALIFORNIA

Part I. Pelecypoda

John Q. Burch, Editor

(Arrived Feb. 14, 1945)

CHECK LIST

WEST NORTH AMERICAN MARINE MOLLUSCA FROM SAN DIEGO, CALIF. TO ALASKA

This list will follow the arrangement of W.H. Dall in his Summary of Species, Bulletin 112, United States National Museum.

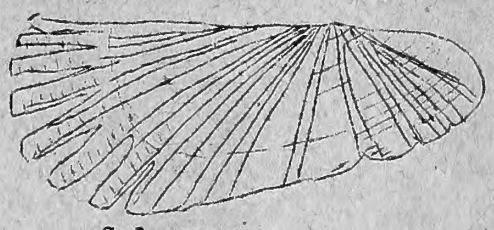
Species on which the members of the club have no additional information will merely be listed.

Class- Pelecypoda
Family- Solemyidae (Solemyacidae)
Genus- Solemya Lamarck, 1818 (Solenimya Lamarck 1822, Solenomya Lamarck 1830, Stephanopsus Scacchi 1833).
Type- Solemya togata (Poli)- Mediterranean
Subgenus- Acharax Dall 1908.
Solemya agassizii Dall 1908- " Off Tillamook Bay, Oregon, south to Aguja Point, Peru, in 1036-1800 fathoms".
Solemya johnsoni Dall 1891- " Puget Sound to Panama"
Subgenus Petrasma Dall 1908
Solemya panamensis Dall 1908- " Santa Barbara, Calif. to Panama" and here extended to Monterey, Calif.

Dredged in 25 fathoms off Avalon, Catalina Island (8/1937) and fairly common off Redondo Beach from 15 to 50 fathoms on mud bottom (1937-1941)(Burch) San Jose Island, Gulf of Calif. (H.N. Lowe 1931); 9 fathoms in coarse arkose sand, off Pacific Grove, Calif. rare (Gordon); Catalina Id., 100 fathoms ((adult), 4 fathoms, mud (juvenile) (G. Willett); Malaga Cove, L.A. Co., Cal. 15 fms. (juvenile) and Point Loma, San Diego Co., 30 fms. (juvemile) (Willett)

Solemya valvulus Carpenter 1864- " San Pedro, Calif. to Gulf of Calif." and off Monterey, Calif.

Off Monterey, Calif. in 10-25 fms. sand, rare (A. Smith); off Newport Bay, Calif. (H.N. Lowe); Scammon's Lagoon, Lower Calif. (Hemphill).



Solemya

Family- Nuculidae
Genus- Nucula Lamarck 1799
Type- Arca nucleus Linnaeus- Europe
Subgenus Nucula
Nucula exigua Sowerby - " Golden Gate to Acapulco, Mexico"- Hertlein and Strong give the range " San Bartolome Bay (Turtle Bay), Lower Calif., and Gulf of California to Ecuador (?) Magellanic region (Dall)."

Dredged in 20 fathoms off Malaga Cove, L.A. Co., Calif. 11/1937 and very abundant in the Baldwin Hills Pleistocene Playa del Rey deposit (Burch); in 18 ftms. off South Coronado Island (Dr. Fred Baker); Malaga Cove in 10-15 fms. (G. Willett); Scammons Lagoon, L.C. (Hemphill); Santa Maria Bay, L.C. H.N. Lowe 1931); Pleistocene from Lido Isle, Newport Bay, Anomia Bed, Vermont & Sepulveda, Gaffey St. Bridge, San Pedro, Lumber Yard, San Pedro, & Nigger Slough (Miss E. Cook).

Subgenus Ennucula Iredale 1931
Nucula cardara Dall 1916- " Monterey, Calif. to Lower Calif. in deep water." In 43-108 fms. in soft green or dark mud (U.S.F.C.) Stas. 4475, 4482, 4483, 4523"
Nucula carlottensis Dall 1897- " Queen Charlotte Islands to Anacapa Island " 581 fms. in green mud and sand (U.S.F.C.) Sta. 3670, rare.

Nucula darella Dall 1916- " Off San Diego,Calif. in 822 fms."
Nucula linki Dall 1916- " Queen Charlotte Sound, British Columbia, to Guaymas, Mexico".

Dredged off Redondo Beach, Calif. in 75 fathoms, mud bottom, 8/41(Burch); Tillamook, Oregon (H.N. Lowe); 51 fms. in soft dark gray mud (U.S.F.C.) Sta. 4464.

Nucula petriola Dall 1916- (See Cyrilla A. Adams under Fam. Nuculanidae)
Nucula quirica Dall 1916- " Chugachik Bay , Cooks Inlet, Alaska"

We have a note from Dr. Myra Keen that this species equals Nucula bellottii Adams fide Schenck, 1939, p 31.

Nucula tenuis Montagu,1808- Hertlein & Strong give range " Northern Europe, Northeastern North America. Circumboreal. Point Barrow,Alaska to Cedros Id., Lower Calif."

Dredged in 25 ftms. off Avalon,Catalina Id.,8/1937, in 40 ftms. off Monterey,Calif. 8/1937-40, in 40 fms. off Rocky Pt.,L.A. Co. 7/1938, in 25 fms . 50 to 100 fms. off Redondo Beach, Calif. 1937-41, in 50 fms. off Ensenada,Mex 7/1938- always from mud bottoms (Burch). Many specimens dredged in the inner harbor at San Pedro about 1910 (Tremper) (Strong); Craig,Alaska, 15-30 fms ., San Pedro, 20 fms., Catalina Id., Newport, Point Loma, Calif. in 30 fms. (Geo. Willett); San Juan Id., Puget Sound (H.N. Lowe); Departure Bay, British Col ., (Mrs. Oldroyd); in 15-149 fms. in mud,sand and clay, common off Monterey, Calif. (A. Smith); Akutan Id. dreged 15 fms. mud, 1934 (Norberg); Hinchinbrook I., Pr. Wm. Snd.,Alaska, 15 fms. 1936 (Norberg); Tromso,Norway, drgd . in 1930 (Norberg); Knight Island,Drier Bay,Alaska, 1923 (W.J. Eyerdam).

Nucula tenuis expansa Reeve,1855- " Arctic Ocean to Sitka,Alaska; San Diego ?"

We have a note from Dr. Myra Keen that this species equals Nucula bellottii A. Adams fide Schenck ,1939. Doubtful if the true N. bellottii occurs south of Alaska. The name " expansa" is both a synonym and a homonym."

Punuk Island, Bering Sea, 15 ftms. (Lewis) (Willett); arctic (H.N. Lowe Akutan Island, dredged 10 ftms. 1934 (Norberg); Izhut Bay, Afognak Id., dredged in mud, 1922 (W.J. Eyerdam)

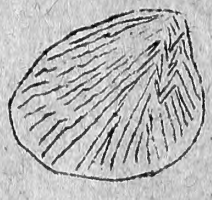
Subgenus Nuculopsis Woodring 1925. Hertlein and Strong describe species under this subgenus, but insofar as we know now it is not known north of San Diego.

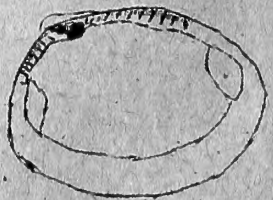
Genus Acila H. & A. Adams, 1858-
Type- Nucula divaricata Hinds - China Sea
Subgenus Truncacila Schenck in Grant & Gale 1931.

Acila castrensis Hinds 1843- Hertlein and Strong give the range " Sitka, Alaska, to Cedros Island, Lower Calif., 40 to 262 fathoms"

Dredged in such abundance as to make it the predominant mollusk in mud off Redondo Beach from 50 to 75 fms. 1937-41; 50 fms. off Ensenada,Mex. 7/1938; abundant in the Pleistocene of Timm's Pt.,San Pedro,Calif. (Burch); 20 fms. mud Friday Harbor, Wash. 5/1936 (W.J. Eyerdam); off Upright Head, San Juan Islands, Wash. on shell bottom (Ruth Coats); Craig, Alaska, 15-40 fms.; Forrester Id., Alaska, 50 fms.; San Pedro,Calif. 15-20 fms. (G. Willett); Pleistocene from 3rd & Mesa, 8th & Palisades, Timm's Pt., & Walteria (Miss E. Cook.).

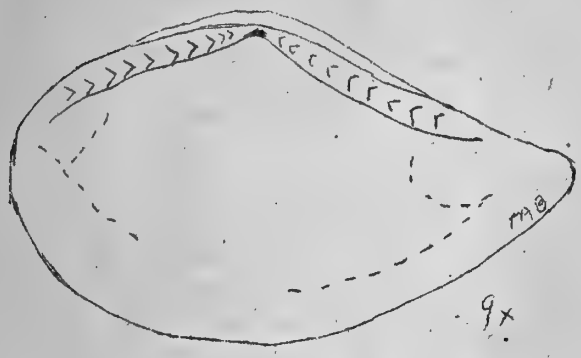
The following works should be consulted on these groups :
Hertlein & Strong"Mollusks from the West Coast of Mexico & Central America" Part I, Zoologica,Vol.XXV.
"Nuculid Bivalves of the Genus Acila" by H.G. Schenck, Geol. Soc. of Amer. Special Papers No. 4, 1936.


Acila

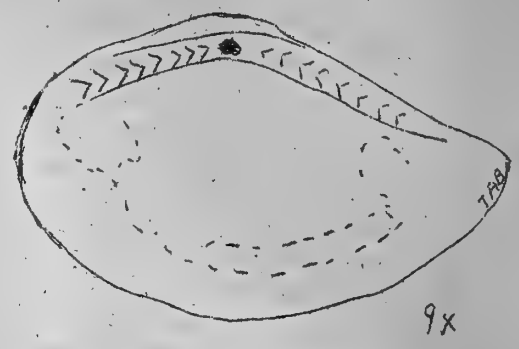

Nucula

Family Nuculanidae (Ledidae)
Like Nucula, but posterior and elongate, rostrate; pallial line sinuate; end of shell sometimes partly gaping.
Genus Nuculana Link 1807 (Leda Schumacher 1817)
Type- Arca rostrata Chemnitz-- Mya pernula Muller- Northern coasts of Europe.
Subgenus Nuculana s.s.
Nuculana amblia Dall 1905- Monterey Bay, Calif.
465-1041 fathoms, in green, blue and soft gray mud, and hard sand, off Point Pinos (U.S.F.C. Stas. 3128,4516,4517,4530,4536-9) common.
Nuculana buccata Steenstrup 1842- Arctic Ocean and Bering Strait. Also Atlantic.
Nuculana conceptionis Dall- Aleutian Islands to San Diego, Calif.
298 fathoms in yellow sand and mud, off Point Sur,Calif. (U.S.F.C. Sta. 3187) one specimen; specimens in Burch collection taken off San Diego by Fred L. Button.
Nuculana fossa Baird 1863- Kotzebue Sound,Alaska to Puget Sound.
Mr. George Willett places the following in the synonomy of this species: N. f. sculpta Dall and N. f. vaginata Dall. They are here listed as in Dall.
Kodiak Island, Alaska 15 fms. (Lewis); Wrangel and Craig,Alaska,30-50 fms. (G. Willett); Knight Id., Drier Bay, dredged in 1923 (W.J. Eyerdam); Boulder Clay, Moss Pt., Victoria, B.C. , also Unalaska Id. in 75 fms. (Mrs. I.S. Oldroyd
Nuculana fossa sculpta Dall 1916- South of Alaska peninsula , 69 fms.
Nuculana fossa vaginata Dall 1916- Kasaan Bay,Alaska 50 fms.
Nuculana fossa curtulosa Dall,1916- Bering Sea and Unalaska.
Nuculana pernula Muller,1779- Arctic Ocean to Plover Bay. Also Atlantic.
Spitzbergen 70' 45"-- 20'E. of Hinlopen, 55 fms. clay,1861; W. coast of Sweden, Gullmarn, Bohuslan, 1897 (A. d' Ailly); Tromso,Norway, 8-10 fms. sandy mud 1935 (Norberg); Knight Id.,Drier Bay, dredged 1923 (W.J. Eyerdam); Akutan Id., dredged 1931 (Norberg).
Subgenus Saccella Woodring ,1925- Type Arca fragilis Chemnitz.
Nuculana (Saccella) acuta Conrad 1831- Type locality- North Carolina.
Range: Off Martha's Vineyard to the West Indies.
The following note on this species is the opinion of John Q. Burch.
With but few exceptions all west coast collections contain sets of a small species of Nuculana found common in comparatively shallow water off the coast of Southern California and have it erroneously labelled N. acuta. Many of us have sets of the true Atlantic N. acuta in our cabinets with the west coast specimens for comparative purposes. It is obvious to any amateur that the two shells could not possibly be considered to be the same species. This fact is always noted and commented upon whenever these specimens are examined, but for some reason no one has seen fit to describe it and give it a name. It is hoped that the figures below will show the differences between the two species.
Grant and Gale (Mem. San Diego Soc. Vol. 1, 1931) suggest that the species may be N. penderi Dall and Bartsch 1910. " N. acuta differs from N. penderi in its smaller size and its less dorsally curved rostrum. Dall and Bartsch, in their description of N. penderi state that the latter is less elongate than N. acuta, a relationship which is true of the Atlantic acuta, but does not hold for the shorter, less typical Pacific coast representatives of Conrad's species."
N. penderi has been well figured. Two very good figures are in Oldroyd, Stanford Univ. Publ. Geol. Vol. 1, Pl. 39, figs. 4,5.
George Willett suggests that this shell be labelled N. penderi subsp.
It is the opinion of the writer that this southern California species is distinct from N. penderi which is shorter and more globose.
It has been our custom when labelling shells that seem to us undescribed and are abundant off Redondo Beach, to name them after the locality. So until this species is given a better name, it will be Nuculana redondoensis in our collection.

Some collecting data on this species follows: Dredged in 25 fms. off Avalon,Catalina Island, Calif. 8/1937, abundant in gravel at 25 fms. off Redondo Beach,Calif. 1937-41, in 20 fms. off Monterey,Calif. on shale bottom, 8/1937,40 (Burch); Point Loma,Catalina Island, San Pedro, 2030 fms., sand (G. Willett).

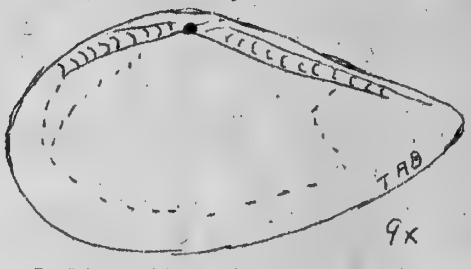


Redondo Beach,Calif. 25 fms.



Lantana,Fla. 100 fms.

Note difference in shape of shell and center of hinge.
Tom Burch sent the following comment with the drawings, " Just finished the drawings- I believe the two figures of N. acuta show the difference clearly. I drew them first with a camera lucida and then reduced them with proportional dividers. They are all the same magnification (9x). I did not try to get the teeth accurately drawn, but the central area is as shown."
Nuculana austini (Oldroyd) 1935- West coast of Vancouver Id., Nootka Light, (Nautilus V. 49, p 13). This species is generally placed in the synonomy of N. minuta Fabricius 1776.
Nuculana cellulita Dall 1896- Puget Sound
Craig,Alaska,30-40 fms. sandy mud (George Willett); Elrington Id., Pr. Wm. Sound, dredged 1925 (W.J. Eyerdam); dredged off Friday Harbor,Wash. 4/1941 (T. Kincaid).
Nuculana " cuneata Sowerby"- Monterey (Cooper). Note by Allyn Smith. " This is not N. cuneata Sowerby which is a synonym of N. elenensis Sowerby. Early collectors applied the name to the species which Dall called N. acuta Conrad."
Nuculana oxia Dall 1916- Santa Rosa Island,Calif. to Gulf of California.
Specimens taken in great abundance off Redondo Beach in 75 to 100 fms. mud bottom 1937-41, and in 50 fms. off Ensenada,Mexico 8/1938 have been tant-atively placed in this species which has never been figured (Burch). A figure of the Redondo Beach shell follows.



Nuculana oxia Dall, 1916 Off Redondo Beach,Calif. in 75 fms. mud.

Nuculana minuta Fabricius,1776- Arctic Ocean to San Diego,Calif. Also Atlantic.
Victoria, B.C., 10-15 fms. (Lewis); Craig,Ketchikan,Forrester Id.,Alaska in 20-50 fms. (G. Willett); Catalina Island, 200 fms. (G. Willett); Orca, Pr. Wm. Sound 1936(Norberg); Knight Id.,Drier Bay, dredged,mud,1924 (W.J. Eyerdam); Knight Id.,Thum Bay, dredged 1940 (W.J. Eyerdam).
Nuculana minuta lomaensis Dall, 1919- San Diego, Calif.
Dredged off Redondo Beach, Calif. 1937-41, 50 fms. (Burch).
Nuculana penderi Dall,1910- Forrester Id., Alaska to Santa Barbara Islands.
Craig,Alaska, 30-40 fms., sandy mud (G. Willett).
Nuculana taphria Dall,1897- Bodego Bay, Calif. to Lower California.
Dredged off Santa Monica,Calif. in 10 fms. sand 12/1935, off Monterey, Calif. in 10 fms. shale 8/1937, and exceptionally large specimens off Pacific Grove in 15 fms. sand, off Redondo Beach and San Pedro,Calif. in 15-25 fms. 1937-41,off Ensenada,Mex. in 15 fms. 7/1938, fossil in Pleistocene of Timm's Pt. and Hilltop Quarry,San Pedro,Calif. and very abundant in the Baldwin Hills deposit at Playa del Rey (Burch); dredged in 7-10 fms. off South Coronado Id (Dr. Fred Baker); Many specimens dredged in 6 fms. near Deadman's Island, by Capt. Luke in 1912 (Tremper); in 3 fms. along the inside of the Government breakwater at San Pedro (Strong); specimens were taken from lumps of clay dicharged by the dredges in the outer harbor, San Pedro (Chace). 8-51 fms. in coarse and fine sand, abundant. Common in fish stomachs off Monterey.(Sorensen)
Subgenus Thestyleda Iredale, 1929- Type- Leda ramsayi E.A. Smith
Nuculana hamata Carpenter 1864- Puget Sound to Panama Bay
Dredged in abundance off Redondo Beach in 25,50,75 and 100 fms. mud bottom, in 40 fms. off Rocky Pt., in 35 fms. off Avalon,Catalina Id., 8/1937-41, in 50 fms. off Monterey,Calif. 8/1937, abundant in the Pleistocene of Timm's Pt. San Pedro,Calif. (Burch). 35-158 fms. in mud and sand, fairly common off Monterey (A. Smith).
Nuculana hamata limata Dall,1916- Santa Barbara to San Diego,Calif.
Nuculana leonina Dall, 1916 - Straits of Fuca to latitude 36 north.
152-766 fathoms in green mud, sand and rocks, off Point Pinos (U.S.F.C. Stas. 3202,4509,4514,4517,4541), fairly common.

Hertlein and Strong in " Mollusks from the West Coast of Mexico and Central America",Part I, Zoologica, Dec. 31,1940, describe two new subgenera and use others:
Politoleda Hertlein and Strong, 1940- Type - Nucula polita Sowerby
Costelloleda Hertlein and Strong,1940- Type- Nucula costellata Sowerby
Spinula Dall, 1908- Type-Leda calcar Dall
Jupiteria Bellardi, 1875- Type- Leda concava Bronn.
So far as known these subgenera have not been taken north of San Diego.

The subgeneric position of the following species of Nuculana is uncertain:
Nuculana amiata Dall 1916- Off San Diego, in 488 fathoms.
Nuculana dalli Krause, 1885- Unalaska,Aleutian Islands. Note by Dr. A. Myra Keen " Probably a Yoldia".
Nuculana extenuata Dall, 1897- Off Sitka,Alaska, 1,569 fathoms.
Nuculana fiascona Dall, 1916- Off San Diego,Calif. in 822 fathoms.
Nuculana gomphoidea Dall, 1897- Off Tillamook,Oregon, 786 fathoms.
Nuculana liogona Dall,1916- Bering Sea in 1,401 fathoms.
Nuculana navissa Dall, 1916- Farallones Islands to San Diego,Calif.
Nuculana phenaxia Dall,1916- Off San Diego,Calif. in 822 fathoms.
Nuculana pontonia Dall,1889-Santa Barbara Ids.,Calif. to Peru.Gallapagos.
Nuculana radiata Krause,1885- Arctic Ocean; Plover Bay,E. Siberia; Okhotsk and Bering Seas.
Nuculana sparsana Dall, 1916- Santa Barbara Ids., to Point Loma, Calif.

Genus Adrana H. and A. Adams, 1858. Type Nucula lanceolata Lamarck.

A number of species of this genus have been described from off Mexico and Central America, but none have been reported north of San Diego.

Genus Yoldia Moller, 1842- (Portlandia Morch, 1853)
Type- Nucula arctica Gray Circumboreal

Pallial sinus deeper than in Nuculana; shell thinner, gaping at both ends; usually with strong keel on posterior dorsal margin.

Subgenus Yoldia s.s. Flattened; elongated; no sculpture except incremental lines.

Yoldia myalis Couthouyi, 1838- Arctic Ocean to Puget Sound.

Punuk Id. and Nunivak Id., Bering Sea (Lewis); Kodiak Id.,Alaska (Lewis); Craig,Alaska, 20-40 fms. (G. Willett); Sucia Id., Puget Sound, 25 fms. (Mrs . Oldroyd); Akutan Id., dredged 10 fms. mud, 1934 (Norberg); Hinchinbrook Id. dredged 1936 (Norberg); Knight Id., Drier Bay, 25 fms. mud,1923 (W.J. Eyerdam); Unalaska Id., under stones on rocky reef at low tide,1932 (W.J. Eyerdam).

Yoldia limatula Say, 1831- Arctic Ocean to San Diego.

Kodiak Id., 15 fms. (Lewis); Wrangell, Alaska, 50 fms. (G. Willett); Puget Sound (U. of W.); Elrington Id.,Pr. Wm. Sound, dredged 1924 (W.Eyerdam); Sorfjord,Norway, 1935 (Norberg);

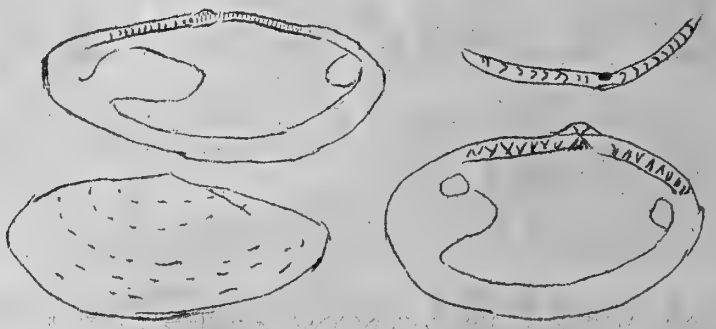
Yoldia gardneri Oldroyd, 1935 - Gardner Bay, Pender Harbor in 4 fms. (Nautilus V.49,No.1 ,p.14). Some students suggest that this is the west coast represen--tative of Yoldia limatula Say. Others place it in the synonomy of limatula. Mr. George Willett collected a topotype which he says is narrower and more attenuated posteriorly than Y. limatula. He labels the species as,

Yoldia limatula gardneri Oldroyd, 1935.

Subgenus Cnesterium Dall, 1898- Like Yoldia s.s., but with concentric sculpture not coincident with incremental lines.

Yoldia scissurata Dall,1897- Syn. Y. ensifera Dall, 1897; Y. ensifera plena Dall,1908. Arctic Ocean to San Diego, Calif.

It seems to be generally believed by students that Y. scissurata and Y. ensifera are the same species. There has been some confusion as to which is the older name. They were both described in the same publication and scissurata has page priority.



Yoldia, s.s. Yoldia (Yoldiella)

Punuk Id. and Nunivak Id., Bering Sea, 8-12 fms. (Lewis); Craig,Alaska, 60 fms., Newport,Calif. 30 fms. (G. Willett); Puget Sound (U. of W.); Akutan Id., dredged 12 fms. mud, 1934 (Norberg); Unalaska Id., dredged 20 fms. 1932 (W.J. Eyerdam); Hinchinbrook Id., Pr. Wm. Sound, dredged 1936(Norberg); Izhut Bay, Afognak Id., dredged, mud, 1922 (W.J. Eyerdam); San Juan Id.,Puget Sound, 25 fms. (Mrs. Oldroyd); 8-51 fms. in coarse and fine sand, abundant off Monterey (A. Smith); common in fish stomachs at Pacific Grove (Sorensen); dredged in great abundance off Redondo Beach,Calif. in 50-75 fms. mud, not uncommon in the Pleistocene of Timm's Pt., San Pedro,Calif. (Burch.)

Yoldia seminuda Dall, 1871- Bering Sea to Sitka, Alaska.

One living specimen from 21 fms., in sand off Monterey,Calif.(Gordon).

Subgenus Kalayoldia Grant and Gale, 1931. Definite concentric riblets; poster-
-ior portion of shell upcurved.

Yoldia cooperi Gabb, 1865. " San Francisco Bay to San Diego". Todos Santos Bay, Lower Calif.

Dredged off Ensenada,L.C., Mex. in 15 fms. 7/4/38, Oceano, San Luis Obispo Co. 6/29/35 (Burch); 5-15 fms. in sand off Soquel,Calif. (A. Smith); many specimens dredged off Deadman's Id., San Pedro,Calif. in 6 fms. in 1912. A large number of specimens have been cast up by storms at various times along the Terminal Island front (Tremper) (Strong); La Jolla, Calif. (H.N. Lowe); many dead valves on the beach at Ocean Beach, San Diego Co. (Miss V. Bristol);

Subgenus Megayoldia Verrill and Bush, 1897- Shell swollen, blunt ended.

Yoldia thraciaeformis Storer, 1838. Arctic Ocean to Oregon; also Atlantic.

Wrangell, Alaska, 50 fms. (G. Willett); Sucia Id.,Puget Sound, 35 fms. (Mrs. Oldroyd);

Yoldia secunda Dall, 1916- Southeastern Alaska in deep water.

Wrangell, Alaska, 50 fms. (G. Willett).

Yoldia beringiana Dall, 1916- Bering Sea to Anacapa Id., Calif.

152-1041 fathoms, in hard sand and blue and soft gray mud, off Point Pinos (U.S.F.C. Stas. 3128,4509,4536).

Yoldia montereyensis Dall, 1893- Chirikoff Id., Alaska to San Diego.

152-871 fathoms, in mud and sand (U.S.F.C. Stas. 3128,3202,3670,4509, 4514,4515,4517,4538,4540,4541,4542) common. Off Monterey, Calif. (A. Smith) Knight Id., Drier Bay, dredged, 1923 (W.J. Eyerdam); off Monterey, Calif. 60 fms. (H.N. Lowe); off Monterey, 25 fms. (Mrs. Oldroyd).

Yoldia martyria Dall, 1897- Prince of Wales Id., Alaska to Gulf of Calif.

Off Seattle, Wash. (Oldroyd).

Yoldia vancouverensis Smith, 1880- Vancouver Id. (Smith).

Subgenus Yoldiella Verrill and Bush,1897. Very small; polished. Deep water.

Yoldia siliqua Reeve, 1855. Norton Sound,Alaska; also Atlantic.

Cape Simpson, B.C. (H.N. Lowe).

Yoldia intermedia Sars, 1865- Bering Strait & Norton Sound, Alaska.Circumboreal.

Yoldia oricia Dall,1916. Oregon to San Diego.

Yoldia sanesia Dall, 1916. Southeastern Alaska to Pt. Conception, Calif.

Yoldia capsa Dall, 1916. Off Tillamook Bay, Oregon, in 786 fms.

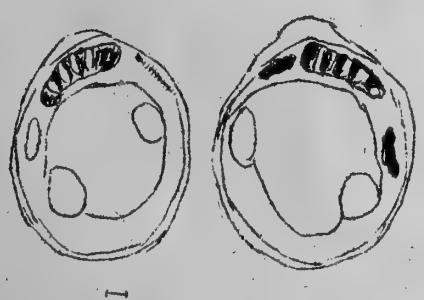
Yoldia cecinella Dall,1916. Aleutian Islands to Gulf of California.

Genus Cyrilla A. Adams. (Pleurodon,Nucinella) Type- Huxleyia sulcata A. Adams.

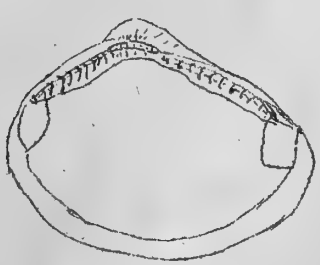
Like a small Nucula, but less nacreous, with sparse transverse teeth, and a long anterior lateral tooth.

Cyrilla munita Carpenter in Dall 1898- (Pleurodon munitum(Carp.) Dall, Nuculina munita Carp., Nucinella munita (Carp. in Dall) Keen, Nucula petriola)

Catalina Island,Calif. to Lat. 34 S. Off Catalina Id., 30 fms. (Willett).



Cyrilla



Tindaria

Genus Malletia Desmoulins, 1832. Type- Malletia norrisii (Sby.)-- chilensis Des
Distinguished from Yoldia by lack of rostrum and absence of lunule and escut-
-cheon. Tooth series interrupted below the umbones. Deep water.

Malletia faba Dall, 1897- Queen Charlotte Ids., B.C. to Lower Calif.
581-627 fms. in mud (U.S.F.C. Stas. 3128,3670); rare. Monterey,Calif.

Malletia fiora Dall, 1916- Off Sitka, Alaska in 1569 fathoms.

Malletia pacifica Dall, 1897- Chignak Bay,Alaska to Monterey, Calif.
152-329 fathoms, in soft gray mud, off Point Pinos (U.S.F.C. Sta. 4509)

Malletia talama Dall, 1916- Bering Sea to Oregon.

Hertlein and Strong use several subgenera under Malletia as follows:
Malletia s.s., Neilo H. & A. Adams, 1852, and Minormalletia Dall,1908.
So far as known these subgenera have not been reported north of San Diego.

Genus Tindaria Bellardi ,1875. Type- Tindaria arata Bellardi.
Shell thick, globose, oval, closed; beaks swollen. Teeth continuous below umbones. Deep water.

Tindaria brunnea Dall, 1916. Bering Sea to Tillamook, Oregon.
U.S.F.C. Sta. 3604, Bering Sea, Lat. N. 54' 51", Long. W. 168 59' from 1401 fms. (H.N. Lowe Coll.)

Tindaria californica Dall, 1916. Santa Barbara to San Diego, Calif.

Tindaria cervola Dall, 1916. Off San Diego, Calif. in 822 fms.

Tindaria dicofania Dall, 1916. Off San Diego, Calif. in 822 fathoms.

Tindaria gibbsii Dall, 1897. Queen Charlotte Islands to Coronado Islands.
755-958 fathoms, in soft gray mud, off Point Pinos (U.S.F.C. Sta. 4539) .

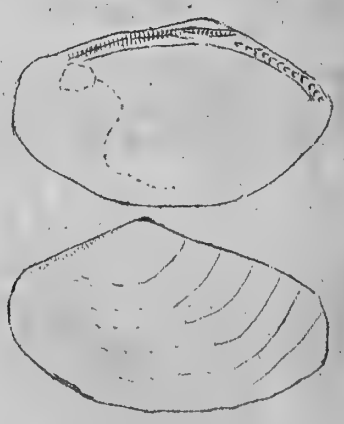
Tindaria kennerlyi Dall, 1897. Off Sitka, Alaska, to Santa Barbara Ids. in deep water.

Tindaria martiniana Dall, 1916. Cape San Martin to Santa Barbara Islands in deep water.

Tindaria mexicana Dall, 1908. San Diego, Calif. to Acapulco,Mexico in deep water.

Tindaria ritteri Dall, 1916. Off La Jolla, California , 293 fathoms.

Hertlein and Strong use a subgenus Tindariopsis Verrill & Bush,1897 for one of their southern species, but the subgeneric position of our northern group is uncertain.



Malletia

Family GLYCYMERIDAE

Genus Glycymeris Da Costa, 1778. Type: Arca glycymeris Linnaeus. Coasts of England. (Axinaea Poli, 1791- Tuceta Bolten, 1798- Pectunculus Lamarck,1799)

The following works should be examined for the most recent reports on this group :

" Northwest American Species of Glycymeris" by G. Willett, Bulletin of the Southern California Academy of Sciences, Vol. XLII, Sept.-Dec.,1943,Part 3.

" Mollusks from the West Coast of Mexico and Central America, Part II" by Hertlein and Strong, Zoologica, Vol. XXVIII (Part 3), Dec. 6, 1943.

Description of the genus by Tryon S.S. Conch. " Shell orbicular, nearly equilateral, smooth or radiately striated; umbones central, divided by a striated ligamental area; hinge with a semi-circular row of transverse teeth; adductors sub-equal; pallial line simple; margins crenated inside."

Subgenus Glycymeris s.s.

Glycymeris corteziana Dall, 1916. Southern California. Bulletin 112 gives the range of this species from Forrester Island, Alaska to Cortez Bank, Calif. Mr. G. Willett in his paper referred to above, makes the following statement: " Evidently a southern shell, from moderately deep water. Eight specimens in the Willett collection are from 50 fms. off Santa Catalina Island, and in the Burch collection are two specimens from 40 fms. off San Clemente, and 25 and 50 fms. off South Coronado Island. As previously stated, the record for this species from Forrester Island, Alaska, resulted from misidentification. Other northern records should be carefully checked."

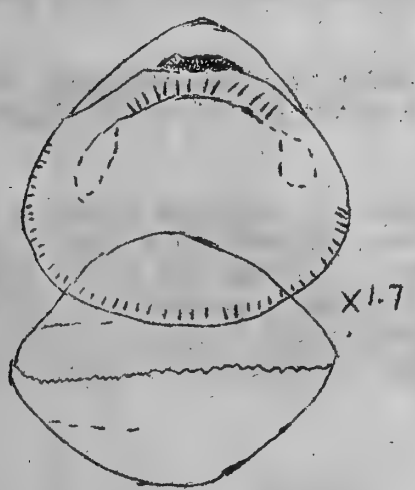
Members have sent in collecting localities for this species ranging from Alaska,Puget Sound,Monterey etc. However, we are omitting these records due to the strong probability of misidentification.

Glycymeris keenae Willett, 1943. Type locality and only record is Forrester Island, Alaska. (Bull. So. Calif. Acad. Sci. , Vol. 42, Pt. 3, 1943).

Glycymeris migueliana Dall, 1916. Dall in Bulletin 112 reports the range of this species as from Oregon to Magdalena Bay, Lower Calif. and the Cortez Bank. It was also reported from Forrester Island, Alaska, but Mr. G. Willett shows that this was due to a misidentification. Inasmuch as all members of the club seem to be entirely unfamiliar with this species, it is simply listed.

Glycymeris profunda Dall, 1879. Off Catalina Island and Redondo Beach, Calif. (Proc. U.S.N.M., Vol. 1, 1879, pp 13-14). Figured in G. Willett's paper.

Six valves from off Catalina Island in 200 fms. (G. Willett); one living specimen and an additional valve from off Redondo Beach, Calif. in 25 fms. (Burch); species was described from a fossil specimen from San Diego.



Glycymeris profunda Dall
Off Redondo Beach, 25 fms., 8/1940.

Glycymeris septentrionalis (Middendorff), 1849. Both type locality and range of this species is a question. Mr. G. Willett in the paper cited above reproduces Middendorff's original figure. It is very clear. Bulletin 112 gives the range of this species as from the Aleutian Islands to Forrester Island, Alaska. Mr. Willett shows this to be an error and makes the statement " Specimens labelled septentrionalis in west coast collections are almost certainly misidentified."

Therefore, for the above reasons we are omitting the numerous collecting records of the members until they have had an opportunity to check their specimens with the latest information. Hertlein and Strong suggest that this species should be placed in the synonomy of G. multicostata.

Glycymeris subobsoleta Carpenter, 1864. Aleutian Islands to Lower Calif.

This is the commonest species of the genus along our coast. " It is the flattest and thinnest of our Glycymeris." It is probable that many specimens identified as one of the above species are subobsoleta.

Mr. G. Willett in his recent report cited above gives an interesting account of the apparent change in this species between one end of the range and the other. Mr. Willett states:" A large series of specimens in the Calif . Acad. of Sciences, taken in 22 fms. on Cordell Bank, about 20 miles off Point Reyes, Marin County, Calif., is quite typical of subobsoleta, though perhaps averaging very slightly rounder than Alaskan shells. Off southern California, however, a morphological change in the species begins to be noted. Many specimens are as high as long, with posterior margin slightly, or not at all produced,and with the apical angle about a right angle." Mr. Willett suggests that sooner or later this southern species may be found to rate a subspecific name.

This is the common Glycymeris taken off Redondo Beach from littoral to 25 fms. on sand bottom and frequently washed in to the beaches in large num--bers following blows. Also dredged off Pacific Grove, Calif. 8/1937, common in local Pleistocene deposits (Burch); Agate Pass, Kitsap Co., Wash., 1920, Friday Harbor, San Juan Islands, 1920 (W.J. Eyerdam).

Subgenus Tuceta Bolten, 1798. Type T. pectunculus-- Arca pectunculus Gmelin. Strongly ribbed with an arcuate hinge. For the strongly ribbed species . Glycymeris multicostata Sowerby, 1832. Dall in Bulletin 112 gives the range of this species as " (?) Monterey, Calif. to Gulf of Calif." and Guayquil". However, it is the opinion of most students that the California record of this species is probably due to a misidentification. Hertlein and Strong give the range " Punta Penasco, Sonora, Mexico to Guayquil,Ecuador." The type locality is Quayquil, Ecuador in 12 fms.

Subgenus Axinactis Morch, 1861. Hertlein and Strong use this subgenus for several southern species but it has not been recorded north of San Diego.

Family LIMOPSIDAE

" Shell small or medium sized, generally roundish and somewhat oblique, moder--ately solid, with a tufted periostracum. Umbones subcentral, slightly elevated, separated by a narrow rhomboidal ligamental area, in which the short ligament lies in a central, triangular pit. Sculpture consisting usually of more or less conspicupus radial striae. Hinge line curved, with a series of more or less oblique teeth. Posterior muscle scar larger than anterior one."(Dall, Bartsch, Rehder).

Limopsis

Genus Limopsis Sasso, 1827. Type: Arca aurita Brocchi (by monotypy).
Limopsis akutanica Dall, 1916. Off Akutan Island, Aleutians, 72 fms." Dall
Limopsis diegensis Dall, 1908. Santa Barbara Islands to Coronado Island" Dall
Limopsis skenea Dall, 1916. Bowers Bank, Bering Sea, 30 fms." Dall
Section Empleconia Dall, 1908.
Limopsis vaginatus Dall, 1891. Bering Sea and Aleutian Islands." Dall.

Family ARCIDAE

The following works should be examined for the more recent reports on this group:
Hertlein and Strong " Mollusks from the West Coast of Mexico and Central Amer--ica, Part II", Zoologica, Vol. XXVIII (Part 3), Dec. 6, 1943.
Reinhart, P.W. " Classification of the Pelecypod Family Arcidae", Bul. Mus. Roy. Hist. Nat. Belgique, Tome 11, No. 13, 1935, 68 pp, pls. 1-5.
Reinhart, P.W." Mesozoic and Cenozoic Arcidae from the Pacific Slope of North America", Geol. Soc. America, Spec. Pap. No. 47, June 16 ,1943, pp XI, 1-117, pls. 1-15, 3 figs.
Reinhart, P.W. " The Holotype of Barbatia (Acar) Gradata (Brod. ' Sby.), Trans. San Diego Soc. Nat. Hist. Vol. IX, No. 10, pp 39-46, 1939.
Strong, A.M. " An Overlooked Arca from Southern Calif.", Nautilus, v.46? p 27.
Bartsch, Paul Proc. U.S.N.M. , Art. 9, p 2.

Genus Arca Linnaeus, 1758. Type (by subsequent desig. , Schumacher, 1817), Arca antiquata Linnaeus.
" Shell subquadrate or trapezoidal, ventricose, ribbed, striated or cancellat--ed; hinge straight, with two series of similar comb-like (taxodont) teeth" Grant and Gale.

Subgenus Arcopsis Von Koenen, 1885. Subgenotype: Arca limopsis Von Koenen, 1885 (by subsequent designation of Reinhart, 1935). Reinhart gives Arcopsis full generic value.
Arca (Arcopsis) solida Broderip and Sowerby, 1833. Dr. Dall in Bulletin 112 placed this species under the subgenus Barbatia Gray, 1847, and gave the range as " San Diego to Panama". The San Diego record has been questioned because it has been said that this record was based upon one single dead valve taken from a kelp holdfast off San Diego. However, A. Myra Keen in " An Abridged Check List and Bibliography of West American Marine Mollusca", 1937, p 18, gives the northern limit of the range as 34 degrees N. latitude which would bring it up to Santa Monica Bay. Hertlein and Strong give the range " Asunc--ion Island, Lower Calif. and the Gulf of Calif. to Paita, Peru, and the Galapagos". The California record of this species is subject to some question and these records may all be due to a confusion with other species. One source of error in which this species was misidentified is described by A.M. Strong in the " Recent Marine Bivalve Molluscs of Los Angeles and Orange Counties, Calif." as follows: " A small Arca has been found in large numbers at Reef Point and Mussel Cove in Orange County, and at San Onofre on the northern line of San Diego Co. They were attached to the under side of rocks where the shells were buried in from 2 to 4 inches of clean sand and fine gr--avel. Small rocks were found which were covered with the shells. They were identified by Dr. Dall as a dwarfed form of A. solida occuring at the extreme end of the range. With the normal form there were found a small elongated form which has been identified as the young of A. reticulata Gmelin. but which Dr. Dall states are young males of A. solida. " We now know that the species referred to is Arca (Acar) pernoides Carpenter. However, these two should be easily distinguished because of the raised muscle scar in Acar, which does not occur in other subgenera. Reinhart suggests that this species has at times been confused with A. gradata and very tersely states the difference between these two as follows:

" A. solida, however, may be distinguished by its ligament, which occupies only a small triangular area under the beak, on each valve, leaving most of the cardinal area devoid of ligament. On B. gradata, on the other hand, the ligament occupies most of the cardinal area."

Subgenus Acar Gray, 1847. Type: Arca divaricata Sowerby, 1833 (by sub. desig. Stoliczka, 1871). The distinguishing feature of this subgenus is that the muscle scars are elevated. Dall,Bartsch, Rehder in " Marine Molluscs of Hawaii" and other current authors use Acar as a genus under the family Arcidae. Reinhart raises Barbatia (subgenus of Arca with most authors) to generic standing and places Acar as a subgenus of Barbatia. Hertlein and Strong and many other authors consider Acar a subgenus of the genus Arca and we are following them for the present.

Arca (Acar) reticulata Gmelin, 1792. Range: Atlantic- North Carolina to West Indies and Texas. While Dr. Dall in Bulletin 112 listed this species as occuring from San Diego to Ecuador, there seems to be little question but that all Pacific coast identifications of this species have been in error.

Arca (Acar) pernoides Carpenter, 1857. Arca bailyi Bartsch, 1931. Reinhart gives the range as " Topanga Beach (near Santa Monica) to San Geronimo Island, Gulf of California (.H.N. Lowe Coll.).

This species has been the subject of a great deal of dispute. The referenc--es given above all deal with this- Bartsch, Strong, Reinhart etc. We had thought the matter settled when A.M. Strong in 1932 (Nautilus) stated that A. pernoides is the same species as A. bailyi Bartsch, and Reinhart concurred in this opinion in his paper, 1939,(Trans. San Diego Soc.). However, Reinhart in his more recent work (Geol. Soc. Amer. #47) abandons the name pernoides and returns to bailyi. Reinhart's reasoning is quoted here: " Strong (1932,p 27-29) concluded that this species was identical with " Byssoarca" pernoides Carpenter described from San Diego and believed from its description to be an Acar. This conclusion, which was until recently concurred in by me (Reinhart,1939), had in its favor the fact that only one Recent species of Acar is known from the southern California coast. The older name, therefore, appeared the correct one to use. However, Dr. S.S. Berry has pointed out (personal communication, 1939) an obvious discrepancy in this conclusion. Carpenter's original description of B. pernoides (1857) gives its length as .68 " pollex", indicating a much larger species than the southern California Acar, which is always small, seldom exceed--ing 9 mm. in length. It is therefore probable that the name Byssoarca pernoides refers to some other species, and that Barbatia bailyi is the correct name for the southern California species."

Collecting data: Palos Verdes Estates 9/1936 under rocks at low tide, from Chama beds in Newport Bay, Calif. 10/1935, from under stones at low tide at San Onofre, Calif. rubble reef and very abundant. Could sweep them off with a broom 11/1930, same habitat from El Morro Pt. north of Ensenada, Mex. 10/1936 (Burch); Laguna Beach, and La Jolla, Calif. (Willett); " Recorded as B. gradata Sowerby from 12 fms. in sand off Monterey, by Berry, who now states that the record is extremely doubtful" (A. Smith); Mr. E.P. Chace reported taking the species at Monterey, Calif, , but again Mr. Chace is doubtful of his record.

Arca (Acar) pernoides Carpenter
San Onofre, Calif.

Subgenus Barbatia Gray, 1847. Type: (by orig. desig. Gray, 1847), Arca barbata Linnaeus. Mediterranean. " According to Gray, Barbatia is distinguished by the lengthening and the increasing obliquity of the teeth from the center to the ends of the hinge line, and by the hairy (bearded) epidermis. It is usually a comparatively small, not very thick shell with somewhat irregular fine radial striations and a narrow cardinal area. It is elongate-quadrangular in outline, with the corners well rounded, and usually has only a narrow byssal gape." Grant and Gale.

Arca (Barbatia) reeveana d' Orbigny, 1846. Arca helblingii Bruguiere"Reeve Range by Reinhart " Southern California(Keen, 1937, p. 18) to Peru and Galapag--os Islands (Grant and Gale, 1931, p. 143).

Collecting data: Note from A. Myra Keen " We have a fresh looking valve of Barbatia reeveana a student picked up at Santa Monica Beach. Has any one taken it alive in southern California ?" ; Note from A.M. Strong (Rec. Mar. Biv. Moll.) " One specimen found near the Arches below Balboa, the animal not living but the shell in fine condition. This is the only specimen known from this district, and was identified by Dr. Dall (Tremper)."

Subgenus Larkinia Reinhart, 1935. Type: Arca larkinii Nelson (by orig. desig.)

Again we have some difference of opinion about this group. Reinhart,the author of the name, establishes Anadara Gray, 1847 (subgenus of Arca with most authors)as having full generic value (in fact uses a subfamily Anadarinae) and described Larkinia as a subgenus of Anadara. However, Hertlein and Strong use both Anadara and Larkinia as subgenera of Arca and we will follow them for the present. They distinguish between the two in their fine key as follows: " Central teeth perpindicular to the hinge line .. Anadara; Central teeth diver--ging .. Larkinia."

Arca (Larkinia) multicostata Sowerby, 1833. " Newport Bay, Calif. to Panama, and the Galapagos Islands." Type locality: Gulf of Tehuantepec, Mexico in 12 fms.

Collecting data: Newport Bay, along sandy bank of the slough, 1934 (Burch); a half dozen specimens reported to have been taken in a dredge by a fisherman at a point a short distance below Laguna(Strong).

Genus Bathyarca Kobelt, 1891. Genotype: Arca pectunculoides Scacchi,1833 (by original designation) Type locality: Bay of Panama.

Bathyarca nucleator (Dall), 1908. " San Diego to Panama"

Habitat: Type specimen from 1270 fathoms.

Bathyarca pompholyx (Dall, 1908. " Santa Barbara, Calif. to the Galapagos Islands and mid Pacific in deep water." Type locality: Not designated.

Habitat: Found at depth of about 2000 fathoms (Reinhart).

Family PINNIDAE

Genus Atrina Gray, 1842. Type: (by sub. desig., Gray, 1847), Pinna nigra Chem. from the Indo-Pacific.

Many of our members have specimens of the Genus Pinna Linnaeus, 1758 from more southern waters. No Pinna has ever been reported north of San Diego. They may be easily distinguished because the genus Pinna has a median groove inter--iorly dividing the nacreous layer into two parts. The genus Atrina does not have this groove.

Atrina oldroydi Dall, 1901. Type locality: San Pedro, Calif. in 25 fathoms.

Range: San Pedro to Cedros Island and Magdalena Bay, Lower Calif. (Hertlein and Strong).

" The type specimen of this species, now in the collection of Stanford University, was brought up by a fisherman from a depth of 25 fath. off San Pedro. A second specimen in the collection of Mrs. W.H. Eshnaur was taken on a fish line in 50 fath. in Santa Barbara Channel by fishermen working out of Newport. Two other specimens in the collection of Dr. R.H. Tremper came from

the same source, and he also has a few specimens which were taken off the coast of Lower California. Still another specimen in the collection of Mr. C.E.White, was taken by fishermen off San Onofre. As far as is known by members of the Club these are the only specimens in existence of this very rare shell."(Strong).

The specimen mentioned in the collection of Mrs. W.H. Eshnaur is now in the Burch collection.

Atrina oldroydi Dall

Family PTERIIDAE

" Shell oblique, Aviculoid, alate, inequivalve, adult with one adductor scar; ligament alivincular; byssys present; young with hinge teeth, becoming obscure with age". " It is somewhat intermediate between the dimyarians and the monomy--arians, the young possessing two adductor muscles, the anterior becoming very small or absent in the adult." Grant and Gale.

Genus Pteria Scopoli, 1777. Type: Mytilus hirundo Linnaeus (by monotypy), from the Mediterranean. (Avicula Bruguiere,1792)

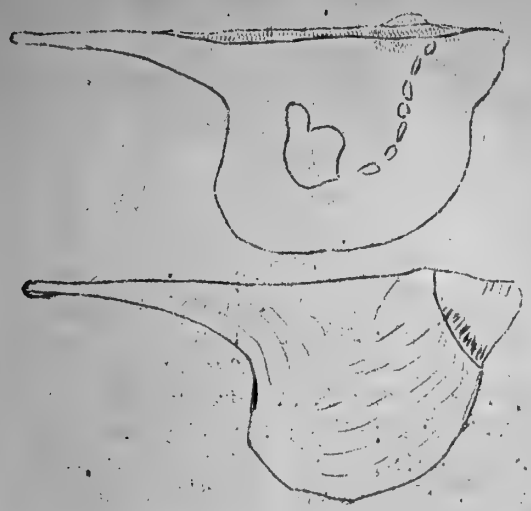
" Shell oblique, inequivalve, eared, byssal notch present under anterior ear of right valve; cardinal area linear, with obscure or obsolete teeth; dorsal margin long, straight; sculpture not prominent; shell fragile." Grant & Gale.

Pteria sterna Gould, 1851. " Hueneme Point, California to the Gulf of Calif., and south to Paita, Peru" (Hertlein and Strong). Type locality: Mazatlan, Mexico.

Many of us have this species labelled Pteria peruviana Reeve, 1857- Avicula peruviana Reeve, but Hertlein and Syrong and others have shown the species to be identical with P. sterna.

An interesting thing to consider about this species is brought out by Dr. Hanna in his paper " Exotic Mollusca in California" (Bull. Dept. Agric. 1939): " Dr. Fred Baker has advised (verbal communication) that the presence of this species in San Diego waters is due almost certainly to its having been carried there on the bottoms of ships and barges. Dall (Bull. 112,) gave the range as San Diego to Panama, but made no mention of the probability of its being exotic."

Collecting data: Fine 4 inch specimens taken from pilings under 101 highway bridge at Newport Bay 6/28/1937 (Mrs. P.M. Connelly) (Burch); Mr. Edgerton B. Sprague of Santa Ana took over 50 large specimens from a float that was brought ashore in Newport Bay in March, 1941; old marine ways, San Diego (F.W. Kelsey). Pteria viridozona Dall, 1916. Long Beach, Calif. (Lowe). " Specimens in the Golisch collection taken from the backs of deep sea crabs off San Pedro are believed to belong to this species.(Chace) (Strong). However, this is a very questionable species with no member of the club sure of what it is.



Pteria

Family PEDALIONIDAE
Genus Pedalion Solander, 1770. (Melina Retz. 1788, Perna Brug. 1799).
Type: Perna ephippium Linnaeus.
" Shell nearly equivalve, compressed, subquadrate; area wide, cartilage pits numerous, elongate, close-set; right valve with a byssal sinus; muscular impression double." (Tryon).
Pedalion chemnitzianum d' Orbigny, 1845. " Coronado Islands to Chile. Also Atlantic." Type locality: Cuba " (Hertlein and Strong).

A.M. Strong suggests the probability that the Coronado Islands record for this species may be Pedalion janus Carpenter, a more delicate species with a more northern range.

Pedalion

Philobrya

Family PHILOBRYIDAE

Genus Philobrya Carpenter, 1872. (Bryophila Carpenter, 1864). Type: (by mono--typy) Bryophila setosa Carpenter.

" Shell like that of a minute Pinna with pointed beaks; upper margin straight, with a strong internal ligament, anteriorly somewhat indented by the byssal sinus, ventrally and posteriorly rounded and gaping; posterior muscular scar subcentral, indistinct." (Tryon).

Philobrya setosa Carpenter, 1864. " Forrester Island, Alaska to Gulf of Calif." Type locality: Cape San Lucas, Lower California.

Collecting data: Dredged 7 fathoms off Santa Monica, Calif. 12/1935, 15 to 40 fathoms off Monterey, Calif. 8/1937, taken in abundance at low tide on the bay side of the San Pedro breakwater in holdfasts of corraline algae, 1937(Burch) San Pedro, Calif. (Lowe Coll.); San Clemente Island (Hemphill); Coronado Ids. (Stephens); Guadalupe Island (Huey); 5-25 fathoms, on sea mosses and calcareous algae, off Pacific Grove, Calif., Common (A. Smith); Forrester Id., Alaska, Cayucos,San Pedro and Santa Cruz Island, Calif. (G. Willett); " This moss-loving species is not at all uncommon at White's Point, Point Firmin, and Reef's Point, Calif. (Chace); " Found quite plentifully on the moss on the backs of abalones at Isthmus Cove, Catalina Island. (White) (Strong).

Family DIMYIDAE

Genus Dimya Rouault, 1848. Type: Dimya deshaysiana Rouault (by monotypy). " Shell small, irregularly orbicular, inequivalved, adhering by the right valve to substratum, left valve smaller than right valve, greatly compressed and flattened, external layers nacreous, internal ones porcellaneous, whitish; umbones only slightly prominent, submedial. Surface smooth or with very fine radial sculpture or partaking of the sculpture of the substratum. Hinge line short, straight; external ligament slender, linear; internal ligament in a small triangular pit. Interior white, with a double posterior and a single anterior adductor muscle scar; inner margin radiately wrinkled." Dall,Bartsch,Rch.

Dimya californiana Berry, 1936. (Proceedings of the Malacological Society, Vol. XXII, Part III, Nov. 1936). 100 fathoms off Santa Monica, Calif.

We know of no record of this species other than the type specimen which is presumably still in the possession of the author, Dr. S.S. Berry. No member of the club has seen it. It was obtained from a stone taken by fishermen by W.H. Golisch, summer 1918.

Dimya

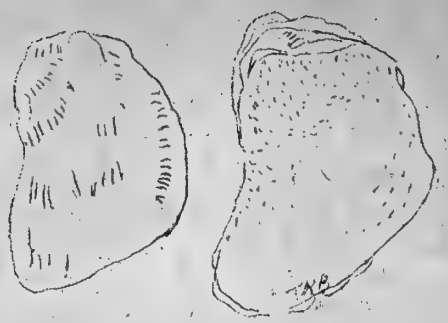
Family OSTREIDAE
" Shell distorted by sessile habit; only the posterior adductor muscle present in the adult; generally attached by the left valve, which may be more ventricose than the right". Grant and Gale.
Genus Ostrea Linnaeus, 1758. Type (by subsequent desig., Children, 1823)- Ostrea edulis Linnaeus, figured by Reeve.
" Shell irregular, with terminal beaks; sculptured by imbricating lamellae and plications, or rarely almost smooth; lower valve generally deeper than the upper valve, which may be flat or externally concave; ligament in a mesial groove." (Grant and Gale).

Ostrea palmula Carpenter, 1857. Range given by Dr. Dall in Bulletin 112 is from " Puget Sound to Gulf of California". However, it is now thought that this species is confined to West Mexico and the Gulf of California. Most of us have been following the opinion stated in Grant and Gale as follows: " O. palmula has palm like foliations on the outer margin, and a row of denticles which fit into the margin of the opposite valve." True Ostrea palmula Carpenter from the Gulf of California according to Mr. A.M. Strong is characterized by a brown stain or mottling of the inner surface. This is not true of the specimens we have been labelling with this name from the California coast. Some local collectors have been disposed to confuse Ostrea mexicana Sowerby with this species but Strong advises that mexicana from the Gulf is always dark inside and out, almost black. Dr. L.G. Hertlein of the California Academy of Sciences is of the opinion that the specimens we have been identidying as O. palmula are in fact: Ostrea lurida laticaudata Carpenter. Carpenter states that this " Passes toward palmula". Inasmuch as no specimens have been seen that will fit the description of typical palmula it is our opinion to follow Dr. Hertlein and state that all such specimens taken north of San Diego, Calif. are in reality the above species.
Ostrea lurida Carpenter, 1864. " Sitka, Alaska to Cape San Lucas, Lower Calif ." (Dall).

This common species found the length of the coast where exposed at low tide It is almost smooth except for the irregularities of growth. It occasionally has indications of brown bands running toward purple.
Ostrea lurida rufoides Carpenter, is thought to be but a color form of lurida.
Ostrea lurida expansa Carpenter, 1864. " Monterey to San Diego, Calif." Dall.

The general opinion has been that this is a situs form only. It is usually found singly and not in clusters and the flat form easily explained. However, Dr. L.G. Hertlein according to Mr. A.M. Strong suggests that this is a flat form grading into conchaphila.
Ostrea conchaphila Carpenter. Redondo Beach, Calif. to Panama. This is a flat species with strong brown stripping. It is a deeper water shell and does not cluster, usually being found growing on dead shells and pebbles. It is probable that the specimens from the backs of crabs taken off Redondo Beach a re this species. It has been dredged on stones from the gravel beds off Redondo Beach in as much as 20 fathoms. However, Hertlein says that the northern range records of conchaphila and expansa are hardly separable, for, by definition expansa " passes into Ostrea conchaphila Carpenter."

Ostrea veatchii Gabb, 1866. Grant and Gale place this species in the synonomy of Ostrea vespertina Conrad, 1854. It is found recent in Mexican waters but is known only as a fossil in California. It is listed here only because Dall had it in Bulletin 112.



Ostrea lurida Carpenter
San Onofre, Calif.

X1

Introduced species of Ostrea

Ostrea chilensis Phil. " This is the large edible form of the Gulf, often reaching a length of ten inches or more." (Pilsbry and Lowe). A.M. Strong reported that this species has been introduced into Newport, Mugu, and Morro Bays but as far as known did not take.

Ostrea virginica Gmelin, 1792. Imported from the Atlantic coast. This species has been planted extensively in California waters according to Dr. Hanna from as far back as 1870. However, propagation in California waters has never been successful probably due to temperature conditions.

Ostrea laperousii Schrenck. Introduced from Japan. Many of us have been classifying the round form as laperousii and the long slender form as Ostrea gigas Thunberg, 1793. Several other names have been placed in the synonomy of this species by authors. The latest data indicates that these Japanese oysters are but one species, laperousii. Dr. G. Dallas Hanna, California Academy of Sciences, " Exotic Mollusca in California", Bull. Dept. Arric. 1939 says:" The Japanese oyster has been widely introduced along the west coast of the United States and forms a thriving industry in many of the bays of California at the date of writing. The species has been cultivated in Japan for at least three centuries and the spat is brought here for planting. Growth is rapid and the quality is said to compare favorably with the best oysters elsewhere.

The name laperousii is sometimes restricted to the fluted, rather round form and gigas Thunberg, 1793, is applied to the long strap-like form. Both forms have been introduced, but the first is the most important one in commerce. Intergrading specimens between the two are abundant. Apparently the shape is largely dependent upon the place each individual happens to grow. Since Thunberg's name is preoccupied by " gigas" Meuschen, 1781, it appears that the Japanese oyster should be indicated as " laperousii" according to Dr. L.G. Hertlein of the California Academy of Sciences".

References on this species follow:

Keep, Josiah " West Coast Shells", 1911, p. 57; 1935 Ed. by J.L. Baily, p. 51.
McMillan, H.C. & Bonnot, Paul " Oyster Culture in Calif.", Calif. Fish & Game, vol. 18, no. 3, July 1931, pp. 246-251, 5 text figs.
Galtsoff, P.S. " Introduction of Japanese oysters into the United States", U.S. Dept. Commerce, Bur. Fisheries, Fishery Circular, no. 12, Aug. 1932, 16 pp.
Bonnot, Paul, " The Calif. Oyster Industry". Calif. Fish & Game, vol. 21, No. 1.
MacGinitie, G.E., " Amer. Midland Naturalist" vol. 16, no. 5, Sept. 1935, p.721 (Introduced in Elkhorn Slough; name used, " O. giganteus".

Family PECTINIDAE

Genus Pecten Muller,1776. Type : Ostrea maxima Linnaeus.

Subgenus Pecten s.s.

"Shell usually rather large,orbicular,moderately heavy, left valve rather flat or somewhat concave, right valve convex; the dorso-lateral wings or aur--icles subequal, the byssal sinus on the right anterior one shallow. The scul--pture consists of rather heavy radial ribs, and finer riblets, which are cros--sed by exceedingly fine incremental lines, especially conspicuous on the left valve" Dall, Bartsch, Rehder.

It should be mentioned that somewhat different descriptive terms are used in discussions of this group, the monomyarians such as the Pectens and Oysters . The animal is at right angles to that occupied by dimyarian pelecypods. The foot emerges to one side. As a result the following terms apply. The ears become ventral and dorsal instead of anterior and posterior. The hinge line is anterior. The free ends of the valves are posterior. The byssus is always ven--tral. The right valve is the valve with the byssus on the right (and bears the byssal notch), the left is the valve with the byssus on the left.

The taxonomy of this group has been the subject of a great deal of dispute . Grant and Gale (Mem. San Diego Soc. Nat. Hist.,1931) maintain that the genotype should be Pecten adscensionis Osbeck,1765 and give a voluminous and interesting statement of their case for Pecten Osbeck,1765. Osbeck stated that his species was attached to a piece of coral. Grant and Gale drew the conclusion from this that his species must be a form similar to our Hinnites giganteus Gray, and therefore placed Hinnites in the synonomy of Pecten s.s. On the other hand Ostrea maxima is one of the group with a flat valve, a much different type of shell. The Pecten of Osbeck has been rejected by Dr. L.G. Hertlein (Calif. Acad. of Sciences, Vol. XXI) who gives the following references to authors who have discussed it and also rejected it:

Dall, W.H., Bull. Mus. Comp. Zool., vol. 43, no.6, 1908, p.400.
Iredale, T., Trans. New Zealand Inst., vol. 49, pt. 3, 1915, p. 194.
Winckworth, R., Jour. Conch. vol. 20, no. 2, 1934, p.51.

Dr. Joshua L. Baily Jr. (personal communication, April, 1944) states the opposition to the Grant and Gale theory as follows:" The difficulty with this action is that Osbeck's description is too painfully brief. Our Pecten latiaur--atus spins a byssus by which it attached itself to kelp. It may be that Osbeck's Pecten was merely fastened to the coral by a byssus, and may have been some form similar to our P. latiauratus. Also it is said that P. irradians of the Atlantic coast spins a byssus when young- though I have never seen such a spec--imen. Finally Hertlein has suggested that Osbeck's specimen may have been a dead shell to which the coral had fastened itself, in which case it might have been anything. I believe that Osbeck's publication of the name would have been sufficient to establish a type if it could be identified. If it is ever found it will then be necessary to revise the nomenclature of this family accordingly. Until then Osbeck's name is a nomen nudum."

Dr. Baily mentions a further curious theory in regard to this disputed genotype:" In Dr. Fred Baker's card catalogue Pecten islandicus is indicated as type. This, if correct, would make Pecten and Chlamys identical, and the flat valved forms would have to be called Janira. But there is no evidence as to where Dr. Baker picked up this type designation. Certainly I have never come across it anywhere.

Also, Tryon, in his Structural and Systematic Conchology divided Pecten into many subgenera- to all of which he gave subgeneric names except one. This one is the group commonly called Aequipecten, and I think there can be no reas--onable doubt that he considered it the true Pecten s.s. But again the evidence on which he based this conclusion is not known, so that we have no choice but to accept the group known as Janira with the flat valve to be the true Pecten. It is true that Janira has a different type, but this is so much like Pecten

maximus that Janira cannot be given even subgeneric rank. The group called Pecten s.s. by Grant and Gale must retain the old name Hinnites."

Pecten (Pecten) diegensis Dall,1898. " Monterey to San Diego and the Cortez Bank" (Dall), to San Benito Islands (Hertlein).

Note: The southern species Pecten (Pecten) sericeus Hinds, 1844 is closely related. Dr. L.G. Hertlein states " It is probable that P. sericeus, a southern species, intergrades with the northern P. diegensis."

Collecting data: Dredged in abundance in 25 fath. off Redondo Beach, Calif. on gravel bottom, juvenile specimens living ($\frac{1}{2}$" to 2" diam.) but with them many dead valves ofapparently fresh adult specimens (3" to 4" diam.) and adult living specimens very rare. We suggest the possibility that the large adult specimens of this active mollusk may be capable of sufficient movement to actua--lly escape from the trawl or dredge.?? The experience in dredging off Monterey was somewhat similar with dredgings from 25 to 40 fathoms on the shale bottom off Del Monte resulting in many juvenile specimens and a very few fine living adults 8/1940; good specimens dredged off Avalon, Catalina Island, Calif. in 35 fathoms 8/1937; one fine living specimen washed into Newport Bay in 1939; common in the Pleistocene deposits at Hilltop Quarry and Timm's Pt., San Pedro and also in the Del Rey Baldwin Hills deposit.(Burch).

Pecten s.s.

Subgenus Chlamys Bolten,1798. Type: Ostrea islandica Linnaeus (by sub. desig. Hermannsen 1846).

" Shell equivalved, of medium size, suborbicular or oval, moderately heavy, only moderately inflated, dorso-lateral wings subequal, with the anterior ones usu--ally larger, byssal sinus under the right anterior conspicuous, often with a pectinate lower border. The sculpture consists of rather strong radial ribs with finer riblets, often beset with scales." Dall, Bartsch, Rehder.

Dr. A. Myra Keen " An Abridged Check List, 1937", Dall,Bartschand Rehder " Marine Mollusks of Hawaii",1938, and other recent authors have raised Chlamys to full generic standing.

Pecten (Chlamys) hericius hericius Gould, 1850. " Port Althorp, Alaska to San Diego" Dall.

Grant and Gale, 1931, place this species in the synonomy of Pecten hastatus Sowerby, 1843. However, we are disposed to think that they are distinct species and quote Dr. L.G. Hertlein's statement of the differences (Templeton Crocker Exp. Calif. Acad. Sciences, 1935), when writing of P. hastatus: " The right valve is characterized by about nine pairs of strongly individualized ribs which are ornamented by prominent spines. There are nine narrow, prominent spiny ribs on the left valve. The right valve of the northern species, hericius, is ornamented by fascicules of three spiny riblets which are nearly equal, although the central

riblet is slightly more prominent and spiny; while in P. hastatus there is a central spiny rib, with from two to four small scaly riblets between the major rib and the central riblet of the interspace."

Collecting data: Off Monterey, Calif. in 10-20 fathoms in sand. Fine living specimens were taken yearsago by trawl fishermen but recent dredging has failed to locate the bed and has produced only a few dead valves (A. Smith); Tacoma, Wash. 15 fathoms (W.J. Eyerdam); off Keton Island, Puget Sound, Wash. (Murbarger); Craig, Alaska (George Willett); Vashton Island, Puget Sound (E. Fuller); specimens from Straits of Juan de Fucca with yellow on the umbones (Mrs. T.A. Burch); common in the Pleistocene of Hilltop Quarry, and Timm's Point deposits at San Pedro, Calif. (Burch).

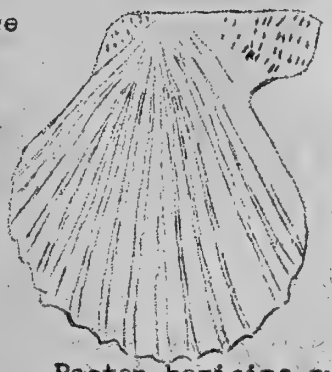
Pecten (Chlamys) hericius pugetensis I.S. Oldroyd,1920. " Craig,Prince of Wales Island,Alaska to Newport Bay, Calif." (Gregg.)

Dr. W.O. Gregg makes an excellent case for his contention that pugetensis is not a subspecies but a distinct species. In this connection read his article " Pecten pugetensis at Newport Bay, Calif." (Nautilus, vol. 51, p 118, April,1938). In addition to the article cited above, Dr. Gregg has written the following (personal communication, April,1944):

" The most southern record of Pecten pugetensis Oldroyd is Newport Bay, collected on rocks at very low tide on east side of entrance to bay, March, 1926. One specimen measuring 29.3 by 25.0; hinge line ,16.3 mm. For reasons given (Naut. 51:118) I do not consider it a subspecies of islan--dicus. Examine a specimen of pugeten--sis with a hand lens. Did you ever see any sculpturing like it on hastatus or hericius ? If so, then pugetensis is only deserving of subspecific rank. I have never seen anything suggestive of this microscopic sculpturing on either hastatus or hericius. If we wish to disregard this micro--scopic sculpturing (I do not see why we should as authorities have set up subgeneric and even generic distinctions on characters less dis--tinct than this) it would seem that hastatus is the form which pugetensis most closely resembles. If we insist on lumping as Grant and Gale do we will have to make them subspecies of hastatus instead of hericius as the former has priority by about seven years.

(con. next page)

Chlamys



Sculpture between ribs x ?

right valve x 3

Pecten hericius pugetensis Oldroyd (young specimen -off Redondo 25 fath.

In my opinion the microscopic sculpturing excludes pugetensis from being grouped subspecifically with hastatus and hericius unless there is at least a suggestion of this sculpturing in the two latter or intergrades of pugeten--sis are found in which this characteristic sculpturing is partially absent. In all the specimens I have examined I have failed to note any such evidence of intergradation."

Collecting data: Puget Sound, S.E. Alaska (many localities,)(G. Willett); Hinchbrook Island, Pr. Wm. Snd., Alaska (Norberg, July 1936); dredged off Monterey, Calif. in 40 fathoms on shale bottom, 8/1937-40, also dredged frequen--tly off Redondo Beach, Calif. in 25 to 50 fathoms, spring and summer, 8/1939-41 not uncommon in the Pleistocene of Timm's Point, San Pedro, Calif. (Burch).

Pecten (Chlamys) hericius albidus Dall, 1906. " Aleutian Islands" (Dall). Type locality: Unalaska.

Pecten (Chlamys) hastatus Sowerby,1843. " Monterey to San Pedro,Calif." (Dall), and south to off Newport Bay (Burch); to " San Diego" (Grant and Gale).

Collecting data: Off Monterey, Calif. in 10-40 fathoms, in sand and on shale and corralines; fairly common (A. Smith); fine specimens of bright orange color off Monterey in 20 fathoms shale bottom 8/1940, not uncommon off Redondo Beach in 25 to 50 fathoms, off Avalon, Catalina Island, 1937, in 25 fathoms (Burch).

Pecten (Chlamys) hindsii hindsii Carpenter, 1864. " Bering Sea to San Diego" (Dall). Note: Grant and Gale, 1931, placed the subspecies navarchus in the synonymy of the typical. Mr. George Willett os the Los Angeles Museum agrees, and the consensus of opinion is so strong that we are listing Pecten (Chlamys) hindsii navarchus Dall, 1898 as identical with P. hindsii hindsii.

The source of the San Pedro and San Diego records for this far northern species is not known to any member of the club and are open to question.

Note: The sculpture between the ribs on P. hindsii, islandicus etc. seems to be so variable as to indicate that this method of differentiation is of little significance. This is the opinion of Mr. George Willett of the Los Ang--eles Museum who collected these species extensively in Alaska, and has been our experience in studying the small series in our collection.

Collecting data: Prince William Sound (Lewis); S.E. Alaska in many local--ities (G. Willett); Straits of Juan de Fucca in 50 fathoms (Eyerdam); spec--imens of yellow color from Straits of Juan de Fucca.

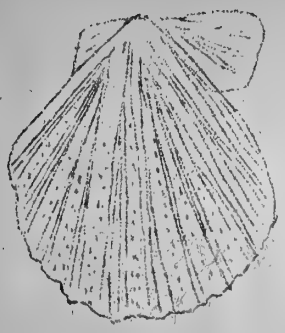
Pecten (Chlamys) hindsii jordani Arnold, 1903. (Mem. Calif. Acad. Sci. vol. 3, p. 111, pl. 12, figs 6,7, 1903). Type locality: " Pliocene of Deadman Island, San Pedro, Calif.". Recorded living " at various places with hindsii" (Grant and Gale). Collected living " Forrester Island, and Howkan, Alaska and in Puget Sound by George Willett of the Los Angeles Museum.

Grant and Gale, 1931, say of this species " This variety is intermediate between hindsii and kincaidi, and it is doubtful whether any of the distinct--ions are of significance. It has fewer, simpler ribs than the typical islandic--us (Grant and Gale consider the entire group subspecies of P. islandicus), and is small; it has fewer broader ribs, and is less elongate parallel to the hinge than hindsii; the ribs of kincaidi are narrower and do not bifurcate."

W.J. Eyerdam reports having taken the species at lat. 58, Alaska.

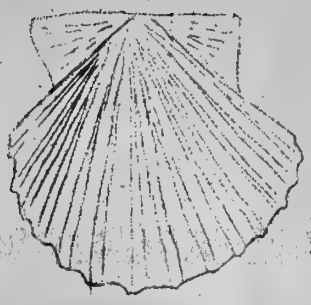
Pecten (Chlamys) hindsii kincaidi Oldroyd,1920. Type locality: Puget Sound. Dr. A. Myra Keen reports that MacKenzie Gordon has this variety from Portage Bay, Alaska (lat. 58).

Mr. George Willett places kincaidi in the synonymy of jordani, which is probably correct. Grant and Gale, 1931, say " This variety is distinguished by its small size and its few distant ribs."



right valve
x 1

Pecten islandicus Muller
Alaska- Willett Coll.

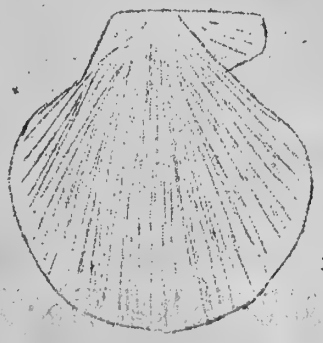


left valve
x 2

Pecten tumbezensis d' Orb.
Champemco, Guatemala 14f Strong Coll.

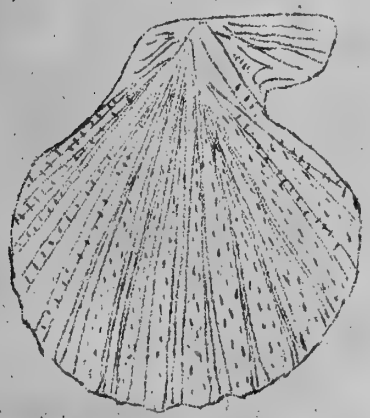
right valve
x 1

Pecten islandicus Muller
Glouceester, Mass. 30 f



right valve
x 1

Pecten hindsii Carpenter
Puget Sound



right valve
x 1

Pecten hastatus Sowerby
Monterey, Calif. 20 f shale

Pecten (Chlamys) islandicus Muller, 1776. " Arctic Ocean to Kamchatka and Puget Sound on the west, to Chesapeake Bay on the east" (Dall); Scandinavia and north Scotland (Wood) (Grant and Gale).

The consensus of opinion seems to be that islandicus is not of the Pacific coast fauna. Note by Mr. George Willett of the Los Angeles Museum " Probably not Pacific coast", and Dr. A. Myra Keen writes " Hertlein informs me he has never seen islandicus south of the Bering Sea".

Note: Grant and Gale, 1931, were disposed to make west coast species into varieties of east coast species. The consensus of opinion seems to reject this theory as artificial.

Pecten (Chlamys) beringianus Middendorff, 1849. " Bering Sea" (Dall); Umnak Id. and Aleutians (G. Willett).

This species is figured by Grant and Gale, 1931, who say of it " This spec--ies is easily distinguished by the few broad swollen ribs on the early part. Most of the specimens figured are immature or stunted. It may be, as Middendorff thought, a variety of islandicus, for it is very like the form jordani. In some respects it is closer to hastatus, but it lacks the spines and is covered with a peculiar cross-hatching".

Mr. George Willett suggests that Pacific coast records of islandicus are probably this species.

Pecten (Chlamys) lowei Hertlein, 1935. " Gulf of California; Galapagos Islands, ? Catalina Island, Calif." (Hertlein). (The Recent Pectinidae, Proc. Calif. Acad. of Sci., 1935) " One left valve is present from Loc. 25610) C.A.S.), said to have been dredged on the north side of Catalina Island, in 30 to 80 fathoms. There seems no reason to doubt this locality, although the range is longer than that of most west American Pectens".

Subgenus Patinopecten Dall, 1898. Type (by original desig.) Pecten caurinus Gould.

" Shell large, thin, sometimes of a somewhat pearly texture, having a circular outline and very low convexity, valves usually nearly equal, although at times one or the other may become nearly flat; radial sculpture consisting of distinct ribs without minor striation, sometimes with microscopic cross-hatching, ribs of the right valve comparatively broad and squarish, sometimes with a medial sulcus, those of the left valve narrow, often sharp, with intercalaries if the ribs of the right valve are sulcated; hinge line usually short, ears of almost equal length, byssal notch deep in the older species, more shallow in Recent species" Grant and Gale.

Pecten (Patinopecten) caurinus Gould, 1850. Range as given in note from Dr. A. Myra Keen : " The range is Wrangell, Alaska (lat. 57 not Wrangel I. (lat. 71) south to Humboldt Bay, California. The latter record was reported by Dr. H. McGinitie who dredged it there." Type locality: Puget Sound.

Dr. L.G. Hertlein, Calif. Acad. of Sciences, has published two articles in the Nautilus dealing with the range of this species- Nautilus, vol. 51, No. 4, 1938, p. 144 and vol. 54, No. 2, p. 68, 1940 in which Hertlein gives the range as " Channel Island, Orca Inlet, Cordova, Alaska to off Point Reyes, Calif."

Note: Many of us have specimens of Pecten yessoensis Jay from Japan. These shells have been imported extensively and sold for use as cooking dishes etc. Good specimens could be purchased for a few cents at the Fish Pier in San Francisco. Carpenter considered yessoensis a variety of caurinus,and they are so close that any amateur collector is in trouble if his labels are mixed.

Grant and Gale do not state the origin of the Williamson San Pedro record for this northern species. It sounds too illogical to consider unless it is based on a fossil. This species is not uncommon in the Pleistocene deposits of San Pedro, and even today it is possible to find winrows of shells washed in on the San Pedro beaches with fossil and recent shells mixed to cause confusion.

W.J. Eyerdam published a note in the Nautilus , vol. 47, No. 1, p. 36, 1933 on the record size of this species. Eyerdam's specimen was dredged outside of Wrangel Narrows, Alaska, in 1918 and measured 9 inches in length by 7½ inches in width. The largest specimen in the National Museum in 1927 measured 6½ inches.

Grant and Gale, 1931 give an excellent discussion of the possibility of the older name, Pecten (Patinopecten) propatulus Conrad, 1849 ultimately being satisfactorily identified as identical which would threaten the well known name caurinus.

Colledting data: Petersburg,Wrangell, and Craig, Alaska (G. Willett); not uncommon in the Pleistocene of Timm's Pt., San Pedro,Calif. (Burch); Humboldt Bay and Puget Sound (Sorensen).

Subgenus Leptopecten Verrill, 1897. Type (by original designation): Pecten monotimeris Conrad.

" Shell thin, small, of low convexity, approximately equivalved (except for the ears); sculptured typically with only a few low, broad folds, but on the older species and on the typical variety of P. latiauratus Conrad, where the relation to typical Aequipecten is more clearly shown, the folds revealing their true nature as more definite and more numerous ribs; hinge line long, some times as long or even longer than the shell, byssal notch deep, with prominent (but delicate) pectinidial teeth" (Grant and Gale).

Note from Dr. A. Myra Keen: " If you take Pecten as the sole genus of the coast, as Hertlein does, then Leptopecten would be a subgenus. If you start subdividing, as seems to be our tendency here at Stanford, then Leptopecten would either be a subgenus of Aequipecten or a genus in its own right. Take your choice."

Grant and Gale used it as a section of Aequipecten used as a subgenus of Pecten. Dr. Joshua L. Baily Jr. in " West Coast Shells" uses Aequipecten as subgenus of Pecten for the species involved. Hertlein uses Leptopecten as sub--genus of Pecten and we will follow this practice until more evidence is submit--ted.

Pecten (Leptopecten) latiauratus latiauratus Conrad, 1837. " Monterey,Calif. to Gulf of California (I.S. Oldroyd); San Francisco Bay, Calif. ? (Packard)" (Hertlein). Type locality: San Diego, Calif.

" An inspection of Conrad's original figures of latiauratus and monotimeris indicates that latiauratus has more squarely shaped ribs, a longer hinge line, and a cutely pointed ears. The longer hinge line and prominently lamellated inter--spaces distinguish the subspecies latiauratus delosi (Plate 19, fig. 10) from Conrad's species" (Hertlein).

However, Grant and Gale, 1931, place the variety, Pecten (Leptopecten) latiauratus delosi Arnold, 1906 in the synonymy of the typical. Mr. George Willett of the Los Angeles Museum agrees with Grant and Gale in placing delosi and also places the variety Pecten (Leptopecten) latiauratus fusicolus Dall, 1898, in the synonymy of the variety monotimeris. The consensus of opinion at present seems to favor the last conclusion.

Pecten (Leptopecten) latiauratus monotimeris Conrad, 1837. " Monterey, Calif. to Gulf of California" (Dall). Type locality: San Diego, Calif.

In the discussion of monotimeris Grant and Gale, 1931, say: " This variety lives in great abundance attached by its byssus to kelp. Its situs accounts en--tirely for its special characters. Mrs. I.S. Oldroyd has informed the writers that the normal variety although not so common, is found attached to worm tubes at low tide level near San Pedro. The forms described by Dall as fusicolus and by Arnold as cerritensis are but variations of this variety, having a smaller number of ribs. They are almost surely without significance. Intergradations of monotimeris with the typical variety are not at all rare"

Specimens dredged in vast numbers off Redondo Beach attached to gravel in from 15 to 25 fathoms seem to be typical latiauratus in every character; the varieties monotimeris etc. may be found in abundance attached to kelp floating close off shore. Therefore it seems logical to assume that all subspecies of latiauratus are but forms adjusted to a different habitat. (Burch).

Collecting data: To attempt to give a list of localities for this common species would be a waste of paper. It may be taken in great numbers in the following habitats: off shore kelp, eel grass, pilings, stones at minus tides, attached to the bottoms of boats, bait barges, floats etc. And as stated above the habitat of the typical form seems to be in deeper water and usually attach--ed to stones and gravel.

Pecten (Leptopecten) paucicostatus Carpenter, 1864. " Catalina Island,Calif. to Gulf of California" (Dall). " Santa Barbara, Calif. to Gulf of Calif."(Strong " In Carpenter's description the species is listed from Santa Barbara (Jewett) and Santa Barbara Islands (Cooper). It has also been listed from Catalina. No recent collecting from local waters known to members of the club" (Strong).

Grant and Gale, 1931, place this species under the subgenus Aequipecten and place it in the synonymy of Pecten tumbezensis d' Orbigny, 1847. Hertlein places in the subgenus Leptopecten , and also places in the synonymy of tumbezen--ensis.

Pecten (Leptopecten) tumbezensis d' Orbigny, 1847. " Gulf of California to Peru Santa Barbara, Calif. ?" The California record of this species is doubtful. " Arnold states of this species, " A pair of valves in the U.S. National Museum from U.S. Fish Commission Sta. No. 2840, Santa Barbara Islands, is labelled P. tumbezensis d' Orb. This shell is probably an albino variety of P. latiauratus having just a touch of color on the interior of the posterior ear of the left valve. The true P. tumbezensis is from the Peruvian part of the South American coast." The Santa Barbara Channel listing for this species seems to be based entirely on this specimen" (Strong).

This species is distinguished from P. latiauratus : "... has fewer ribs and the tops are more broadly rounded.; by its heavier shell and stronger ribs." Grant and Gale. " The left valve usually shows a sprinkling of light bluish dots on a slate colored or brownish background" (Hertlein).

Subgenus Plagioctenium Dall, 1898. Type (by orig. desig.): Pecten ventricosus Sowerby.

" Shell like that of Aequipecten s.s. but usually with stronger, squarer ribs, on which the radial striations are faint or obsolete; valves often more convex; hinge line long, ears nearly equal" (Grant and Gale, 1931).

Subgenus Aequipecten Fischer, 1886. Type (by monotypy): Ostrea opercularis L.

" Shell of moderate size and thickness, of circular outline; ribs uniform, dis--tinct, not bifurcating, sometimes with finely imbricated radial striations; ears usually equal, the byssal notch of moderate depth, ctenolium usually present but small" (Grant and Gale, 1931).

Note from Dr. A. Myra Keen: " As Grant and Gale point out, Aequipecten is prior to Plagioctenium , and as far as I can see is doubtfully separable from it. I have abandoned use of the latter in our collections, and I now think I was wrong in subsuming the species under Chlamys in the Abridges List."

However, Dall in Bulletin 112 used Plagioctenium and this practice has been followed by Hertlein, Willett and others. Therefore, we will continue at present.

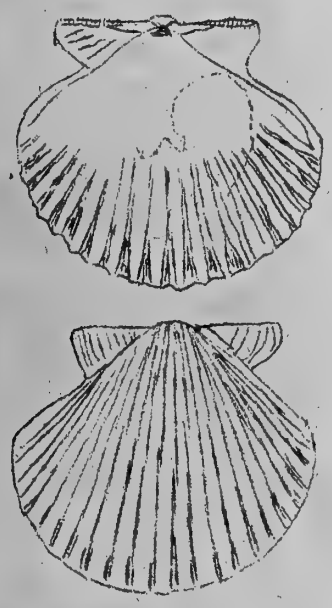
Pecten (Plagioctenium) circularis Sowerby, 1835. " Monterey, Calif. to Payta, Peru" (Dall). Grant and Gale consider this species a variety of gibbus as " Pecten (Aequipecten) gibbus Linnaeus variety circularis Sowerby.

" Although the typical Gulf of California form is listed from the coast no mem--ber of the club has specimens that can be classed as coming under it" (Strong).

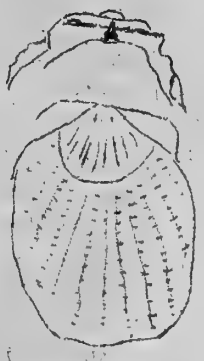
Pecten (Plagioctenium) circularis aequisulcatus Carpenter, 1865. " Santa Barba--ara, Calif. to cape San Lucas, Lower Calif. " (Dall). Type locality: Santa Barbara,

This is the common species of the California coast. The only distinction from typical circularis seems to be that aequisulcatus attains a larger size when adult, is less convex, the shell is thinner with narrower ribs and more subdued coloration. It seems to be difficult if not impossible to separate the young of typical from the young of the variety. Specimens taken from as far north as Todos Santos Bay produce adult specimens that if not typical circularis at least show intergrades toward the typical. A logical inference would seem to be that aequisulcatus is but a cooler water form of circularis. (Burch).

The bathymetric range of this species is somewhat interesting. It has been taken in abundance at the far upper end of many of the sloughs such as Newport Bay, Anaheim Bay, Mugu etc. and on the other side it has been brought up in dredge hauls from as deep as 25 fathoms and is very common in shallow depths off shore. (Burch). Allyn Smith writes that the species is not found in Monterey Bay.



Plagioctenium



Hinnites

Genus Hinnites Defrance, 1821. Type: Hinnites cortezi Defrance.
" Shell oval, irregular, inequivalve, subequilateral, close, adhering by the right valve; eared irregularly; hinge without teeth; ligament thick, in a deep, narrow pit. Differs from Pecten in its irregular growth, and in being adherent. " (Tryon S.S. Conch.)
Hinnites giganteus Gray, 1825. " Aleutian Islands to Magdalena Bay, Lower Calif. (Dall).

Hoyt Rodney Gale (Trans. San Diego Soc. Nat. Hist., vol. V, No. 9, pp 91--94, 1928) made an excellent case against the genus Hinnites. This was later elaborated by Grant and Gale, (Mem. San Diego Soc. Nat. Hist., vol.1, 1931). Gale rejected Hinnites as a genus and described Pecten multirugosus Gale, 1928 as a new name for the above species. Inasmuch as this is still a much mooted question with the burden of proof upon those making the changes, we shall follow the old name until all of the evidence is in. It would seem that if we retain Hinnites, there would be no question about also retaining the specific name giganteus . However, Dr. A. Myra Keen writes: " The name combination Lima gigan--tea was preoccupied by a L. gigantea (Sowerby),1814. Therefore, Gale's new

name multirugosus is valid whether or not one accepts the genus Hinnites. After looking over the original figure of the genotype and studying material in our collection I continue to be inclined to accept Hinnites as valid." Dr. Joshua L. Baily Jr. states the case as follows:" In 1812 Sowerby described Plagiostoma gigantea, and in 1825 Gray described Lima gigantea , the latter being our Hin--nites giganteus. These names did not at first conflict, being in separate genera. In 1826 Gray took the species out of Lima and put it into Hinnita - a genus which is the same as Hinnites, according to Grant and Gale. Then someone decided that Plagiostoma and Lima were the same, and that therefore Sowerby's species preempted the name, being older. But Opinion #83 does not exactly cover the case. Grant and Gale do not tell when Plagiostoma was made equal to Lima. If this were done previous to 1826, there would have been two Lima gigantea , but when the two species did not simultaneously have the same name it is uncert--ain how the ruling should be interpreted. We must know when Plagiostoma was first synonymized with Lima. Second, we must know why it was synonymyzed - wheth--er it has the same type, or merely whether it is defined the same way. And third we must know whether the r eferring of Gray's species to the wrong genus has any bearing on the case. This is a matter which the International Commission now has under consideration. The rule is commonly interpreted to apply to cases in which a species is removed from a genus because the genus has been divided, and not to a species erroneously referred to a genus that it never belonged to."

Therefore, we propose to retain the old name until the International Comm--ission settles the matter.

W.J. Eyerdam published a note in the Nautilus, vol. 47, No. 1, p. 36, 1933 on the record size of this species. Eyerdam's specimen came from off the San Juan Islands, in 1918, and a lower valve measured 8 3/4 inches in length by 6½ inches in width.

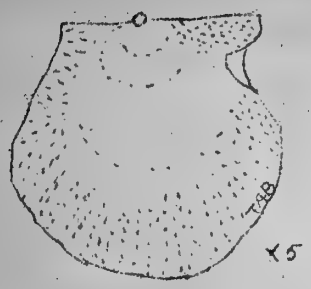
The bathymetric range of this species is of some interest. It is very comm--on off Redondo Beach on gravel bottom down to at least 25 fathoms, ranging in to the pier pilings. An occasional specimen is dredged that seems to have become fully adult without having succeeded in attaching itself to anything. The result is a smoother somewhat convex lower valve. It is a common species the length of the coast being found at low tides with the adult specimens solidly cemented to rocks, pilings, breakwaters etc. and usually distorted to fit the surroundings. Young specimens are r egular in form and s culpture.

Subgenus Propeamussium De Gregorio, 1884. Type (by monotypy) Pecten (Propea--mussium) ceciliae De Gregorio.

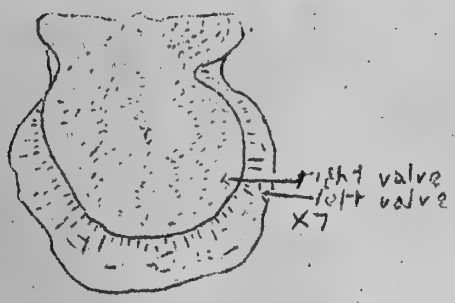
" Shell rather small, thin, orbicular, laterally compressed, white or trans--lucent. The left valve may be smooth or with fine radial or both radial and concentric sculpture; right valve somewhat flatter, with concentric sculpture, appressed near the margin to the left valve, resulting in a slight marginal concavity. Internally there are fine radial riblets, which are usually visable through the translucent shell."

Pecten (Propeamussium) alaskensis Dall, 1871. " Pribiloff Islands, Bering Sea, and southward to the Santa Barbara Islands, Calif. Japan." (Grant and Gale). Type locality: Alaska. Grant and Gale, 1931, extend the range to Magdalena Bay, Lower Calif. " usually in deep water".

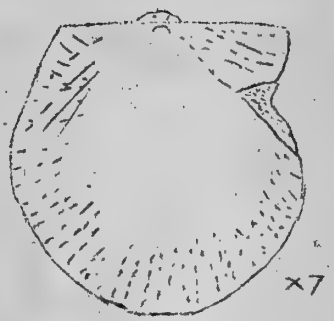
Collecting data: Forrester Island, Ketchikan, Alaska (G. Willett); Prince William Sd., Alaska (Lewis.)



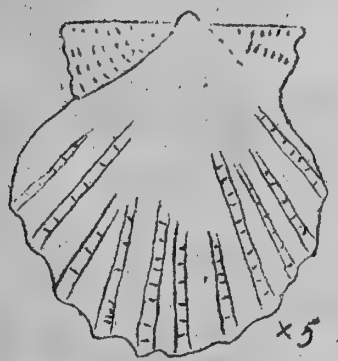
Pecten vancouverensis Whiteaves
Redondo Beach, Calif. 50 fathoms
Note by Thomas A. Burch who drew the above figure:
" I am sorry that I cannot do justice to the fine sculpture on this shell. Note the small embryonic whorl at the top."



Pecten catalinensis Willett
Redondo Beach, Calif. 75 fathoms
Note that the left valve is much larger than the right and extends beyond.

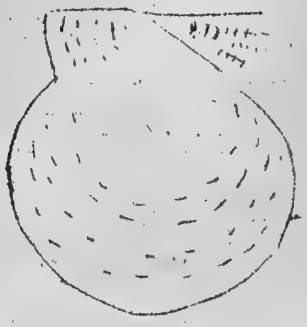


Pecten randolphi Dall
Hood Canal 30 fathoms



Left valve

Pecten alaskensis Dall



Right valve
Pecten alaskensis Dall
Forrester Island, Alaska 60 fathoms
Willett collection.

Pecten (Propeamusium) davidsoni Dall, 1897. " Davidson and Bowers Banks, Ber--ing Sea" (Dall).
Dall in Bulletin 112 listed P. davidsoni with the group under Pseudamusium. Grant and Gale, 1931 suggest the species be assigned to Propeamusium " has much the same shape; but it has fewer and stronger external ribs on the left valve, and after it is a little more than half grown it develops ribs on the outside of the right valve also." Dr. L.G. Hertlein of the California Academy of Sciences (personal communication, May 12, 1944) says " As to davidsoni, it does not have the appearance of a Delectopecten but more like that of Prop--eamusium as suggested by Grant and Gale. The original description did not mention any internal ribs but it appears that some species in this subgenus develop internal ribs much later than others and Dall's type was only 14.7 mm. in altitude. The general resemblance to the species sayanus Dall from the Atl--antic would seem additional evidence that davidsoni may belong to Propeamusium.

Subgenus Delectopecten Stewart,1930. Type(orig. desig.): Pecten (Pseudamusium) vancouverensis Whiteaves. (Acad. Nat. Sci. Phil., Special Pub. No.3,1930). No detailed description but the following remarks:"In not having the posterior ear differentiated, Delectopecten includes a group of small forms now living in the N.E. Pacific which have been classed as " Pseudamusium" by Dall..."

An important reference in making a study of this group is : Woodring " Lower Pliocene Mollusks and Echinoids from the Los Angeles Basin,California", (U.S. Geol. Survey Prof. Paper 190, 1938).

The discussion of this group seems to hinge on the identity of the type of Pseudamusium involving several different views. Pseudamusium is based on an Atlantic species and is rejected for our species by both Hertlein and Wood--ring. Dr. L.G. Hertlein (personal communication, May 12,1944) advises " Hyalopecten Verrill is based on H. undatus Verrill and is quite similar to the west coast mud Pectens but there seems to be some difference in detail of shape and ears. Anyway it is based on an east coast species and may or may not be applicable here. Delectopecten which is based on the west American form vancouverensis gives us a subgeneric name which we can safely use unless it can be shown without doubt that some other name is available for the species occuring here. I am in favor of assigning to it, arces, bistriatum,incongruum, randolphi and subspecies tillamookensis and vancouverensis. As to tillamook--ensis, I have not seen specimens and unless you have information to the con--trary I should think it should be left as a subspecies of randolphi." Woodring in the paper referred to above accepts Hyalopecten Verrill and makes Delectopecten a subgenus of Hyalopecten. Dr. A. Myra Keen of Stanford Universi--ty writes " After studying the various genotypes, Dr. Schenck and I came to the conclusion that it is simplest to consider Delectopecten a genus."

If Verrill's analysis of Pseudamusium is correct, then our species should not be included in that subgenus. Therefore we choose to use Delectopecten as a subgenus of Pecten.

Pecten (Delectopecten) arces Dall,1913. (Proc. U.S.N.M. Vol. 45,pp 592-3, 1913). " Off Santa Barbara, Calif. in over 500 fathoms, muddy bottom, Cat. No. 267169,U.S.N.M."

Dall omitted this from his list in Bulletin 112. Woodring places it in the synonymy of tillamookensis.
Pecten(Delectopecten) randolphi Dall, 1897. " Bering Sea to Guaymas,Mexico" (Dall). " to Cape Blanco, 225-1064 fms." (Woodring).

Grant and Gale place in synonymy of P. pedroanus Trask.

Collecting data: Not uncommon in dredgings from 50 to 75 fathoms off Red--ondo Beach, usually listed as from mud but in proximity to rocky bottom. Has been taken from holdfasts of deep water gorgonians.(Burch); Catalina Id. (40f (Willett); Hoods Canal,Wash. attached to apertures of worm tubes(Kincaid).

Pecten (Delectopecten) randolphi tillamookensis Arnold, 1906. " Pribiloff Islands, Bering Sea to San Diego,Calif." (Dall). Type locality: off Tilla-mook, Oregon in 786 fathoms. This is considered to be a sculptured variety of randolphi as described originally by Arnold. None of the members of the club report having seen specimens.

Pecten(Delectopecten) vancouverensis Whiteaves, 1893. " Bering Sea to San Diego, Calif." (Dall). Type locality: Forward Inlet, Quatsino Sound, Vancou-ver Island, depth 10 to 20 fathoms. There are two very good figures of this shell in Oldroyd.

Collecting data: S.E. Alaska, Redondo Beach, Catalina Island in 30-50 fathoms (G. Willett); not uncommon in dredgings from 50 to 75 fathoms off Redondo Beach usually listed as from mud, but has been taken attached to the holdfasts of deep water gorgonians.

Pecten (Delectopecten) bistriatus Dall, 1916. " Off San Diego, Calif. in 822 fathoms" (Dall).

This species and the species incongruus Dall were described and not fig-ured by Dall. So far as we have been able to determine these species have not been figured anywhere. None of the members of the club report having seen specimens and they are placed in this subgenus tentatively.

Pecten (Delectopecten) incongruus Dall, 1916. " Off San Diego, Calif. in 684 fathoms" (Dall).

Pecten binominatus Hanna, 1924. " Dolphin and Union Strait, Arctic Ocean"(Dall Bulletin 112 lists Pecten (Pseudamusium) andersoni Dall, 1918, but the name andersoni was preoccupied by Pecten (Plagioctenium) andersoni Arnold,1906. Hanna gave the species the new name listed above " Rectifications of Nomen-clature", Proc. Cal. Acad. Sci. Ser. 4, Vol. 18, p. 175,1924.

Note- This is another unfigured species with the position something of a mystery.

Subgenus Cyclopecten Verrill,1899. Trans. Conn. Acad. Arts and Sci., 1899-1900. Type: P. pustulosus Verrill (by original designation).

" The species in this group have usually been referred to Pseudamusium, but they differ widely from the typical form of that group, such as P. exoti-cum, P. dispar, etc. in which the valves are of nearly equal size, with simple edges that come evenly together without flexure of the lower one, and in which the auricles are small and nearly equal" (Verrill).

Pecten (Cyclopecten) catalinensis Willett, 1931. (Nautilus- Vol. XLV, No. 2, Oct. 1931). Type locality: " 100 fathoms off White's Landing, north side of Catalina Island, Calif."

Collecting data: While Mr. Willett described this species from a few speci-mens it has been dredged in great numbers off Redondo Beach, Calif. in 75 to 100 fathoms, mud bottom. (Burch).

Pecten whiteavesi Dall. This name is added for the members who love a mystery. A note from Dr. A. Myra Keen about this name follows: " We have specimens from 413 fathoms off San Diego-- a beautiful and fairly large, paper thin species. It is not cited in Bulletin 112; Grant and Gale do not mention it, but Orcutt in " Molluscan World" cites the name."

Family LIMIDAE

Genus Lima Bruguiere, 1797. Type: Ostrea lima Linnaeus (by tautonomy,Lamarck)

" Shell equivalve, compressed, obliquely oval; anterior side straight, gaping posterior rounded, usually close; umbones apart, eared; valves white, smooth, punctate-striate, or radiately ribbed and imbricated; there is uaually a thin brownish epidermis; hinge area triangular, cartilage pit cebtral; adductor im--pression lateral, large, double; pedal scars two,small." (Tryon. S.S. Conch.)

Subgenus Mantellum Bolten,1798. Type: M. inflata Chemnitz.

" Shell obliquely oval, thin, ventricose, anterior side widely gaping; sub--margins not impressed; hinge margin oblique; resilifer central, projecting into the cavity of the shell." (Limaria Link, 1807).

Lima (Mantellum) dehiscens Conrad, 1837. " Monterey, Calif. to Acapulco, Mex--ico" (Dall). The type locality of this species is Fayal Island, Azores. There is reason to question the distance involved in the range of this shell. Our common Pacific coast species is very close to forms studied from the Atl--antic such as Lima hians Gmelin from Florida, Bahamas etc. We have one set sent us by Mr. Paul McGinty dredged 150 ft. off Palm Beach,Florida and labelled L. dehiscens. A comparison of these shells with specimens from this coast show small but unmistakable differences in the hinge and slight differences in the sculpture and shape. It would seem that they should not both be dehiscens. However, there must be some difficulties in determining this matter. We have a note stating that the holotype is in the Philadelphia Academy. A study of it should be in order.

Collecting data: As a free swimming form this is one of the most beautiful of living things. First glance gives the impression of a bright rose colored nudibranch. It is common in kelp holdfasts, frequently washed ashore, but the bathymetric range is interesting having been dredged living from as deep as 25 fathoms off Redondo Beach,Catalina Island and Monterey.(Burch).

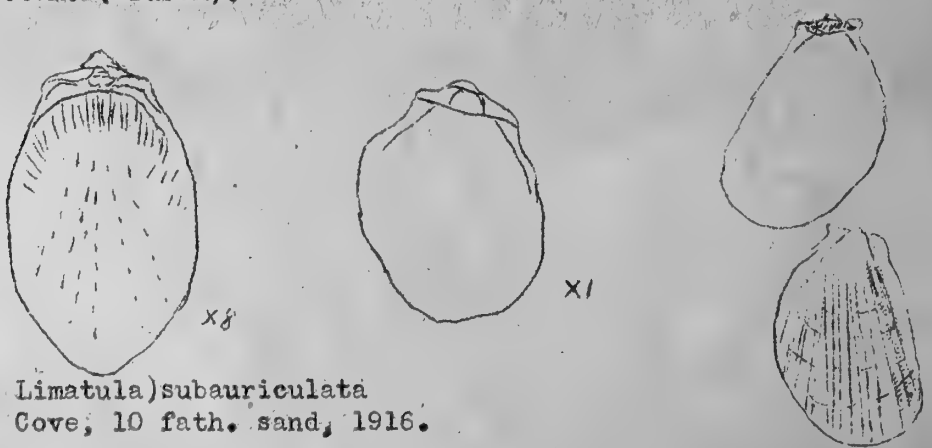
Subgenus Limatula Wood, 1839. Type: L. subauriculata Montagu 1808.

" Valves closed, equilateral, more or less distinctly mesially sulcate; sculp--ture radial".

Lima (Limatula) attenuata Dall, 1916. " Southern Bering Sea, the Aleutian Islands and eastward to the Shumagin Islands, Alaska" (Dall).

Lima (Limatula) subauriculata Montagu,1808. " Forrester Island,Alaska(Willett) to San Quentin Bay, Lower Calif. (Dall). The species was reported by W.J. Eyerdam (Nautilus, vol. 38, p. 24) at Drier Bay,Prince Wm. Sound. This is another of those circumboreal question marks. Maxwell Smith " East Coast Shells gives the range on that side " North Atlantic; Labrador to Porto Rico" and states " It has also been taken on the British Coast."

Collecting data: Forrester Id., Ketchikan,Alaska; Catalina Id. (G.Willett dredged in 20 fathoms off Monterey, Calif. on shale bottom, 25 fathoms off Avalon, Catalina Id., and common in 15 to 25 fathoms off Redondo Beach on sand bottom. (Burch).



Lima (Limatula)subauriculata
Malaga Cove, 10 fath. sand, 1916.

Lima

Family ANOMIIDAE

Genus Anomia Linnaeus, 1758. Type: Anomia ephippium Linnaeus (by sub. desig. Schmidt 1818).

" Shell of small to medium size, irregularly orbicular, laterally compressed or with left valve slightly inflated, right valve adhering to the substratum by a calcified byssus, which emerges through a deep byssal sinus just anter--ior to the apex; the sinus may grow together dorsally. Surface smooth or irregularly sculptured with radial riblets and lines of growth. The right valve bears the resilium on a raised knoblike process; in the left valve the resilium fits into a little depression under the apex. Interior with two byssal retractor muscle scars in the left valve." Dall, Bartsch, Rehder.

Pododesmus may be distinguished from Anomia in that it has but one con--spicuous byssal scar whereas in Anomia there are two byssal scars present. However, the amateur will find it simpler to remember that Anomia has in all four muscle impressions in the left or top valve;- a small one near the hinge, three others near the center of the valve in a space circumscribed by a line. Pododesmus shows but two muscle impressions, the large byssal scar and a smaller and smoother one below it.

Anomia peruviana d'Orbigny, 1846. " San Pedro, Calif. to Peru and the Gala--pagos Islands" (Dall). Keen " Abridged Check List" gives the range to 37N latitude or near Monterey, Calif. A note from Dr. A. Myra Keen regarding thisrecord follows " The record of Anomia peruviana at Monterey was given by Carpenter in the Mazatlan Catalogue, p. 168, as follows: " Monterey, 60 fm. Major Rich". Perhaps it may be attributed to an error of some sort, perhaps a mixing of collections before Carpenter saw them."

Note: None of our members have reported the species north of Los Angeles County, Calif.

Collecting data: Abundant all along the coast of Southern California. The upper valves are washed ahore in great numbers but complete specimens are seldom taken by littoral collectors due to the fact that the lowe valves remain attached and the habitat is below the low tide line. The bathymetric range is somewhat uncertain but it has been taken from dredgings as deep as 25 fathoms off Redondo Beach, Calif. (Burch); taken by H.N. Lowe at La Paz, Guaymas, Kino Bay, Mazatlan, Salina Cruz, Mexico.; Talara and Payta, Peru on sandy beaches in 1938 and 1939 (W.J. Eyerdam).

Genus Pododesmus Philippi,1837. Type (by monotypy), P. decipiens Philippi = Placunamonia rudis Broderip, Cuba, Recent. (Grant and Gale).

" Shell variable, right valve rather flat, suborbicular, somewhat pearly; byssal plug passing through foramen in right valve; a single conspicuous byssal scar present; hinge without teeth; valves sculptured with radial groo--ves" (Grant and Gale).

Subgenus Monia Gray,1849. Type (by sub. desig., Buc., Dautz. & Dollfus,1888), Anomia zealandica Gray.

" Monia Gray is much like Pododesmus,s.s. but has a larger byssal open--ing" (Grant and Gale.)

Pododesmus (Monia) macroschisma (Deshayes),1839. " Southern Bering Sea from the Pribilof Islands to Japan and the Okhotsk Sea on the west, and on the east south to and including the whole coast of Lower California, Mexico" (Dall).

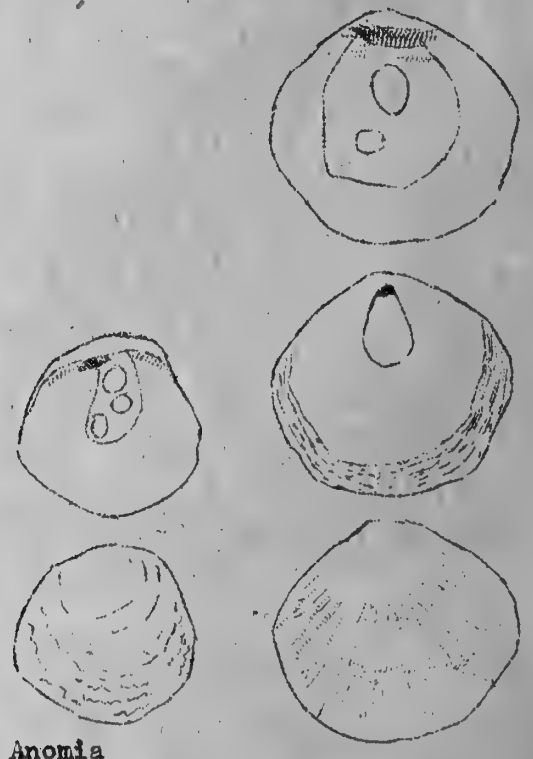
Collecting data: Very common the entire length of the coast on stones, pilings etc. near the low tide mark. The bathymetric range extends down to at least 35 fathoms on stones off Redondo Beach, Calif. It is a conspicuous fouling organism on anchored barges, bait floats etc. The bait traps at Point Mugu, Calif. were brought ashore at one time in order to scrape these shells off of them. It is safe to state that not less than one out of three of the large Haliotis rufescens brought in at Monterey, Calif. carry one or more

Pododesmus attached to the shells. (Burch); Gulf of Kronotski, Kamchatka .. 1925, Alaska peninsula, Unimak Island, Unalaska Island, Atka Island 1932, Mitrofania Id. 1928, Izhut bay, Red Fox bay, Shuyak strait, Afognak Id., 1922-24, Port Armstrong, Baranoff Id., 1917 and 1919, Icy Strait, Chicagoff Id., Admiralty Id., 1918, Raspberry Id., 1939. (W.J. Eyerdam). And a fur--ther note from Eyerdam " I also have it from many localities on Puget Sound . It assumes many shapes and forms, varying a great deal in thickness. Some valves are as thin as paper while others may be a quarter of an inch thick. I have a valve from Afognak Island that is nearly half an inch thick. A great many of the pectens are infested by a special form of this rock oyster. The pecten generally dies when the rock oyster attaches itself and most of them are deal to begin with the attachment. The lower valve of each Pododesmus is very thin and shows all the rib markings of the pecten very distinctly wherever the shell contacts. I believe that this special form of Pododesmus should be described as a variety".

Pododesmus (Monia) foliata Broderip. " San Pedro, Calif. to Guayaquil" (Proc. U.S.N.M. vol. 37, p. 257). Note from Dr. A. Myra Keen " The Lat.34 record in my " Abridged Check List" is based on Dall's statement of range in the Peruvian Fauna paper. Dall could have been wrong, of course. I have detected a number of errors in his determinations".

This is a southern species and reported from many localities along the west coast of Mexico to Nicauragua by H.N. Lowe and others. However, the California record is questionable. No member of the club reports having seen specimens from this coast.

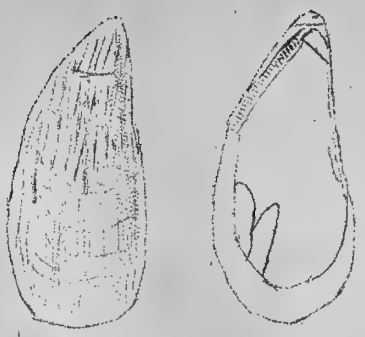
Note: There has been some confusion about the correct spelling of species under this genus. A note from Dr. A. Myra Keen should be of interest in this connection:" For the past several years I have been plumping for the spelling macroschismus, but after a restudy of the derivation, I concede that macroschisma is probably right."



Anomia

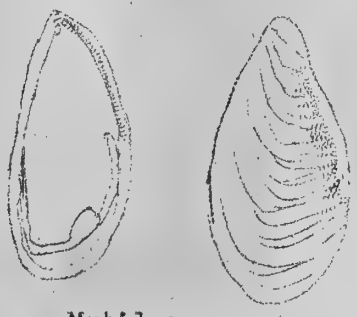
Pododesmus

Volsella



Septifer

Lithophaga

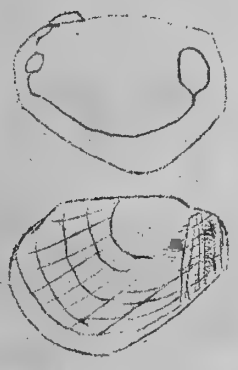


Mytilus

Botula

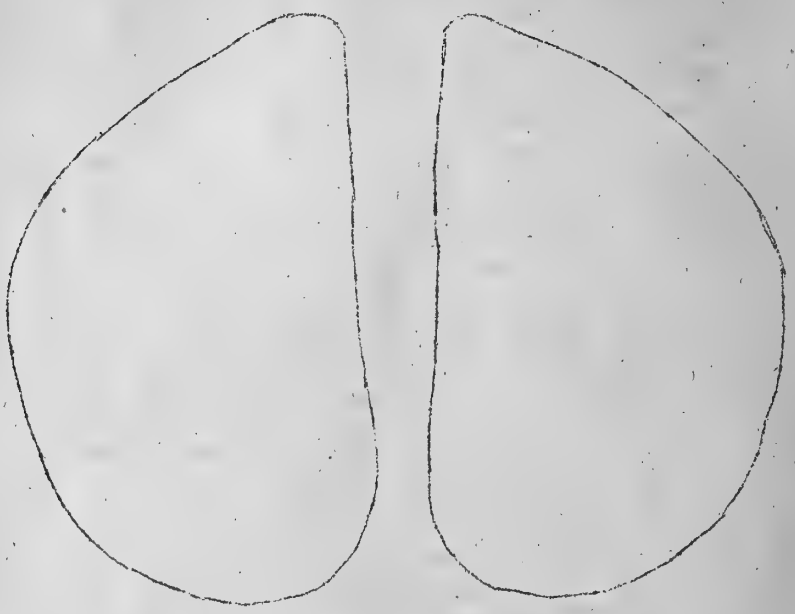
Amygdalum

Crenella

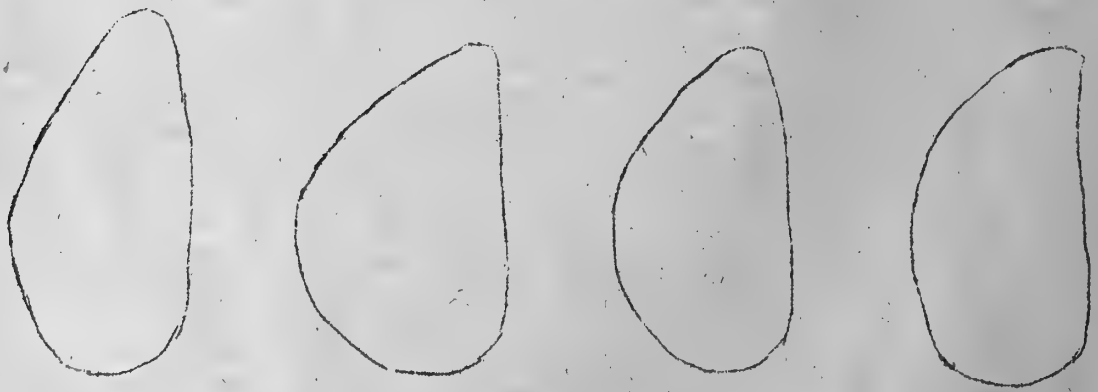


Musculus
(Modiolaria)

Dacrydium



Mytilus dunkeri Reeve ?



M. trossulus

M. dunkeri

M. edulis
(fr Atlantic)

M. edulis
(Alki Pt.
Puget Sound, Wash.

The above figures were made by selecting typical specimens from sets of the species and simply tracing the outline of the valves on the stencil. They only indicate the decided differences in form.

Family MYTILIDAE
Genus Mytilus Linnaeus, 1758. Type (by subsequent designation Anton,1839) Mytilus edulis Linnaeus.
" Shell wedge-shaped, rounded behind, smooth in the typical species; umbones terminal, pointed; hinge teeth minute or obsolete; pedal muscular impressions two in each valve, simple, close to the adductor". (Tryon S.S. Conch.)
Subgenus Mytilus s.s.
" Umbonal end of shell not greatly thickened. Sculpture when present consis--ting of incremental undulations and coarse, often indefinite or subdued radial ribs, sculpture sometimes lacking; fine bifurcating riblets absent" (Grant and Gale).
Mytilus (Mytilus) californianus Conrad,1837. " Unalaska, Aleutian Islands, eastward and southward to Socorro Island, Mexico" (Dall). " The type locality of M. californianus is " San Diego, Santa Barbara, and Monterey"; as the hol--otype is apparently lost, someone will have to designate a neotype from one of the localities some day " (Dr. A. Myra Keen).

This is the common large Mytilus of the California fauna, forming dense beds on most exposed surfaces from high tide line to the lowest tide line. The species is easily distinguished from others by its few broad radial ribs which are never wholly absent. Conrad's original description gave the length 2 1/8 inches which is a very small specimen. It would be interesting to know the maximum size attained by this species.

Mytilus (Mytilus) edulis Linnaeus, 1758. " Arctic Ocean to Cerros Island, and worldwide in temperate waters" (Dall).

This cosmopolitan species would seem to be too well known to deserve much comment. However, collections from different localities and different habitats show such great variations in shape that there have been many variet--ies, subspecies and species described. We will comment upon a few of these from this coast.

Mytilus glomeratus Gould, Proc. Boston Soc. Nat. Hist., 1851, p. 92; Mex. and Calif. Shells, p. 29, pl. 16, fig.8; Otia, p. 214. San Francisco Bay on float--ing sea weed". Carpenter, Suppl. Rept., p. 616 " Perhaps an accidental variety from being crowded on a floating stick". On page 643 " Short, stumpy. solid, crowded". Mr. A.M. Strong is of the opinion that this is merely a form caused by the mollusk adapting itself to a strange habitat and therefore not even deserving a varietal name. Dr. A. Myra Keen fails to mention it in her " Abrid--ges Check List". Dall ommited it from Bulletin 112 and it is generally ignored. However, Dr. Joshua L. Baily Jr. in " West Coast Shells"1935, describes it as Mytilus edulis glomeratus Gould and states that it is the common species in San Francisco Bay, having the common name " Spherical Mussel".

Mytilus (Mytilus) edulis trossulus Gould, 1850. Proc. Boston Soc. Nat. Hist. vol.3, p. 344; it was figured in the Atlas of the U.S. Exploring Expedition (Mollusca), 1856, pl. 41, fig. 567. The type locality is " Killimook, Puget Sound, Oregon". Dr. A. Myra Keen writes of this " from my own little collect--ing expedition along the Oregon-Washington coast I concluded that this is Tillamook,Oregon, where the species occurs abundantly". However, Dr. Joshua L. Baily Jr. comments on this locality " The old Oregon territory included three states, Washington, Oregon, a nd Idaho which explains the placing of Puget Sound in Oregon."

Dr. A. Myra Keen writes (personal communication, May, 1944) " Some years ago I made a statistical study of so-called Mytilus edulis of the west coast. I found there is a significant difference in size between a) the true M. edulis of the Atlantic coast, which averages 59 mm. in length for 43 specimens; b) the form on the northwest American coast (Puget Sound northward), which aver--ages 42 mm. in length (47 specimens) and, like the Atlantic form, is purplish on worn surfaces; c) the native form along the central California to Washington

coast, which averages 30 mm. in length (50 specimens) and shows, when fresh, a bluish color on worn surfaces. (Unon inspection I find that my Oregon specimens, bluish when collected, now are purplish. The color must alter with age, and this distinction is therefore invalid.) Form c) fits Gould's descrip--tion of Mytilus edulis trossulus. I am going to send you some samples. My research on mytilids came to a halt when I started measuring specimens from southern California, as these seem to be a mixture of true M. edulis (possibly imported on ship's bottoms) and the native form I consider to be M. trossulus. Maybe my statistical findings were spurious in the first place, as perhaps the mussels in our collection from Alaska and Europe were not representative of the population. However, the color differences are consistent, as also is the difference in height-length ratio."

In support of Dr. Keen's conclusions Lamy, E. " Revision des Mytilidae vivants du Museum d' Histoire Naturelle de Paris" , Jour. Conchyl. Part II, vol. 80, no.3 (Sept.1,1936) on page 107 cites Mytilus trossulus as a separate species, distinguished from M. edulis , he says, by constant differences in form, color, and smaller size. Gould's original comparative notes on trossulus read " It is more slender and more cylindrical than M. edulis; the dorsal wing is less elevated, the posterior slope rectilinear; the color is more glossy jet-black and without radiations, and there is a difference in the form of the muscular impression."

Mr. A.M. Strong is disposed to express his opinion of trossulus by citing Carpenter, Suppl. Rept., 1863, p. 532 " Is scarcely a variety of M. edulis, which is very abundant along the coast under its usual modifications of form and color, but generally of smaller size."

However, note the figures on page 6 of these minutes.

In regard to the possible introduction of exotic forms of Mytilus on ship's bottoms Mr. A.M. Strong stated to the club that in his opinion it is highly improbable that the mollusk could survive the journey through tropical as well as colder water and this explanation of distribution should be careful--ly questioned.

Mytilus (Mytilus) dunkeri Reeve, 1857. ??? Conch. Icon. v. 10, pl. 5, fig. 17. Reeve's species came from the Philippine Islands. " Shell triangularly fan shaped, posteriorly flatly incurved and gibbous, anteriorly slopingly compr--essed, towards the umbones rather narrowly beaked, radiately superficially striated, decussated with concentric striae, shining black." "... It is a shining black shell, of a conspicuous fan shape, broadly gibbous and incurved on the posterior side, with the umboes contracted and beaked."

Reeve did not compare his species with M. edulis.

Note: The Minutes of the Conchological Club of Southern California, #30 discussed this species. In the past few years a new species of Mytilus has invaded the bays and sloughs all along the southern California coast being very common in Newport Bay, Mission Bay, and San Pedro Bay. The first impressi--on is of some odd form of Mytilus edulis L. However, a comparison of these shells with all known forms of edulis shows it to be a much more triangular shaped shell. Dr. Paul Bartsch recently identified these shells as the above species. They were sent him from San Diego and taken at La Jolla. The common explanation is that this exotic species was introduced with seed oysters from Japan. Some of us thought this conclusion illogical because of the fact that seed of the Japanese oysters has not been used in southern California to an extent sufficient to account for such a general distribution in such a short time. Paul Bonnot, Nautilus 49, No. 1, p. 1 gives an account of a large plant--ing at Elkhorn Slough, California in 1930 which did contain M. dunkeri from Japan. However, Mr. Allyn Smith recently wrote that Bonnot had returned to the planting a number of times and could find no evidence that any Mytilus had taken root.

This new and exceedingly abundant species seems to mature much more rapidly than any of our native forms. Mr. A.M. Strong advises that he is making a careful check on the growth in one years time of a space in Newport Bay. The year will be up this summer and we look forward with interest to the results. We expect to hear of a much different life cycle which would guide us to some extent.

Miss Viola Bristol of the San Diego Museum writes " We have specimens of Mytilus dunkeri from the Inland Sea, Japan. They came to H.N. Lowe from Ann Arbor. They do not appear to be the same as our new and abundant species."

We are not only uncertain whether or not our shell is really dunkeri but Dr. A. Myra Keen (personal communication May, 1944) " Mytilus (Mytilus) grayanus Dunker, 1853 seems to be a prior name for the M. (M.) dunkeri Reeve. The reference for grayanus is: Zeitschrift fur Malak., vol. 10,1853. The two species are considered synymous by Lamy (Jour. Conchyl., vol. 80, pt. 2,1936, p. 119. Dr. Hanna is interested in this new record of an exotic species and possibly he will check up for us and decide whether Lamy is correct in synony-mizing M. dunkeri."

Mr. A.M. Strong (personal communication, May 1944) intimates that we should check the possibility of our new shell being a more southern species from this coast before definitely classifying it as exotic: " At the time of Dall's death there was on his desk a list of species from south of San Diego. A copy was made of this manuscript which Grant has. This included Mytilus algosus Gould, range Magdalena Bay to Patagonia. The description of this appears in Pacific Exploring Exped. and has been listed as a synonym of Mytilus atar Molino, which corresponds to M. edulis in the Chilean fauna. I know of no rec-ord of atar north of the Galapagos. This Magdalena Bay record should be checked with our introduced Mytilus from Newport Bay and elsewhere.

Subgenus Hormomya Morch,1850. " The type was first designated by Jukes-Browne 1905, as Mytilus exustus Linnaeus, fortunately the same species later selec-ted by Grant and Gale." (Dr. A. Myra Keen).

" Shell sculptured with numerous, fine, closely spaced, bifurcating riblets".

There has been considerable dispute regarding the relation of Hormomya and Brachidontes. They do seem very close. The distinction seems to be largely that Brachidontes has a produced anterior margin similar to Volsella. Grant and Gale suggest on this point " Perhaps Brachidontes should be recognized as a genus intermediate between Mytilus and Volsella, with Hormomya as a sec-tion." Dr. A. Myra Keen (personal communication, May 1944) " Dr. Schenck and I last year went into the question with some care, studying topotype material and original descriptions. We concluded that no true Brachidontes occurs on our coast today, although there were some species here in the Tertiary. It seems to us preferable to place Hormomya as a subgenus under Mytilus." Bur, Dr. Joshua L. Baily Jr. (Personal communication, May 1944) " Bartsch tells me that this subgenus should be placed under Brachidontes, because both of these have a taxodont hinge. I feel that the taxodont hinge is of greater importance than the terminal umbones, so I believe Hormomya should be placed under Brachi-dontes. The difference between Mytilus and Modiolus (Volsella) is in the position of the umbones. Brachidontes has umbones like Modiolus , Hormomya has umbones like Mytilus. Hormomya, therefore, cannot be a subgenus of Modiolus. If Brachidontes is made a subgenus of Modiolus (Volsella), then Hormomya cannot be a subgenus of Brachidontes. Before my attention had been called to the taxodont hinge, I considered Hormomya a subgenus of Mytilus, and Brachi-dontes a subgenus of Modiolus, but as I said above, I consider the taxodont dentition more important, so I think it best to unite these two. When I raised Brachidontes to generic rank in " West Coast Shells", I did so on the advice of E.G. Vanatta."

The following three species will be discussed at the end of descriptions.

Mytilus (Hormomya) stearnsi Pilsbry and Raymond, 1898. Nautilus, vol. 12, no. 6, p. 70, pl.4, figs. 1-3 (this plate was apparently never published). Type locality: San Diego,Calif. "... a length of 25 mm. or one inch being a good size", " An ' unusually large ' specimen of Carpenter's M. multiformis measured: length 0.45, width 0.24, diam. 0.32 inch. This would be very small for M. stearnsi. As to color, our species seems to be invariably brownish-purple above, with the ventral face straw colored, white beneath the cuticle. None of the specimens I have seen could be called green. Carpenter describes M. multiformis as " purpureo, ad marginum ventralem viridi", with a variation " omnine viridi".

Mytilus (Hormomya) multiformis Carpenter, Mazatlan Catalogue, No. 168, p. 118 (date of part, as given on p. 109, Dec. 1855). Type locality: Mazatlan, Sinaloa Mexico. Described as varying from smooth to plicate, generally purple, with a larger or smaller greenish portion near the byssus, length of large specimen about $\frac{1}{2}$ inch, breadth about $\frac{1}{4}$ inch.

Mytilus (Hormomya) adamsianus Dunker, Proc. Zool. Soc. London for 1856, p. 360 (date of part, May 8,1857). Type locality: Isthmus of Panama. A free trans--lation of the original description would be " Shell ovate-trigonal, obtusely carinate, solid, sculptured with elegantly granulate bifid ribs in the adult, brownish purple and white, with horny epidermis, with terminal umbones, margin crenate. Length 10 lines, width $6\frac{1}{2}$ lines, thickness $4\frac{1}{2}$.

As many divergent views as are geometrically possible have been advanced to make the above three species one, two, three or more with almost as many ideas on generic allocation. A few recent references to articles dealing with this problem are: Dr. Fritz Haas, Nautilus vol. 56, p. 30, July 1942 and also Malacological Notes III, Zoological Series of Field Museum of Natural History, vol. 29, No. 1, pp 12-17, June 10,1943 : and E.P. Chace, Nautilus vol. 56, p 41, October 1942.

Dr. A. Myra Keen (personal communication, May 1944) " If one very variable species is involved in this complex, then the name multiformis must apply. On the basis of specimens at the National Museum I concluded in 1940 that the California form (stearnsi) was separable from the Panamic form. The Panamic form, which ranges north to Cape San Lucas, is smaller, with more divaricate finer sculpture. The California form, larger, with coarse sculpture ranges south as far as Oaxaca,Mexico. In the Gulf both forms occur and separation is difficult. The specimens in our collection seem to support this conclusion. Pilsbry and Lowe's species may be something else still."

Dr. Joshua L. Baily Jr. (personal communication, may 1944) in writing of multiformis " Specimens from Mazatlan are widely different from San Diego specimens. I have taken it in both localities and to me they look like differ--ent species. But Carpenter recognizes this difference and says that specimens taken at intermediate stations show a complete intergradation. But until I have seen a set of intergrades I am going to consider these species distinct, despite what Dr. Haas and Dr. Bartsch have to say. The question then arises as to names for these species." And in writing of stearnsi " This is the same species as that to which the names adamsianus Dunker and multiformis Carpenter have been given recently by Dr. Haas and others, but I feel sure that stearnsi and multiformis are different and am not sure as to what adamsianus is."

" Panamic Marine Shells", 1944, by Maxwell Smith lists and figures both M. stearnsi and M. adamsianus. Mr. A.M. Strong is positive in his statement that multiformis is a distinct species.

Therefore, the consensus of opinion seems to be that we have three species involved: M. adamsianus Dunker , the Panamic form ranging up to Cape San Lucas,; M. stearnsi Pilsbry and Raymond, the San Diego form, ranging from Santa Barbara, Calif. south to Oaxaca,Mexico; and M. multiformis Carpenter, ranging from the Gulf of California south.

Mytilus (Hormomya) puntarenensis Pilsbry and Lowe;1932. Proc. Acad. Nat. Sci. Phila. vol. 84. This is another species in this group. Type locality: Punta--renas, Costa Rica. " A larger species than M. multiformis Carp." " While this species is very close to M. exustus L. of the Caribbaean region, it dif--fers by having a decidedly longer hinge." This may be another distinct species or it may be in the synonymy of adamsianus. None of the members are familiar with it.

Mytilus (Hormomya) multiformis houstonius (Bartsch and Rehder),1938, Smith--sonian Miscellaneous Collections, vol. 98, No. 10, June 15, 1939. Described as Brachidontes multiformis houstonius Bartschand Rehder. Type locality: Sulivan Bay, James Island, Galapagos Islands. The authors state that this is a more finely sculptured race than typical multiformis from the mainland. The figures definitely place it in this group. None of the members report having seen specimens.

Mytilus (Hormomya) recurvus Rafinesque, 1820. Reported from Newport Bay, Calif. alive by Dr. Trmper and identified by Dr. Dall. One specimen only involved. No one has seen it before or since. There is no question but that this was error and the above name should be ommitted from all faunal lists of this coast.

Collecting data: Mytilus stearnsi Pilsbryand Raymond is usually found in crevices of stones rather than out in the open surf.

Genus Septifer Recluz, 1848. Type (fide Stoliczka,1871), Mytilus bilocularis L. " Shell like that of Mytilus but with an umbonal deck"

Septifer bifurcatus (Conrad),1837. " Crescent City, Calif. to Gulf of Calif." (Dall). This very common species is found in much the same habitat as Mytilus stearnsi Pilsbryand Raymond but is disposed to be on the under side of the stones and more Hidden from the light.

While the experienced collector soon learns to distinguish them at a glance, the certain check is to open the valves. The Septifer has an umbonal deck which is always very apparent.

Septifer bifurcatus var. obsoletus Dall,1916. Santa Barbara to San Diego, Calif. Type locality: San Diego Bay , mud flats. The description of this shell is short and almost self explanatory; " Shell large, the sculpture obsolete, the distal part of the valves nearly smooth".

With but few exceptions west coast collectors ignore this varietal name as being of little or no significance. The first inclination is to think of old specimens withthe sculpture worn smooth. However, specimens of this species are not uncommon in which the sculpture is obsolete but not worn. Miss Viola Bristol of the San Diego Museum reports that they have sets of this type from Santa Barbara and from San Diego. Mr. George Willett of the Los Angeles Museum has such sets in his collection.

Note from Dr. A. Myra Keen " There has been some question as to whether Septifer bifurcatus (Conrad) could correctly be assigned to our fauna, as Conrad gave the Hawaiian Islands as type locality. Dall, Bartsch, and Rehder in their manual of Hawaiian pelecypods (Bernice Bishop Mus. Bull. 153,1938), figure three species of Hawaiian Septifers, none of which resembles Conrad's figure. As the holotype is in the Philadelphia Academy and does resemble it, and as it seems pretty definitely to be the thing California collectors call S. bifurcatus, we may conclude that Conrad's statement of locality was erroneous."

Genus Volsella Scopoli,1777. (Modiolus Lamarck,1799) Type: Mytilus modio--lus (by subsequent designation, Gray 1847).

" Shell obliquely oblong, expanded posteriorly and inflated along an oblique medial line from the umbonal end to the posterior ventral margin; anterior end produced beyond umbones; hinge edentulous in adult".

Here we have another of these mooted questions. Grant and Gale,1931 accepted Volsella, Dall, Bartsch, and Rehder " Marine Mollusks of Hawaii" accept it, and others. Dr. A. Myra Keen writes (personal communication May 1944) " Since publishing the Abdridged List , I have come to the conclusion that we must accept Volsella rather than Modiolus. Dr. Joshua L. Baily Jr. in " West Coast Shells" and many other current authors retain Modiolus.

The argument seems briefly to be whether or not Scopoli's shell was a misidentified species. If the original figure and description are correct, then Volsella antedates Lamarck's Modiolus and must be used.

Subgenus Volsella s.s.

" Shell moderately heavy, usually purplish or reddish and covered with a rather heavy periostracum which bears membranous fringes or hairs."

Volsella (Volsella) modiolus (Linnaeus),1758. " On the Pacific Coast from the Arctic Ocean to San Ignacio Lagoon, Lower California (E.K. Jordan); circumboreal" (Grant and Gale).

This range is a matter of considerable difference of opinion. In a preliminary outline the following statement of opinion was made by John Q. Burch " This species has been reported from southern California by many collectors from many localities. However, it is my opinion that there are not two distinct species here. I may be wrong. What about it? Volsella capax (Conrad),1837 is said to differ from this species in being " heavier shelled, more inflated, and has a more depressed region between the umbones" (Grant and Gale). But I have yet to see a local specimen that will not fit both des--cription and figure of capax. I have certainly never seen anything from southern California that could possibly be confused with the Volsella modiolus of the far north or the Atlantic". George Willett commented " Neither have I . Jordan's shells from S. Ignacio should be studied". Dr. A. Myra Keen writes " We have no V. modiolus in our collection from south of Monterey or any V. capax from north of San Pedro. I suspect that you are correct in your opinionn as to range". However, Mrs. Elsie Chace is disposed to think that the two species are separable in southern California stating that capax runs larger and darker than modiolus and is always slightly inequivalve. Mrs. Chace reported that Mrs. Ida Oldroyd considered V. modiolus as more usually from below low water mark, and to her V. modiolus and V. fornicata ran much clos--er together, but she said that V. modiolus lived singly as V. capax and V. fornicata in clusters.

Collecting data: Collected by W.J. Eyerdam in many places in Puget Sound, Baranoff Island, Afognak Island, Amoknak Island (heavily incrusted with nullipores and Saxicava arctica) .. also Atka Island, Kamchatka, Kola Fjord, and Tromso Fjord. I also have them from Ash Point, Knox Co., Maine coll. N. Lermond (very hairy) and off Owl's Head, Penobscot Bay, Knox Co., Maine. My specimens from Amoknak Island are up to 150 mm. long and 63 mm wide. These resemble more closely the specimens from Penobscot Bay. Specimens from Georg--es Bank, New Foundland look more like Mytilus californianus except that they lack the irridescent nacre. Without doubt these are two distinct species occuring in both the north Atlantic and north Pacific, one of which is un--described. I have one large specimen from Gulmarn, west coast of Sweden that is also similar to the ones from Georges Bank, N.F., and others from Tromso, Norway coll. by I. Norberg in 1935 which are typical. The specimens from Penobscot, Maine and from Unalaska and Amoknak Island are similar to each other but are much more elongated than the typical and should at least rate as a variety of N. modiolus to distinguish them."(Eyerdam).

Volsella (Volsella) capax (Conrad), 1837. " Santa Barbara, Calif. to Payta, Peru" (Dall). Type locality: San Diego, Calif.

This is the common southern California species of this genus being found in great numbers on breakwaters, stones, pilings etc. It seems to reach its greatest abundance on wharf piles in the sloughs such as Newport Bay, Anaheim Bay etc. However, it is cast up on the beaches all along the coast. We are a little uncertain about the bathymetric range but it certainly ranges down to several fathoms below the tide line. We have no record of dredging the species at any depth beyond the littoral. The shell of this species is brick red when the periostracum is removed. It is our opinion that V. capax is a good distinct species although Keep a nd Baily " West Coast Shells" comment " ... though I have grave doubts as to its being really distinct from the last species".

Volsella (Volsella) recta (Conrad), 1837. " Bolinas Bay, Calif. to Maddal--ena Bay, Lower Calif., Mexico" (Dall).

Grant and Gale say of this species " ... differs from V. modiolus (L), in the greater extention beyond the beaks of the anterior alation; also the anterior half of the dorsal margin of the valves is straighter, the dorsal alation occuring posterior to the middle. V. recta attains a larger size and is often more elongate than V. modiolus".

The figure of this species in Keep a nd Baily " West Coast Shells" agrees with specimens so classified by most of the members of the club.

Collecting data: Our experience has been that the typical of this species is the off shore form with our records reading, 7 faths. off Santa Monica, 25 faths. off Redondo Beach in gravel, 15 faths. off Ensenada, Mexico etc. (Burch); " I do not recall ever taking the slender, light weight shell on shore" (Mrs. Elsie Chace).

Volsella (Volsella) recta flabellata (Gould), 1850. " Vancouver Island to San Diego, Calif." (Dall).

Grant and Gale, 1931, say of this variety " This form is close to recta, but is larger, less ventricose, particularly at the umbones, and the anter--ior alation projects farther forward".

This species is well figured in Oldroyd " Marine Shells of the West Coast of North America", Pl. 6, fig.2 and also figured by Grant and Gale, Pl. 12, fig.7. Both figures agree with the popular conception of this variety. The variety flabellata is considered a distinct species by many authors. However, intergrades are not uncommon with the occasional specimen very diff--icult to place. Mrs. Elsie Chace says I find the two forms which were named recta and flabellata easy to recognize- Gould's phrase " edge shaped in three directions" being very illuminating." Our experience has been that flabellata is the predominant bay form although we have dredged the variety along with the typical from as deep as 25 fathoms off Redondo Beach,Calif. There seems to be some difference of opinion regarding the habitat of the species. Keep and Baily " West Coast Shells" 1935, p. 63, state " ... former--ly considered but a variety of rectus, grows to a much larger size. It is found off shore of British Columbia, and ranges as far south as San Diego in deep water", and Dr. Joshua L. Baily Jr. (personal communcication May 1944) says " The fact that you can't separate these forms proves that they are a single species. To my mind there appear to be three varieties. According to our collection, recta is the form in which the byssal a nd cardinal edges are parallel or nearly so, which recta flabellata is the large northern form in which these edges are close together at the umbonal end. I think it wise to keep both names."

Collecting data: Newport Bay,Calif. 2/25, Mugu, Ventura Co. 6/35, Miss--ion Bay, San Diego Co. 5/36, Morro Bay, San Luis Obispo Co. very common and exceptionally large 1/1940, all on mud flats, often associated with eel grass (Burch); W.J. Eyerdam reports " I have this species from various local-

-ities on Puget Sound including specimens from the mud flats near Port Orch--ard, Kitsap Co. which are 7 inches long. I have heard of specimens up to 9 inches in length. In my collection are a number of specimens of rectus from California up to 6 inches in length. I have compared them with flabellata several t imes but failed to detect any essential difference except that the Puget Sound form seems to grow larger.".

Volsella(Volsella) fornicata (Carpenter),1864. " Trinidad to San Pedro and Cortez Bank, Calif." Type locality: Santa Barbara, Calif.

" In this species the beaks curve strongly forward, downward a nd back--ward so that a portion of their curve projects considerably beyond the ant--erior margins of the valves" (Grant and Gale).

Our experience has beenthat this species is confined to moderately deep water. It is not uncommon as deep as 25 fathoms on the gravel off Redondo Beach, Calif. However, we have taken it from kelp holdfasts, a nd at one time took large numbers of fine specimens from the lower portions of the old Saphire pilings off Redondo Beach. These were brought up by using diving equipment from a depth of about 40 ft. We list it from 20 fathoms off Mont--erey, Calif., 15 faths. off Ensenada, Mex., 25 faths. off Avalon, Catalina Island etc. It is not uncommon commensal on the Haliotis rufescens brought into the Monterey market. It is occasionally washed in after storms but is rarely taken by littoral collectors.

Subgenus Amygdalum Megerle von Muhlfeld,1811. Type: A. dendriticum Chemn.= A. arborescens Dillwyn (by momotypy).

" Shell of medium to rather small size, elongate to elongate-ovate, thin and fragile, white or translucent, smooth and shiny, with no sculpture except for delicate incremental lines; periostracum very thin and ivory white, yell--owish or greenish in color, often with gray color margings. Ligament rather thin and slender. Hinge line simple, without teeth or projections. Interior white, pearly." (Dall, Bartsch, Rehder).

Volsella (Amygdalum) pallidula (Dall),1916. " Off Bodega Head, Calif. and south to Cerros Island, Lower Calif. in deep water" (Dall). Type locality: Off San Luis Obispo Bay, in 77 fathoms.

In the original description of this species (Proc. U.S.N.M. vol. 52, p. 404), Dall gives the measurements of the holotype as length 23; maximum height 11.5; beaks behind the anterior e nd, 1; diameter 5 mm. and suggested that it may be a variety of politus Verrill and Smith ,1880, an Atlantic species. This was accepted by some authors. Mrs. Ida Oldroyd lists the species as politus pallidus in " Marine Shells of West Coast of North America", 1924. Dall makes the following statement " None of the Pacific specimens have the golden yellow color of the Atlantic species and none of them attain the same size. Otherwise the shells are very similar."

We have dredged specimens of this species off Redondo Beach considerably larger than Dall's measurements and some of them are very definitely golden yellow. However, we have had no opportunity for comparison of our shells with politus and are disposed to place the burden of proof on those disposed to make a Pacific species a variety of an Atlantic species.

Collecting data: Our experience has placed this species between 40 and 75 fathoms in mud bottom. We have found it most abundant around 50 fathoms both off Redondo Beach, Catalina Island and Ensenada, Lower Calif. It is a yellowish white almost transparent shell and quite different from anything else. George Willett reports having taken it in 25 fathoms off Los Coronados .

Subgenus Brachidontes Swainson, 1840. Type (by monotypy), Modiola sulcata Lamarck. " Like Volsella s.s. but with numerous, well defined radial riblets; shell generally of medium or small size" (Grant and Gale). There are many more complete descriptions of Brachidontes available and they should perhaps be studied because there are many divergent opinions regarding its position. Dr. Joshua L. Baily Jr. in " West Coast Shells" 1935, Dall, Bartsch, Rehder " Marine Mollusks of Hawaii"1938 and many others use Brachidontes as a genus . Perhaps the most interesting comment in this connection is from Dr. A. Myra Keen (personal communication May, 1944) " My present opinion is that the species demissus is a ribbed Volsella, not a Brachidontes whether one consid--ers the latter subgenus or genus. The ribbing does not bifurcate and swirl upward along the hinge margin as in Brachidontes."

Brachidontes vs. Brachydontes. Swainson first used the name in his Treatise on Malacology in 1840 and spelled it Brachidontes. Therefore this is the spelling we must use. However, the alternative spelling has been extensively used. Mrs. Ida Oldroyd used the y. An interesting little note on the matter by Dr. Joshua L. Baily Jr. " The reason that the alternative form Brachydontes arose was because it seems more reasonable etymologically. I am not a Greek scholar, but I believe the name Brachidontes means " arm toothed", and that Brachydontes means " short toothed". It may be that Swain--son misspelled the name he intended to use."

Volsella (Brachidontes) demissus Dillwyn, 1817. San Francisco Bay introduced from the Atlantic with seed oysters.

Hanna, G.D. " Bull. of Dept. of Agric. Calif. vol. 28, no. 5" says " This is probably the species Stearns recorded in 1900 as Modiola plicatula Lamarck".

Collecting data: We have found it very abundant on the mud flats along the Bay Shore Highway between San Mateo and San Francisco.

Volsella diegensis (Dall),1911. " San Francisco Bay to Cape San Lucas"(Dall). Type locality: San Diego. We are uncertain of the subgeneric position.

This species was described by Dall in Nautilus vol. 24, pp 110-111, as Modiolus diegensis. However, Dall in Nautilus vol. 30, p. 1, 1916 placed it under Adula as subgenus of Botula with a very brief inadequate explanation since in both the original description and his later articles he mentions the fact that diegensis is not a borer. It is, of course, possible that Dall had made a study of the anatomy and found evidence to support this position. However, the well known habits of this common species are as different from those of the other species under Botula as it is possible to be. We have taken diegensis by the thousands nestling in with the Mytilus in many local--ities. Our experience seems to indicate that it likes rough open water. It is very common in the large neds of Mytilus californianus on the breakwater at Playa del Rey, Calif., Santa Monica , and also the breakwater at Coronado, San Diego, the type locality. However, we have also taken it from the barnacle covered pilings at the entrance to the Playa del Rey lagoon apparently not associated with Mytilus in any way in this instance. All of its habits as well as general formand appearance indicate that it is a Volsella, as orig--inally described by Dall. However, Dr. A. Myra Keen in her " Abridged Check List" 1937 places the species under Botula.

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We received the following interesting data on the genus Mytilus after having completed the above notes from Mr. W.J. Eyerdam.

Mytilus californianus Conrad, 1837. The following specimens collected by Eyerdam ... Port Armstrong, Baranof Island (up to 180 mm. in length),1917.. Izhut Bay, Afognak Island,1922- Unalaska, Aleutian Islands, 1932 and several localities in Puget Sound. M. magellanicus collected by W.J.E. on the strait of Magellan in Dec. 1938 are almost indistinguishable from M. californianus.

(con.)

Mytilus (Mytilus) edulis Linnaeus,1758. " Mytilus chilensis Hupe which I collected at Puerto Natales, Chile and Mytilus platensis d' Orb. at Commo--doro Rividavia are in my opinion varieties of Mytilus edulis. In my collec--tion are specimens mostly of my own taking from many places in Alaska, Aleu--tian Islands, Kamchatka,Manchuria, Kola Fjord, Strait of Magellan etc. One large specimen from Bohuslan, W. coast of Sweden is quite similar to Mytilus dunkeri from Japan. Specimens from Unalaska Island are up to 90 mm in length and 40 mm. in width. Mytilus crassiteste Lischke which I collected at Vladiv--ostock in 1928 is similar to specimens of Mytilus edulis from Unalaska but is correspondingly larger and heavier, being 112 mm. in length and 55 mm. in width. It also approaches Mytilus dunkeri Reeve from Japan. In its younger stages it is similar to and is the counterpart of Mytilus californianus in the Japan Sea.From Tromso, Norway, I have typical Mytilus edulis collected by I. Norberg and some very large ones collected by N. Lermond from Gays Island Knox Co., Maine.

Mytilus dunkeri Reeve. " Introduced from Japan on the California coast. Specimens collected by W.J. Eyerdam at Tsuruga, Japan and Vladivostock.

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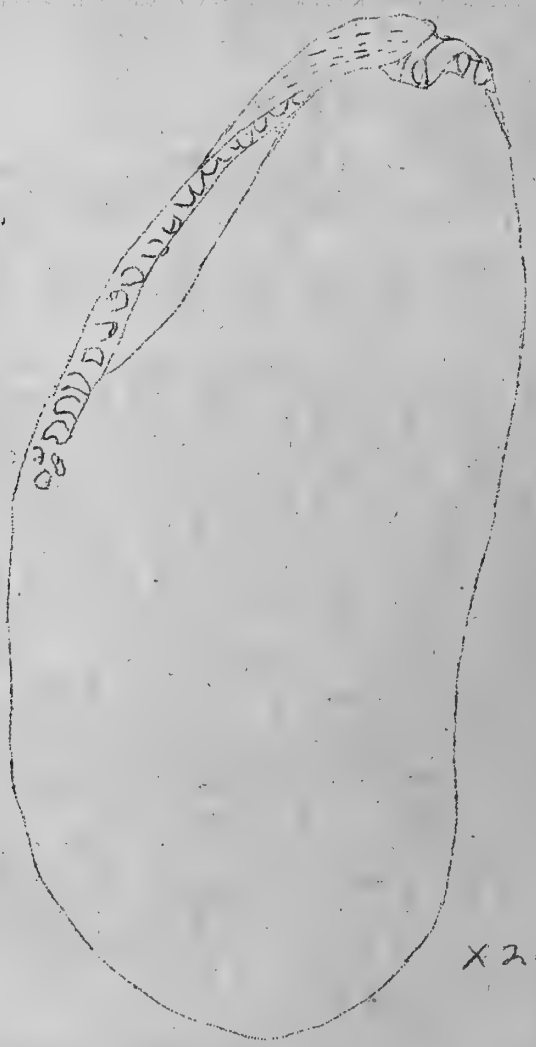
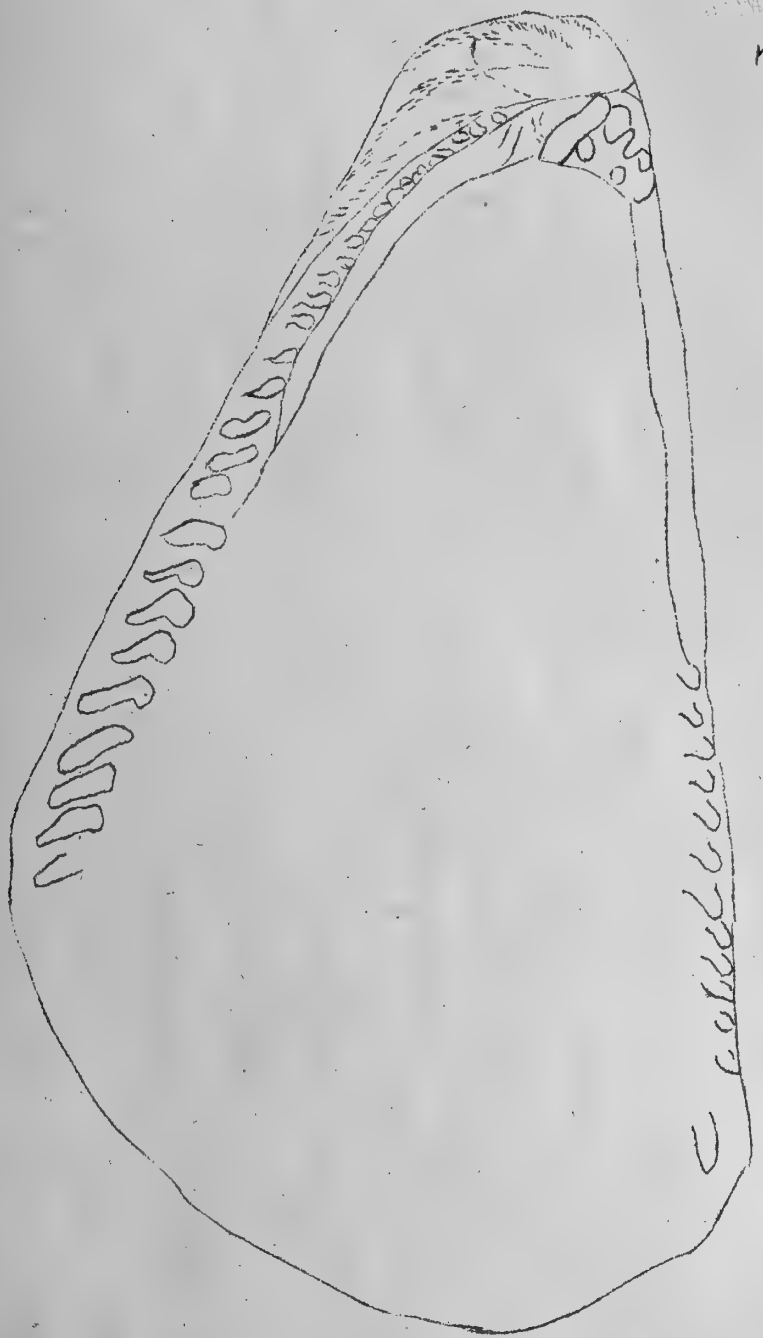


X 20

Mytilus multiformis Carp.
San Felipe, Mex. (Huttman)
6/37

Note by Tom Burch who drew these figures : " Young Mytilus stearnsi has characteristic shape as shown, but as they grow older and larger they approach the shape of Mytilus multiformis more closely. However, note the difference in HINGE and the fact that even on the nuclear part of stearnsi there are heavy ribs while on multiformis they are very faint. Note also the absence of " teeth" on the side opposite the ligament in multiformis as compared to stearnsi. I would say that these are definitely different species and possibly even genera."

Mytilus (Hormomya) stearnsi Pilsbry and Raymond
Punta Banda, Lower Calif., Mexico 10/1936

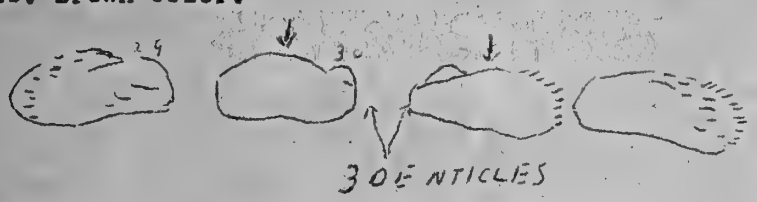


Genus Botulina Dall,1889. U.S. Nat. Mus. Bull. 37, p. 38. In this public--ation Dr. Dall simply used the name Botulina as a section without descrip--tion. However, in " Marine Mollusks of Hawaii", Bernice P. Bishop Museum Bulletin 153,1938, Dall, Bartsch, and Rehder, Botulina is set up as a distimct genus following the species of Modiolaria (Musculus) and described as follows " Shell small, elongate-ovate, with a more or less prominent posterior keel, moderately thin, with a thin brown periostracum clothed posteriorly with a dense mass of hairs; umbones anterior, terminal or nearly so. Sculpture like that of a Musculus , finely radiately costulate anteriorly and posteriorly, with a triangular, posteriorly expanding area below the beaks, which is dev--oid of radiate sculpture. Ligament subinternal, moderately stout, with rather strong denticles anterior and posterior to it. Margin crenulate; ventral margin slightly concave." Genotype: Modiola opifex Say (by monotypy).

Modiolus (Gregariella) opifex Say, 1825 is the label at this time on sets in all of our west coast collections with few exceptions. This is the name used by Dall in Bulletin 112 and followed by Mrs. Oldroyd. Dall gave the range as " Santa Barbara to Gulf of Calif.". But before consideration of the specific name it seems advisable to discuss the generic allocation. In the first place it seems certain that all of the species involved belong either in the genus Modiolaria (Musculus), or in a separate genus of their own rather than in the genus Volsella(Modiolus). Data and opinions follow without regard for arrangement.

We are indebted to Dr. A. Myra Keen for the following notes on the name Gregariella Monterosato, Naturalista Siciliano, vol.3, fasc. 3, p. 90, Dec. 1883. Type, fide Bucquoy,Dautzenberg, and Dollfus,1890; Modiolus sulcatus Risso,1826.(a homonym)-- M. barbatellus Cantraine, 1835, a Mediterranean species shaped like a Modiolaria (in fact, Lamy and others consider Greg--ariella a subgenus of Modiolaria rather than Volsella) , with radiating ribs and a heavy bearded epidermis on the posterior surface.

Below are tracings of figures of Modiolaria sulcata (Risso) as figured by Bucquoy,Dautzenberg, a nd Dollfus, Marine Moll. of Roussillon, vol. 2,1887. This is the genotype of Gregariella. The description mentions fine, radiat--ing ribs, internal ligament, and denticles at either end of ligament. Bearded epidermis. Brown color.



Comment : Obviously, if Bartsch and Rehder have determined that the mediter--annean species sulcata is definitely different, then Gregariella cannot apply to our shells and Botulina is good and should be used. However, no comparison in print to our knowledge seems to have been made of Botulina and Gregariella. Another note by Dr. A. Myra Keen follows:" Reviewing the matter again, I would say that Gregariella has priority over Botulina by a few years (as Dr . Dall apparently had recognized by 1907 when he published the Porto Rico list), that Gregariella is a subgenus of Modiolaria (or Musculus) , and that our species is distinct and nameless. The Dall,Bartsch, and Rehder usage of Botulina may have been an oversight; at least they do not definitely compare it to Gregariella and show its difference."

Lowe in Trans. San Diego Soc. Nat. Hist., vol.8, p.27, lists Gregariella denticulata Dall from Punta Penasco, Mexico.

However, Dr. L.G. Hertlein of the California Academy of Sciences, (per . communication, June 16,1944) says" The question of the correct genus for the west coast shell is something of a problem. The denticulation and bearded

appearance seems different from Modiolaria. I have compared our specimens of denticulata with the illustrations of Modiola sulcata Risso, the type of Gregariella, shown by Bucquoy,Dautzenberg & Dollfus in volume 2, pl. 29, figs. 29-32, and with specimens of this species from southern France in the Acad--emy's collection. The specimens from France are much less strongly radiately striated than the west American shells. Another difference is that the ventral margin is smooth while in the west American shells the entire margin is den--ticulated. The decision as to which genus to use seems to rest upon the imp--ortance of the amount of denticulation. After a consideration of the facts I am inclined to favor use of the name Botulina Dall because it seems to be applicable without doubt to denticulata. Perhaps one could use Botulina as a subgenus of Gregariella. However, since Botulina is available for the west coast shell both Allyn and I favor using it as a genus, subject of course to change if later study shows that it should be considered to be a subgenus of some earlier genus or possibly abandoned if necessary."

We will accept the advice of Dr. Hertlein and subject to later correcti--on use Botulina for the generic allocation.

Botulina denticulata (Dall),1871. American Journal of Conchology, vol.7, 1871, p. 154." Shell with a thick blackish brown epidermis, furnished poster--iorly with strong, fine, projecting beards, which entangle particles of sand etc., and form a solid mass of regular form, which cannot be removed without crushing the shell. There is an obtusely rounded carina to the posterior end of the shell, and by the formation alluded to this carina is greatly exagger--ated, sharpened, and made to terminate in a sharp point some distance beyond the end of the shell. The general form of the valve itself is elongate-ovate, with a not prominent umbone. Both ends of the margin are gently rounded, the anterior end being slightly the smaller. There is a slight gape and concavity in the middle of the ventral margin , otherwise both dorsal and ventral mar--gins are equally arched. The entire margin is denticulate, and the denticles are particularly strong on the hinge margin, which is interrupted for the large and strong ligament. The beaks are deep and vaulted and the valves in--flated. The color of the shell is pearly white, with a purple spot behind the posterior muscular impression, and the umbones tinged with purple. The epidermis is blackish bwown,thick, and liable to peel off; it is marked with faint radiating lines, as nearly as the incrustations will permit of perceiv--ing. Long. .7, alt. .4 in. Habitat, Acapulco,Mexico, Dall, 1868.

This very curious species is unlike any other I know of . In some res--pects it approaches Modiola opifex Say, which is a much more elongated shell from Rio Janeiro, Brazil."

The above species was described as Modiolaria denticulata Dall.

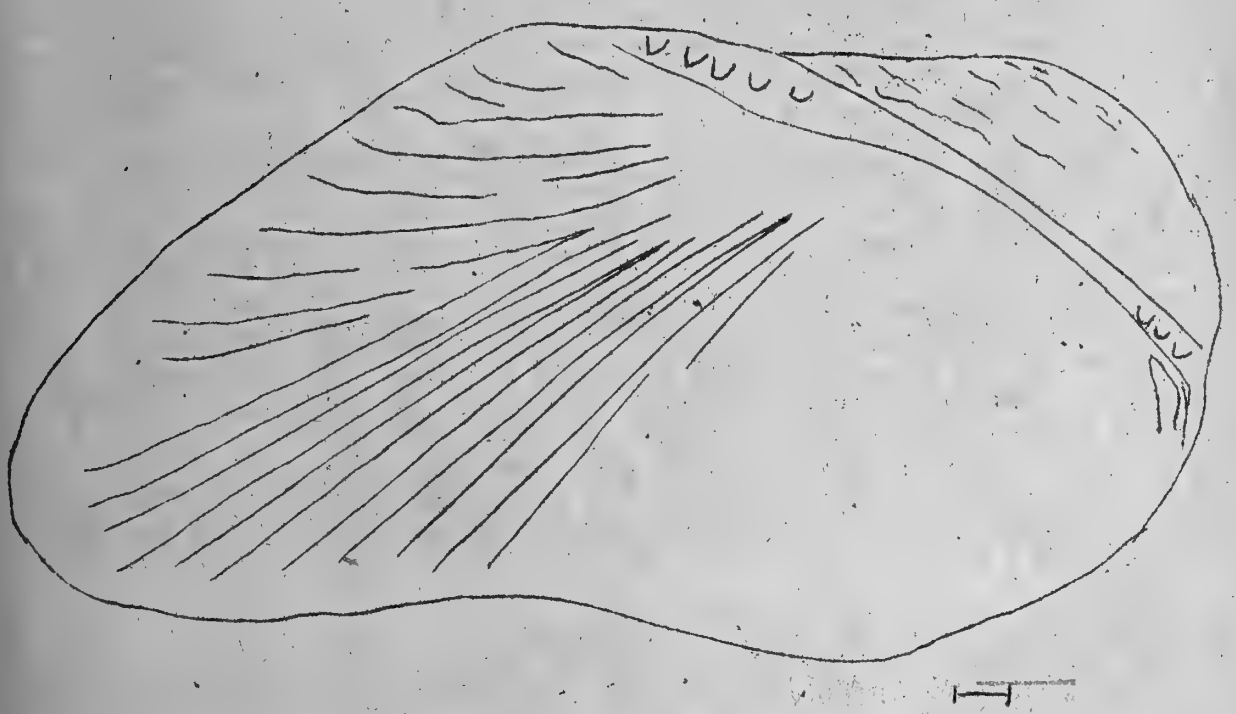
We have the following comments by Dr. A. Myra Keen of Stanford University " Comparison of west coast specimens of opifex with the original figure and with topotypes from the Caribbaean area leaves no doubt in my mind that our species is distinct. There seems to be no name for it unless the Modiolaria denticulata Dall mentioned by Orcutt in Molluscan World was intended to apply" " West coast specimens differ from east coast in outline as follows: groove shallower, posterior end less obliquely attenuated, posterior dorsal margin less pouting. " " The synonymy card in the drawer at the National Museum placed opifex under coralliophaga, with semen Reeve also as a synonym. This would have been Dr. Dall's last word on the matter."

Dall in The Mollusca of Porto Rico, U.S. Commission of Fish and Fisheri--es for 1900, published 1901, p. 470, lists, Section Gregariella Monterosato ,1884, Modiolus coralliophaga Gmelin,1792, equals Botula semen of authors, equals Modiola opifex Say.

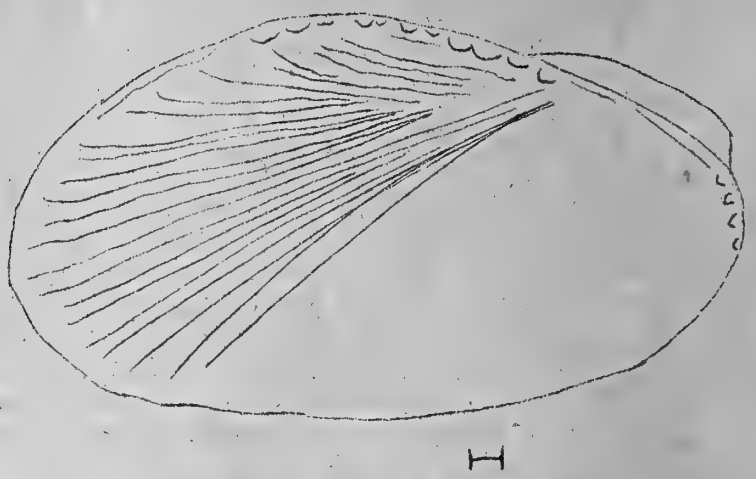
The original description of Mytilus coralliophagus Gmelin, in Systema Naturae ed. 13, p. 3359. " M. testa medio carinata margine crenata: umbone obtuso." Chemn. Conch. 8, t. 84, f. 752. Habitat in Oceano indico et americano, corall--ifero, scopulos pholadis instar perforans, testa 3/4 pollicis circiter longa." Dr. L.G. Hertlein (personal communication June,1944) " .. have just gone over the problem of the allocation of the small Modiola-like form generally referr--ed to opifex Say or denticulata Dall. A comparison of our specimens with Say's original figure convinces me that they belong to the same genus but there seems to be some doubt as to their specific identity. Say's shellsapparently has a more pronounced medial depression and the posterior end is more tapering. Whether these differences remain constant in a series of opifex from the east coast I do not know. According to Miss Keen the species are different and after a study of the original illustration and description I am inclined to refer our specimens to denticulata Dall. I have not seen a figure of the type of Dall's species. It was described rather fully ... Specimens from Lower Calif. seem to fit Dall's description. There may be a question as to whether or not the specimens from southern California are exactly identical or whether they may possibly be a separate subspecies."

Our conclusion is to refer this species either to Botulina denticulata (Dall),1871 or Botulina sp. Keen.

Collecting data: Our experience has been that it is a dredged species coming from moderate d epths. We have taken it rather frequently off Redondo Beach in the 25 fathoms gravel, and it was not uncommon in our dredgings from the deeper rocks, about 35 fathoms off El Segundo,Calif. We dredged it in both 40 fathoms and 20 fathoms off Monterey, Calif. (Burch) off Catalina Island in 30 fathoms (G. Willett).



Botulina coralliophaga (Gmelin),1792.
Sand Island,Florida. Koto.



Botulina denticulata (Dall),1871
El Segundo,Calif. 35 fathoms.

Genus Botula Morch,1853. Type (by subsequent designation, Dall), Botula fusca (Gmelin).
" Shell long,subcylindric or rhombic; beaks subterminal or subcentral."
Subgenus Adula H. & A. Adams, 1857. Type (by monotypy), Botula (Adula) soleniformis (d' Orbigny).
" Shell rhombic, with subcentral beaks; surface of valves polished, not incrusted. "
Botula (Adula) falcata (Gould), 1851. " Coos Bay, Oregon, to San Diego, Calif." (Dall). Type locality: Monterey, Calif.

This group with Lithophaga has been the subject of much speculation regarding the manner of boring in solid rock. The excretion of some acid to assist it in boring sounds logical but so far as reported to us no positive proof of this has been made.

B. falcata is distinguished from B. californiensis Philippi in that falcata has numerous transverse wrinkles in the dark brown periostracum. B. californiensis is shorter with more angular valves.

Collecting data: Boring in shale at San Pedro, Point Firmin, also La Jolla, Calif. Dredged in shale off Monterey, Calif. in 10 fathoms 8/37 (Burch)
Botula (Adula) californiensis Philippi, 1847. " Vancouver Island to San Diego, Calif.. North Japan" (Dall). Type locality: Vancouver Island.

This species is much more common in the northern part of the range. The predominant species in southern California being B. falcata. However, the species is taken in southern California.

Collecting data: Crescent City, Calif. and Agate Beach, Oregon 8/36, (Burch); San Diego, Calif. (Tremper) (G. Willett); Dr. A. Myra Keen reports that there is a tray of this species from San Diego in the Stanford collection.

Genus Dacrydium Torell,1859. Type: D. vitrea Sars.
" Hinge crenulations tuberculiform anteriorly, elongate posteriorly" (Tryon)
Dacrydium pacificum Dall,1916. " Bering Sea, 1401 fathoms" (Dall).

Genus Lithophaga Roding,1798. Type (by monotypy), L. mytuloides Roding--Mytilus lithophagus Gmelin.
" Shell cylindrical, inflated in front, wedge-shaped behind; epidermis thick and dark; interior nacreous." (Tryon S.S. Conch.)
" The wedge shaped posterior end of the shell serves to differentiate this genus from Botula." (Grant and Gale).

Subgenus Diberus Dall,1898. Type (by original designation), L. plumula Hanley " Shell with two or more radial sulci extending backward from the beaks; with a plume-like incrustation arranged in a distinct pattern on the areas between the sulci, and when projecting beyond the ends of the valves, opposed symmet--rically."

Lithophaga (Diberus) plumula (Hanley),1844. Type locality: Panama.

This is the label we have been using for our common rock borer. However, we have been informed by Mr. A.M. Strong that our California species will shortly have a new name. Obviously we cannot use another name until it has been published but Mr. Strong has given us the following data which is self explanatory, " Lithophagus calyculus Carpenter, Mazatlan Catalogue, p. 124/ Carpenter states that the incrustation lies in a solid triangular layer over the posterior part, with the arrow headed lines pointing away from the vertex of the triangle. At the extremity of the beaks there suddenly appears a deep cup dividing the termination into two knobs. Lithophaga plumula (Hanley), Carpenter,Mazatlan Catalogue, p. 125. Carpenter states that the incrustation for the most part presents the arrangement of a featherin lines running out on each side of a mid rib which joins the umbo to the posterior end. The in--crustation forms beaks beyond the shell, appressed but not prolonged or hollowed out. The difference in the incrustation shown by these descriptions form at least a varietal difference.Hanley's original description and figure of plumula is very similar to that of calyculus and the latter becomes a synonym of the typical plumula Hanley. The incrustations on our California shells is similar to plumula Carpenter,(not Hanley) and seems to be without a name. We will describe it as a new variety. Perhaps both occur here. We have the typical form from west Mexico and they appear quite distinct. I have seen nothing like them from California."

Collecting data: It is found boring in such mollusks as Chama,Haliotis, Hinnites, and other heavy shells as well as stone and shale. The bathymetric range is not known to us but we have dredged it from as deep as 20 fathoms off Monterey and 25 fathoms off Redondo Beach,Calif. (Burch).

Subgenus Myoforceps Fischer,1886.

" Similar to Diberus Dall, but the incrustation projecting beyond the ends of the valves is twisted."

Lithophaga (Myoforceps) aristata Dillwyn,1817. " La Jolla,San Diego Co., Calif. to Peru. Also Atlantic." (Dall). Johnson lists it from the Atlantic coast " North Carolina to the West Indies and Mexico".

Collecting data: We have specimens from the Caves at La Jolla,Calif. (Burch); early records show this species not uncommon on Deadman's Island, San Pedro Harbor, but this locality has been d redged away and there have been no recent reports from the San Pedro vicinity.

Subgenus Labis Dall,1916. Type (by original desig.), Lithophaga attenuata Deshayes. Dall in Proc. U.S.N.M. Vol. 52, pp 405-6 states " The typical Lith--ophaga has a clean outer surface; Diberus a divaricate posterior incrustat--ion; Myoforceps , two crossed conical projections; the present form has on each valve a semicylindrical smooth appendageof which the distal end is inter--nally flattened and somewhat separated from the appendage of the opposite valve, the ends being rounded."

Lithophaga (Labis) attenuata Deshayes, 1836. " Monterey to Patagonia" (Dall) The Monterey record of this species is subject to great douht. H.N. Lowe and others report this species from west Mexico. However, I have never seen a specimen said to originate in California. Allyn Smith writes " Several lots in the collection of the California Academy, of which the most northerly locality is San Ignacio Lagoon,Mexico. It is not in our fauna."

Genus Modiolaria Beck,1838. Type (fide Stoliczkam1871),Mytilus discors L. " Shell rhomboidal,sculptured by two rows (one on each side of a lateral area) of striae, which radiate from the beaks, leaving the middle portion smooth; umbones incurved, hinge edentulous or crenulated, with the hinge plate finely notched. "

Here we have another dispute- Modiolaria Beck vs. Musculus Roding,1798 " Musculus Bolten being preoccupied by Thomas Martyn, Modiolaria takes its place" (Grant and Gale.). This conclusion has been accepted by the great majority of recent authors,; A. Myra Keen " Abridged Check List" 1937, Dr. Joshua L. Baily Jr. in " West Coast Shells", Johnson " Mollusca of the Atl--antic Coast", Dr. Louise Perry, Maxwell Smith and other writing of the Atlantic fauna all have accepted Modiolaria. However, there is another group who reject all of Martyn's work thereby nullifying Musculus Martyn and leaving Musculus Roding the name for this group. Dall,Bartsch & Rehder in " Marine Molluscs of Hawaii" 1938 state this position as follows " This name (Musculus) has recently been considered to be preoccupied by Musculus Martyn 1787, but in our opinion Martyn's name is not available, his classification being non-Linnean." Several opinions on this matter follow. Dr. Joshua L. Baily Jr. (personal communication June 1944) " I used Modiolaria because I had not rejected Martyn. Dall used Musculus in Bull. 112, but restored Mod--iolaria in his supplement to Bull. 112. Dall,Bartsch & Rehder did not pub--lish until after Dall's death, and I think that the rejection of Martyn reflects the opinion of Bartsch and Rehder rather than Dall. My feeling is that Martyn's synonymy (not his classification) is so confused that it is impossible to tell whether it is Linnean or not. To reject it because it is not Linnean is just as dogmatic as to accept it because it is Linnean. Until the International Commission has ruled on it, I feel that each one of Martyn's names must be acted upon separately. We do not have a copy here. Grant has one a t U.C.L.A. He accepts Martyn. Pilsbry and Baker do not. If you have never seen a copy of Martyn I can tell you a little about it. His difficulty is not like that of Martini and Chemnitz. The latter authors used polynomials of s o many terms that they are quite inconsistent with the Linnean system and so their work is naturally rejected. But Martyn frequently used a single word f or a name. If he intended this for a genus, or for a species under some other genus, his w ork is Linnean, but if he intended to introduce a system in which some species would be called by a single word, then his work is not Linnean" But it is impossible to tell what he meant, a nd it may well be that we must accept some of his names and not others."

Dr. A. Myra Keen rejected a number of Martyn's names in a recent work " An Annotated Check List of the Gastropods of Cape Arago,Oregon" and we find her opinion on the matter of interest (personal communication June 1944) " The Martyn matter is a mess and will continue to be until someone formally petitions the International Commission for a ruling. The problem is: granted Martyn's specific names are non-binomial, must his generic names be rejected, also. A few years ago in another connection we received a partial answer from the Commission to the effect that generic names proposed by a non-binom--ial author might be valid provided they were binary (there's a difference, but dont lets get technical). Accodingly, pending a definite ruling, I have been accepting Martyn's genera (Purpura, for example) but disregarding his species. However, one of our students in mulling over the problem pointed out to me that part of Martyn's specific names were clearly binomial, part not. Some day I want to take time off to go over to our Rare Book Room, where Stanford's copy of Martyn is stored, and make a careful inventory of the names. In re Musculus, it would appear, from the policy mentioned above that we should continue using Modiolaria.."

Modiolaria nigra(Gray)1824. " Arctic Ocean to Oregon. Circumboreal" (Dall).

Collecting data: Ketchikan,Craig,Forrester Id.,Alaska (G. Willett); 20 fathoms in Puget Sound by Mr. Oldroyd (A. Smith); Kodiak Id. 15 fms., Montagu Id. 18 fms., Frederick Snd. 12 fms. (Lewis Coll.); Ishut Bay, Afog--nak Id., Hinchinbrook Id., (W. Eyerdam); Flensburg,Schleswig (I. Norberg) (Eyerdam); Whalerspynt, Spitsbergen (20-30 fsm. clay),1864 (Hans Schlesh) .

Modiolaria nigra obesa(Dall) 1916. " Arctic Ocean to Cape Flattery" (Dall).

Modiolaria protracta(Dall)1916. " Nunivak Island, Bering Sea to Monterey"(Dall

Note from Allyn Smith " Dall's Monterey record is an error, based on the misidentification of a worn specimen of Botulina opifex. I suspect the specie s is found only in the northern fauna."

Modiolaria olivacea(Dall)1916. " Bering Sea to Catalina Island,Calif." (Dall)

The Catalina Island record is probably an error also. No member of the club reports ever having seen a specimen from southern California. Reported by George Willett from Umnak Island, Alaska, dead on the beach.

Modiolaria impressa(Dall)1907. " Petrel Bank, Bering Sea" (Dall).

Modiolaria taylori(Dall)1897. " Victoria,Vancouver Island" (Dall).

Collecting data: Departure Bay, B.C. (G. Willett); Departure Bay, B.C. collected by Mr. Oldroyd (A. Smith).

Modiolaria substriata(Gray)1824. " Arctic Ocean to Puget Sound. Circumboreal" (Dall); Greenland to New York, 5-100 fathoms (Johnson).

Collecting data: Puget Sound(G. Willett); Punuk Island, Bering Sea, Nunivak Id., Bering Sea, 8-10 fathoms, Parlof Bay, Alaska 13-15 fathoms, Frederick Sound, Alaska 12 fathoms, Victoria, B.C. 10 fathoms (Lewis Coll.) : reported by W.J. Eyerdam- Izhut Bay, Afognak Id., 1922 and Elrington Id. 1924, W.J. Eyerdam on kelp holdfasts, Hinchinbrook Id., Norberg 1936, Chatanga Bay Arctic Ocean, Vega Expedition 1878.

Modiolaria corrugata(Stimpson)1851. " Arctic Ocean to Puget Sound. Circumbor--eal." (Dall); " Greenland to North Carolina 2-100 fathoms (Johnson).

Collecting data: Unalaska, 1932 (W.J. Eyerdam); Tromsosund, Norway,1935 (Norberg).

Modiolaria vernicosa(Middendorff) 1849. " Bering Sea to Sitka. Also Oshotsk Sea" (Dall).

Collecting data: Forrester Island and Umnak Island, Alaska (G. Willett); common on eel grass Mallard Bay, Knight Island 1923 and Thum Bay,Knight Id. 1939 and 1940 collected by W.J. Eyerdam; also Elrington Id. and Evans Ids., Prince William Sound (Eyerdam).

Modiolaria phenax(Dall)1915. " St. George Island, Bering Sea" (Dall).

Collecting data: Amaknak Id.,Alaska(G. Willett); Saltwater Lake, Amaknak Island from the Oldroyd collection (A. Smith).

Modiolaria marmorata(Forbes)1838. " Circumboreal ? " Puget Sound" (P.P.C.)((Dall). Collecting data: Tromsosund, Norway,1935 (I. Norberg) (Eyerdam).

Modiolaria seminuda(Dall)1897. " Bering Sea to Forrester Island, Alaska" (Dall

Collecting data: Craig, Alaska in 20 faths. (G. Willett); Frederick Sound, Alaska (Lewis Coll.);

Genus Crenella Brown,1827. Type (probably by monotypy), Mytilus decussatus Montagu,1808.

" Shell oblong-oval, equilateral,ventricose; beaks obtuse, slightly tur--ned to one side; hinge destitute of teeth, but with a flattened, horizontal slightly crenulated plate on one side of the hinge in each valve; right valve with a triangular, horizontal, projecting, reflexed plate, and the left one with an oblique plait, both of which are a little crenated externally.(Brown)"

Crenella decussata Montagu,1808. " Bering Sea to Puget Sound and south to San Pedro,California; also Atlantic" (Grant and Gale); " Greenland to North Carolina, 5-124 fath. Circumpolar." (Johnson).

Collecting reports: Ketchikan,Alaska 25-30 faths. (G. Willett); Drier

Bay,Knight Island, Alaska dredged..1923 (W.J. Eyerdam); Hinchinbrook Id., Alaska, dredged..1936 (I. Norberg) (W.J. Eyerdam).
Crenella divaricata Orbigny,1845. " Santa Barbara Islands to Panama Bay. Also West Indies. (Dall); " North Carolina to the West Indies." (Johnson).

In a preliminary note John Q. Burch wrote the following and received several different opinions. " Crenella decussata and divaricata make a very confusing group to me. Grant and Gale, 1931, state that divaricata is probably a tropical race of decussata. These small species of Crenella are very comm--on in dredgings in comparatively shallow water, usually 25 to 50 fathoms and in mud. We have specimens in any number from off Redondo Beach,Catalina Id., San Diego,Coronado Islands, Ensenada,Mexico etc. I have on many occasions attempted to separate decussata from divaricata with poor success. Dall says of divaricata " This little shell is not to be distinguished, except by its nearly white color, from the young of C. decussata of the same size." My question is very simply this. What do you propose to do with a thousand of them coming up in the same dredge haul and nicely mixed from white to yellow to brown? " This note brought the following comments. " Small southern race of decussata" (George Willett). The following remarks came from Allyn Smith " C. divaricata- As we have concluded, this is only a Gulf and tropical species, not found in California. It is distinct from decussata,and is commonn in the Gulf. As a further check, we compared the Academy's lots of West Coast decussata with material from Europe and Florida. We believe all your speci--mens from Redondo are probably decussata." So if it is true that these species are clearly distinct, it is probable that the Burch collection does not have a set of true divaricata.

Carpenter made the following comment in his " On Mollusca of the West Coast of North America" 1863 " C. decussata Mont. Exactly accords with Atlantic specimens".

In studying this group we became interested in a southern species, C. inflata Carpenter, 1864. We know of no record indentifying this species as part of our fauna, but since we had some difficulty in getting the original description we shall reproduce it here for the convenience of any member interested in checking up on it. The original description was in Latin with a note as follows: " Crenella inflata Carpenter,1864. Ann. Mag. Nat. Hist. ser. 3, vol. 13, p. 313. "? C. testa valde inflata, minuta, albida,subrhombo-ideo-orbiculari; diagonaliter parum producta; marginibus subquadrangulatim rotundatis; umbonibus prominentibus, valde antice intortis; tota superficie ut in C. decussata sculpta, costulis crebris radiantibus aequidistantibus, hic et illic aliis intercalatis; lirulis concentricis decussantibus: intus margine dorsali brevissimo, arcuato,dentato; ligamento curtissimo, in fossa omnino interna, celata, lamina definiente, sito; lamina cardinali sub umboni--bus intus porrecta, dentibus validis instructa; marginibus internis omnino crenatis; cicatr. adduct. subaequalibus, vantraliter sitis. Lon. .1, lat. .12, alt. .09 poll." " Located provisionally in Crenella from its likeness to C. decussata, but with peculiarities of hinge and adductors which approach Nuculina on one side and Cardilia on another." Type locality: Cape San Lucas. Collected by J. Xantus.

The following comments on inflata were received. " This sounds most like C. d. divaricata of any of our California species, but, being from Cape San Lucas, it may be entirely different." (George Willett). " Collected by C.B. Adams, no location, p. 39" (Dr. Joshua L. Baily Jr.).

Carpenter's document "A" contains the following: " Valves, very rare. (An aberrant form). Also Panama, C.B. Adams".

Crenella leana Dall, 1897. " Aleutian Islands, eastward to Middleton Island Alaska" (Dall).

Crenella columbiana Dall, 1897. " Aleutian Islands to San Diego, Calif." ((Dall).

Collecting data: This species is easily identified. It is the largest of the genus, more inflated than the above species, and is of a greenish gray color. We have dredged it frequently in mud usually around 50 fathoms. We have taken it in considerable abundance in dredgings from 40 fathoms off Monterey, 25 to 50 fathoms off Redondo Beach, 50 fathoms off Ensenada,Mexico . It is not uncommon in the Pleistocene of Timm's Point, San Pedro. (Burch); Craig, Alaska, 10-25 fathoms, San Pedro, 10 fathoms, Catalina Island, 30 fathoms, Los Coronados Islands, 30 fathoms (G. Willett); Unalaska, Illuliuk Bay, dredged, 1932 (W.J. Eyerdam).

Crenella grisea Dall,1897. " Bering Sea to Sitka, Alaska" (Dall).

Collecting data: Forrester Island, Alaska, 30 fathoms (G. Willett).

Crenella rotundata Dall,1916. " Santa Cruz Island, Calif. in 155 fathoms"(Dall)

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Corrections and Additions

Mytilus dunkeri Reeve- " The Academy now has sets of Mytilus from La Jolla (Dr. Coe) and from Anaheim (E.P. Baker). It has a single specimen of dunkeri from Japan, which agrees with the type figure quite closely. The two shells are very different, the principle one being that dunkeri has a light pearly nacre on the inside that is not at all like the southern California shells called dunkeri. Also dunkeri has a more concave ventral margin and the umbon--es are almost hooked at this end of the shell. If what we have is really dunkeri then the southern California shells are not this species. Comparison of the latter with M. edulis galloprovincialis from the south of France show no differences whatever. If the two lots were mixed there would be no way to separate thema gain. Our conclusion is that your shells are M. edulis . If they were dunkeri, they would have to have been introduced, probably with Jap oysters (O. laperousii Schrenck). I know of no such commercial introduc--tion of this oyster in southern California although it has been raised from spat from Japan at Elkhorn Slough in Monterey Bay and Drakes Bay. We have found no Jap Mytilus at either place yet in spite of the fact that Paul Bonnot of the Fish and Game Commission has been watching for it." (Allyn Smith, California Academy of Sciences, personal communication , June, 1944).

Dimya coralliotis Berry, 1944. Proceedings of the Malacological Society of London, Volume 26, part 1, May 4, 1944, pp 25-26. Type locality: 100 fathoms, in westerly direction 10 miles off Huntington Beach,Orange Co.,Calif.; specimen found adhering between the branches of a large Porosa coral (Dendro--phyllia oldroydi Faustino) hauled up by Mr. Shelton, fisherman, c.1 March 1936. Holotype: Cat. No. 8435 Berry Collection. Measurements of holotype: Longest diam. 14.7, shortest diam. 10.3, width 4.6 mm.

There are four figures but they are so indistinct that they will be of little value in classification. However, Dr. Berry gives a very full and clear description of the species. One comment follows " .. but the more tangible and trenchant peculiarities of D. coralliotis may be summarized as the possession of a more rudely finished shell than D. californiana, with the upper surface of the left valve scurfy rather than laminated, attached only by about the umbonal quarter of the right valve, and with the muscle scars more nearly circular and otherwise different both in shape and position.

This species should be studied in connection with Dimya californiana Berry, which we discussed in our issue # 34 p 10.

Family PERIPLOMATIDAE

Genus Periploma Schumacher, 1817. Type (by monotypy), Periploma inaequivalvis Schumacher.

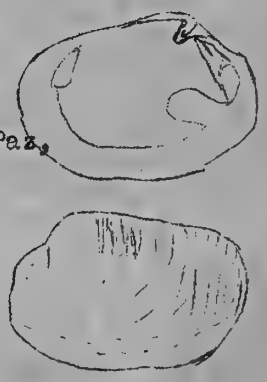
" Shell oval, very inequivalve, inequilateral, slightly nacreous; left valve deepest; posterior side very short and contracted; hinge with a narrow, oblique spoon-shaped process in each valve, and a small triangular ossicle; an inter--nal rib proceeds from under the hinge to the posterior margin; muscular im--pressions unequal, the anterior long and narrow, theposterior small,semi--lunar; pallial impression marginal. Siphons long and slender, separate.(Tryon)

Periploma planiuscula Sowerby,1834. " Point Concepcion,Calif. to Guayquil" (Dall) " Negritos,Peru (Olsson, Naut. 57, p. 128)" Dall listed range San Pedro south. Type locality: Isla de Muerte,Guayquil. P. argentaria Conrad is a much used name in the synonymy of this species.

This is the common southern California Periploma. The habitat is evident--ly just below the low tide line. The shells are washed in by the surf not infreuqently still living, but I have never heard of a collector taking a littoral specimen in what seemed to be its natural habitat. It must be a very abundant species in the off shore reefs along the coast from Long Beach to Huntington Beach as it is usually possible to pick up dead valves by the hundreds.

Periploma alaskana Williams,1940. Pomona College Journal of Entomology,June, 1940. Type locality: Lat. 68 degrees, 37 ' north long. 168,53' west in 32 fathoms, fine mud bottom, Arctic Ocean and known to range to Mac-Leod Harbor,Montague Island,Prince William Sound, Alaska, in 25 fathoms shell bottom.

Periploma discus Stearns, 1890. Monterey,Calif. to La Paz, Lower Calif. The Hopkins Marine Station have spec--imens dredged in 20 fathoms in Monterey Bay, and H.N. Lowe listed it from the mud flats at La Paz. Dall gave the range as San Pedro to San Diego.



Periploma

Collecting data: San Pedro Harbor, 10 fmd. mud (G. Willett); ~~off~~ Redondo Beach in 50 fathoms mud (Burch); in 1915 both Mrs. Eshnaur and E.P. Chace reported finding this species in some numbers after a storm on Terminal Island and at Seal Beach.

Subgenus Halistrepta, Dall, 1904. Nautilus 17, p. 123.

" This species is, we believe, the first Periploma known to possess an un--dulated sculpture, and bears to those of the ordinary type such a relation as that of Cyathodonta to Thracia or Labiosa to Raeta."

Periploma sulcata Dall, 1904. Known only from the type locality, San Pedro Bay, Calif. This species was apparently described from one specimen washed in after a storm and found by Mrs. Oldroyd.

The only other record we know of is one specimen dredged off San Pedro by George Willett in 15 fathoms.

An interesting little note is at hand from Dr. Joshua L. Baily Jr, " Periploma is neuter. Should be P. planiusculum according to Berry." This is one for the Latin scholars. It is not the common usage.

Family Thraciidae
Genus Thracia Blainville, 1824 (Dict. Sci. Nat. vol. 32, p. 347). Type (fixed by Blainville, 1827, Man. Mal., vol.2,p. 660), T. corbuloidea Blainville. Note by Dr. A. Myra Keen " Unless this interpretation of the type is taken, under analogy with the case cited in Opinion 6 of the Inter--national Rules, the type of Thracia must be T. pubescens Pennant, by desig--nation of Anton,1839. Blainville in 1824 proposes Thracia with two divis--ions, A and B, for which he cites as examples "T. corbuloidea" and " T. pubescens Leach", respectively. In 1827 he says that division B should be suppressed, as the species he previously cited was misidentified. This, it seems to me, could be construed as fixing the type in a manner acceptable under Opinion 6 of the Rules." Note that the author of corbuloidea is not Deshayes, as often cited."
" Shell rather thin, often bluntly rostrate; sculpture lacking or consis--ting of concentric striae, with or without concentric or oblique undul--ations, sometimes with fine granulations; beaks generally in contact, and one or both perforated (usually the right) by contact with each other. Size up to 100mm in length or more." (Grant and Gale).
Subgenus Thracia s.s.
Thracia (Thracia) trapezoides Conrad, 1849. Craig, Alaska to Redondo Beach, Calif. Described in " Fossils from Northwestern America", in J.D. Dana, U.S. Exploring Expedition ..v. under Charles Wilkes, vol. 10, p. 723, pl. 17, fig. 6a. Original description reprinted by Dall in U.S. Geol. Survey Prof. Paper 59, 1909, p. 153. Type locality: Astoria, Oregon,Miocene.

Grant and Gale give the range " Puget Sound (I.S. Oldroyd,1924); Craig,Prince of Wales Island,Alaska" (G. Willett)". However, Dr. Myra Keen in " Abridged Check List" brought the range down to Monterey, Calif. giving latitude 36 to 56. The Burches have dredged it in considerable numbers off Redondo Beach in about 75 fathoms mud bottom . This is a considerable ext--ention of the range southward and would make Dr. Keen's range read 34-56.

The reason for discussing this species first is beacuse according to Grant and Gale, it is very close to T. corbuloides Blainville, the type species. It is well figured in Oldroyd " Marine Shells of the West Coast of North America" and also by Grant and Gale, 1931.

It is a common species in the Timm's Point Pleistocene of San Pedro.

Dall mentioned this species in writing of Thracia curta Conrad, " The fossil T. trapezoides Conrad is a more elongated shell". Grant and Gale state " This species is recognized by its rather short, broad rostration" and they emphasize this as a means of differentiating between T. curta and T. trapezoides. " The imperfection of the right beak is typical of Thracia" " Imperfect right umbones due to contact with the left beak."
Thracia (Thracia) curta Conrad, 1837. " Icy Cape, Arctic Ocean, Bering Sea, south to San Diego, Calif. (Oldroyd); San Hipolito Point, Lower Calif., Mexico (in Hemphill collection- Jordan); to Punta Penasco, Sonora,Mex. (Lowe- Trans. San Diego Soc. Nat. Hist. vol.8, no.6,1935)(with note from Dr. A. Myra keen on the Punta Penasco record " Corrected range: 23-71.I also found it there."

This species is not a common shell but has been taken by most littoral collectors to some extent. Our southern California specimens are quite small by comparison with specimens of the same species from the north. In fact, it would seem to be indicated that perhaps some of the northern records for this species should be reexamined for possible misidentification. The specie s is usually taken in crevices and other protected places. Our experience has been that it is very abundant for the species at San Onofre, Calif. in the rubble reef at minus tides. We have also collected it from many other points in the littoral from San Luis Obispo county to Bird Rock, San Diego. We have taken it from wharf pilings on several occasions. We are not certain of the bathymetric range but have dredged it off Monterey in 20 fms. on shale.

W.J. Eyerdam reports having taken T. curta at, Drier Bay, Knight Island, Pr. Wm. Sound, 1923, dredged; Hinchinbrook Island & Atka Id. 1932 (Norberg).

Thracia (Thracia) beringi Dall, 1915. " Bering Sea, Aleutian Islands and south to Sitka, Alaska" (Dall). Departure Bay (Taylor), to Puget Sound (Oldroyd). Type locality: Commander Islands.
Collecting data: Wislow,Unalaska Id., and Atka Id., 1932- not common(Eyerdam)

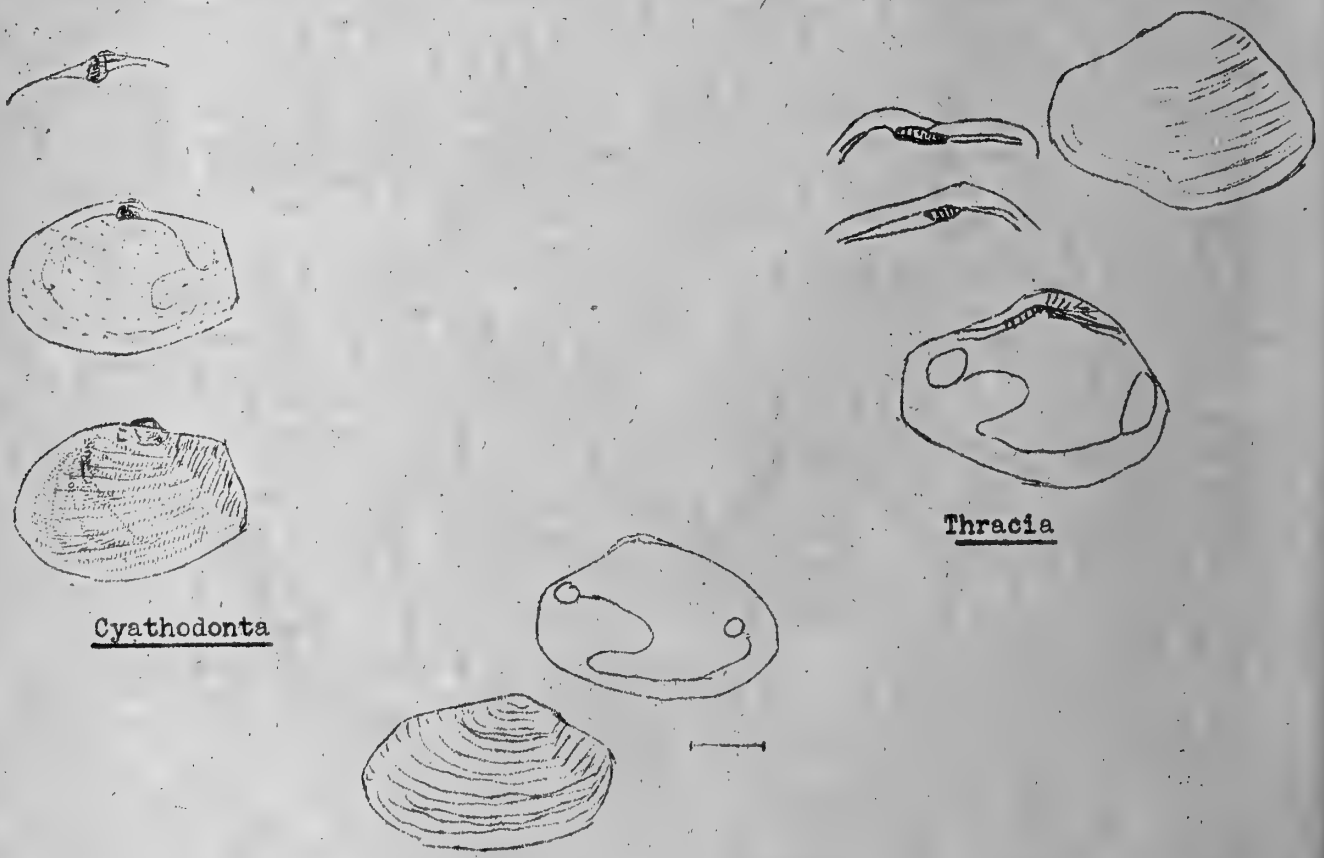
Thracia (Thracia) challisiana Dall, 1915. " Forrester Island, Alaska to Gulf of Georgia" (Dall); Keen " Abridged Check List" gives the range 37-55, and a note from Dr. Myra Keen " Collected at Monterey, Calif. by Mackenzie Gordon. Oldroyd also gives Monterey.

Collecting data: Craig,Ketchikan,Forrester Island,Alaska in 25-30 fms. (G. Willett).

Thracia (Thracia) diegensis Dall,1915. " San Pedro Bay, Calif. to Magdalena Bay" (Dall). Type locality: " San Diego Bay, in 1 to 5 fathoms, sandy mud, very abundant" (Dall).

Our collecting experience has been to find this little species quite rare. We took it from the mud around the bridge pilings in Anaheim Bay,3/38 and later dredged it off Ensenada,Mexico in rather deep mud probably 20 and 35 fathoms. (Burch).

Our collecting reports on this species are ommitted in this report pending further study. Several of the club members have sets labelled Asth--enothaerus villosior Carpenter that are certainly the same species others have been calling diegensis. Several of the members have made comments as Mr. George Willett " Same as Asthenothaerus villosior Carp."?



Thracia

Cyathodonta

Asthenothaerus

Note from Dr. A. Myra Keen regarding the figure in her " Key to Pelecypod Genera" crudely traced above," The figure in the Pelecypod Key was obtained from U.S. National Museum and is of the holotype."

Genus Cyathodonta Conrad,1849. Type (by monotypy), Cyathodonta undulata Conrad. Original description of genus " An inequivalved bivalve; hinge with a broad not very projecting cartilege fosset, which is carinated near the margin; muscular impressions rounded, indistinct; pallial impression with a large rounded sinus."

Grant and Gale, 1931, say " Shell much like that of Thracia s.s. but with prominent, obliquely concentric undulations". And Grant and Gale make it a subgenus of Thracia. However, the general usuage has been to consider Cyathodonta a distinct genus and there are other differences in addition to the undulations. Grant and Gale state " This imperfection of the right beak is typical of Thracia s.s. , but Cyathodonta has an entire right beak or but a small eroded hole on most specimens. The ligament of Cyathodonta is internal on a definite chondrophore, while the ligament of Thracia corb--uloidea and Thracia trapezoides is external". A note from Dr. Joshua L. Baily Jr. on the genus vs. subgenus matt er " This is a matter of personal taste. I think we have too many genera, and would make Cyathodonta a subgen--us. But probably most people would agree with you." We are disposed to give it generic standing.

Cyathodonta undulata Conrad,1849. Monterey, Calif. (collected by Mackenzie Gordon and recorded by Dr. A. Myra Keen) to Tres Marias Islands, Mexico (record by Strong a nd Hanna).

Dall (Proc. U.S.N.M. vol. 49, p. 444, 1915) gives the distribution of this, the type species of the genus as " La Paz and other localities in the Gulf of California". Then in the same publication on page 445 Dall des--cribed C. dubiosa and C. pedroana. Conrad did not figure the species in his original description. Grant and Gale, 1931, state that southern Califor--nia shells fit Conrad's description of undulata and " we do not believe that the distinctions Dall has used for separation of dubiosa and pedroana as full species are significant." So Grant and Gale list Dall's species in the synonymy of undulata as the only distinct species on the California coast. The preponderance of oponion seems to favor this conclusion. Note on the matter by Mr. George Willett of the Los Angeles Museum " Cyathodonta undulata Con.(plus C. dubiosa,plus C. pedroana Dall)." Dr. A. Myra Keen (personal commun. July 1944) " I have compared our Gulf and Lower California specimens with San Pedro and San Diego material and am ready to concede that only one biologic entity is involved. The size and position of the pallial sinus is variable, as are outline,convexity, and sculpture. The name, of course, will be undulata." However, there are those who disagree. A note from Dr. Joshua L. Baily Jr. states " In 1932 Grant told me that he now considered undulata and dubiosa distinct,and that dubiosa alone was found in Alta California. I would follow him." Dall states that undulata from La Paz etc. " The pallial sinus is rounded and high, reaching the vertical from the beaks" , and for both dubiosa and pedroana " pallial sinus is not so high relatively and falls short of reaching the vertical of the beaks". Dall in Bulletin 112 gave the range of dubiosa " San Pedro to San Diego and the Gulf of California, thereby overlapping his range of undulata. In the description of C. pedroana Dall stressed differences in shape anf sculpture in comparing with dubiosa " more pointed behind" " plaits are more numerous (25), narrower,more close set, and more regular" " reach the posterior dorsal margin". Pedroana is described as a smaller shell.

Orcutt in his " Molluscan World" and others have listed Cyathodonta plicata Deshayes from the California coast. Grant and Gale say that plicata is more elongate than undulata. However, Dr. Myra Keen (Per. Comm. July 1944) disposes of these records as follows" C. plicata (Deshayes) was described without locality; afterward Deshayes attributed it to West Africa, but other authors have identified it as Indo-Pacific,Caribbean, etc. etc. ".

Genus Asthenothaerus Carpenter,1864. Type: A. villosior Carpenter.
" Shell like a Thracia, hinge without teeth, spongy cartilage situated in a pit under the umbos." (Oldroyd).
Asthenothaerus villosior Carpenter,1864. " San Pedro, Calif. to Cape San Lucas" (Dall). Type locality: Cape San Lucas, Lower California, Mexico.

As stated above in the discussion of Thracia diegensis Dall, many of the members are confused in regard to this genus. It is either extremely close to Thracia s.s. or else the sets in local collections labelled Asthen--othaerus are not that genus. A further report must be made after more information is on hand.

Family PANDORIDAE
Genus Pandora Bruguiere,1797. A number of authors including Dall in Bull. 112 and followed by Grant and Gale and others, have given the genus Pandora Hwass in Chemnitz,1795. Dr. A. Myra Keen (Per. Comm. July 1944) " Until a ruling by the International Commission has been made on Chemnitz, it is better not to accept his names. Therefore the citation should be: Pandora Bruguiere,1797 (Encycl. Meth. livr. 2, p. 250) (genus without species; type fixed by Lamarck,1799-- Pandora inaequivalvis (Linne)." This is used by Tryon,Oldroyd etc.
" Shell inequivalve, thin,pearly inside; valves close, attenuated behind; right valve flat, with a diverging ridge and cartilage furrows; left valve convex, with two diverging grooves at the hinge; usually no ossicle; pallial line slightly sinuated. Outer layer of regular vertival,prismatic cells".
Subgenus Pandora s.s. " Right valve with two cardinals; left valve with one obscure cardinal or none; lithodesma absent; right valve with feeble concentric sculpture." (Grant and Gale). The typical is not represented on the California coast.

Subgenus Kennerlia Carpenter,1864. Type (by subsequent desig. Dall,1903), K. filosa Carpenter.
" Like Pandora s.s., but with a lithodesma; right valve with fine but widely spaced and somewhat irregular radial striae."
Pandora (Kennerlia) grandis Dall,1877. " Pribilof Islands, Bering Sea, to Siletz Bay,Oregon." (Dall). Type locality: Unalaska.
" recognizable by its large size, curved dorsal margin and lack of rostrat--ion" (Grant and Gale.)

Collecting data: Wrangell,Alaska, 50 fathoms in mud (G. Willett); San Juan Islands and Victoria, B.C. in sandy mud (W.J. Eyerdam); specimens up to 45 mm. in length, Orca, Pr. Wm. Sound (Norberg) (Eyerdam).
Pandora (Kennerlia) forresterensis Willett,1918. " Forrester Island,Alaska 50 fathoms (Dall); Ketchikan, 20-30 faths., (G. Willett); Prince Wm. Sound 18 fathoms, Frederick Sound, 12 fathoms (Lewis).
Pandora (Kennerlia) glacialis Leach,1819. " Arctic Ocean and south to Fuca Straits; also Atlantic" (Dall). On the Atlantic " Arctic Ocean, Gulf of St. Lawrence and off Martha's Vineyard, Mass. 45-100 faths." (Johnson). Type locality: Greenland. " ... the right valve has two or three posterior radial plications and a broad sulcation ventral to them" (Grant and Gale).

Collecting data: Storfjord, Spitzbergen..5-10 fms. clay (Eyerdam coll.)
Pandora (Kennerlia) glacialis eutaenia Dall, 1915. " Port Etches and east--ward at Sitka, Alaska," (Dall). " ... a more rostrate posterior end and averaging larger than the typical form." (Dall).

Pandora continued in next issue.

Pandora (Kennerlia) filosa Carpenter,1864. " Nunivak Island, Bering Sea to San Pedro, Calif." (Dall). To Ensenada, Lower Calif., Mexico, dredged in 50 fathoms 8/1938 (Burch).

" The posterior dorsal margin is approximately straight. The posterior end is definitely attenuated into a rostrum" (Grant and Gale).

Type locality: Puget Sound

Collecting data: Off Redondo Beach, Calif. in 75 fathoms mud and off Ensenada,Mexico in 50 fathoms mud (Burch); Kodiak Id.,Alaska in 15 fath., Prince William Sound, 18 fathoms (Lewis) (Willett); Craig, Ketchikan,Alaska in 20-40 fath., Newport Bay, Calif. in 30 fath.(G. Willett); Smith's Cove, Seattle,Wash. Harbor in 10 fathoms mud,1919, Izhut Bay,Afognak Island, 1922 in 10 fathoms mud (W.J. Eyerdam); Monterey in 40-202 fms. (A. Smith).

Pandora (Kennerlia) bilirata Conrad,1855. " Prince William Sound,Alaska (Eyerdam, Nautilus v.51, p. 101)" to " Point Abreojos, Lower Calif." (Dall).

" This species differs from P. filosa by the rounded posterior margin, which in filosa is rostrated. The beaks are also nearer the middle in bilirata"

Collecting data: Dredged off Avalon,Catalina Island 8/36 in 25 fath., off Monterey, Calif. in 40 fathoms 8/37, off Redondo Beach,Calif. in 25 fath ., off Ensenada,Mexico in 50 fathoms (Burch); Ketchikan,Forrester Island,Alaska 20-40 fathoms (G. Willett); Drier Bay,Knight Island, Prince William Sound, in 10 fathoms mud (W.J. Eyerdam); off Monterey, Calif. 41-142 fathoms in mud,clay and gravel (A. Smith).

Pandora (Kennerlia) granulata Dall,1915. " Santa Barbara, Calif. to Guaymas Mexico and especially abundant at the type locality on muddy bottom in the vicinity of La Paz, Lower Calif." (Dall). ?

"... closely resembling in form bilirata,but much smaller, more trans--lucent and of a greenish tint, with the base and dorsal margins more nearly parallel and with the elevated lirae of the posterior dorsal surface delicat--ely granulated."

Collecting data: Note from Allyn Smith of the California Academy " No information, except that we question the California records". No member of the club reports having taken it.

Subgenus Heteroclidus Dall,1903. Type (by original designation), Clidio--phora punctata Conrad.

" Left valve with the posterior cardinal ridge or tooth absent; right valve with a short posterior cardinal and a produced anterior cardinal ridge ; both the anterior ridges or teeth, ending in front of the anterior adductor scar; lithodesma present."

Pandora (Heteroclidus) punctata Conrad, 1837. " Vancouver Island to the Gulf of California" (Dall).

" This species is readily recognized by its strongly curved (concave) posterior dorsal margin and the small punctations on the inner surface of the valves." (Grant and Gale).

Collecting data: This species is found in shallower water than any others of the genus and is not infrequently washed ashore. However, the habitat is below the lowest tide lines. We dredged it in some abundance though immediate--ly on the seaward side of the Santa Monica breakwater in what could not have exceeded 3 or 4 fathoms. We have taken it as deep as 25 fathoms off Redondo Beach and about 15 fathoms off Ensenada,Mexico (Burch); off San Pedro in 20 fathoms (G. Willett); Clayoquat, Vancouver Island, British Columbia (W.J. Eyerdam).

Pandora

Corrections - Additions

The following notes (personal communication, July 22,1944) reached us after we had published our article on the genus Botulina. It is interest--ing to note that Dr. Harald A. Rehder, U.S. Natl. Museum, quoted below,came to the same conclusions reached by Dr. Hertlein and followed in our article. " Gregariella (Monterosato (Naturalista Siciliana, vol.3, 1883, p. 90) (not Gregoriella; the name comes from its gregarious habits) has as its type Modiolus barbatellus Cantraine (-- M. petagnae Scacchi) . This is closely related to Botulina Dall, but has a somewhat weaker radial sculpture, partic--ularly on the dorsal surface, and the internal ventral margin is smooth, whereas in Botulina it is denticulated; possibly Botulina might be used as a subgenus of Gregariella.

Lamy(Journ. de Conch., vol. 81, 1937, pp.7,33) gives a diagnosis and discussion of this group. He places it erroneously, I believe, under Modio--laria (-- Musculus) as a subgenus, considering Botulina a synonym of Gregar--iella .

We have at least two species of Botulina in west Atlantic waters with quite different habits:

Botulina opifex (Say) makes a colonial nest of the agglutinated sand grains on a stone or very hard substratum, the dorsal surface lying flush with the outer edge of the nest.

Botulina coralliophagus (Gmelin),on the other hand, bores in coral or in sponges.

It would be interesting to know what the habits of your Californian species is, which, by the way, is not opifex (Say).

In regard to the group Hormomya, we are using it as a subgenus of the genus Brachidontes. "

I find the statement about the habits of the two species of Botulina in the western Atlantic of particular interest because our experience has been that our Botulina denticulata (Dall) has quite different habits than either mentioned. Our species is solitary. I never recall having taken even two of them together, have never observed anything resembling a nest, and they are neither nestlers or borers. It is true that they are usually taken on gravel,rocky, or shale bottoms but quite single and clean. Before making this statement I conferred with Mr. George Willett of the Los Angeles Museum who has dredged a great many of them. Mr. Willett's experience checks with mine. (John Burch).

Family LYONSIIDAE

" Shell rather small, elongate-ovate to suborbicular, or sometimes irr--egularly shaped, gaping,especially posteriorly, usually thin, white, yellow--ish or grayish; umbones submedian or anterior. The surface is covered with crowded radial rows of fine microscopic spines or nodules, which may dissap--ear in later stages; there are often rugose concentric wrinkles and some--times a few strong radial ridges; a more or less strong light to dark brown periostracum is present, which may be pinched up into slender radial threads. The ligament is internal and lies in a posterior groove and has an elongated calcareous body or lithodesma attached to its ventral surface. The hinge is toothless, although there may be a knoblike protuberance in each valve on the dorsal margin below the umbo. The interior is pearly, with a shallow pallial sinus, a nd with a posterior muscle scar slightly larger than the interior one" (Dall, Bartsch, Rehder).

Genus Lyonsia Turton,1822. Type: Mya striata Montagu-- Mya norvegica (by mon--otypy).

Subgenus Lyonsia s.s. " Thin, elongated , with fine radial sculpture externa--lly; periostracum inconspicuous, usually with more or less adherent sand; moderately inequilateral." (Dall,1903).

The distinction between the subgenus Lyonsia s.s. and the subgenus Allo--gramma Dall is that the latter has strong radial undulations whereas Lyonsia s.s. is without them.

Lyonsia (Lyonsia) striata Montagu,1815. " Circumboreal. Aleutian Islands to Fuca Straits" (Dall). Type locality: Atlantic.

There is some question about the exact identification and separation of this species. Mr. George Willett, of the Los Angeles Museum, suggests that it is possible that some of the specimens some of us have been labelling gouldii may actually be identical with this species. If this should prove to be true the range would be extended southward past San Pedro, Calif.

Collecting data: Kodiak Island, 15 fms. (Lewis); Forrester Island- Ketch--ikan, 15-40 fms. (G. Willett); Illuliuk Harbor, Unalaska Island, 15 fms. mud, 1932 (W.J. Eyerdam).

Lyonsia (Lyonsia) arenosa Moller,1842. " Circumboreal. Arctic Sea to Japan and the Okhotsk Sea on the west and on the east to the Aleutians and Kodiak Island, Alaska" (Dall). Johnson gives the range in the Atlantic " Greenland to Cape Ann, Mass. 13-60 fath."

Collecting data: Cape Schelagskoi, Arctic Siberia, 12 fms. sand- Vega Exped. 1878 (W.J. Eyerdam).

Lyonsia gouldii Dall,1915. " San Francisco Bay south to Point Abrejos, Lower Calif." (Dall), extended to Tres Marias Islands (Strong and Hanna).

L. gouldii is the new name given by Dall to nitida Gould. Type locality: Santa Barbara, Calif.

Welare not too positive about the classification of some of our southern California shells in this species. Mr. George Willett calls attention to the fact that whereas our shells seem to conform to the shape and in other partic--ulars, Gould's original description calls for a smooth shell and all of our's are granulated. Therefore some of our records are included subject to correct--ion.

Collecting data: Dredged off Avalon, Catalina Island in 25 fathoms 8/1937, off Redondo Beach in 30-50 fathoms 1937-41, off El Segundo in 35 fathoms, off Monterey, Calif. 10-20 fathoms (Burch); Catalina Island 30 fathoms, San Pedro 20 fathoms (G. Willett); Monterey, Calif. records 5-15 fathoms in sand-rare, (A. Smith);

Lyonsia (Lyonsia) californica Conrad,1837. " Puget Sound to Manuel's Lagoon, Lower Calif.,Mex. (Grant and Gale, 1931); Keen " Abridged Check List" gives lat. 24-56 which would take the range up near Sitka, Alaska. Type locality: near Santa Barbara,Calif.

Collecting data: Our common California species taken in mud bottom of all sloughs and bays such as Morro,Mugu,Alamitos,Anaheim,Newport etc. The bathy-

-metric range in our experience goes as deep as 40 fathoms off Monterey,Calif. 50 fathoms off Ensenada,Mexico, 25 and 35 fathoms off Redondo Beach and Cat-alina Island. More common in sandy mud bottom.(Burch); Craig, Ketchikan, Forrester Island, Alaska, 15-40 fms. (G. Willett); Elliott Bay, Seattle, Wash. 10 fms. mud,1921 (W.J. Eyerdam).

Lyonsia (Lyonsia) californica haroldi Dall,1915. Morro Bay, Calif. to San Francisco Bay. Keen " Abridged Check List" gives 35-38 which is about as stated. to Tomales Bay, Calif. (A. Smith).

Dall certainly gives very little description to this " A variety with nearly cylindrical form without arcuation from San Francisco Bay".

It has been our custom to label the shells taken from upper Morro Bay with this name. They are much larger than the typical californica averaging perhaps an inch or more in length and seem to lack the pearly appearance of the typical. It is probable that we have the same thing from Alamitos Bay and other southern California sloughs which would bring the range far to the south. (Burch).

In a preliminary discussion of this species John Burch made the following statement which brought up some interesting opinions and a decision which will have an effect on our future work. " Such things as haroldi cause me to wonder if there should not be a custom of indicating a mere form caused by the hab-itat rather than being distinct such as L. calif. var. haroldi Dall instead of writing it out as a subspecies. Of course, this may be a subspecies. It is easily distinguished from other shells of the same genus."

In answer to this Mr. Allyn Smith sent in the following note " While it is true that this is, as you call it, a " situs" form, found in shallow water in muddy bays, it is just this sort of a different environment that creates real subspecies over a long period of time. Personally, I think haroldi is a good subspecies. Your thought to use the term " variety" for such ecological variants is something I would steer away from, for two reasons-(1) it adds confusion to the definition of a true subspecies, unless it is considered to be a variant that is subordinate in position to a subspecies in the present nomenclatorial scale, in which case it (2) leads you into quadrinomials, which I believe hinders rather than helps, and is cumbersome, at best. Many older zoologists used the term " variety" when they really meant " subspecies". The reverse was also true, as you well know, with the result that in some instances it is now difficult to tell just what they really did mean. Conse-quently using this line of reasoning, I feel that color varieties have no real taxonomic standing in a faunal list and Mac and I have put them all into synonymy in our Monterey paper. "

This matter was discussed in open meeting of the club and the conclusion was to place all color forms and minor differences in the synonymy.

Lyonsia (Lyonsia) californica nesiotes Dall,1915. " Catalina and Coronado Islands, to Magdalena Bay" (Dall). Type locality: Catalina Island.

Dall's description ".. a very thin, smaller, and translucent form from Catalina and the Coronado Islands, with the beaks very close to the anterior end".

In a preliminary note John Burch stated " We have dredged shells from all around the channel, El Segundo,Redondo Beach,Santa Monica etc. that might or might not fit such a description. So far as I know it has never been fig-ured anywhere." Mr. George Willett commented " This and all preceeding may be forms of striata, or, with exception of striata, may be forms of califor-nica. Catalina Island, 30 fathoms". Mr. Allyn Smith writes " We have checked the Academy material with no better luck than you have in making a separation that would be satisfactory. We would put this subspecies into the synonymy with true californica."

Our disposition until some student can make a careful study of the type is to place this in the synonymy of the typical.

Lyonsia (Lyonsia) pugetensis Dall,1913. " Chignik Bay, Alaska to Puget Sound (Dall). Keen " Abridged Check List" gives lat. 42055 which would be from about Cresent City,Calif. to Forrester Island, Alaska. Type locality: Queet's River, Wash. This is the largest described species.

Mr. George Willett makes the suggestion that this may be a form of calif--ornica.

Collecting data: Prince William Sound, Alaska, 18 fathoms (Lewis); Izhut Bay, Afognak Island, Alaska, 10 fathoms, 1922 (W.J. Eyerdam).

Subgenus Allogramma Dall,1903. Typel Lyonsia formosa Jeffreys (by orig. desig. " Valves with radial and vertical undulations, gaping behind but not below; siphons very short, with a profusion of long, tentacular filaments and a slen--der, cylindrical foot." (Dall, 1903).

Lyonsia (Allogramma) amabilis Dall,1913. " Off Santa Barbara Chennal, Calif. 534 fathoms".

Genus Entodesma Philippi,1845. Archiv. fur Naturgeschichte, vol.11, pt.1, p. 52. Type (by monotypy): E. chilensis Philippi,1845 (genotype figured in vol. 13, pt.1, pl.3, fig.10,10a).

" Testa bivalvis,transversa, inaequilatera, epidermide crassa vestita, subhians; cardo edentulus; ligamentum (cartilagineum) internum, in utraque valve prominentiae semilunari, longitudinali insertum. Impressiones muscul--ares .."

Tryon, Manual, Vol. 3:146- " Shell thin, Saxicava-shaped, slightly inae--quivalve and gaping, covered with a thick epidermis; hinge edentulous; each valve with a semicircular process containing the cartilage. Ossicle and pall--ial impression not observed."

The above generic descriptions are of interest because Entodesma was considered a subgenus by Mrs. Oldroyd and others and no descriptions were given in her work. The consensus of opinion seems to be that it should be used as a genus although Thiele and many others consider it a subgenus of Lyonsia.

Entodesma (Entodesma) inflatum Conrad,1837. " In sponges, Vancouver Island to Guayaquil " (Dall). Keen " Abridged Check List" gives the range 2955 which would bring the northern end of the range up to Forrester Island, Alaska. Type locality: Guayaquil,Ecuador.

Dall states that the habitat of this species is " in sponges or the mass of compound ascidians". Our experience has been that we have dredged it rather common off Redondo Beach, Calif. usually in 20 to 25 fathoms in both sand and gravel bottoms, and we also dredged it rather common off Monterey, Calif. in as deep as 40 fathoms and also on the shale bed off Del Monte, Calif. in 20 fathoms or less. Many of these specimens came up with nothing to indicate that they were associated with either sponge or ascidians. (Burch). In this conn--ection the following note from Mr. Allyn Smith " We would like to see the northern record confirmed (i.e. Puget Sound and north). My experience at Monterey is that it is rare and not necessarily associated with sponge or ascidians." But to confirm the northern records Mr. George Willett has spec--imens personally collected at Forrester Island, Alaska in 50 fathoms. Mr. Willett also lists it from off San Pedro, Calif. in 20 fathoms".

In discussion of the allocation of Entodesma as a genus or a subgenus Mr. George Willett gives cause for serious thought with the following obser--vation " Does not inflatum connect Lyonsia and Entodesma ? If so, Lyonsia should be used."

No doubt because this species was described as Lyonsia inflata several of our members have sets labelled Entodesma inflata which is incorrect. Dr . A. Myra Keen advises us on Entodesma " As the Greek desma is neuter, the neuter endings- um or ense are required for species that are adjectives."

Subgenus Agriodesma Dall,1909. Type (by orig. desig. Entodesma saxicola Bair
The name Agriodesma was originallt used by Dall without description in Proc. U.S.N.M. vol. 37, No. 1704, p. 284, Nov, 1909 exactly as follows: "Entodesma (saxicola Baird) Carpenter -- Agriodesma Dall,1909, new name"

Dr. A. Myra Keen explains the matter as follows " Agriodesma Dall is a nomenclatural orphan but apparently was validly proposed. In the reference you cite Dall in effect says: " The Entodesma as used by Carpenter for the species saxicola Baird is incorrect and I propose the new name Agriodesma for this species. As you will see by consulting the International Rules, Article 25 and Opinion 1, this is a sufficient indication to validate the name. The differences between Agriodesma and Entodesma are the differences between the type species.

Thiele makes Entodesma and Agriodesma subgenera of Lyonsia , and dis--tinguishes them thus:
" Entodesma s.s. Schale ziemlich gross und kraftig,aufgeblasen,Ligament lang, mit grossem Lithodesma.
"Agriodesma Dall,1909. Schale gross und dick, mit sehr kraftigem Periostracum, unten breit klaffend, Lithodesma sehr gross".

The principal difference between Thiele's characterizations would seem to be in the strong periostracum and the broad gape of Agriodesma."
Entodesma (Agriodesma) saxicola Baird,1863. " Aleutian Islands to Cape Colne--tte, Lower Calif. (Dall). Type locality: Vancouver Island.

" This enormous rude species, sometimes reaching nearly 6 inches in length (Dall). " The lithodesma is very large and strong and is inserted obliquely below the dorsal margin. The varietal name cylindracea Carpenter was given to specimens which had grown to fit borings of Lithophaga." (Dall).

Collecting data: Large specimens from the littoral rocks at low tide at Port Orchard, Puget Sound, Wash. 8/1936, Crescent City, Calif. in the same habitat, also found in the rocks at Monterey, Calif. Fine specimens taken from ships bottoms in dry dock at San Pedro. (Burch); common littoral species in southwest Alaska (G. Willett); Port Orchard, Kitsap Co., Wash, Izhut Bay, Afognak Island,1922, Drier Bay, Knight Island,1923, Sitkalidak Island,1931, Dutch Harbor and Unalaska in the Aleutians 1932. This species assumes many peculiar shapes according to its habitat. A specimen from Sitkalidak Island is heavily encrusted with nullipores. Most specimens are chitinous a nd crack all to,pieces when dry but I have some old specimens that were cast up on the beach that never showed signs of cracking.(W.J. Eyerdam).

Mr. Eyerdam also reports " Near Valparaiso I collected Entodesma chilen--sis Philippi, the genotype."
Entodesma (Agriodesma) scammoni Dall,1871. " Port Simpson, British Columbia (Scammon): San Diego (Orcutt)" (Dall).

" This species differs from all others in its brilliantly pearly interior, its oval shape, and its permanently adherent periostracum without radiating lines. Only the original specimens collected in 1865 have so far been obtained" (Dall).

Some careful student should study the types of this species. Most of us list scammoni with a question mark before and after. Mr. George Willett had a set so labelled when sent him but they were obviously Mytilimeria. The San Diego record by Orcutt is definitely questionable. Orcutt states of this find " One example found with the above species" and the above species mentioned is Thracia plicata Deshayes, an even more startling find and clearly not accepted. If anyone has any information regarding this species we will be glad to hear of it.

Genus Mytilimeria Conrad,1837. Type (by monotypy), Mytilimeria nuttallii Con--rad.

" Shell rounded-oval, more or less ventricose, equivalve, fragile, cover--ed by a thin caducous epidermis; beaks subspiral; hinge without teeth, but formed of small linear excavations under the beaks to receive the ligament

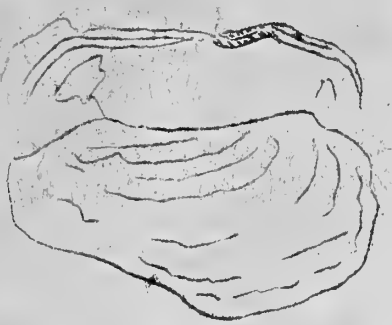
which contains a small ossicle; muscular impressions small, pallial impress--ion with an obtuse sinus" (Tryon).

Mytilimeria nuttallii Conrad,1837. " Forrester Island, Alaska (Willett) to Round Island, Lower California (Jordan). Dall in Bulletin 112 under the range states " In compound ascidians". Dr . A. Myra Keen in " Key to West North American Pelecypod Genera" states under the habitat " Burroughing in such compound ascidians as Amaroucium californicum." And in a recent note Dr. Keen comments " The compound ascidian was identified for me at Hopkins Marine Station." However, several of our members are of the opinion that they have taken Mytilimeria from radically different appearing masses of ascidians indicating that it is not confined to the one species of ascidian. In 1915 Dr. Dall wrote (Proc. U.S.N.M. No. 2116) " It is by no means certain that this genus is properly placed here, despite its conchological characters. The little that is known of the anatomy rather points in the direction of Verti--cordia." However, Dr. A. Myra Keen (personal commun.) states " As to the propriety of allocating Mytilimeria here, the latest work on pelecypods by Thiele, places it in family Lyonsiidae, superfamily Pandoracea, and as Thiele studied soft parts as well as shells, the placement is probably correct."

Collecting data: Common under the rocks along the coast of San Luis Obispo county, Calif., dredged exceptionally large specimens off Monterey in 10-20 fathoms, always in the ascidian mass. Also taken from Bird Rock, San Diego county and elsewhere along the southern California coast. (Burch); Port Orchard, Kitsap Co., Wash. (W.J. Eyerdam); and as stated above Mr. George Willett's extention of the range to Forrester Island, Alaska.

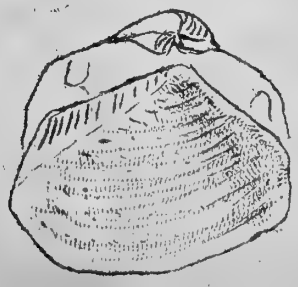
Lyonsia

Entodesma



Dermatomya

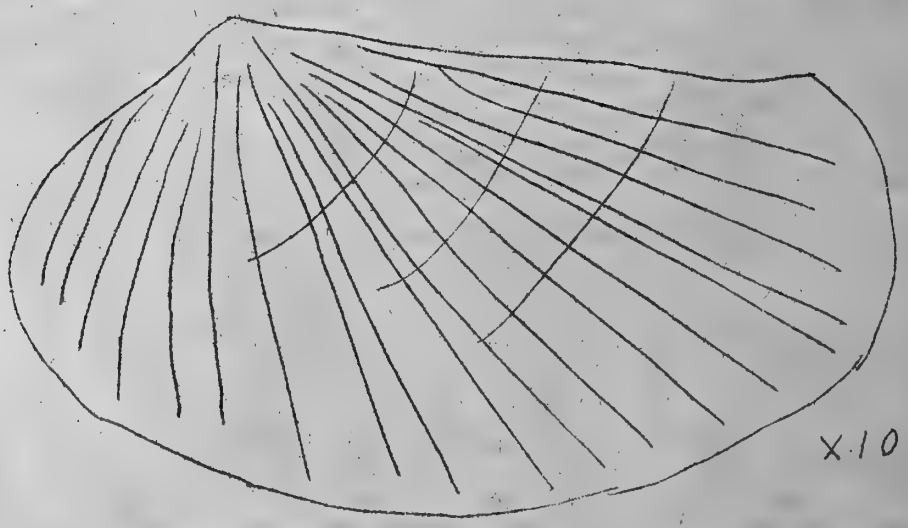
Mytilimeria



NQ 447

Lyonsia californica Conrad
20 fathoms, shale, off Monterey, Calif. 8/1940

NQ 448



Lyonsia striata Montagu ? Off Redondo Beach, Calif., 25 fathoms in gravel. 8/1939. This is the species we have been calling Lyonsia gouldii Dall. Other than the distinctly different shape the striations are farther apart. See note under gouldii.

Family POROMYACIDAE
Genus Poromya Forbes,1844. Type (by monotypy), Poromya anatinoides Forbes--granulata Nyst and West.

" Shell small,suborbicular or ovate, thin, inflated, gray or whitish, with prominent submedian umbones. The surface is microscopically granulate, and is covered with a thin yellowish periostracum. Ligament external. Hinge with a strong or sometimes rudimentary cardinal tooth in the right valve. Interior pearly, without a pallial sinus, and with the muscle scars subequal" Dall,Bartsch, Rehder.

The above description is included as a necessary part of a discussion of this group although the consensus of opinion is that Poromya s.s. is not represented in our fauna.

Genus Dermatomya Dall,1889. Bull. Mus. Comp. Zool., vol. 18, 1889, p. 448. Type (by monotypy) Dermatomya mactroides Dall 1889.

Dall in Bulletin 112, Mrs. Oldroyd in " Marine Shells of the West Coast of North America" and others used Dermatomya as a subgenus of Poromya. Some additional confusion has been added by giving the date Dermatomya Dall,1908.

Dr. A. Myra Keen (personal communication, July 1944) gives an explan--ation as follows and we are following her conclusions. " You will notice in the Pelecypod Key that we abandoned Poromya after examining figures of the genotype, as we could not key out our West Coast description using the description of Poromya. The first use of Dermatomya is in Bull. Mus. Comp. Zool., vol. 18, 1889, p. 448, where Dall says: " Poromya(Dermatomya) mactr--oides n.s. This fine species differs from the typical form of the genus in the absence of the superficial granulations, and in the presence of a deep and strong pallial sinus,which characters indicate that it should form a special section of the group. The hinge is also remarkably coarse and strong. It was dredged by the Albatross off the coast of Ecuador, in 741 fms., and externally presents much the appearance of a large high specimen of Mactra lateralis." On page 452 Dall gives a synopsis of the family Cuspidariidae, under which he lists, among others, the following genera:
" Poromya: teeth strong; oral palpi large; foramina of septum slit-like ... pallial sinus obsolete; surface of shell granular.
Subgenus Dermatomya: shell not granular; pallial sinus developed; hinge strong.
Cetoconcha: hinge teeth obsolete in the adult; pallial sinus obsolete; sipho--septum foraminate....."

Dermatomya tenuiconcha(Dall)1913. " Alaska peninsula to Coronado Islands, in deep water" (Dall).

Collecting data: Dredged off Redondo Beach in 50 fathoms, apparently confined to the north side of the submarine canyon and to rocky bottom, not uncommon in the Pleistocene of Timm's Pt., San Pedro (Burch); Catalina Island, 30 fms. (G. Willett); Monterey, Calif. records- 66-73 fathoms, in green mud and rocks, off Point Pinos (U.S.F.C. Sta. 4552); 659 fathoms, in green mud off Point Sur (U.S.F.C. Sta. 5699) rare (Allyn Smith)
Dermatomya trosti(Strong and Hertlein)1937. Proc. Calif. Acad. of Sci., ser. 4 vol. 22, no.6, p. 163, pl. 34, figs. 3-6). Type locality: Costes Bank, off San Clemente Island. And a note from Dr. A. Myra Keen " We have a specimen that I believe to be of this species, from off San Diego."
Dermatomya buttoni(Dall)1916. " Monterey, Calif. (Button)" (Dall).
Monterey records: 581 fathoms, in mud (U.S.F.C. Sta. 3670): rare.(Smith).
Dermatomya beringiana (Dall),1916. " Aleutian Islands to Tillamook,Ore."(Dall
Dermatomya leonina (Dall),1916. " Off coast of Washington,877 fathoms" (Dall

Genus Cetoconcha Dall,1889. Type: Lyonsia bulla Dall.

" Shell differing from Poromya proper by the cartilage being almost external and the fossettes diminished in size and upturned, the external lig--ament consequently nearly obsolete; the dentition obsolete except the card--inal tooth of the right valve, which itself is sometimes absent in the adult though observable in the young; other shell characters much as in Poromya" (Dall).

Cetoconcha malespinae Dall,1916. " Southwest of Sitka, Alaska, 1,579 ftms. ((Dall). Known only from the type locality.

The only note received on this species is one from Dr. Joshua L. Baily Jr. who commented " Although Dall and Oldroyd both use malespinae, I believe this to be an obvious typographical error for malaspinae."

However, it is not likely to make a great deal of difference to most of us how they spell the name of such an exceedingly rare little species.

Family CUSPIDARIIDAE

" Shell small,ovate, posteriorly rostrate, inflated, thin, white or gray; umbones submedian or slightly anterior. The surface may be smooth or granul--ose, or concentrically or radially sculptures, and it is covered with a thin light brown periostracum. The ligament is internal, usually posterior, and is situated in a groove or fossette which may project from the dorsal margin or may be more or less adherent; a lithodesma is present. The hinge may be toothless or with cardinal and lateral teeth. There may be a posterior internal rib or buttress, variable, and more or less parallel with the dorsal margin. The interior is white, not pearly; the anterior muscle scar double or single, the posterior muscle scar double, a pallial sinus is absent." Dall, Bartsch, Rehder " Marine Molls. of Hawaii".

Genus Cuspidaria Nardo,1840. Type: Cuspidaria typus Nardo (-- Tellina cus--pidata Olivi) (by original designation).

Subgenus Cuspidaria s.s.

" Valves smooth or concentrically feebly sculptured, fossette posteriorly inclined and attached to the hinge margin by its posterior edge; one posterior lateral tooth in the right valve." Dall,1903.

Cuspidaria glacialis G.O. Sars,1878. " Off San Diego, Calif., 239 fathoms. Also Atlantic. Johnson " Mollusca of Atlantic Coast" gives the range " Gulf of St. Lawrence to Florida, 64-1467 fath." Type locality: Vadso,Norway.

Cuspidaria subglacialis Dall,1913. " Off California coast in deep water"(Dall

Cuspidaria apodema Dall,1916. " Off Sitka, Alaska,and south to Panama Bay, in deep water" (Dall). Type locality: Sta. 2859, southwest of Sitka,Alaska.

Collecting data: Rather common in mud bottom 25 to 75 fathoms off Redondo Beach and in 50 fathoms off Ensenada, Mexico (Burch); Catalina Island, 50 fms. (G. Willett).

Cuspidaria chilensis Dall,1889. " Off Oregon in 277 fathoms, and south to coast of Chile in 1,036 fathoms" (Dall).

Cuspidaria nana Oldroyd,1918. Dall in Bulletin 112 listed this species and gave the range " Baulinas to Monterey,Calif." However, the following note from Dr. A. Myra Keen (personal comm. July 1944) places this species in another group and is interesting " Cuspidaria nana Oldroyd is a Sphenia. It is my opinion that Sphenia globula Dall,1919, is a synonym. We have type material of both for comparison." So we have Sphenia nana (Oldroyd) with S. globula Dall in synonymy.

Genus Cardiomya A. Adams,1864. Type (by monotypy), Neara gouldiana Hinds. " Valves with radiating sculpture, and the fossette more vertical and prom--inent; otherwise like Cuspidaria s.s." (Dall, 1903.

We have a note from Dr. A. Myra Keen in this connection as follows " Pal--eontologists such as Stewart,Vokes, and others , now recognize Cardiomya as a full genus; rightly, it seems to me."

Cardiomya pectinata (Carpenter),1864. " Puget Sound,British Columbia to Panama Bay" (Oldroyd). Type locality- Puget Sound.

Collecting data: Rather common in about 25 fathoms off Catalina Island and off Redondo Beach, Calif. also in the Pleistocene of Timm's Point,Hilltop Quarry etc. of San Pedro (Burch); San Pedro, 20 fathoms (G. Willett); Smith's Cove, Seattle Harbor, in 10 fathoms mud,1920 (W.J. Eyerdam)

Cardiomya beringensis (Leche),1883. " Bering Sea to Kodiak Island and Pan--ama Bay" (Dall).

Collecting data: Off Redondo Beach, Calif. in 75 fathoms mud bottom 8/38 (Burch); Craig and Ketchikan, Alaska in 25 fathoms (G. Willett); Sawmill Bay, Evans Island, Prince Wm. Sound, Alaska, 1922, dredged in 15 fathoms mud bottom (W.J. Eyerdam).

Cardiomya oldroydi (Dall),1924. In I.S. Oldroyd, 1924, Publ. Puget Sound Biol. Station, vol.4, p. 33, pl. 1, fig.13. " Vancouver Island, British Col--umbia to Puget Sound" (Oldroyd) to Catalina Island, Calif. (G. Willett).

Mr. George Willett of the Los Angeles Museum has dredged this species in 70 fathoms off Catalina Island which is an entention of range recorded here from Puget Sound southward to Catalina.

Cardiomya californica (Dall),1886. " Puget Sound to San Diego, Calif." (Dall). Type locality: Catalina Island, Calif.

Collecting data: Not uncommon in mud bottom 25 to 50 fathoms off Redondo Beach, Calif. (Burch); San Pedro, 20 fathoms, Timm's Point Pleistocene (G. Willett).

Cardiomya planetica(Dall)1908. " Pribiloff Islands, Bering Sea, to Coronado Islands, Lower Calif. in deep water" (Dall). Type locality, U.S.S. Albatross Station 2985, off San Diego, Calif.

Collecting data: Off Redondo Beach, Calif. in 50 to 75 fathoms mud bottom (Burch); Craig, Forrester Island, Alaska in 50 fathoms and off Catalina Islaand Calif. in 50-100 fathoms (G. Willett); Drier Bay, Knight Island, Prince Wm. Sound in 10 fathoms, 1923 (W.J. Eyerdam).

Cardiomya balboae (Dall),1916. " Cortez Bank, Calif. 60 fathoms" (Dall), to Catalina Island, 50 fathoms (G. Willett).

Collecting data: Mr. Willett of the Los Angeles Museum has dredged this species in 50 fathoms off Catalina Island, an extention of range recorded here. Before this it has been known only from the type locality.

Genus Myonera Dall and Smith,1886. Type: Neaera paucistriata Dall (by original designation).

" Surface with radiating or concentric sculpture or both; hinge eden--tulous; fossette vertical or posteriorly directed, adherent by either margin" (Dall, 1903).

Dall,Bartsch, and Rehder " Marine Mollusks of Hawaii" 1938 use Myonera as a subgenus of Cuspidaria. However, Myonera has a hinge without teeth, whereas Cuspidaria s.s. has a hinge with a right posterior lateral. This with other differences make quite a different hinge and seem to indicate a full generic distinction. The figures will show this.

Myonera tillamookensis Dall,1916. " Off Tillamook Bay, Oregon in 786 fathoms" (Dall).

Leiomya A. Adams,1864 was used as a genus by Dall in Bulletin 112 and follow--ed by Oldroyd a nd others. Plectodon Carpenter,1864 was used as a subgenus under Leiomya. There has been no little confusion regarding these two names, used by many authors including Dall (1903) as separate subgenera of Cuspid--aria. Dr. A. Myra Keen (Personal communication, July, 1944) gives an explanation as follows. We are accepting her conclusions .

" Leiomya A. Adams,1864: Ann. Mag. Nat. Hist. ,ser. 3, vol.8, p. 208. Genotype by monotypy: L. adunca (Gould). Original description: "shell thin, ventricose, hyaline, beaked posteriorly. Hinge with an external cartilage-pit

in each valve . Right valve with two anterior primary teeth; left valve with a single primary tooth. Lateral teeth two, strong, prominent." Dall,1886 says the cardinal of the right valve is single and bifid.

Reviewing all evidence some years ago, Dr. Schenck and I came to the conclusion that as all the evidence we had concerning the genotype of Leiomya is hear say and opinion, and as the type of Plectodon, proposed the same year and possibly prior to Leiomya, is a west coast species, it is more practical for our purposes to recognize Plectodon as a genus, pending a mon-ographic study of the group by some specialist. The data on Plectodon are: Plectodon Carpenter,1864 (Suppl. Rept. Brit. Assoc., p. 638). Dall,1886 (Bull. Mus. Comp. Zool. Harvard, vol. 12, no.6, p. 299) says: " Plectodon .. is closely related to Leiomya. It differs in the insertion of the cartil-age behind and under the beaks, instead of on the hinge-margin itself, or in a fossette; in having rather than a true tooth upon the margin, a tooth-like prominence formed by the spiral twisting under the beaks of the hinge-margin itself, upon and over which, in Plectodon scaber, there is a minute external ligament; lastly in Plectodon there is a granulated surface such as in Poromya. The pallial sinus appears to be about the same in both, and the tips of the siphons are protected, in both groups, as in Schizothaerus, by a leathery ring, flattened and broadened at the sides. Until recently only two right valves of Plectodon were known, but in 1873 I dredged at Catalina Island, Calif., in 16 ftms. .. mud, some half a dozen living specimens, which have enabled me to make a careful comparison with my Neaera granulata. There can be no doubt of their generic identity, and even considered as species they are very similar, the intwisting of the margin being less marked in granulata and the supposed external ligament obsolete. I regard Plectodon, therefore, as a mere section of Leiomya, which might also include Rhinoclama, which is of about equal value with Plectodon."

Rhinoclama " Dall and Smith" is described in the same paper (Dall,1886 p. 300) as like Plectodon but without cardinal teeth; Halonympha " Dall and Smith" (Dall,1886, p. 301) has an acute cardinal tooth in the right valve, no other teeth in either valve, a clavicular rib extending posteriorly in both valves.

The specimen of Plectodon illustrated in the Pelecypod Key was contrib-uted by Mr. George Willett, who dredged it off Catalina Island in 40 fms. The shell figured by Mrs. Oldroyd (Marine Shells ... vol.1, pl. 54, fig.4) is Cardiomya planetica. One further word on generic allocation: Thiele makes Plectodon coordinate with Leiomya, both subgenera of Cuspidaria."

Plectodon scaber Carpenter,1864. " Catalina Island, Calif. to San Diego" (Dall) Type locality, Catalina Island in 40-60 fathoms.

Collecting data: Dredged off Catalina Island by Mr. George Willett in 30-60 fathoms.

Family VERTICORDIIDAE

" Shell of small to medium size, suborbicular to ovate, inflated, thin or moderately thick, whitish or gray, covered with a brownish periostracum, the umbones are submedian or anteriorly situated, often with a rather conspic-uous depressed lunule. The surface is usually minutely granulose, the micro-scopic granules or obtuse spines being arranged in crowded radial rows; besides this thwre may be more or less conspicuous radial ribs. The hinge line is usually somewhat sinuous and is anteriorly thickened, or may have cardinal and lateral teeth. The interior is pearly and has two subequal muscle scars; the pallial sinus is either absent or only slightly developed." Dall, Bartsch, & Rehder 1938.

Genus Verticordia J. de C. Sowerby, 1844 (ex. Wood MS). Type (by monotypy) Verticordia cardiformis J. Sowerby.

Subgenus Trigonulina D'Orbigny,1846. The following note (personal commun. July,1944) by Dr. A. Myra Keen explains this point: " Trigonulina D'Orbigny in Sagra, Hist. Nat. Cuba (Moll.), vol.2,1846, p. 291, is described by Thi as being compressed, radially ribbed, with a long hinge tooth. Verticordia s is toothless. The type of Trigonulina is probably ornata, by monotypy; I ha not seen the original reference.

Verticordia (Trigonulina) ornata(D'Orbigny),1846. " Catalina Island, Calif. to Panama Bay. Also Japan and the Antilles" (Dall,1921). Keen " Abridged Check List" gives lat. 8-36 which would take the range northward to Monterey, Calif. Johnson gives the range on the Atlantic " North Carolina to West Indies, 8-687 fathoms"

Collecting data: We have found this species rather a common dredged shell recording it off Santa Cruz Island in 50 fms., off El Segundo, Calif. in 40 fms., off Redondo Beach in abundance between 50 and 75 fathoms, off Rocky Point in 40 fms., off Ensenada, Mexico in 50 fms. (Burch); San Pedro 20 fms., Catalina Island 30 fms. (G. Willett).

Johnson in " Mollusca of Atlantic Coast" lists a subspecies, Verticordia ornata caelata Verrill 1884 with range " Off Martha's Vineyard, Mass. 100 fath." Dr. A. Myra Keen comments on this " As to Verticordia caelata Verrill 1882((not 1884), there is no evidence in the original description as to how it differs, if it does differ, from V. ornata."

Genus Lyonsiella M. Sars,1872. Type: Lyonsiella abyssicola Sars.

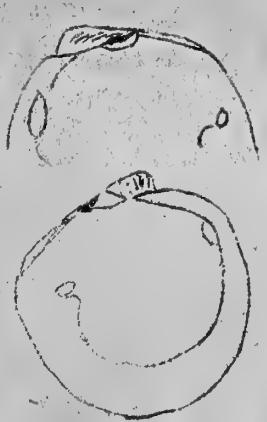
" Shell small,thin; lunule faint or none; ossicle semicylindrical,forked behind; external ligament almost none; right valve edentulous, lunular edge a little produced and thickened; left valve with an elongate obscure thick--ening of the hinge-margin under the beak."

The generic allocation of Lyonsiella has been the source of a variety of quite different opinions. Dall in Bulletin 112 and followed by Mrs. Oldroyd and others placed it in a family Lyonsiellidae, but with a question mark. Johnson and a host of other authors have placed it as a genus of Lyondiidae. We are placing it here on the advice of Dr. A. Myra Keen (Per. Comm. July 1944) " Thiele (Handbuch der Systematischen Weichtierkunde, pt. 3), who was a care--ful student and an authority on thw soft parts of the Mollusca, places Lyonsiella in the Verticordiidae on the basis of anatomy. It even falls in a different superfamily, the Poromyacea, whereas Lyonsia is placed in the Pandor--acea. I should recommend following Thiele. If this meets opposition I should use the family name Lyonsiellidae.

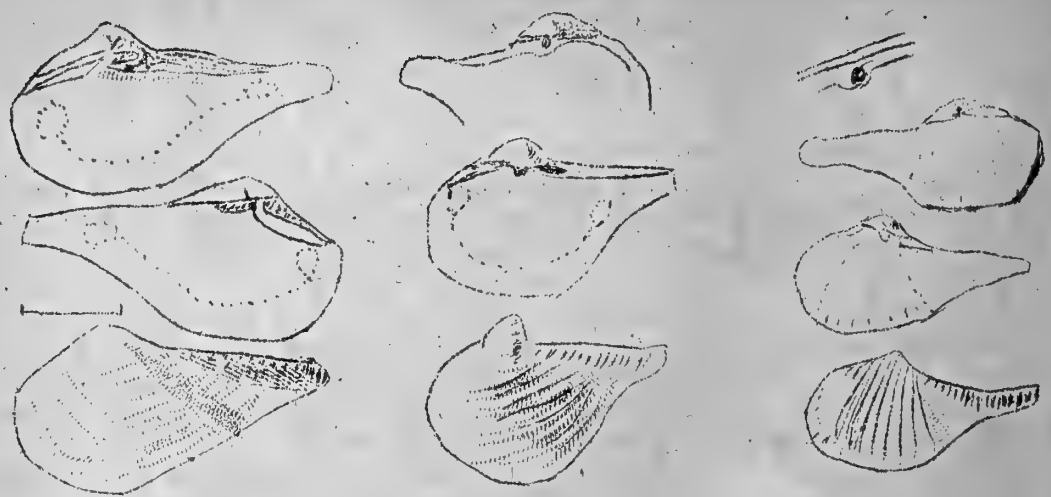
The drawing of Lyonsiella alaskana in the Pelecypod Key is of the holotype"

Lyonsiella alaskana Dall,1894. " Southwest of Sitka, 1,659 fathoms, and off Catalina Island, California in 600 fathoms" (Dall).

Verticordia



Lyonsiella



Plectodon Cuspidaria Cardiomya

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Asthenothaerus villosior Carpenter,1864. We have the following personal note from Mr. Allyn Smith of the California Academy of Sciences " This has been confused for a long time with Thracia diegensis, which is a very different shell. The Academy has a half valve, taken by the Crocker-Beebe Expedition from somewhere off Mexico (I forget where now). This looks like a much elongated Thracia curta, with about the outline of a very young Platyodon cancellatus (although, of course, the similarity ends there). It is about 3/4 inch long. A. villosior is a perfectly good Mex--ican species that probably should not be listed in the California fauna."

We also have a note from Dr. A. Myra Keen of Stanford University " Re Asthenothaerus villosior vs. Thracia diegensis: All of the specimens I have examined have turned out to be the latter. I have, from the National Museum, photographs of the holotype of the former, used as a basis for the drawings in the Pelecypod Key. ...."

Our final conclusion on this problem is that all of our local shells labelled Asthenothaerus are, in reality, Thracia diegensis.

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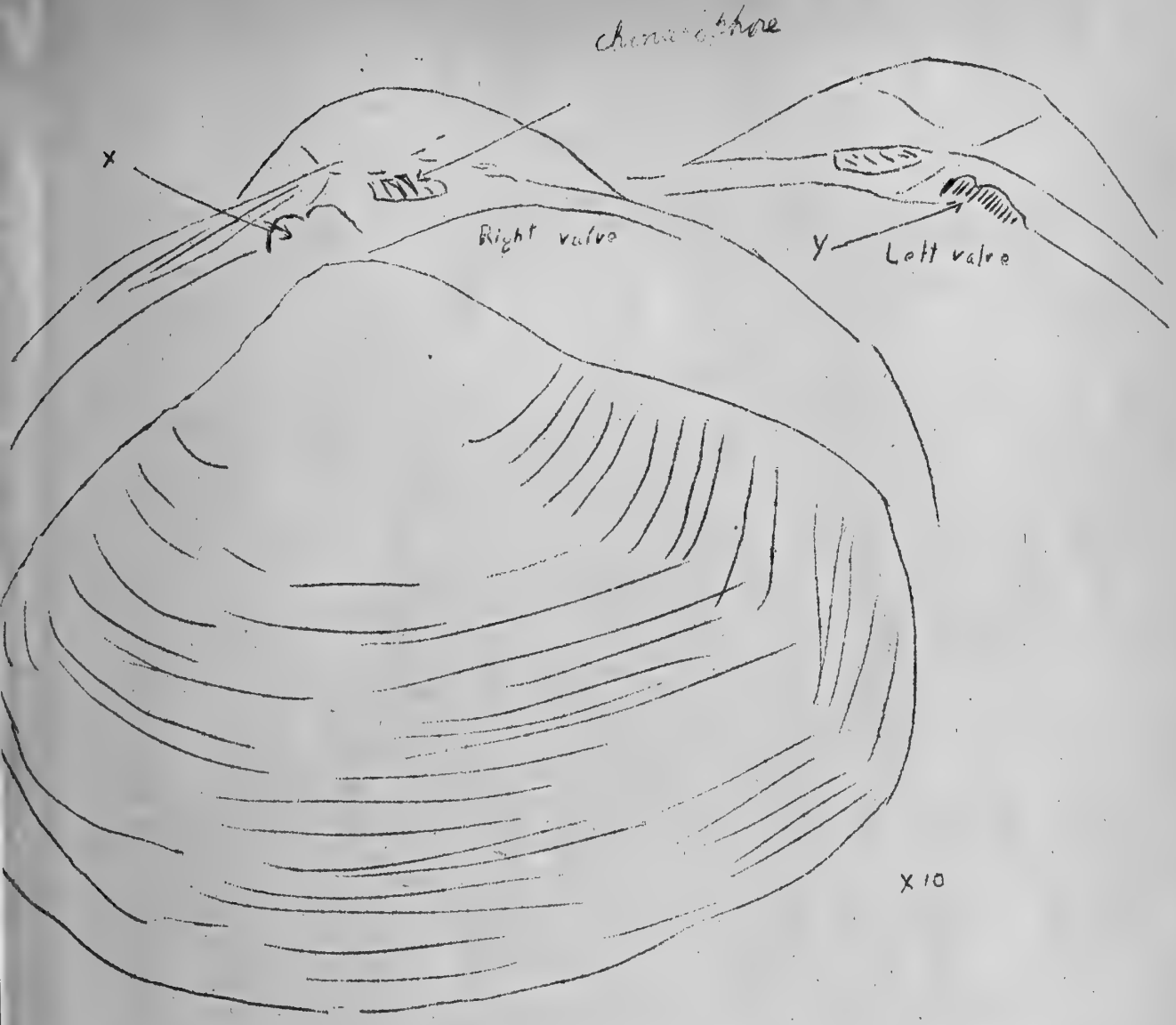
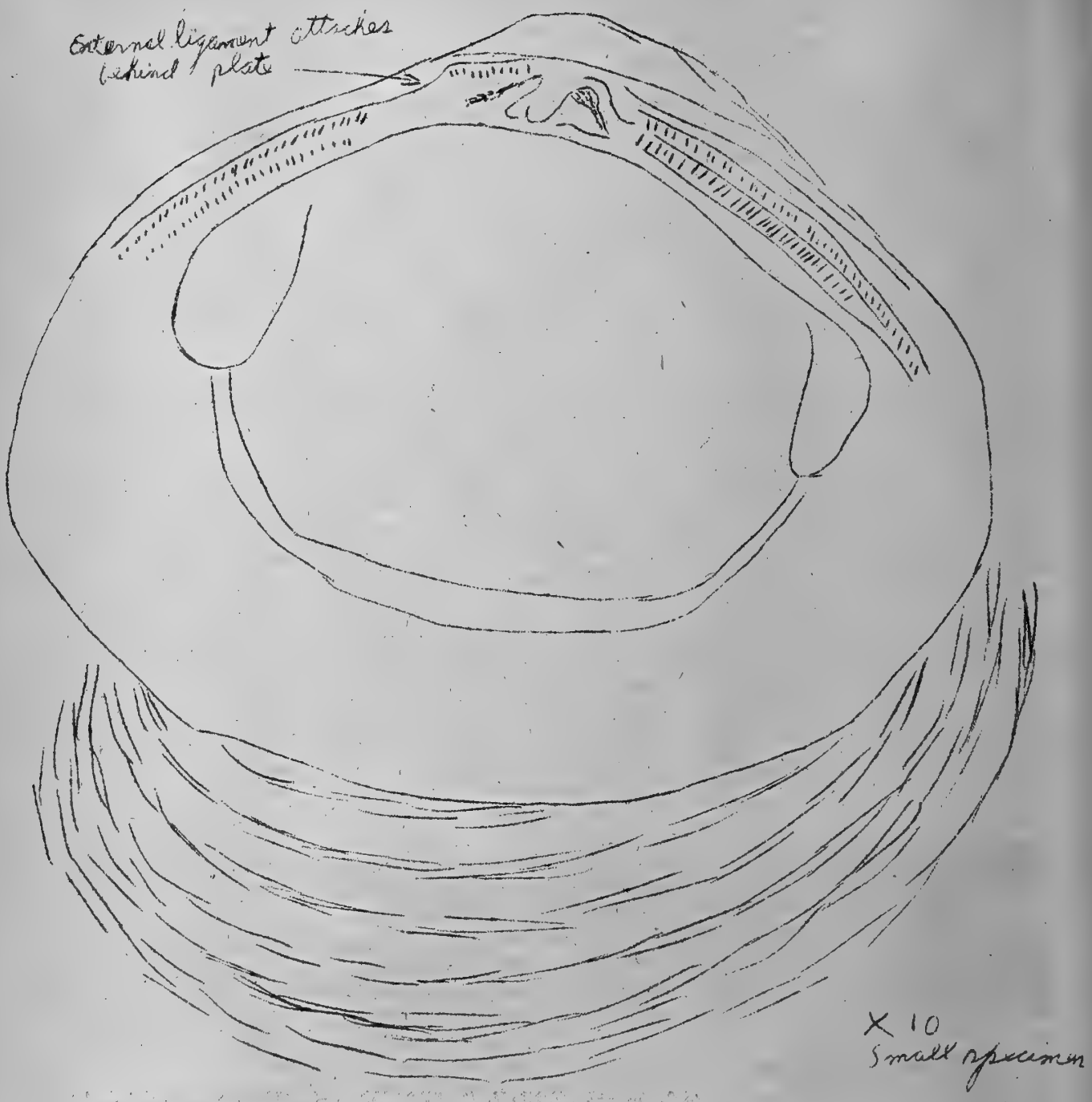
The following note has been received from Mr. Allyn Smith " Further note on Mytilus dunkeri (See Minutes, No. 36, bottom of p. 6). Your account leaves the impression that there was a large planting of Japanese oyster spat in Monterey Bay at Elkhorn Slough which contained M. dunkeri. The facts are that Paul Bonnot inspected the shipment of spat, found M. dunkeri and other Japanese species, and ordered the entire shipment des--troyed , which was done. Thus dunkeri has not knowingly been introduced into Monterey Bay."



Dermatomya tenuiconcha (Dall) Off Redondo Beach, Calif. 50 fathoms, , mud and gravel, north side of the canyon, 8/1940.

Note by Thomas A. Burch, who drew the above figure " Hinge consists of one large protuberate tooth (X) in the right valve only which fits into a depression (y) in the left valve. A chondrophore is present. Sculpture consists of growth lines only and there is a thin easily rubbed off periostracum which laps over inside the shell."

We are not positive of the specific identification of the above species. Our Redondo Beach specimens have never been compared with type material.



Family CORBICULIDAE

Genus Corbicula Megerle von Muhlfeld,1811. Ges. Nat. Fr. Berlin, Mag. vol. 5, pt.1, p.56. Type (by monotypy): Tellina fluminalis Muller.

Corbicula fluminea Muller This is an exotic species collected in August 1938 on the north bank of the Columbia River in Pacific County, Wash., 2 miles east of the little town of Knapton. This species was introduced supposedly with seed oysters from Japan. It is not known whether or not it has become definitely established.

We are uncertain about the specific identification of this species and hope to receive further information.

Pecten Osbeck and the Marine Mollusca of Ascension Island, Atlantic.

by J.R. le B. Tomlin

The following personal communication, August 5,1944 settles one of our recent problems:

" Dear Mr. Burch; I have meant to write to you before about the validity of the name Pecten in Osbeck's book but war work keeps one away from conchology. Normally I am on the British Museum staff in London, but of course the museum is closed and has suffered some damage.

I can, however, state certain points as to the above.

1. Osbeck's work was published in 1757 and is therefore prelinnean and invalid.
2. Grant bases his claim on the German translation of 1765 and the English one of 1771. But opinions 21 and 57 of the International Commission expressly refuse validity to prelinnean names which have merely been cited post 1758, as Pecten is from Osbeck in these translations. The case which is always quoted as an example of this is that of Klein's numerous genera, which were repeated en masse by Bruguiere in 1792, but are not thereby validated.

Analagously, some one or others translation of Osbeck- which is merely a verbatim repetition- doesnt validate his names.

And now another point.

Many years ago I got into touch with one of the nurses at the Ascension Island hospital, and during her long stay there she collected shells and sent them home to us.

The fauna is very small: I am enclosing a list, which you may like to have of the 20 species which represent the total fauna that my friend collec--ted in a good many years assiduous collecting. I do not feel at all sure that these 20 kinds are all indigenous there. They represent several different faunal areas- S. Africa, the W. Indies, the Atlantic Islands. There is a current which brings Carribbean shells to the west coast of Africa, and sev--eral well known Caribbean species are established there. Fissuridea parvifor--ata is exclusively Cape G. Hope and has probably been brought to Ascension and St. Helena on the giant kelp. Several species are chiefly Mediterranean--e.g. C. spurca, C. lurida, and Fiss. nubecula.

There is a current westwards from Africa called the Benguela current , which carries material to the islands Ascension and St. Helena.

I don't think that there will be any additions to the list I give you.

There have been various spurious things brought to both these islands from the East, as they have both in their time been regular ports of call before the opening of the Suez Canal. A wary eye therefore has to be cast on any shell which purports to have been definitely collected on either of these islands.

Finally I must put you on your guard about another snag which has come up again at the British Museum. This is the existence of another Ascension Island in the Pacific. This isle is now more often referred to as Ponape in the Caroline group, but older writers used to call it Ascension- e.g. the Sowerbys- and at first I used to be puzzled at the British Museum by obvious--ly tropical shells labelled " Ascension Island", which could not possibly have come from the Atlantic.

It is a pity that Grant and Gale have resuscitated the old Osbeck idea, which is quite untenable.

Have just received another of your interesting minutes. They are a great asset. Yours with cordial greetings, "

Marine Mollusca of Ascension Island, Atlantic.

c-- common

Bursa pustulosa (Reeve)
Cassis testiculus L. ------- c
Cymatium cyanocephalus (Lam.)
Cypraea lurida L. ------- c
(con.)

Cypraea spurca L. --------- c
Fissurella nubecula L.
Fissuridea parviforata (Sowerby)
Harpa rosea Lam.
Nerita ascensionis Gmelin
Pisania pusio (L.)
Pyrene cribraria (Lam.)
Strombus bubonius Lam.
Thais ascensionis (Gmelin)
Thais fasciatus (Reeve)
Thais deltoidea (Lam.)

Arca bouvieri Fischer
Hemicardium medium (L.)
Ostrea cucullata Born
Pecten nodosus L.
Spondylus powelli Smith

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Additions and Corrections

Mr. Allyn Smith sent in some collecting localities and notes which are added here in the interests of completeness.

Minutes No. 33

Nucula cardara Dall (p.7)- Monterey records should read : 43-108 fathoms off Pt. Pinos and Santa Cruz.

Nucula carlottensis Dall (p.7)- Ditto: 581 fms. off mouth of Salinas R.

Acila castrensis Hinds (p.8)- Add: 15-149 fms. in Monterey Bay, in mud, sand and clay; common.

Nuculana taphria Dall (p. 11)- Add: 8-51 fms. in Monterey Bay, in sand.

Yoldia scissurata Dall (p. 12) - The Monterey record, through error, is the one that should have been cited for Nuculana taphria. The actual record should read : 35-139 fms., Monterey Bay, in mud.

Yoldia montereyensis Dall (p. 13)- For 152-871 fms. , read 152-1041 fms. I question the Lowe and Oldroyd records from 25 and 60 fms. .. as this is an abyssal species.

Cyrilla munita Carpenter (p. 13)- Add: 50 fms. off San Diego (F.W. Kelsey)

Minutes No. 34-

Glycymeris subobsoleta Carpenter (p. 4): Add: 5-15 fms., Monterey Bay, in coarse granitic sand.

Arca reeveana d' Orbigny (p.7) : Laguna Beach, 1 valve (AGS).

Minutes No. 35.

Pecten arces Dall (p. 14)- Another record: 764-891 fms. off Santa Cruz Id., in mud (USFC Sta. 4428); 1 specimen.

Pecten randolphi tillamookensis Arnold (p. 14a) - Another record: 659 fms. off Pt. Sur, in green mud (USFC Sta. 5699); 1 specimen.

Pecten vancouverensis Whiteaves (p. 14a)- Add: 15-200 fms. , Monterey Bay on calcareous algae; not uncommon.

Minutes No. 36

Anomia peruviana d' Orbigny (p. 3)- Add: Monterey (Hemphill) CAS coll. Loc. No. 6039 HH. These seem to be O.K. There are several specimens in the lot.

Mytilus dunkeri Reeve (p. 6)- Shall have more to say on this problem shortly based on a number of samples from various places loaned by Walter Eyerdam just received.

Volsella pallidula Dall (p. 14)- Add: 41-142 fms. Monterey Bay, in mud; fairly common.

Volsella diegensis Dall (p. 15)- Add: Rock fill at Elkhorn Slough, Monterey Bay; 12 fms. off Del Monte, on shale. Also, Sausalito and 2 mi. N. of Jenner, Mendocino Co. (AGS).

Minutes #37
Botula falcata Gould (p. 6)- We record it from 15 fms. off Monterey.
Botula californiensis Philippi (p. 6) - Monterey Bay in 8-15 fms., boring in shale. I have it also from the Mendocino Coast (3 mi. N. of Gualala); Cliff House Beach, San Francisco (W. Williams); Duxbury Reef (AGS).
Crenella decussata Montagu (p. 9)- Add: Monterey Bay, 15-30 fms. in sand.
Thracia trapezoides Conrad (p. 13)- Add: Monterey Bay, 35 fms. off Seaside, in mud; a single young specimen (Gordon).
Asthenothaerus villosior Carpenter- Minor comment: The CAS valve from Lower California has an outline like the figure in Dr. Keen's Key. If anything, it may be a slight bit more elongated than her figure.
Minutes No. 38-
Pandora punctata Conrad (p. 3) - Add: Monterey Bay, 10-15 fms. in sand; San Francisco Bay, 2-3 fms. in mud.
Dermatomya buttoni Dall (p. 11)- Locality of USFC Sta. 3670 is " Off mouth of Salinas River".
Cuspidaria apodema Dall (p. 12) - Monterey records: 70 fms. mud (McGinitie); 85-158 fms., soft, green mud, off Point Pinos (USFC Sta. 4475). 35f Catalina L.
Cardiomya pectinata (Carpenter) (p. 13)- Monterey record: 66-69 fms., green mud and rocks, off Pt. Pinos (USFC Sta. 4555).
Cardiomya californica Dall (p. 13) - Monterey record: 34-73 fms. mud and rocks off Pt. Pinos (USFC Stas. 4457,4474,4552). 50 fms. Catalina id. (H. Lowe)
Cardiomya planetica Dall (p. 13)- Monterey record: 40-202 fms. soft green mud and sand (USFC Stas. 4475, 4482,4483,4485). 35 fms. Catalina (H. Lowe
Verticordia ornata d'Orbigny (p. 15)- Monterey record: 25 fms. , sand, in Monterey and Carmel Bays; rare. Catalina Id., 50 fms. (H. Lowe).
Verticordia ornata alaelata Verrill (p. 15)- Note by Hertlein: " Has 11 ribs and a wide posterior area".

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Family ASTARTIDAE
Genus Astarte Sowerby,1816. Type (by subsequent designation, Stoliczka,1871) Astarte lurida Sowerby, fide Grant and Gale 1931. Type as given in Oldroyd Vol. 1. 1924, Dall in Proc. USNM 26, 1903 - Astarte sulcata (Da Costa).

" Shell equivalve, inequilateral, sub-ovate, or orbicular, or sub-trig--onal, generally sub-compressed; concentrically wrinkled, covered with a thick epidermis, closed. Muscular impressions two, large, rather kidney--shaped. Impression of the mantle entire. Hinge tridentate in each valve. Ligament external, with dorsal area and lunule excavated."(Reeve).

In the preliminary discussion of this group the following note was made by John Q. Burch: " I have been using the sections of Astarte following Dr. Dall in " Synopsis of the Fam. Astartidae.." USNM, Vol. 26-,pp 933-951, Trans. Wagner Free Ist. 1903, pp. 1485-1496 etc. However, a casual study of the specimens in our collection tends to be a bit discouraging. I wonder if these sections are deserving of descriptions as subgenera. Dr. Dall stated ,1903, " The distinctions upon which the subordinate groups of Astartidae are founded are chiefly the greater or less development of the hinge teeth and modificat--ions of external sculpture. As the type of the hinge formula does not change but merely submits to certain deductions from its possible total, it will be inferred that the subgenera or sections are not very widely separated." " Anyway some one will have to show me some easy way to place for example Astarte willetti and Astarte alaskensis in different subgenera. My off hand personal opinion is that we are splitting hairs when we try to subdivide the genus Astarte."

Dr . Joshua L. Baily Jr. noted in pencil following the above " O.K. and Amen" which seems to be the consensus of opinion. Therefore we will ignore the sections of Astatte. Those interested may examine the above references.

Astarte polaris Dall, 1903. " Aleutian and Shumagin Islands, Alaska. Circumboreal." (Dall). Johnson " Moll. of Atlantic Coast" gives " Davis Strait 90 fathoms". Type locality: near Shumagin Islands, Alaska.

Astarte compacta Carpenter,1864. " Forrester Island, Alaska to Puget Sound" (Dall). Type locality, Puget Sound.

Collecting data: Forrester Island, Alaska, 40 fms. (G. Willett); Ketchikan, Alaska and San Juan Islands, Wash. (W.J. Eyerdam).

Astarte willetti Dall,1917. " Forrester Island to Puget Sound" (Dall). (Report from Puget Sound by Oldroyds, Nautilus, vol. 39, p. 97.) Type locality, Forrester Island, Alaska.

Collecting data: Forrester Island,Alaska ,50 fms. (G. Willett)

Astarte rollandi Bernardi,1858. " Pribilof and Aleutian Islands to Prince William Sound, Alaska. Also Kamchatka." (Dall). Type locality, not known.

Collecting data: Cooks Inlet, Umnak Island, Alaska- shallow (G.Willett) Seldovia, Alaska,1922, Akutan Island, Aleutians,1931 (I. Norberg, Eyerdam), Orca, Prince William Sound, Alaska (Norberg- Eyerdam Coll.).

Astarte rollandi loxia Dall,1902. " Semidi Islands, Alaska" (Dall). Keen " Abridged Check List" gives lat. 56-59. Type loc., Simidi Islands.

Collecting data: Orca, Prince Wm. Sound coll. by I. Norberg (Eyerdam)

Astarte arctica Gray, 1824. " Circumboreal. Arctic and Bering Seas and the Aleutian Islands." (Dall). Johnson " Moll. of Atl. Coast" gives " Greenland and Davis Strait, 15-60 fathoms." Type loc., Bering Sea.

" Generally larger and not to elongate as A. borealis". (Grant & Gale)

Collecting data: Hinchinbrook Island, Prince Wm. Sound, 15 fms. coll. by I. Norberg, 1936; Izhut Bay, Afognak Island, 10 fms. (W.J. Eyerdam 1922) (Eastward extention from Aleutian Islands of about 1000 miles).

Astarte borealis Schumacher,1817. " Polar and Bering Seas, North Japan, and eastward to Prince William Sound, Alaska." (Dall). Johnson " Moll. of Atl. Coast" gives " Greenland to Massachusetts Bay, 15-100 fathoms".

" Alaskan specimens of this species are somewhat elongate, with the concentric undulations pronounced on the upper (umbonal) quarter or half of the valves, but smooth or with growth lines only on the remainder." (Grant & Gale, 1931).

Collecting data: Hanasloi, Iceland, coll. by Diomedes Davidson,1929, Ice Fjord, Spitzbergen, 10 fms. clay 1864, Drier Bay, Knight Island, Pr. Wm Sound coll. by W.J. Eyerdam, 1923, 10 fms., off Provincetown, Rhode Id., 19 fms. (W.J. Eyerdam).

Astarte alaskensis Dall,1903. " Southern Bering Sea, to Aleutians and south to Puget Sound. Herschell Island, Arctic Coast" (Dall). Type locality: Unimak Id., southern part of Bering Sea.

" This handsome species has prominent concentric ripples. Mr. George Willett obtained many specimens in the open sea off Forrester Island, Alaska and also in the straits. A. willetti Dall (Nautilus, vol. 31, p. 10, 1917) is smaller, relatively more ventricose and has fine concentric riblets. Mr. Willett who has done considerable collecting in the Alaskan waters, obtained the latter species in the open sea off Forrester Island, but not in the straits." (Grant and Gale, 1931.)

Collecting data: Ketchikan,Craig, Forrester Island,Alaska 10-40 fms. (G. Willett); Ishut Bay, Afognak Id., coll. by W.J. Eyerdam, 1922, 10 fms. Drier Bay, Knight Island, Prince Wm. Sound, coll. by W.J. Eyerdam, 1923, 15 fms., Hinchinbrook Id., Prince Wm. Sound, coll. by I. Norberg, 1936, 15 fms. San Juan Islands collected by W.J. Eyerdam.

Astarte fabula Reeve ,1855. " Circumboreal, Arctic Sea and south in Bering Sea, Nunivak Island" (Dall). Johnson " Moll. Atl. Coast" gives " Greenland 12-90 fathoms."

Astarte bennettii Dall,1903. " Polar Sea at Bennett Island, and south in Bering Sea to Nunivak Island." (Dall).

Astarte vernicosa Dall, 1903. " Arctic and Bering Seas. Attu to Atka Ids. in the Aleutian chain." (Dall).

rCollecting data: Atka Island, Alaska (U.S.N.M. in G. Willett coll.)

Astarte globosa Moller,1842. " Arctic Coast to Greenland" (Dall).

Astarte esquimalti Baird,1863. " Aleutian Islands to Puget Sound" (Dall). Type locality: Esquimalt Harbor, Vancouver Id.,British Columbia.

Collecting data: Ketchikan, Alaska 10-40 fms., Craig,Alaska 20-40 fma. (G. Willett); Drier Bay, Knight Id., Pr. Wm. Sound, Alaska 1923 (Eyerdam).

Genus Bernardina Dall, 1910. Type: Bernardina bakeri Dall, 1910.

" Shell small, of the general form of Rochefortia, concentrically sculptured externally, with a conspicuous prodissoconch, which is elevated in the center and at the margins and between these points somewhat excavated; pallial line entire; hinge with the posterior dorsal margin of the right valve fitting into a shallow groover in the margin of the opposite valve; anteriorly with a strong left lateral fitting between two prominent flexuous right anterior laterals; two right and three left cardinals with the resilium posterior to them all. (Dall).

Bernardina bakeri Dall,1910. Point Loma, San Diego (Emerson) to Magdalena Bay, Lower California (Dr. Baker). Type locality: Coronado Islands.

We ran a short note on the extention of range of this species in Minutes #35, p. 19, May, 1944, when our member William K. Emerson reported taking 4 complete specimens and 1 odd valve from the sand at the end of Point Loma. This seemed to be a slight northward extention of the range. Keen " Abridged Check List" simply gives lat. 32. However, we have sets from Dr. Fred Baker from as far south as Magdalena Bay, Lower Calif., Mexico and it seems probable that the range may be further extended.

Dr. Fred Baker was very proud of this little species and often made the remark that in his long life of collecting he had taken many new species but that Bernardina was his only new genus.

In concluding the family Astartidae perhaps it should be mentioned that the literature contains a number of species not only now in synonymy but several that have proved to belong to other groups such as Astarte crassidens Broderip and Sowerby (Carpenter Report, p. 175) which was figured and discussed by Dall , USNM Proc. 1903 , p. 949 as Venericardia crassidens.

Astarte

Bernardina

Family CRASSATELLIDAE

This family presents another dispute in Crassatella Lamarck,1799 vs. Crassatellites Krueger,1823. The authors supporting Crassatellites state that the sole species of Lamarck's Crassatella was a Mactra and cannot therefore be used. Grant and Gale, 1931,Dr. Joshua L. Baily Jr. in " West Coast Shells" and many others are of this opinion. This contention is well stated by Dr. Joshua L. Baily Jr. (Per. Comm. Aug. 1944) as follows : " Stewart prefers the name Crassatella to Crassatellites. The former name is uncertain because the type species was originally described as a Mactra. If this shell really is a Mactra, the name Crassatella cannot be used for our C. fluctuatus. But if it were not a real Mactra but only supposed to be one, the Crassatella is good. Neither Stewart nor Grant have seen Lamarck's original material and they have based their opinions on illustrations. Unfor--tunately they did not use the same illustrations, which accounts for the difference of opinion. In this case I agree with Grant, because the name Crassatellites has only one meaning, and there is no possibility of a mis--understanding when it is used. "

But we are disposed for the time being to follow the advice of Dr. A. Myra Keen stated as follows (Per. Comm. Aug. 1944) : " I have recently seen a copy of Krueger's work and am convinced it must be rejected as not binomial. Therefore, Crassatellites must be dropped. Kruger attaches the suffix- ites to all previously described genera as a device for indicating fossil species. He does not cite bibliographic references, and the use of his names must be attended with so much guess work and inference that it is much preferable to disregard them. An excellent discussion of the problem is given by Stewart (Acad. Nat. Sci. Philadelphia, Spec. Publ. no. 3, pp. 134-136,1930). There seems to be ample justification for returning to the name Crassatella Lamarck,1801-- C. tumida Lamarck,1807 -- Venus ponderosa Gmelin. This is Stewart's interpretation of the type, although Lamarck's actual citation was " Mactra cygnea, Chemn. 6, t.21, f. 207." As Stewart says " It is clear from the original description that the figure cited by Lamarck was due to a misidentification."

This family bears a close relationship to the Astartidae. " The chief characteristic by which the two families are discriminated is found in the ligament, which in Astartidae is external as wellas the resilium, while in the Crassatellidae this organ is separated from the resilium ..." (Dall) It is interesting to note that the Astartidae seems to prefer cold waters while the Crassatellidae are prevalent in tropical waters and unknown in the cold seas.

Genus Crassatella Lamarck ,1799.

Crassatella fluctuata (Carpenter, 1864) - " Santa Barbara Islands, Calif." (Dall). " Santa Barbara Islands to San Pedro" (Oldroyd). Type locality: Catalina Island, Calif.

While other specific names have been given shells from southern Calif--ornia it is our opinion that the above species is the sole local represen--tative of this group.

Collecting data: Off Avalon, Catalina Island in 25 fathoms ~~6/1937~~ (Busch off Catalina Island in 30 fathoms (G. Willett).

Genus Crassinella Guppy,1874. Type (by monotypy), Crassinella martinicen--sis d' Orbigny.

We have another rather complicated dispute regarding this generic name. The source of this difficulty is confusion with the name Gouldia C.B. Adams,1847. One version of this problem is stated by Dr. Joshua L. Baily Jr. (Per. Comm. Aug. 1944) as follows: " The name Crassinella was proposed by Guppy as a substitute for Gouldia in the belief that this name was preoccupied. But Adams had used the name Gouldia for shells in 1847 and it was not until 1850 that Bonaparte used the same name for a bird. It

therefore appears that the bird and not the shell needs a new name. "

The statement of Dr. Baily about the bird needing a new name is no doubt correct. However, this does not quite settle the matter because it seems that when Adams published the name Gouldia it was based upon two very different species, Gouldia cerina and Gouldia parva. The species cerina is a Venerid and parva a Crassinella. An excellent statement of the case for both schools may be found in Ralph B. Stewarts work, Spec. Publ. No.3, Acad. Nat. Sci. Phila, 1930, pp 146-47.

Dr. A. Myra Keen in Proceedings of the Malacological Society of London vol. 23, Part I, 1938, pp 3-31 gives an excellent explanation of the matter in which she states that G. cerina was clearly designated by Dall as the genotype of Gouldia in 1883. If this is true then it follows that Gouldia is a section of Veneridae and Crassinella is the genus for the family Crassa--tellidae.

Crassinella oregonensis Keen,1938. Proc. Malacological Soc. of London,vol. 23, Part I, 1938, pp31-32. Type locality: South Slough, near highway bridge, Coos Bay, Oregon, in Sect. 14, T. 26, S.R. 14, W., Willamette Meridian, 1 to 2 fathoms. Known only from the type locality.
Crassinella branneri Arnold,1903. " San Diego, Calif. to Panama. San Pedro Pleistocene." (Dall).

Collecting data: This species is not reported taken living by any mem--ber of the club in California. It is very abundant in the San Pedro Pleisto--cene. Another species has been recently described from the San Pedro fossil Crassinella nuculiformis Berry, 1940 , described in Bulletin of American Paleontology, No. 94A- Paleontological Research Institution.

Mr. W.J. Eyerdam reports having collected C. branneri Arnold living at Corinto,Nicauragua in 1939.

We have in our collection a set of Crassinella pacifica A. Adams from Diggs Pt., L.B.C., Mexico collected by Earl Huffman in June 1934. A com--parison of these shells with some of the San Pedro fossils show them to be strikingly close. However, they are somewhat less elongate.

Before leaving this family it becomes necessary to ask a few questions trusting that some of our members will send in the answers soon.
1. What is the species listed in many publications as Crassatellites marginata Carpenter. Keep " West Coast Shells" described it " a minute southern shell about the size of a pin head. It is somewhat triangular, yellowish, and marked with brown chrevrons". This specific name was listed by Kelsey, Vol. 1, No. 2 San Diego Soc. of Nat. Hist. p. 38 from 12 fms. off San Diego. The species is also listed by Orcutt " Molluscan World". Eric Knight Jordan Bulletin of the Southern Calif. Academy of Sciences, p. 155 lists a Crass--atellites margarita Carpenter. It would seem logical to assume that this is another reference to the same thing whatever it is ?
2. Kelsey also lists a Crassinella varians C.B. Adams as dredged in 15 fathoms off San Diego. What is it ?

Mr. Allyn Smith sends in the following note regarding question #1. " Discussed your questions today with Hertlein over the telephone. He thinks Jordan's citation of Crassatellites margarita is an error for C. marginata. The earliest reference to Crassatella marginata Carpenter, so far as we can find is in Paetel's Cataloguder Conchilien- Sammlung, part 3, p. 136 (1890) as " Crassatella marginata Cptr. Calforn." There is no printed description that we can find and therefore we suspect that it is a nude name, taken, perhaps from Carpenter's unpublished mss. or labels. Berry (Naut. 21:20) lists " Tivela (?) marginata Cpr." in his Monterey list, based on one valve identified by Dall. Mac and I threw it out as unidentifiable both as to the species and the record itself. We suggest you ignore the whole thing."

See Page 17

Crassatella

Crassinella

Family CARDITIDAE

The following paper was read to the club by Mr. A.M. Strong dealing with the genera, subgenera and species of Carditides from the west coast.

Dall's review and revision of the family Carditidae appears in the Trans. Wagner Free Institute, vol. 3, pt. 6, pp. 1406 to 1436, 1903. In this he divides the family into two subfamilies, Carditinae, with the marsupium in the soft parts, and Thecaliinae , with the marsupium in the ventral por-tion of the mantle in the female, and protected by an infolding of the valves. He further subdivided the subfamily Carditinae into two groups, the mytiloid form with a byssus and slight ventral gape and the cardoid forms without a gape.

In the mytiloid group of the subfamily Carditinae Dall places one genus, Cardita Bruguiere,1792,Lamarck,1799. For the type he uses Cardita calyculata Linnaeus, the first name to appear on Lamarck's list. Under the genus Cardita Dall places as sections Glans Megerle,1811, type C. trapezia and Carditimera Conrad, 1839, type C. arata Conrad as well as others not represented on the west coast. Grant and Gale show that C. sulcata Bruguiere (equals C. antiquata Linne) was designated as the type by Children in 1832. This species does not belong in the mytiloid group and Cardita cannot be used as Dall used it. The oldest of the sections, Glans,then becomes the genus. Carditimera can well be classed under it as a subgenus. Grant and Gale sugg-est that Mytilicardia Anton,1839, " of which it is the type" can be used for the species which Dall placed in Cardita s.s.

In the cardoid forms Dall lists a number of genera, subgenera and sec-tions. The first genus he lists is Venericardia Lamarck,1801, for which he gives the type as V. imbricata Lamarck. Grant gives the type as V. imbricata Gmelin. It is to be assumed that these two are the same but it is not so stated. Under Venericardia Dall lists various sections and subgenera. Of these we have on the west coast the following; subgenera Cardites Link, type Cardites antiquata Linne and under it section Cyclocardia Conrad,1867, type C. borealis. Inasmuch as Cardites Link has the same type as Cardita Lamarck it cannot be used as Dall used it. Grant and Gale do not consider that Cyclocardia Conrad can be distinguished from Cardita and that Veneri-cardia " probably should be considered only a subgenus". No one seems to agree with them on these points.

Venericardia is generally considered a good genus. It is only represen-

-ted on the coast by two species which probably belong in some subgenus not mentioned by Grant and Gale nor Dall. Dall lists Miodontiscus Dall,1903, a new name for Miodon Carpenter,1864,not Dumeril, 1857, type M. prolongatus Carpenter. Cardita Lamarck,replacing Cardites as used by Dall can be consid--ered as genus with Cyclocardia as subgenus under it and Miodontiscus con--sidered a genus. Calyptogena Dall,1891 , type C. pacifica Dall was descri--bed as a genus and is so recognized by Grant and Gale.

In the subfamily Thecaliinae Dall lists two genera only one of which is known to occur on the west coast. It is Milneria Dall,1881, type Ceropsis minima Dall,1871.

If we take the arrangement in genera and subgenera used by Dall with hinge and other characters and change the names according to the above alal-ysis , we will have the following.

Subfamily Carditinae. Marsupium seated in the soft parts.
Group mytiloid. With a byssus and small ventral gape.
Genus Glans. Shell quadrate, with slight ventral gape.
Subgenus Glans s.s. Shell short, quadrate, convex, posterior right cardinal often obsolete, species usually small.
Subgenus carditamera. Shell elongate quadrate, lateral teeth strong in the adult.
Subgenus Mytilicardia. Shell elongate quadrate, the laterals obsolete in the adult.
Group cardoid.
Genus Venericardia. Shell large, rounded trigonal, lateral teeth absent or obsolete, two cardinal teeth in the left valve, three in the right.
Genus Cardita. Similar to Venericardia but smaller, with the right ant--erior cardinal absent, the laterals absent.
Subgenus Cardita s.s. Shell more or less colored, from warm seas.
Subgenus Cyclocardia. Shell white, with a rude periostracum. Boreal and cold waters.
Genus Calyptogena. Shell smooth or faintly concentrically striated. A well marked escutcheon but no lunule. All teeth becoming more or less obsolete in the adult.
Genus Miodontiscus. Shell small,high, with narrow umbones, radially ribb--ed . Right posterior cardinal absent, a posterior right and anterior left lateral feebly developed.
Subfamily Thecaliinae. Marsupium in the ventral portion of the mantle.
Genus Milneria. The female with a domelike indentation rising from the ventral margin which is closed only by an extention of the mantle edge.

Lamy in the Journ. de Conch., Paris, vol. 66, 1921, reviews all known living species in the family Carditidae. He uses the arrangement in genera and subgenera as used by Dall. If the west coast species given by him are placed under the above arrangement of genera and subgenera the west coast species would be as follows.

Genus Glans
Glans (Glans) carpenteri Lamy (C. subquadrata Cpr., not Conrad)G. minuscula Grant and Gale not needed).California.
Glans (Glans) naviformis Reeve. Chile.
Glans (Glans) sulcosa Dall. Bay of Panama.
Glans (Carditamera) affinis Sowerby. Gulf of Calif. to Panama.
Glans (Carditamera) affinis californica Deshayes. Gulf of California.
Glans (Carditamera) radiata Sowerby. Panama.
Glans (Mytilicardia) grayi Dall (C. crassa Sby. not Lamarck). Gulf of Cal .
Glans (Mytilicardia) tricolor Sowerby. (C. laticostata Sby. not Eichwald) Gulf of California to Ecuador.

Genus Venericardia
Venericardia (?) cuvieri Broderip. (C. crassicostata Sby. and other synonyms). Gulf of California to Panama.
Venericardia (?) megastropha Gray. (C. flammae Michelin & other synonyms) Lower California to Ecuador.
Genus Cardita.
Cardita (Cardita) spurca Sowerby. Gulf of Calif. to Peru.
Cardita (Cyclocardia) alaskana Dall. Alaska.
Cardita (Cyclocardia) barbarensis Stearns. Santa Barbara to San Diego.
Cardita (Cyclocardia) crassidens Broderip & Sowerby. Bering Sea to Kodiak Id.
Cardita (Cyclocardia) gouldii Dall. Off San Diego.
Cardita (Cyclocardia) incisa Dall. Alaska.
Cardita (Cyclocardia) monilicosta Gabb. Santa Barbara Pleistocene.Recent ?
Cardita (Cyclocardia) nodulosa Dall. Santa Barbara to Coronado Islands.
Cardita (Cyclocardia) paucicostata Krause. Arctic Sea to Fuca Straits.
Cardita (Cyclocardia) stearnsii Dall. Puget Sound.
Cardita (Cyclocardia) ventricosa Gould. Alaska to Coronado Islands.
Cardita (Cyclocardia) umnaka Willett. Alaska.

To these should be added one species listed by Lamy from Chile & Peru.

Genus Calyptogena.
Calyptogena elongata Dall. Santa Barbara to San Diego.
Calyptogena pacifica Dall. Alaska to Santa Barbara Channel.
Genus Miodontiscus
Miodontiscus meridionalis Dall. Off Point Loma in 70 fathoms.
Miodontiscus prolongatus Carpenter. Alaska to San Diego.
Subfamily Thecaliinae.
Genus Milneria.
Milneria kelseyi Dall. Monterey to Rosario Bay.
Milneria minima Dall. Monterey to Rosario Bay.

Gardner & Bowles in U.S.G.S. Prof. Paper 189 F, 1939, p. 194 indicate that Venericardia cuvieri Brod. may belong in the subgenus Glyptoactis Stew--art, 1930, type V. hadra Dall but this is a Miocene group.

The following notes by Dr. A. Myra Keen (Per. Comm. Aug. 1944) differ from Mr. Strong's conclusions in but few particulars.
Genus Beguina Roding, 1798. Type by monotypy, Chama phrenetica Born-- Chama semiorbiculata Linne.

The species grayi Dall seems to fit here better than in Glans, at least so far as the hinge is concerned; this is a highly unorthodox assignment, however, and I make it with due hesitation.
Genus Cardita
Subgenus Cardita: spurca
Cyclocardia: (species as indicated by Mr. Strong)
Genus Venericardia
Subgenus Venericardia s.s. : megastropha Gray
Glyptoactis Stewart: cuvieri Broderip.
Megacardita Sacco: laticostata Sowerby (The Eichwald name is laticosta,which should not preoccupy Sowerby.

I notice that Thiele in his Handbuch der Systematischen Weichtierkunde groups Glans, Mytilicardita, Carditamera, and Beguina together, all as sub--genera of the oldest name, Beguina. So far as I can make out, we have no true Mytilicardita in the American area, though there may be some in the Caribbean. The genotype is intermediate in size between Glans and Carditamera with a reverse curve along the ventral margin. Good illustrations of the hinges of the various groups are given by Lamy (Jour. Conchyl. vol.66,1922) The genus Venericardia does seem to be represented by a few living species

in the tropics but by none in our area. I am surprised at how many groups seem to be represented in the tropical American fauna. I have compared West coast specimens of laticostata with specimens and illustrations of turgida, supposedly the only living representative of Megacardita, and feel convinced that this is where laticostata belongs.

Glans (Glans) carpenteri Lamy,1922. Jour. Conchyl. vol.66,1922. " Queen Charlotte Islands, British Columbia, to Todos Santos Bay, Lower Calif." (Dall Type locality: Santa Barbara, Calif.

The names subquadrata Carpenter and minuscula Grant and Gale are in the synonymy of the above species.

Collecting data: This is a very common little species taken easily in abundance all along the coast usually under stones, in wharf piles etc. The bathymetric range is rather surprising. We have taken it far up in the southern California sloughs such as Newport Bay, Anaheim Bay etc. and have also brought it up living from as deep as 50 fathoms off Redondo Beach, 15 fathoms off Pacific Grove etc. Dr. Baker dredged it in moderately deep water off the Coronado Islands. (Burch).

Genus Cardita Bruguiere,1792.
Subgenus Cyclocardia Conrad,1867.
Cardita (Cyclocardia) barbarensis Stearns,1890. " Santa Barbara Channel to San Diego, Calif. in deep water" (Dall). Type locality: off Santa Barbara.

The following note received from Mr . Allyn Smith " According to Mac--kenzie Gordon, who made a pretty careful study of this group in the U.S. National Museum, barbarensis is a thin-valved shell from 1000 fms. in the Santa Barbara Channel and is known only from the original lot. I have one of these shells in my collection. It is a good species.
Cardita (Cyclocardia) gouldii Dall,1902. " Off San Diego, Calif." (Dall).
Cardita (Cyclocardia) stearnsii Dall, 1902. " Puget Sound" (Dall).
Cardita (Cyclocardia) paucicostata Krause,1885. " Arctic Sea to Fuca Straits (Dall). Type locality: Emmahafen.

Collecting data: Atka Island, Aleutians, 1932 (W.J. Eyerdam).
Cardita (Cyclocardia) crebricostata Krause,1885. " Point Barrow, Alaska to Monterey, Calif." (Dall). Type locality- St. Paul Island, Alaska.

Collecting data: Note from Allyn Smith " Mac says that this species is not known, for certain, to have been taken south of the coast of Oregon. We have not seen it from Monterey." Reported from Ketchikan, Forrester Island, Alaska 30-40 fms. (G. Willett);Ishut Bay, Afognak I, coll. by W.J. Eyerdam, 1922, 10 fms. mud, Drier Bay, Knight Island, Pr. Wm. Sound, 1923 by Eyerdam; Akutan Island, Aleutians, coll. by I. Norberg,1931, dredged.
Cardita (Cyclocardia) alaskana Dall,1903. Keen " Abridged Check List " give the range lat. 62. Ommitted from Bulletin 112. Grant and Gale place it in the synonymy of the above species crebricostata Krause.

Collecting data: Izhut Bay,Afognak Island, 1922 (W.J. Eyer dam); Victo--ria, B.C. (Newcomb).
Cardita (Cyclocardia) crassidens Broderip & Sowerby,1829. " Arctic and Bering Seas and eastward to Kodiak Island, Alaska" (Dall).

Collecting data: Icy Cape, Alaska (W.J. Eyerdam).
Cardita (Cyclocardia) nodulosa Dall,1919. " Santa Barbara to the Coronado Islands" (Dall). Type locality- off Santa Rosa Island.

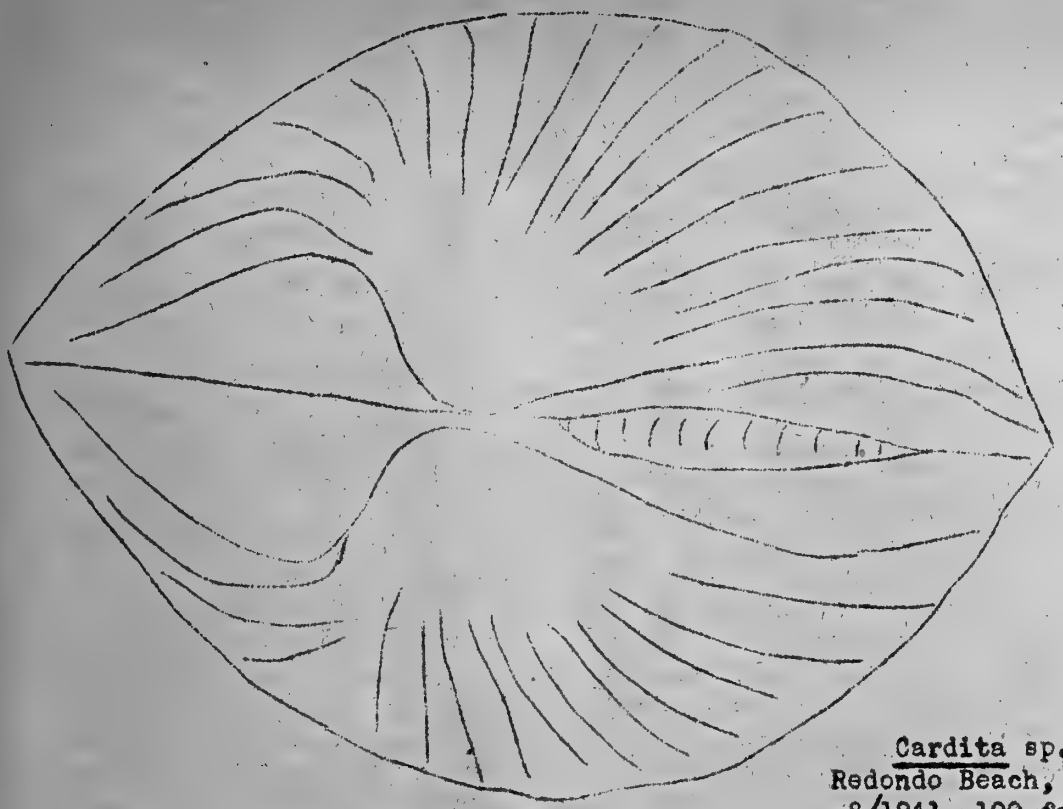
An interesting note regarding this species has been received from Dr. Joshua L. Baily Jr. (Per. Comm. Aug. 1944) " If you decide to follow Grant and Stewart in putting our species of Cyclocardia under Cardita , the species called nodulosa by Dall will have to have a new name, as there are already t two other species of Cardita called nodulosa." Inasmuch as Dr. Baily is quite correct about a nodulosa of Lamarck and also Reeve we propose to call it Cardita bailyi until it may get still another name.

Collecting data: off Catalina Island, 50-200 fms. (G. Willett).
Cardita(Cyclocardia) monilicosta Gabb,1861. "Santa Barbara Pleistocene. Recent ?" (Dall). This species is mentioned here merely because it was listed in Bulletin 112. So far as the members know it has never been taken Recent. One notation was sent in by Mr. George Willett " A Plsistocene species, probably a synonym of occidentalis Conrad."
Cardita (Cyclocardia) umnaka Willett,1932. " Trans. San Diego Soc. Nat. Hist. vol.7, no. 9, pp. 85-90 " Umnak Island, Alaska. Washed up on the beach. (G. Willett).
Cardita (Cyclocardia) ventricosa Gould ,1850. " Belkoffski Bay, Alaska to Coronado Islands and Cortez Bank, California" (Dall). Type locality: Puget Sound.

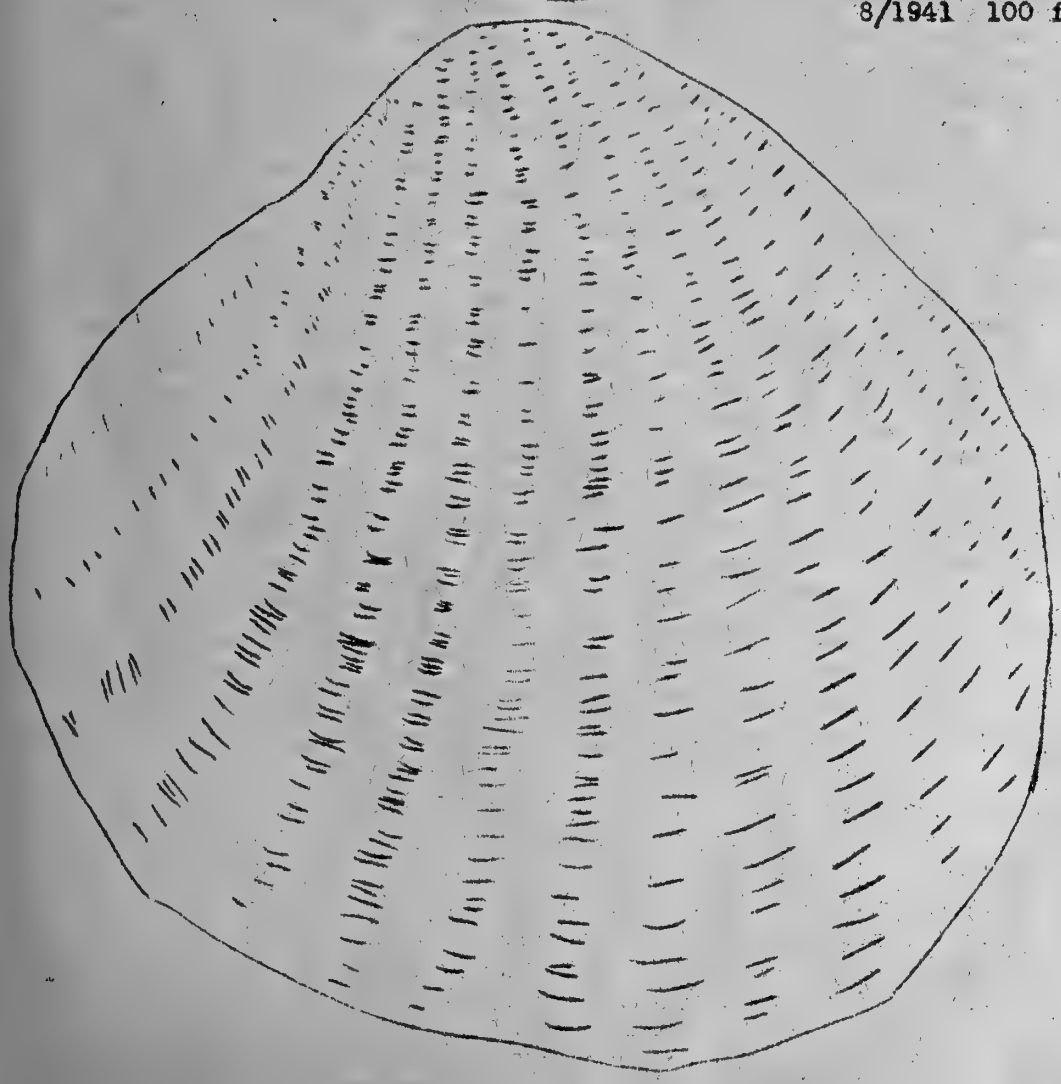
Collecting data: Craig, Ketchikan, Forrester Island, Alaska 20-40 fms. (G. Willett); Monterey records: 35-149 fms. , mud and fine sand, fairly common. Monterey examples are not typical and may be worthy of a subspecific name (A. Smith); Smith Cove, Seattle Harbor, 1920, San Juan Islands, Izhut Bay, Afognak Island,1922, Uzinki, Spruce Island, Kodiak Id. (W.J. Eyerdam).

We have a very interesting note from Mr. Allyn G. Smith in which he quotes some observations of Mac Gordon on this species as follows:
" The other main problem is that of Cardita (Cyclocardia) ventricosa Gould. There were two species in the type lot. One can be recognized from Gould's measurements and figure, but the other was figured as the type by Stearns who stated that it was the same one figured by Gould. Dall later described the Stearns specimen as C. stearnsii and designated the other large specimen in the lot as the type. There are some who would hold that the Stearns mistake was a designation of type and that the name ventricosa must be applied to a species of which only a dozen or so specimens are known. Common sense, however, tells us that Dall should be followed and it may be argued that Stearns designated two types of which Dall selected one; or that Gould's measurements and figures leave no doubt as to which species was intended. As there is no Rule of Nomenclature to cover the holotype of a species, I think the name may be saved for the more common species. However, the Monterey form(of ventricosa) is immediately recognizable from the Puget Sound typical form. I think that it deserves a subspecific name based on the more rounded dorsum, lower beaks, and truncate anterior; this also has an effect on the position of the bend at the lower side of the hinge plate below the cardinal tooth. As I see it there is the typical ventricosa which extends from Puget Sound region south to the Santa Barbara Islands; the Monterey variety which ranges from Alaska to San Diego; and a transverse form, C. gouldii Dall, which is known from one specimen dredged in 822 fathoms off San Diego. The hinge plate of all forms goes through the same variations based on the straight or slightly sigmoidal aspect of the posterior lateral tooth. C. stearnsii is a good species based on the narrower shape from front to back, higher beaks, and the strongly curved posterior lateral tooth."

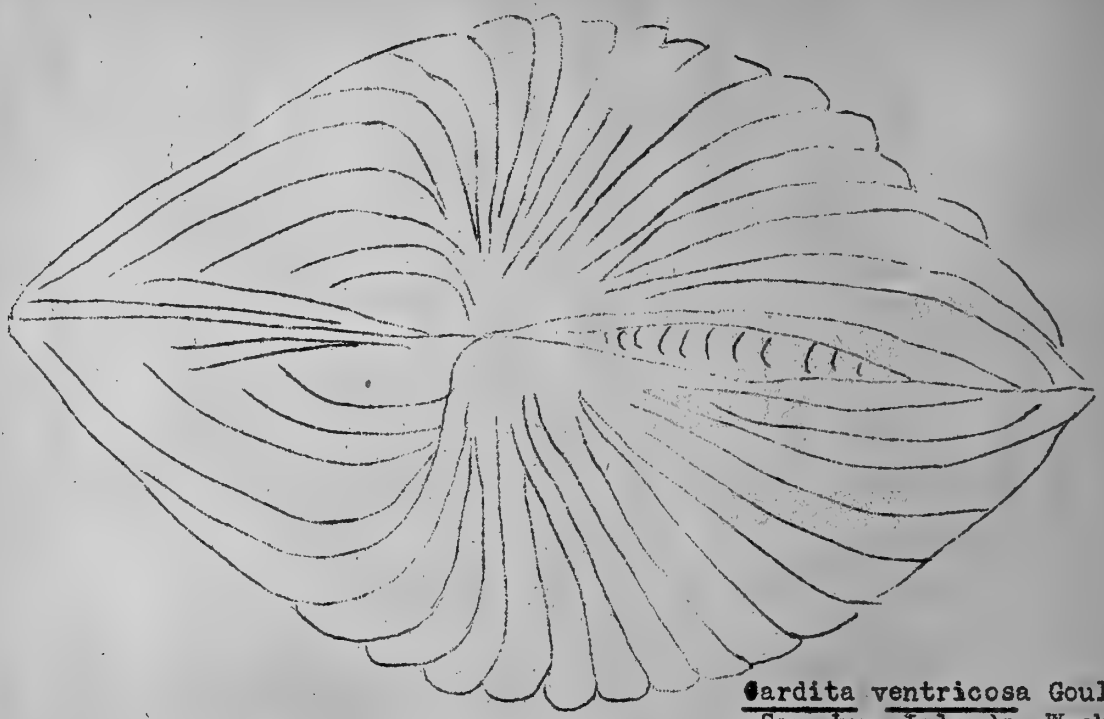
The following note by Thomas A. Burch accompanies the figures on the next two pages: " It is apparent in these drawings that these two shells are of different shape. Our Redondo Beach specimens are rounder in outline and are distinctly more inflated. While these drawings show a difference in the ribs it is very difficult to show exactly how it is. It is clear to me, but then I have just finished drawing them. The ribs are more pronounced in contour in the Puget Sound specimens and while the drawings may not give the impression at first that the ribs of the northern specimen are the more pronounced of the two- such is the case. The concentric sculpture on the ribs of the southern form consists of flat " plates" which I have represented by several closely spaced lines, while on the northern specimen it is merely of incremental lines. These " plates" tend to line up on Redondo Beach specimens, and give a much more definite concentric sculpture than on the others."
John Q. Burch thinks this should be Cardita ventricosa redondoensis, even though there seem to be no intergrades.



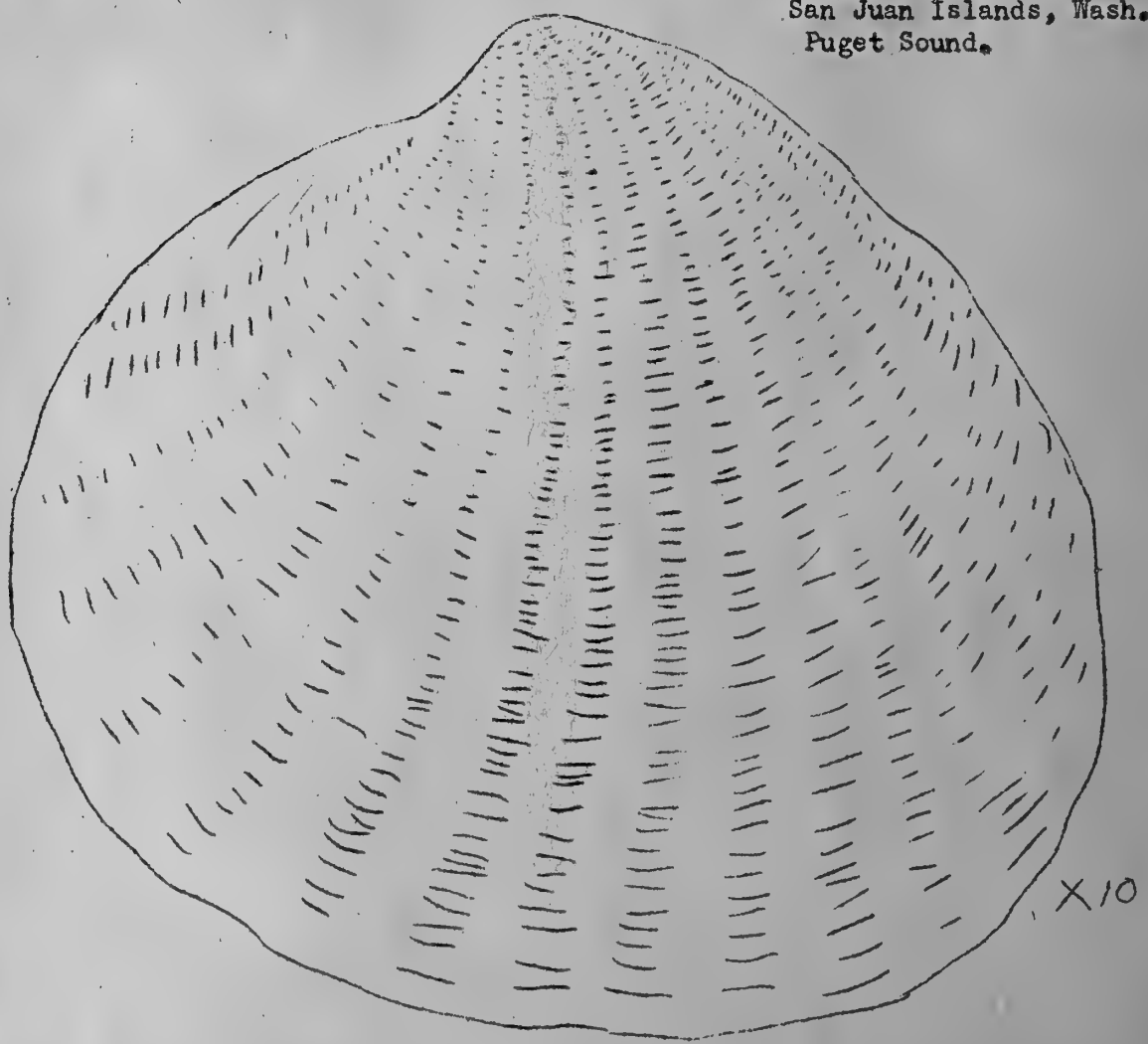
Cardita sp.
Redondo Beach, California
8/1941 100 fathoms- mud.



X 10



Cardita ventricosa Gould
San Juan Islands, Wash.
Puget Sound.



Cardita (Cyclocardia) incisa Dall, 1902. " Unalaska to the Semidi Islands, Alaska." (Dall). Type locality, Unalaska.

Genus Miodontiscus Dall, 1903. Type: M. prolongatus Carpenter.
Miodontiscus prolongatus Carpenter,1864. " Middleton Island, Alaska to San Diego, California " (Dall). Type locality, near Neah Bay, Washington.
Collecting data: Craig, Forrester Island, Alaska, 30 fms. (G. Willett); San Juan Islands, dredged (W.J. Eyerdam); Victoria, B.C., dredged (Newcomb Monterey record- 5-25 fms. sand, off Pacific Grove, 25 fms. off Carmel, rare (A.G. Smith); dredged in Puget Sound in 1940 by Trevor Kincaid; common in San Pedro Pleistocene(Burch).
Miodontiscus meridionalis Dall, 1916. " Off Point Loma, Calif., 70 fathoms" (Dall). Reported only from the type locality.

Genus Calyptogena Dall,1891. Type (by monotypy), C. pacifica Dall, 1891.
Calyptogena pacifica Dall,1891. " Clarence Strait, Alaska, to Santa Barbara Channel, Calif." (Dall). Type locality, off Dixon Entrance, Alaska, 322 fms.
Calyptogena elongata Dall,1916. " Santa Barbara Islands to San Diego." (Dall Type locality, off Point Loma, California in 275 fathoms.

Genus Milneria Dall,1881. Type: Ceropsis minuta Dall.
Reference- Nautilus v. 50, p. 86, 1937- Dr. Fred Baker. Milneria minima Dall and Milneria kelseyi Dall. The first was originally described as Cer--opsis minima. Ceropsis being preoccupied the name was changed to Milneria minima. " In describing M. kelseyi, Dr. Dall remarked that it had been con--fused with M. minima and that it could best be described by using the two species for comparison. By a curious error he reversed his type specimens so that the description of M. minima is really the description of the new species. To read the description correctly, one must reverse the names throughout the whole article." Ref. Proc. U.S.N.M., LII, 1917, p. 408.
The above note copied here although I think all of the members have been familiar with the situation.
Milneria minima Dall,1871. " Monterey to Rosario Bay, Lower Calif. on Haliot--is" (Dall). Type locality: Monterey, Calif.
We have found minima comparatively rare. It was rather common at Arbol--itos, Lower California, cool water locality. M. kelseyi is the common form taken by all littoral collectors under stones.
Milneria kelseyi Dall, 1916. " Monterey to Point Abreojos, Lower Calif. under stones" (Dall).

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Continuing the discussion from page 9we have the following data from Dr. A. Myra Keen (Per. Comm. Aug.31,44) " Circe margarita Carpenter, 1855. Mazat--lan Catalogue, p. 81. Type locality, Mazatlan. Without seeing the types one cannot be positive about the diagnosis of this, but specimens identified by Carpenter, evidently paratypes, in the National Museum seemed to me to be the young of Amiantis callosa or some such beast. Specimens in our collection under the names " Crassatella marginata" and " Crassatella margarita" mostly prove to be the shells later named Psephidia brunnea Dall, which seems to be the valid name for out California species. An interesting little memorandum on one of the San Diego lots, in Hemphill's handwriting, says:" Copy of Carpenter's note -- Crassatella (Hemphillia) margarita Cpr. I must separate this, being ovoviparous; if I suppress Hemphillia from chitons I will put it in here. Meanwhile call it Crassatella, not Circe." Mr. Willett put me on the right track some years ago when I was puzzling over the problem, and later I verified the identification of the Psephidia brunnea at the National Museum. The spelling " marginata" is evidently an error. At any rate, I think we can write the species off so far as California is concerned." (con.)

" Harking back to the Circe margarita problem. Carpenter on p. 82 of the Mazatlan Catalogue describes a C, subtrigona which is also sometimes quoted from our area. Specimens of this in the National Museum identified by Carp--enter seemed to me to be Petricola tellimyalis.

Gouldia varians Carpenter, Oct. 1855. Mazatlan Catalogue, p. 83. Type locality, Mazatlan. This is a Crassinella that differs from C. pacifica (C.B . Adams) in being less compressed, more inequilateral, with finer sculpture.

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We discussed the genus Verticordia in Minutes #38, p. 15. One of the puzzles connected with this group was the name Verticordia acuticostata reported from Dr. Baker's cards in the San Diego Museum and presumably picked up from Mr. Button's list. The following data has been received about this name. Mr. Allyn G. Smith " Verticordia acuticostata was described by Philippi in 1844 as a Sicilian fossil."

And Dr. A. Myra Keen advises us as follows " Verticordia acuticostata (Philippi), 1844. Enum. Moll. Sicil. vol.2, p. 42. This is an east coast species. Our West Coast form was identified as V. novemcostata Adams and Reeve for a time. Dall,1886 (Bull. Mus. Comp. Zool., vol. 12, no.6, pp 285--286), reviews the group and synonymizes novemcostata and caelata Verrill under ornata (D'Orbigny)."

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Volsella senhausi Reeve , an exotic species presumably introduced from Japan with seed oysters has been reported from the Bolinas side of Stinson Beach, Calif. just inside the entrance. Mr. Allyn G. Smith reports that they are more highly colored than specimens in the Hemphill collection from Japan. We hope to receive further information regarding this species.

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Family CHAMIDAE

Genus Chama Linnaeus, 1758. Type (subsequent designation Schumacher 1817) Chama gryphoides Linne. Chama lazarus L. (by sub. desig. Children,1823) is given as the type by many authors.

" Shell orbicular, ovate or oblong-ovate, irregular, inequivalve, profu--sely ornamented with spines, scales or lamellae; lower valve more or less deeply convex, upper valve flatter; umbones unequal distant, involuted some--times to the right, sometimes to the left in the same species. Hinge is composed of a single thick oblique slightly crenated tooth inserted in a correspondingly grooved pit in the opposite valve. Muscular impressions two, lateral large. Ligament external, divaricate behind the umbones.(Conch Iconica).

Chama pellucida Broderip,1835. " Oregon to Chile, and Galapagos Islands"(Dall) Type locality: Iquique,Peru. There has been some confusion in our literature regarding the author, some giving Sowerby 1834 . Dr. A. Myra Keen advises us on this as follows:" The author of C. pellucida according to Sherborn is Broderip, and the actual date of publication of the Proc. Zool. Soc. Lon. for 1834 was April, 1835, for that part in which the name pellucida appears."

Collecting data: This is our common California Chama found all along the coast on pilings, breakwaters, rocks etc. We are not sure about the bathymetric range but have taken it from just below the tide mark down to as deep as 25 fathoms on the gravel beds off Redondo Beach. (Burch).

Chama frondosa Broderip, 1835. " San Diego, Calif. to Peru" (Dall). Type locality: Island La Plata, West Colombia.

The California record of this species is questioned. The consensus of opinion is that such a record was based on misidentification. Mr. Allyn G. Smith sends us the following data " Note by Hertlein: " The lamellae of Chama frondosa are frondose, expanded and radially striated. Have not seen specimens from California or northern Lower California."

Chama buddiana C.B. Adams,1850. " Bodega Bay, Calif. to Panama" (Dall).

(Con.)

Dr. A. Myra Keen (Per. Comm. Aug. 1944) states: " The specimen of "Chama buddiana" in the collection of the U.S. National Museum upon which the Monterey record is based is a Pseudochama granti. I saw no other California specimens in that collection. Dall in Bull. 112 lists also Bodega Bay, the "38 ♂ of my check list. I have no way of checking the authenticity of this record; perhaps, like the Monterey record, it represents a misidentified P. granti. I doubt very much if true C. buddiana occurs in California"

Mr. Allyn G. Smith sends in the following note " Note by Hertlein: C. buddiana does not occur in California. Confused with Pseudochama granti Strong."

Genus Pseudochama Odhner, 1917. Kungl. Svenska Vetensk. Handlingar, Bd. 52, no. 16, p. 30. Genotype (by monotypy): P. cristella (Lamarck) -- Chama reeveana Clessin.

In the preliminary discussion of this generic name the following notes were made by John Q. Burch " Is there any distinction other than the fact that Chama attaches by the left valve and Pseudochama attaches by the right ? A number of authors are disposed to ignore Pseudochama even as a subgenus and place the species under Chama. If the only difference is in the attachment by the right valve there must be considerable question about the validity of Pseudochama. Many species seem to be described as attaching by both right and left. Cotton and Godfrey " The Mollusks of South Australia" Pt. I, p. 197 in describing Chama ruderalis Lamarck 1819 state " Usually, when viewed from the upper valve, twisted sinistrally, but occasionally dextrally as in Lamarck's type; the direction of the twist depends on whether the shell is attached by the left or right valve."

The above comments brought a number of replies. Dr. A. Myra Keen (Per. Comm. Aug. 44) advises: " Odhner says (p.31)..." a division into the two genera Chama and Pseudochama (comprising also Echinochama) is necessary. The distinguishing characters are the following: The dentition in Chama may be expressed (in accordance with Bernard, 1895) thus:

Chama	left valve	2a plus b		4b	II
	right	3a	1	3b	I
Pseudochama	left valve	2a	2b	4b	II
		1	3b		I

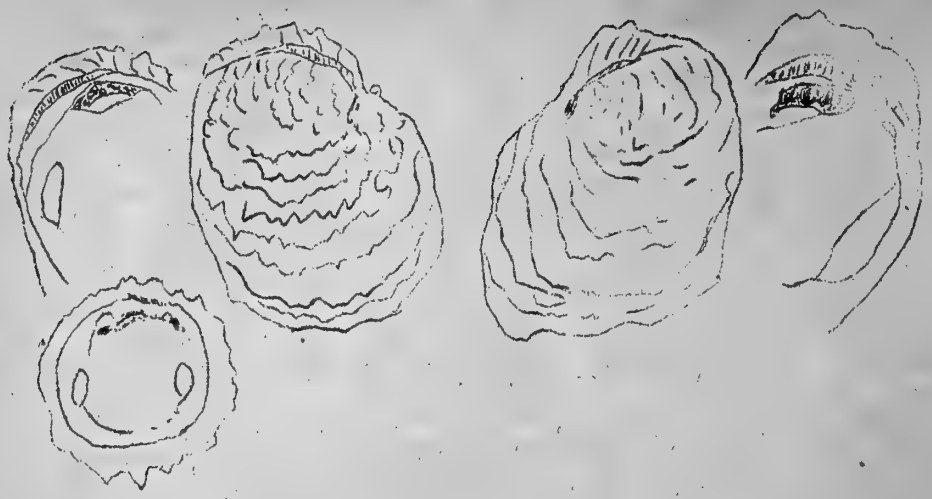
The difference is more obvious in young than in older shells"
Odhner in the remainder of his discussion insists that the difference is more than a simple matter of which valve became attached, that there is a fundamental difference in the soft parts which is reflected in the different dentition of the hinge."

Therefore, with some mental reservations we retain the genus.
Pseudochama exogyra Conrad, 1837. " Oregon to Panama" (Dall).
Type locality, near Santa Barbara, Calif.

Collecting data: Our common sinistral Chama abundant in the intertidal.
Pseudochama granti Strong, 1934. (Nautilus, vol. 47, no.4, p. 137, April, 1934) Keen " Abridged Check List" gives the range lat. 34 to 37. Our experience has been Catalina Island to Monterey.(Burch) San Benito Ids(28 N.) (G.Willett

Collecting data: off Monterey, Calif. on shale in 20-40 fms., off Avalon Catalina Id., in 25-35 fms., off Redondo Beach, Calif. in the gravel at 25 fms. but also from the rocks in 75 fms. or slightly deeper (Burch);

P. granti has well developed spines on the under valve. It is smaller deeper and disposed to be more highly colored than exogyra.



Chama Pseudochama

Family THYASIRIDAE

Genus Thyasira Leach (in Lamarck,1818). Type (by monotypy, fide Dall,1903) Tellina flexuosa Montagu,1803.

" Shell subglobular, earthy; umbos directed forward; posterior side furrowed; lunule absent; ligament in a groove, partly external; hinge eden--tulous, the hinge margin indented in front of the umbos, which form a pseudo tooth; muscular impressions elongated; pallial line simple; margins simple."

Subgenus Thyasira s.s. " Valves with edentulous hinge, the anterior dorsal a area more or less impressed, the posterior more or less radially sulcate or plicate" (Dall, 1903).

Thyasira bisecta Conrad,1849. " Off Alaska Peninsula and southward to Oregon Coast" Also Miocene and Pliocene." (Dall). This should no doubt also include the Pleistocene now. It is not uncommon in the Timm's Point deposit San Pedro once considered Pliocene or older but now generally thought to be Pleistocene.

Keen " Abridged Check List" gives lat. 44-56 for T. disjuncta (Gabb) which brings up the problem of which we elect to use for our recent species. A note on the anatomy etc. of the species appeared in Nautilus vol. 32, p. 103 by Dr. Dall. An article in Nautilus vol. 41, pp 129-131 by Nellie May Tegland " Thyasira disjuncta Gabb not Thyasira bisecta Conrad the Recent West Coast Shell". The arguments pro and contra are too extensive to warrant repetition here. Grant and Gale discuss the Tegland opinion, 1931, p. 282 but do not accept it retaining the name bisecta for the Recent species. Grant and Gale claim to have examined a series of specimens from the Miocene to the Recent and found them specifically identical. So since the name bisecta has been in almost universal use for a great many years it seems that the burden of proof should be greatly upon those asking us to change it.

Reported from Puget Sound by Walter J. Eyerdam.

Thyasira gouldii Philippi, 1845. " Bering Strait to San Diego. Also Atlantic (Dall). Johnson gives the range on the Atlantic " Greenland to Connecticut, 5-400 fath."

This species was first identified as Thyasira flecuosa (Montagu) , the genotype, from England. Carpenter called it flexuosa and was followed for many years by Dall, Cooper and others. Grant and Gale, 1931 discuss this and state that the differences are slight. So gouldii should be of special

interest to us since it is almost if not identical with the genotype. Type locality of T. gouldii is Massachusetts Bay. It is a very common speci in the Timm's Point Pleistocene deposit at San Pedro. Mr. Walter J. Eyer--dam sends in an interesting note as follows: Thyasira flexuosa gouldii Phil Note... Prof. Nils Odhner the foremost authority on the mollusca of N. Europe considers T. gouldii a variety of flexuosa. Comparisons between our European and Alaskan specimens shows minor differences. The European flexuosa is more fragile and white while the Alaskan specimens are rougher, heavier and rather a dirty white" Collecting data: Drier Bay, Knight Island, Prince William Sound, Alaska, 10 fms. (W.J. Eyerdam); Hofsos, and Reykiavik, Iceland, dred--ged by O. Torrell (Eyerdam Coll.) No other member of the club reports gouldii Recent from this coast.

Thyasira trisinuata Orbigny,1846. " Sitka, Alaska, to San Diego. Also Atlantic (Dall). Johnson gives the range in the Atlantic " Labrador to West Indies, 15-192 fathoms." Type locality: Martinique and Guadeloupe. Also reported from the Mediterranean. The subspecies Thyasira trisinuata polygona Jeffreys,1863 was as early as 1901 placed in the synonymy of the typical by Dall, and the consensus of opinion favors that disposal. We mention it because it is listed in Bull. 112.

Collecting data: Frederick Island, Alaska , 12 fms. (Lewis); Ketchikan, Forrester Island, Alaska, 30-50 fms., Point Loma, San Diego Co., 30 fms. (G. Willett).

Thyasira cygnus Dall,1916. " Southeastern Alaska" (Dall). Type locality: Cygnet Inlet, Boca de Quadra, Alaska in 160 fathoms.

Thyasira barbarensis Dall,1889. " Fuca Straits to Gulf of California" (Dall) Type locality: Station 2840, Santa Barbara Islands.

Note by Dall,1901 " Recalling T. sarsii, but differently proportioned. The specimens named Axinus flexuosus by Cooper, from 120 fathoms, near Cat--alina Island, Calif., prove to belong to this species."

Collecting data: We have identified specimens dredged off Redondo Beach Calif. in 75 fms. mud bottom as this species. The only interesting thing about it is that it seems to be located in colonies. It is quite rare other than that when we did strike them we brought them up by the hundreds in the same dredge haul. Then we might not pick up another for months. They are very fragile and a large part of them were always crushed in the dredge (Bursh); off San Pedro, Calif. in 20 fms. (G. Willett).

Thyasira excavata Dall,1901. " Oregon to Gulf of California" (Dall). Type locality: off Tillamook, Oregon.

" A well marked species notable for the sharp fluting of the posterior dorsal area" (Dall, 1901).

Thyasira tricarinata Dall, 1916. " Off Santa Barbara Islands, Calif. in 1,100 fathoms" (Dall). Known only from type locality.

Subgenus Axinulus Verrill and Bush,1898.

" Shell minute, ovate or oblong, with the dorsal areas obsolete."

Thyasira (Axinulus) ferruginea Winckworth,1932. Jour. Conch. vol. 19, no.7 pp 242,251. Dr. A. Myra Keen advised us regarding this specific name " The name Thyasira ferruginosa (Forbes),1844 is preoccupied, a fact overlooked in my check list. Winckworth has caught the homonym."

" Aleutian Islands. Also Atlantic and Arctic" (Dall). Johnson gives the Atlantic range " Greenland to North Carolina, 20-1525 fathoms."

Genus Axinopsis G.O. Sars,1878. Type Axinopsis orbiculatus Sars.

" Shell discoidal, tumid in the middle, compressed toward the margins; umbO--nes slightly prominent; no external ligament; valves thin, pellucid, white, concentrically striate; cardinal tooth in the right valve obtusely elevated, recurved; in the left valve elongated, subhorizontal; cartilage narrow."

Axinopsis sericatus Carpenter,1864. " Aleutian Islands south and east to Puget Sound and Catalina Island, Calif." (Dall). to Todos Santis Bay, West Mexico 7/1938 (Burch). Type locality: Catalina Island, Calif.

" Shell small, circular, flat, epidermis silken" (Carpenter).

Axinopsis viridis Dall, 1901. " Arctic Ocean, on the west to Japan, on the east the Aleutian and Coronado Islands" (Dall). Type locality: Plover Bay, Bering Strait.

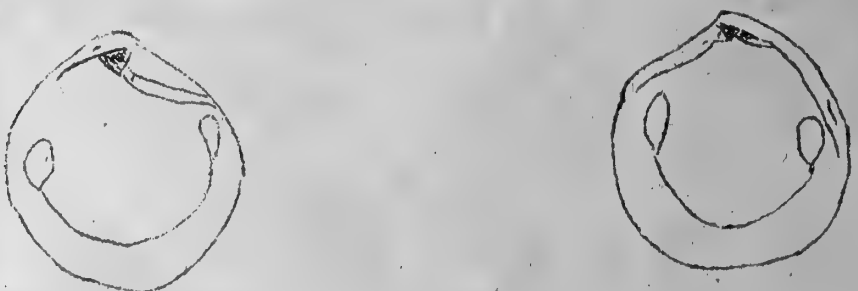
In the preliminary discussion of this genus John Q. Burch made the foll--owing confession of ignorance " I would like very much to know whether or not there are really two species on this coast. Axinopsis is such an unbelie--vably common shell in mud from around 100 fathoms that the custom is to wash out through a screen and then pick the other species out of the countless thousands of Axinopsis. One dredge haul almost anywhere would supply all of the collectors in creation with an extensive set. I have had sets of the species taken from off Redondo Beach labelled viridis by experts and from the same dredge haul they also find sericatus. Dall says sericatus is pale yellow and viridis a silky green. You get all shades of both including some blotched with both in my opinion. Inasmuchas they all easily fit Carpenter's description of sericatus I have been disposed to label all of them sericatus until some one shows me how to separate them."

Dall states of viridis " A silky green, solid, orbicular species with very distinctly developed cardinal teeth" and of sericatus " More ovate, flatter and thinner, with a less developed dentition and pale yellow perios--tracum."

Mr. George Willett advised me on this as follows: " If I have these properly figured out (following illustration by Dall and Oldroyd), sericatus is higher than long, and viridis is as long as high, usually longer." (See Proc. U.S.N.M. 23: pl. 40, figs. 1 & 2). Mr. Willett is of the opinion that all of the Redondo Beach specimens are viridis. We have accepted Mr. Willetts identification.

Collecting data: for A. sericatus : Craig, Alaska (G. Willett); Mon--terey record, 15-25 fathoms, Monterey Bay, in sand, occasional (A.G. Smith) Drier Bay, Knight Island, Pr. Wm. Sound, Alaska, dredged, 1923 (W.J. Eyer--dam); Akutan Island, Aleutians, 1932 (I. Norberg.)

Collecting data: for A. viridis : Craig, Alaska (G. Willett); Kodiak Island, Pr. Wm. Sound, Alaska, Victoria, B.C.- 5015 fms. (Lewis); Akutan Island, dredged 1931 (I. Norberg); Illiliuk Harbor, Unalaska Island, dredged 1932 (W.J. Eyerdam); Monterey record: 36-86 fathoms off Point Pinos, in soft dark gray and green mud (USFC Stas. 4464,4475)- 298 fathoms off Point Sur, in yellow sand and mud (USFC Sta. 3187) (As you can see from the above we are calling the material Mac dredged sericatus, and the Albatross shells viridis. We do'nt have enough material to decide on the essential differences. Would like to see a few of your Axinopsis from off Redondo. I have a set, labelled " A. viridis" from the Arctic Ocean in 30-32 fathoms (Lat. 68 37'N Long. 168 53' W.), collected by Woodbridge Williams. They are not solid or orbicular, as this species is definied by Dall, so I am changing my label on these to A. sericatus.)

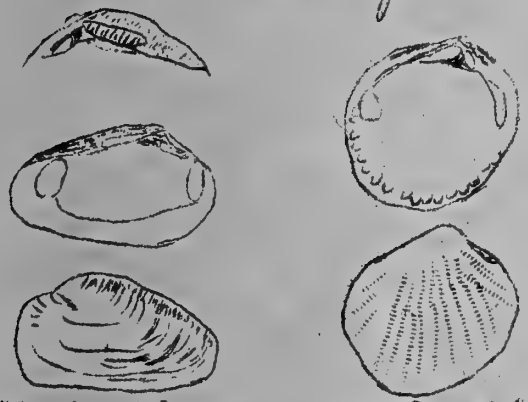


Axinopsis

Cardita antiquata (Linné)

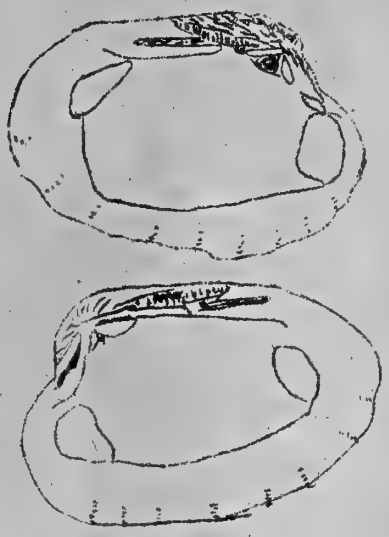
after Lamy 1922

← outline of shell after Burguy Dalitzsch and Dolfuss

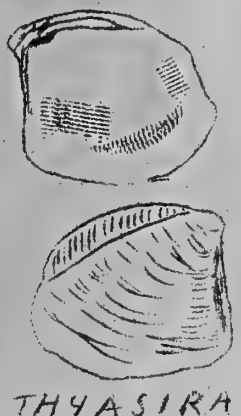



MILNERIA


MIODONTISCUS


CLANS


TARAS


THYASIRA

Family UNGULINIDAE (DIPLODONTIDAE)
Genus Taras Risso,1826 (Diplodonta Brown. 1831) Type: Taras antiquatus RissO
" Shell suborbicular, smooth; ligament double, rather long, submarginal; hinge teeth 2.2, of which the anterior in the left valve, and the posterior in the right are bifid; muscular impressions polished, anterior elongated."

The opinion that the genus Diplodonta must be abandoned as a subjective synonym of Taras has been almost entirely accepted by the more recent stud--ents. Grant and Gale, 1931, p. 293- Ralph B. Stewart, Spec. Pub. no.3, ANSP p. 193. Grant and Gale 1931 suggest that the entire family should probably be included in Lucinidae.

Subgenus Taras s.s. " Shell with growth lines only, rather ventricose, valves inequilateral."

Taras aleuticus Dall,1901. " Cape Lisburne, Arctic Ocean, to the Aleutians and eastward to Sitka Bay, Alaska." (Dall). Drier Bay,Alaska (Eyerdam)

" A chalky, subrectangular species, with coarse epidermis. The young have a smooth surface and dark gray periostracum." (Dall).

Taras orbellus (Gould) 1852. " Pribilof Islands, Bering Sea to Gulf of Cal--ifornia" (Dall). Type locality: San Diego, Calif.

This is our common southern California species. It is a subglobose shell with inconspicuous beaks and fine growth lines. Dall and others all mention the habit of the species in forming a nest of sand and other material cement--ed by musus. However, we have taken this species in great numbers in places showing no inclination to make such a nest. For example the species is very common at San Onofre, Calif. in the rubble reef usually among the worm tubes and I have never taken a specimen there with a nest. However, the nest is the common thing with it in such places as Mission Bay. (Burch) ; Pr. Wm. Sound Alaska, 18 fms. (Lewis); Sitka,Ketchikan,Forrester Id.,Alaska, 10-20 fms. (G. Willett); Seattle in mud, Hoods Canal, Wash. Izhut Bay, Afognak Id., Alaska, 1922 (W.J. Eyerdam);

Taras subquadratus (Carpenter), 1855. " Catalina Island, to Panama"(Dall). Type locality: Maxatlan, Mexico. We have dredged specimens tentatively ref--erred to this species off Redondo Beach, Calif. and off Santa Monica in 25 fathoms which might be an extention of ranhe slightly. However, we have never been very happy about our ability to separate orbellus and subquadratus. Dall states " More compressed and thinner than orbella, and of different outline." While it is true that our dredged specimens seem to be uniformly " more compressed and thinner" it is also true that it is possible to select especially young specimens from a series of orbellus from such localities as San Onofre that seem to have the same outline as the dredged specimens. (Burch). Note from Mr. George Willett " I see no way to separate adults by shell characters".

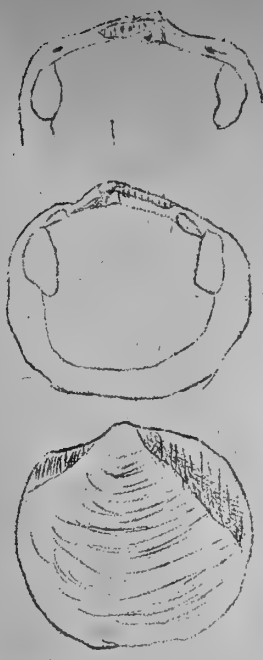
Subgenus Felaniella Dall,1899. Type (by orig. desig.) Felania usta Gould. " Shell like Diplodonta, but heavy, compressed, externally smooth, with a conspicuous dark periostracum and less equilateral valves." (Dall).

Taras (Felaniella) sericatus (Reeve), 1850. " Monterey, Calif. to Panama" Dall gave the range San Diego to Panama, but Keen " Abridged Check List" gives lat. 8-37 and the Burches dredged it off Monterey also in 1940.

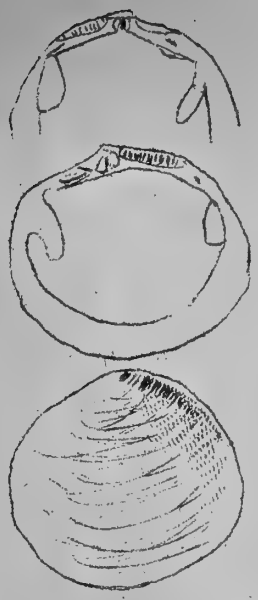
Grant and Gale 1931 consider this species conspecific with the Pliocene form Taras parilis(Conrad) and make it a subspecies of parilis.

We identified our specimens from off Monterey largely by the fact that they did have the " shining pale olive horny epidermis" mentioned by Reeve in the description (Burch). Allyn G. Smith reports having dredged a specimen off Monterey in 15 fathoms, sand.

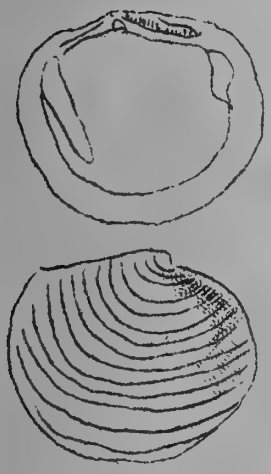
Lucinisca



Parvilucina



Epilucina



Lucinoma

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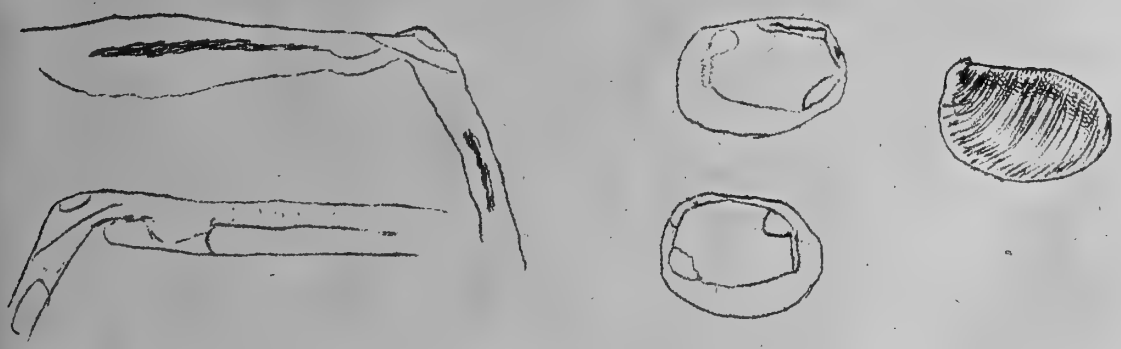
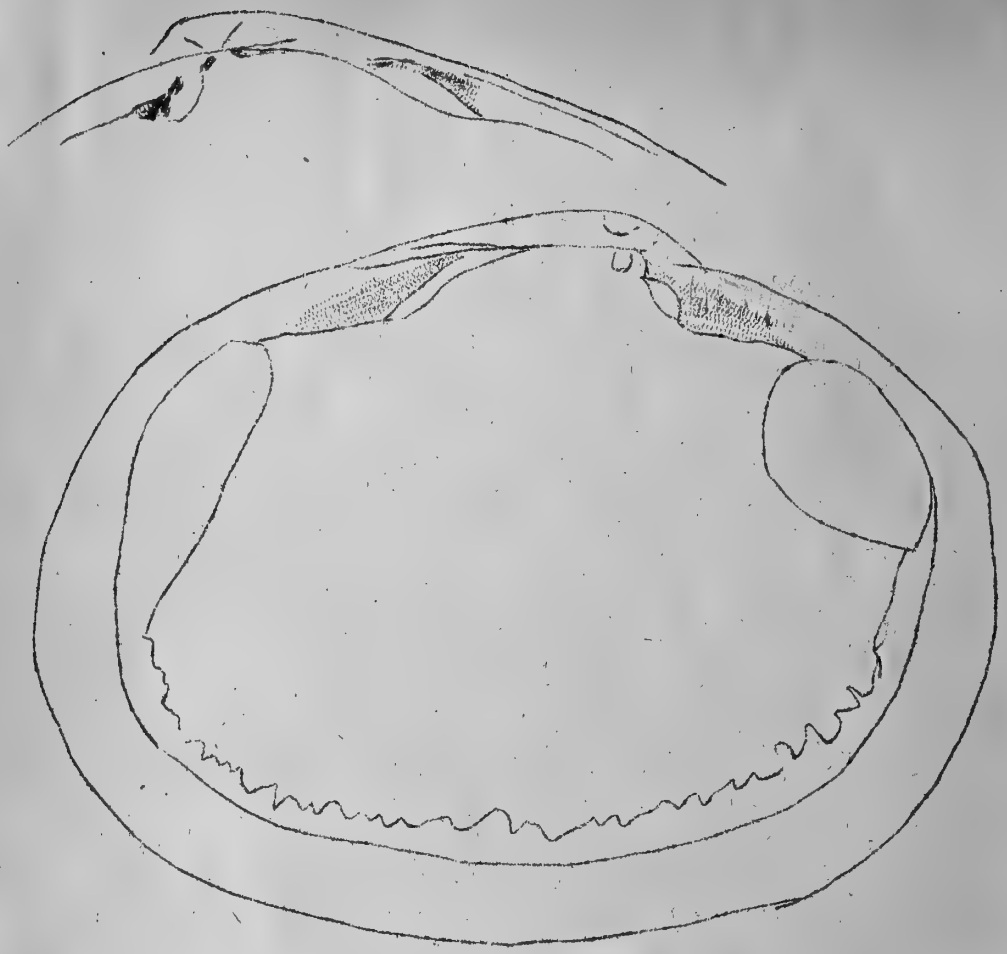
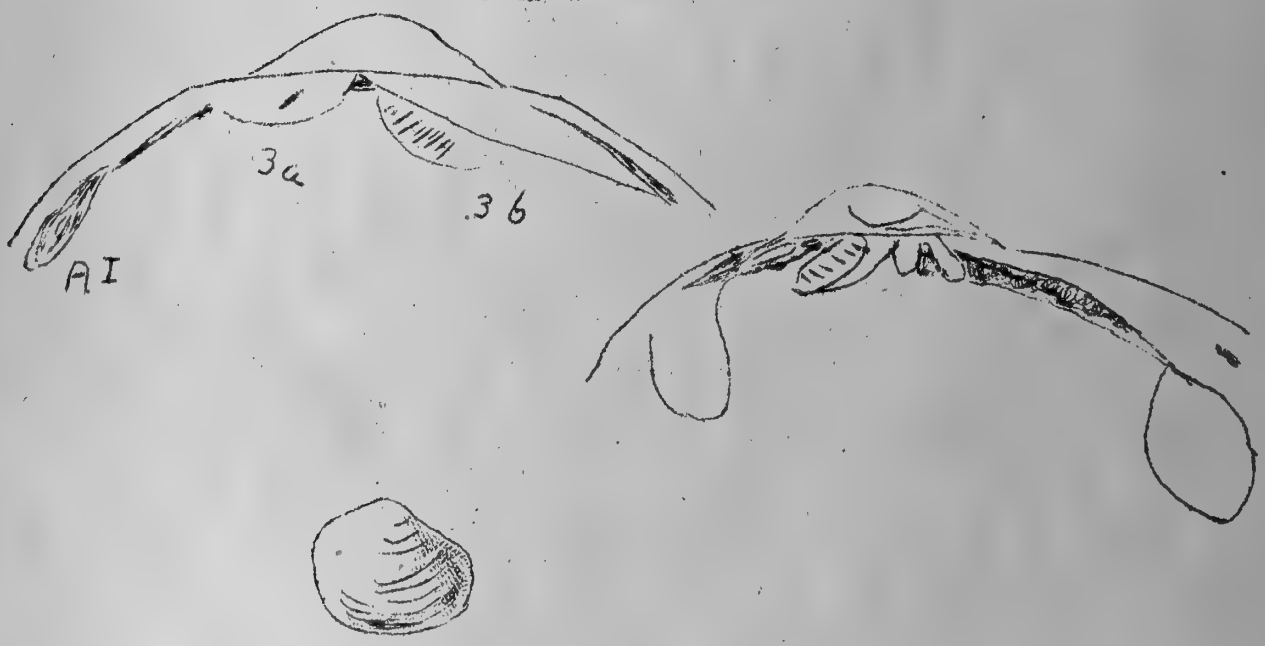


Erycina



Kellia



Lasaea

Family LUCINIDAE

Grant and Gale, 1931 called the family CODAKIIDAE following their custom of naming the families after the oldest genus in the family. This proceedure has not been followed.

Genus Lucina Bruguiere,1797. Type ?

This entire group represents another confusion of different opinions. The difficulty is that at least three types have been used by different schools and each claim to state a strong case for their designation of type. While we will outline these opinions below, for the benefit of members interested, it seems fitting that we should retain the old arrangements until some reason--able certainty can be given to a new nomenclature. Therefore, it is not to be assumed from our use of the name Lucina as genus placing other groups as subgenera that we are not aware of the fact that some of these should and probably will be raised to generic standing. Dr. Dall in Bulletin 112 and his earlier works used the Genus Phacoides Gray,1847, having as type L. jamaicensis which is in the same section as the type of Lucina and becomes a synonym of Lucina Bruguiere. We will therefore not use Phacoides , but pending some definite settlement of the above problem we will retain the arrangement as given in Bulletin 112.

Dr. W.H. Dall in " Synopsis of the Lucinacea", 1901, Proc. U.S.N.M., vol. 23, pp 801-2, and in " Tertiary Fauna of Florida", Trans. Wagner Free Inst. of Sci., vol. 3, pt.6, pp 1351-2, 1903, and carried on into Bulletin 112, 1921 used as the type of Lucina, Venus edentula Linnaeus.

Grant and Gale, 1931, " Pliocene and Pleistocene Mollusca of California", Memoirs of San Diego Soc. of Nat. Hist, vol.I, pp 283-4 follow a host of other authors in the use of Venus pennsylvanica Chemnitz (by subsequent des--ignation Schumacher 1817).

Ralph B. Stewart in Special Publication No.3, Acad. Nat. Sci. Phila. , 1930, pp 175-6 designated A. alba Link = jamaicensis Lam. as type of the subgenus Anodontia Link, which seems to more or less follow a host of authors using jamaicensis as the type of Lucina.

If the above statements seem confusing to the reader, it is not surprising since your editor is in the same position.

Dr. A. Myra Keen (personal communication, September, 1944) outlines the problem as follows:

" The problem concerning the generic name Lucina is very briefly sketched by Grant and Gale. One can advance cogent arguments for the use of any one of the three species of edentula, pennsylvanica, or jamaicensis as type. But the concept of the genus alters radically depending upon which species is accepted. So far as I can see, it is a problem that must be settled by the International Commission. We on the West Coast can avoid dealing with it by treating subgenera as genera, as Frizzel and I did in the Key. Our reason was not solely a matter of nomenclature, either, as we found one could not key out the various groups of the lucinids under a single set of characters. Con--firmation of our grouping is to be found, incidentally, in the revision of the Lucinidae by Chavan, so that we adopted for our groups the nomenclature he recommends-- hence the Linga (Here) about which you inquire. The complete Chavan reference is: " Essai critique de classification des lucines", Jour. Conchyl., vol. 81, 1937, p. 133-153, 198-216, 237-282; vol. 82, 1938, pp. 59--97, 105-130, 215-243. Chavan takes, as type of Lucina, L. jamaicensis, a course that may be open to question. If the International Commission does not uphold his decision, his classification, outlined below, will have to be altered somewhat by substitutions of names. The units into which our West Coast species are allocated are, according to Chavan:

	Genus	Subgenus	Species
This would be ------- Lucina, if pennsyl- -vanica is type.	Linga	Here	excavata
		Parvilucina	tenuisculpta, approximata
		Pleurolucina	undata (Gulf fauna)
" Phacoides" of authors	Lucina	Lucinisca	nuttallii
	Codakia	Epilucina	californica
	Lucinoma		annulata
(Lucina in Dall's class.	Anodontia		edentuloides (Gulf fauna).

For the present, I should prefer to deal with genus Epilucina rather than Codakia (Epilucina), and Parvilucina rather than Linga(Parvilucina), since it is evident from Shavan's study that we can no longer lump them all together in any single genus without obscuring obvious and important differ--ences.

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Subgenus Anodontia Link, 1807. Type (by subsequent designation, Dall,1901), Venus edentula Linnaeus.

" Shell inflated, thin, concentrically striated, anterior and posterior dorsal areas obsolete; lunule deep and narrow, no visible escutcheon; ligament and resilium deeply inset, but not occluded; margins entire, anterior adductor scar long, hinge wholly edentulous, shell usually large" (Dall).

Lucina (Anodontia) edentuloides Verrill,1870. " San Clemente Island to Gulf of California" (Dall). Type locality: La Paz, Lower Calif.

The consensus of opinion seems to be well stated in the following comment by Mr. Allyn G. Smith " We question Dall's record of this Gulf species from San Clemente".

Subgenus Here Gabb, 1866. Type (by desig. Stoliczka,1871), Lucina (Here) richthofeni Gabb.

" Shell having all of the usual characters of Lucina, except that the lunule is very deeply excavated, penetrating the hinge plate, and almost per--forating it; bounded anteriorly by the anterior lateral tooth, and posterior--ly by the cardinal tooth." (Gabb).

Lucina (Here) excavata Carpenter,1857. (Lucina (Here) richthofeni Gabb,1866) " San Pedro, California to Mazatlan, Mexico" (Grant & Gale). Type locality, Mazatlan, Mexico.

Collecting data: San Pedro in 20 fms. (G. Willett); living specimens taken in Newport Bay on the north side(where the big rocks are, upon and around which we used to find Cypraea and M. trialata) moving laboriously among broken shells and pebbbles. The habitat of the species is coarse gravel and pieces of shell. 1935 (K. Althaus); I have a fine adult but dead pair collected by T.R. Gaines at Laguna Beach in 1932 (A.G. Smith); taken living in upper Newport Bay (M. Caruthers); not uncommon in the Del Rey Baldwin Hills Pleistocene.

Subgenus Lucinisca Dall, 1901. Type(by original desig.) Lucina nassula Conrad. " Shell lentiform, white, with well marked dorsal areas, the sculpture reticul--ate and muricate, the right anterior cardinal obsolete." (Dall).

Lucina (Lucinisca) nuttallii Conrad, 1837. " Santa Barbara, Calif. to Mazatlan Mexico" (Dall). Keen " Abridged Check List" gives lat. 21-37 which would be an extention of range northward to Monterey, Calif.

Pilsbry and Lowe, 1932 list the typical from La Paz, but the variety centri--fuga Dall from the Gulf on down to Acapulco, Mexico. If this centrifuga is but a minor form and not a valid subspecies the range would be extended to the south by the Lowe records. Dall says of centrifuga " has the concentric sculpture near the beaks sparser, more elevated and fringed with flat spinules, usually worn off.."

Collecting data: Monterey record, 15 fathoms, in sand, rare, valves only (A.G. Smith); taken living in Morro Bay, 6/36, dredged off Avalon, Catalina Island in 25 fathoms, off Redondo Beach and Santa Monica in 20-25 fathoms, taken littoral in San Diego Bay, Bird Rock. It is not an uncommon beach shell all along the coast from Long Beach south to San Onofre. It is a very abun--dant species in several of the Pleistocene deposits. (Burch).

Subgenus Lucinoma Dall, 1901. Type (by original designation), Lucina filosa Stimpson.

" Shell usually large, lentiform, white, with a conspicuous periostracum, concentrically lamellose or striated; the cardinal teeth developed, the inner pair usually bifid; the laterals obsolete or absent, the inner margins entire" (Dall).

Lucina (Lucinoma) annulata Reeve, 1850. " Port Althorp, Alaska to Coronado Islands" (Dall). Type locality, California.

Grant and Gale, 1931, place this species in the synonymy of the Miocene species acutilineata Conrad, 1849, stating " The supposed specific differences between the teeth of annulata and acutilineata is a delusion." However, this opinion does not seem to have been generally accepted. Keen " Abridged Check List", Dr. Joshua L. Baily Jr " West Coast Shells", and other recent authors retain the use of annulata.

Lucina (Lucinoma) annulata densilineata Dall, 1919. " Sitka, Alaska to Esteros Bay, Calif." (Dall). This subspecies by its description is based solely on the closer spacing of the concentric sculpture. It should no doubt be placed in the synonymy of typical annulata following Grant and Gale,1931.

Collecting data: Craig and Forrester Island, Alaska, 10-40 fathoms (G. Willett); Monterey record, 8-10 fathoms (Dall). Fragments dredged in 25 fms. in sand (A.G. Smith); Alki Point and Harbor Island, Seattle, Wash. (W.J. Eyerdam); we found this species a comparatively common dredged shell off Redondo Beach, Calif. and also off Catalina Island with a bathymetric range of from 25 fathoms or less down to below 75 fathoms. (Burch).

Lucina (Lucinoma) aequizonata Stearns, 1890. " Santa Barbara Islands to south latitude 38 (Chile)" (Dall). Type locality: Off Santa Barbara Islands, Calif. in 276 fathoms.

Subgenus Epilucina Dall, 1901. Type (by original designation) Lucina calif--ornica Conrad.

" Shell veneriform, convex, all the hinge teeth developed, inner margins entire; otherwise like Callucina" (Dall). Dall in Bulletin 112 used Epilucina as a section under Callucina as a subgenus. Keen " Pelecypod Key" figures Epilucina. Dr. Joshua L. Baily Jr. in West Coast Shells followed Grant and Gale on this one with Lucina (Myrtea) californica Conrad. In order to understand Dall's description of Epilucina it is necessary to read his description of Callucina (type L. radians Conrad) " Shell orbicular, dosinoid, concentrically filose and sometimes with feeble radial soulpture; the dorsal areas obsolete; the lunule small, comprised chiefly in one valve and fitting when closed into a recess in the other valve; hinge with one cardinal in each valve, the other teeth feeble or absent; inner margins crenulate."

Lucina (Epilucina) californica Conrad,1837. " Crescent City, Calif. to San Ignacio Lagoon, Lower Calif." (Dall).

Collecting data: Monterey records, shore to 40 fathoms, in sand, common, (A.G. Smith); this is our common littoral species in southern California being usually taken in rocky rubble. We have taken it in abundance from Mon--terey, Cayucos, Malaga Cove, San Pedro, La Jolla etc. The bathymetric range may be indicated by our dredging records, off Catalina Island in 25 fathoms, off Monterey in 20 and 40 fathoms, off Redondo Beach in 25 fathoms (Burch).

Subgenus Parvilucina Dall,1901. Type (by original designation), Lucina tenuisculpta Carpenter.

" Shell small, plump, often inequilateral; sculpture more or less retic--ulate but not muricate, teeth small, but all usually present." (Dall).

Grant and Gale, 1931 say of this " The shells of this section are smaller and more convex than those of Lucinisca. This section, like some of the others, is hardly of more than specific significance".

In the preliminary discussion of this section John Burch made the follow--ing note bringing out some interesting observations " We have two species under this subgenus, tenuisculpta and approximata. Dall writes of tenuisculpta "... metropolis is in the cold waters of the northern coast", and of approx--imata " Closely related to the last species, but smaller, more delicate, with out the anterior right cardinal tooth which is developed in the northern shell and most abundant in the Gulf of California". The difficulty is that experts have identified both forms from deep water off Redondo Beach and elsewhere, off Ensenada etc. The absence of that cardinal tooth sounds important. It may be, but if I am looking at them rightly it is possible to pick out specimens to suit either species from the same dredge haul. We may have two different spec--ies, but for the time being I am disposed to label mine all with the older name tenuisculpta Carpenter. If any of the members know a sound method of differentiation I will be glad to hear of it. " In answer to the above query Mr. George Willett made the following comment " I agree with you as to teeth, but southern specimens in my collection are much smaller, thinner, and radials more pronounced. Hence, the southern shell appears to be a geographic race, but your specimen may show differently." And on the same point Mr. A.G. Smith sent the following note " There is no doubt that the above two species are very clos--ely related. One species name might well do for both. As we see the situation the shells from the extreme ends of the range are probably enough different to separate them. However, as they apparently intergrade, it might be sounder taxonomy to call one a subspecies of the other, if it is desired to call atten--tion to the extreme in variation."

Lucina (Parvilucina) tenuisculpta Carpenter, 1865. " Nunivak Island, Bering Sea to the Coronado Islands, Lower Calif. " (Dall). Type locality,Vancouver Island

Collecting data: Craig and Forrester Island, Alaska (G. Willett); on the basis of USNM specimens from Monterey, Calif.as follows, 19 fms. off Watsonville Beach, in mud and fine sand (USFC Sta. 3138) (A.G. Smith); Izhut Bay, Afognak Island, Drier Bay, Knight Island, Alaska (W.J. Eyerdam); Whal--ing Station at Akutan Island, Aleutian Islands, 1935 (I. Norberg).

Lucina (Parvilucina) approximata Dall, 1901. " Monterey, Calif. to Panama" (Dall). Type locality, Gulf of California

Collecting data: San Pedro, 20 fms., Catalina Id., 40 fms. (G. Willett); off Monterey, Calif. in 10-70 fms., in sand and mud, common (A.G. Smith).

Genus Divaricella von Martens, 1880. Type, D. ornata Reeve.

" Valves suborbicular, subglobose, the umbones inconspicuous, the dorsal areas not indicated, the cardinals two in each valve, the ligament and resilium united, deeply inset but not strictly internal, the excavated striae forming an angle on a line radial from the beaks" (Dall).

Divaricella perparvula Dall,1901. " Monterey, Calif. (Gabb). Cape San Lucas to Ecuador" (Dall).

Grant and Gale were disposed to follow their custom of making west coast species varieties of Atlantic species whenever possible to note similar--ities. Of course, they may be right. They make this Divaricella dentata per--parvula Dall.

Grant and Gale had another unusual opinion about Divaricella. They took it out of the family Lucinidae and placed it in Ungulinidae (Diplodontidae). They state their case on page 295.

Pilsbry and Lowe record this species from La Paz and Acapulco but it seems to be a species of the southern fauna. The Monterey record is open to such question as to make it a dispute. A note in this connection from Mr. A.G. Smith follows " Hertlein says that the Monterey record was based on specimens (or a specimen) from the Rowley Collection, in which the locality records are not--oriously inaccurate. It is not in the Monterey fauna. "

Family LEPTONIDAE Gray, 1847.

There seems to be no little conflict in the proper family name for this group. Authors have been using Erycinidae Deshayes,1860, others use the name Kelliidae. Dr. A. Myra Keen (Per. Comm. Sept. 1944) advises us as follows: " As to family name: pending a revision of the whole group, apparently the best we can do is use the earliest-proposed name, which seems to be Leptonidae Gray,1847. I do not have copies of Anton or Menke, and it may well be that these or other authors cited a valid family name prior to Gray. At any rate, Erycin--idae Deshayes is antedated."

" Subdivision of the superfamily is a complicated problem. Thiele, for example, places Sportella, Turtonia, and Anisodonta in the Cyamiacea, ahead of the Lucinacea and some distance from the " Erycinacea". His evidence for doing this seems plausible. He divides the " Erycinacea" into two families, " Erycinidae" and Montacutidae, the latter including Rochefortia and Montacuta with its subgenus Aligena. However, Thiele's generic nomenclature is very faulty, due to his failure to recognize genotypes. Cossman and Peyrot, " Conchologie Neogenique de l'Aquitane", tôme 1,1909-12, present a classification so different I won't confuse you by copying it here. However, I enclose tracings of some of their illustrations of hinges."

In April 1941 Tom Burch read a paper before the Conchological Club on this group. The following are excerpts from some of Tom's notes and may be of some interest in connection with our present study.

" The Leptonacea form a very interesting and puzzling group. Their char--acters combine features which are characteristic of immaturity in other Tel--eodonts with characters which are more probably due to environmental modifica--tions. Without being prototypes themselves they exhibit features which we may well suppose might have been characteristic of prototypic Teleodonts.Groups which are really starting points for numerous subsequently developed genera, are usually notable for their tendency to vary and interchange characters. In the present case perhaps the very general habit of commensalism or parasitism, has produced degeneration accompanied by a revival of atavistic primary char--acters. It is significant in this connection that authors have often been struck by similarity of dental features to those of immature specimens of gen--era of widely different origin, and have often referred species of Leptonacea to such families as the Mactridae or Cyrenidae.

The dentition is frequently indistinctly developed, or somewhat amorphous, rendering it difficult to make out the homologies of the different parts of the hinge. It is unsafe to assume as Bernard has sometimes done, that the pos--ition of a dental lamina is sufficient to settle its homology. The dynamic reactions of the teeth upon each other are, Dall is confident, of the utmost importance in the development of the hinge. As in the vertebrate skeleton, pres ur--sure and friction in localized areas will produce directly a response in

facets and buttresses. In fact, to the eye trained to take such matters into account, every hinge shows more or less evidence of the mutability of hinge structure and its responses to stress, as well as to inherited tendencies of form. In no group are these more obvious than in the Leptonacea. The proto--typic hinge of the group, or that which with but slight modifications will exhibit any of the various types of hinge structure found in the group, is very simple and has been figured by Bernard as Pachykellya. His researches upon the early features of the hinge have shown that among the Teleodesmacea the so-called laterals and cardinals are parts of originally simple laminae which are sharply bent at the proximal, or umbonal end, and having somewhat the form of a figure (7). In Pachykellya the hinge is composed of an internal re--silium not obviously separated from the ligament and inclined obliquely back--ward as in many nepionic Teleodonts. On each side of this in each valve is a pair of the 7 shaped lamellae , of which most have developed more or less dis--tinctly the proximal or cardinal " hook". The lower ones are less engaged in the various stresses to which the laminae are subjected in use, and therefore, as might be expected, the hook is less evident or even undeveloped.

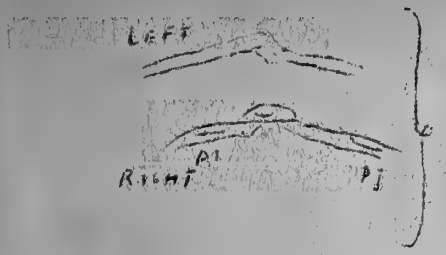
From this type of hinge all the others can be developed by small modificat--ions. The laminae may be long or short; when the outer limb is short we have a ^ shaped tooth; the severed hook may be modified by pressure to a petaloid shape, which may be reduced to obscure minute conical projections by degener--ation as in some species of Galeomma. Any part or the whole of the hinge may become obsolete.

The mantle of the animal is without siphons, the water passing through incurrent and excurrent openings between the mantle lobes at the opposite ends of the body, the incurrent being anterior. If the animal is independent, it is usually very active, and crawls like a gastropod."

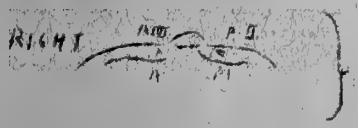
Key to Leptonidae- Adapted from Keen's " Key to Pelecypod Genera"

Both cardinal and lateral teeth present.
- Cardinal teeth 3 in one valve, 2 in other ..... Anisodonta
- Cardinal teeth not 3 in one valve, 2 in other
  - Cardinal teeth one in each valve .....Erycina
  - Cardinal teeth two in right valve
    - Shell minute, inequilateral ..... Lasaea
    - Shell small to medium, equilateral
      - Shell unsculptures, inflated .....Kellia
      - Shell with minute punctations, not inflated .....Bornia

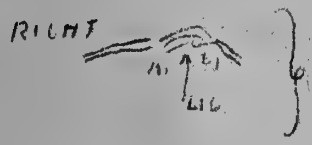
Lateral teeth absent.
- Same number of cardinal teeth in each valve
  - Cardinal teeth two in each valve, ligament internal
    - Shell inequilateral .....Serridens
  - Cardinal teeth one in each valve
    - Outline quadrangular or trapezoidal .....Pseudopythina
    - Outline suborbicular .....Aligena
- Fewer cardinal teeth in one valve than in other
  - Cardinal teeth 3 in one valve, 2 in other, minute .....Turtonia
  - Cardinal teeth not 3 in one valve, 2 in other
    - Cardinal teeth absent in one valve .....Rochefortia
    - Cardinal teeth present in both valves
      - Outline quadrangular; beaks nearer posterior end ...Sportella
      - Outline not quadrangular; beaks subcentral .....Lepton.



Erycina pellucida Lam. Eocene
from Cossman and Peyrot



Lepton squamosum Mtg.
from Cossman and Peyrot

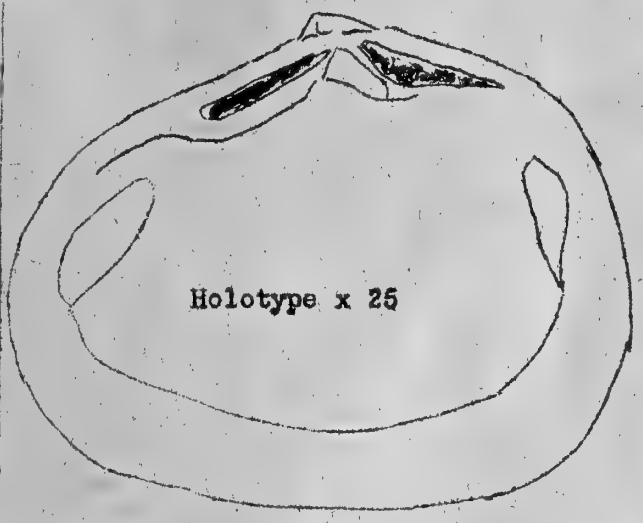


Montacuta substriata Mtg.
from Cossman and Peyrot

Rochefortia bidentata Mtg.
ibid

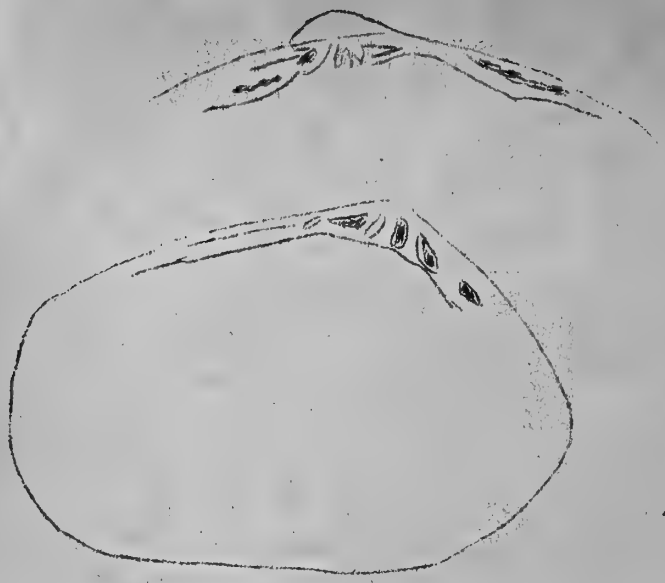
Sportella dubia Deshayes
ibid

Erycina bakeri Dall
Pseudopythina



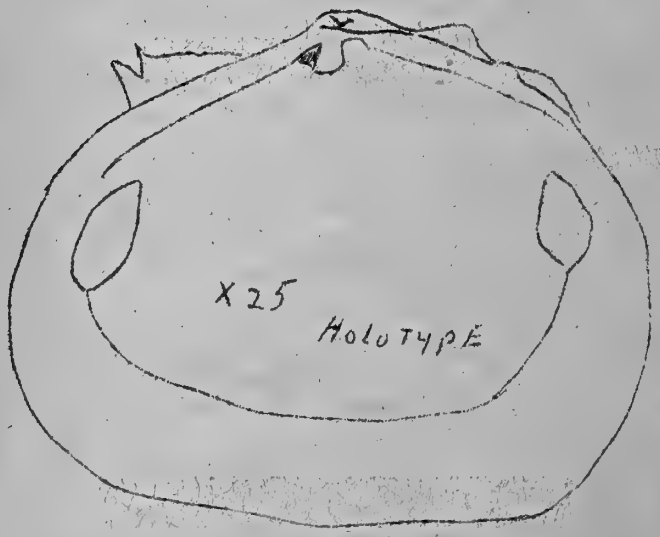
Holotype x 25

Erycina balliana Dall
Montacuta

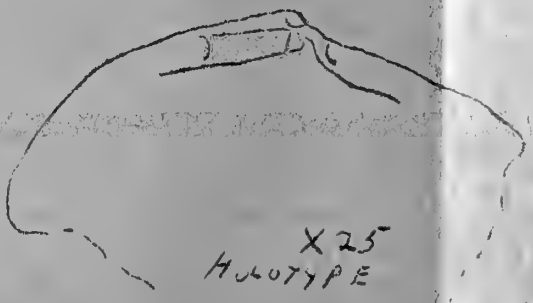


Anisodonta

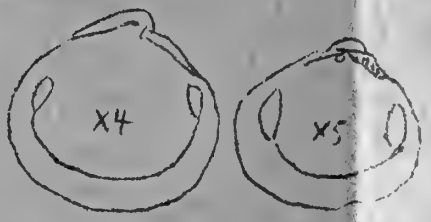
Pachykellya



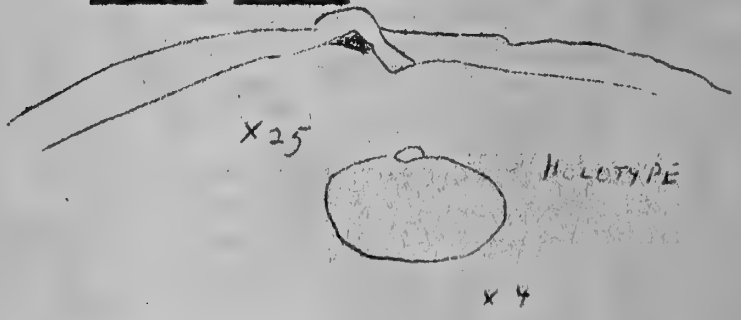
Erycina coronata Dall



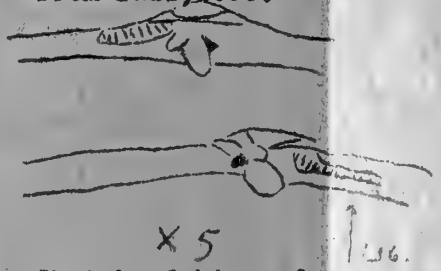
Lepton meroeum Carpenter



Aligena aequata (Conrad) from Dall, 1895.



Erycina chacei Dall
Pseudopythina



Sportella- Sketch of hinge from Eocene specimen.

Genus Erycina Lamarck, 1805. Type (by subsequent designation Stoliczka, 1871), Erycina pellucida Lamarck.

" Shell equivalve, subinequilateral, usually transversely oval. Hinge with 1 or 2 unequal, minute, diverging cardinals and two laterals in each valve, the latter sometimes double in the right valve. Resilium oblique, behind the beaks."

" In all these forms, whether the shorter end be anterior or posterior its adductor scar will be more rounded and often larger than the scar at the longer end of the shell, a result brought about in all probability by the dynamics of the situation." (Dall).

Six species of Erycina have been described from this coast, all of them by Dall and all in the same publication (Proc. U.S.N.M. Vol.52, pp. 409-10). All six of them are from southern California and the original paper contained no figures.

Dr. A. Myra Keen (Personal Comm. Sept., 1944) states " When at the National Museum I made camera lucida drawings of the six " Erycina" described by Dall in 1916. Later the National Museum kindly furnished photographs of several of them; at that time Dr. Rehder commented that none seemed to be true Erycina, in which opinion I concur. I enclose tracings of my drawings of the hinges. From these and notes I took, I would make the following alloc--ations:

Erycina bakeri Dall,1916 is questionably a Pseudopythina. The ventral margin has a peculiar sinus, reflected on the outer surface as squamous scales. If this were a constant feature, it should merit a new genus, but I suspect injury to the mantle of the individual.

Erycina balliana Dall, 1916 seems to be a Montacuta, the first to be recorded on our coast.

Erycina catalinae Dall, 1916 is a Lasaea. The holotype is broken and worn; it looks like L. cistula but could be L. subviridis. I prefer to regard it as a synonym of the latter, for I would be reluctant to throw L. cistula founded upon an entire specimen, into the synonymy of catalinae with a def--ective holotype.

Erycina chacei Dall,1916 is a Pseudopythina .

Erycina coronata Dall, 1916 with its peculiar dorsal spines, probably should be type of a new genus. The hinge does not match any of our other forms.

Erycina santarosae Dall, 1916 remains in doubt, as no hinge is available. "

Genus Kellia Turton,1822. Type(by subsequent designation, Recluz 1844), Kellia suborbicularis (Montagu).

Grant and Gale 1931 stated that the use of Kellia is inadmissable , inasmuch as Hermannson in 1846 selected Cardium rubrum Montague as type. They have, however, overlooked the earlier designation of type by Recluz in 1844, who, in his account of Erycina, refers to Turton's genus Kellia, mentioning " Le type de son Kellia,celui seul qui correspond au charactere de son genre le Kellia suborbicularis". (Revue Zool, Cuv. v.7, p. 295) (Winckworth, Journal Conchology 20:62, 1934).

" Shell small to medium, equilateral, shell unsculptured, inflated. The shell is rounded and inflated, concentrically striate or smooth; with an obsolete amphidetic external ligament and a large strong internal resilium, without a lithodesma. In its fullest development the hinge has 2 anterior and 2 posterior teeth in each valve, of which the anterior ones are shorter and usually regarded as cardinals, which may be conorescent at their umbonal ends, forming an A, shaped tooth, or may be free and pustular; The valves are frequently distorted through the effect of the nestling habit. The species retain the young between the valves until fairly well grown, and the young are much more compressed than the adult shells. In many species the dental formula is not fully represented by developed teeth."(Cotton & Godfrey,1938).

Kellia laperousii Deshayes, 1839. Bering Sea, the Aleutians and south to Panama.

An interesting note regarding this species is one made by MacGinitie, 1935 " There is but one siphon, which is incurrent, a nd the opening poster-ior to the foot is used as an excurrent siphon". The question is this. The Leptonidae are not supposed to have siphons. Do they?

Grant and Gale, 1931 considered laperousii a variety of suborbicularis . It may be but we are disposed to rather prefer to consider laperousii the west coast species and state that our west coast specimens labelled suborbicu-laris , an English species, are but young specimens of laperousii. In the preliminary discussion of this matter Dr. A. Myra Keen (Personal Comm., Sept. 1944) stated " I am in accord with you on the Kellia suborbicularis, as I have never been sure of more than one species. None of the specimens in our collection are as orbicular or high as our lone topotypic specimen of K. sub-orbicularis. If a separation can be made among our West Coast material, the name K. chironii is available (See Carpenter, 1864, p. 643); also, there is K. rotundata Carpenter, same reference. The southernmost range of laperousii is San Martin Island (lat.30), Fred Baker coll."

Collecting data: It would be a waste of paper to list localities in the range when an examination of almost any wharf pile, Chama bed, Mytilus bed etc. will yield great numbers of specimens. It is interesting to note that specimens from the northern end of the range average much larger. The bathy-metric range is a matter of some interest . The species is not uncommon off Redondo Beach in the gravel down to 25 fathoms. Our deepest r ecord is 35 fathoms off San Pedro, Calif. (Burch).

Genus Rochefortia Velain 1876. Type (by monotypy), Rochefortia australis Velain.

Cardinal teeth not 3 in one valve, 2 in other- Cardinal teeth absent in one valve.

" Right valve with 2 diverging cardinals, the resilium between them, and two laterals; left valve with 2 simple laterals." (Suter). " Shell small, ovate or rounded quadrate, anterior end longer; hinge with a short internal resilium below the umbones and traces of an obsolete external ligament. On either side of the resilium the cardinal margin bears a simple oblique lam-ina, the pair divardcating from the umbo and without any hook at the prox-imal ends. They are separated usually in one valve from the dorsal margin by a groove parallel to it, and above this groove the margin in some cases is thickened so as to form another lamina; the single lamina of the opposite valve , sometimes represented only by the inflected and beveled extentions of the valve margin, are received into the grooves above the laminaeof the first mentioned valve, and the right anterior lamina is longer than the right posterior one. From Bernard's researches into the development of the hinge it is evident that these laminae represent the secondary laminae of such forms as the Veneridae before the latter break up into cardinal and lateral teeth properly so called. But in rare instances the laminae of the present group begin to show signs of a tendency to separate, so that the distal portions are more elevated than the medial part, and the former might be talen for laterals and the proximal ends for obscure cardinals, which in a generic sense they really are. The ventral portion of the resilium carries a lithodesma." (Dall).

The shell is ovate or rounded triangular, with an adherent, usually polished periostracum. The individuals are either free , domiciliary in the burrows of crustaceans or commensal on crustaceans.

Dr. A. Myra Keen advises " There is a question as to the exact date of Velain's report; it may have been 1877. Myselia Angas apparently was publish-ed in the same year. Rochefortia apparently has priority.

Rochefortia tumida Carpenter, 1864. " Shumagin Islands, Alaska to San Diego" (Dall) to " Scammons Lagoon, Lower Calif. " (Eric Jordan).

Collecting data: Forrester Island, Alaska (G. Willett); off Redondo Beach, Calif. in 25 fathoms ,gravel 4/38 (Burch).

Rochefortia planata Dall, 1885. " Icy Cape, Arctic Ocean, south to the Shumagin Islands, Alaska" (Dall).

Rochefortia ferruginosa Dall, 1916. " San Francisco Bay to Santa Rosa Island, Calif." (Dall). Type locality, San Francisco Bay.

Rochefortia beringensis Dall,1916. " Bering Island, Bering Sea" (Dall).

Rochefortia grebnitzskii Dall, 1916. " Bering Island, Bering Sea" (Dall).

Rochefortia aleutica Dall, 1899. " Bering Sea to Coronado Islands" (Dall).

Collecting data: Southeast Alaska, San Pedro,Calif. and the Los Coronados (G. Willett); off Redondo Beach in 75 fathoms mud 8/38, off Monterey, Calif. in 10 fathoms, shale bottom (Burch).

Rochefortia compressa Dall, 1911. " Shumagin Islands, Alaska to Gulf of California" (Dall).

Rochefortia pedroana Dall, 1899. " San Pedro, Calif. to Morro Bay, Calif. (Burch). Discussed in connection with the following species.

Rochefortia golischi Dall, 1916. " Off Santa Rosa Islands, Calif." (Dall)

Rochefortia grippi Dall,1912. " San Diego, Calif." (Dall).

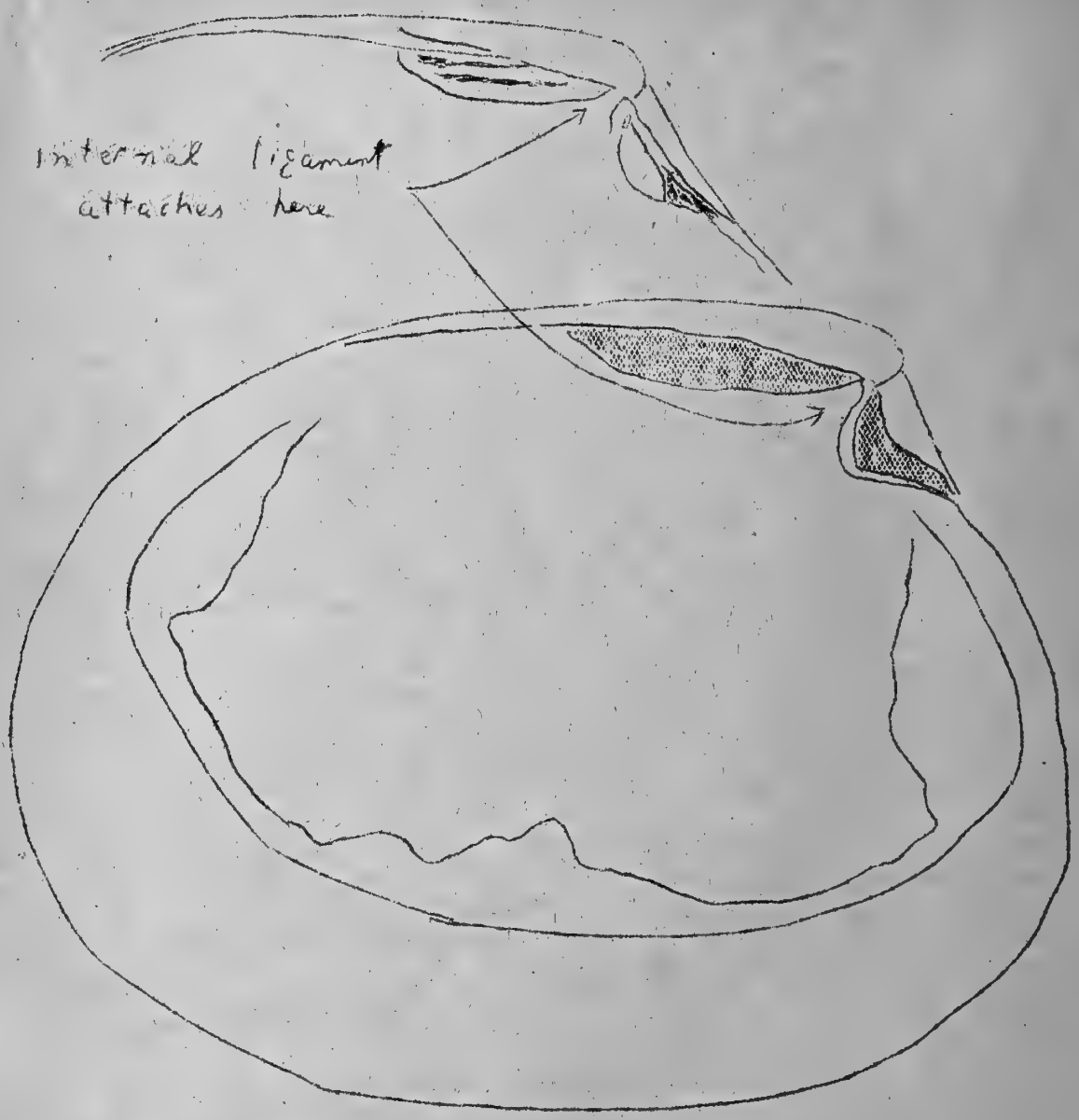
This is a discussion of the species of Rochefortia figured on the next page. This species is very common commensal on the large sand crab, Bleph--aropoda occidentalis. We have taken it from this crustacean at Morro Bay, Hermosa Beach, Venice etc. The mollusks are either fastened to the hairs of the legs and underparts, or more common among the gills under the carapace. Many of us labelled this species Rochefortia pedroana Dall until we were advised by Dr. A. Myra Keen that in her opinion the species is Rochefortia golischi Dall. Dr. Keen very generously sent us photographs of the type. This caused a great deal of study and discussion. Mr. George Willett made the following comments " If Dr. Keen compared our shells with the type of golischi and found them identical, that would seem to settle its identity, but I am unable to explain the apparent discrepancy in the descriptions. Particularly pertinent parts of the descriptions are as follows:

R. golischi- white; surface polished, minutely concentrically wrinkled. Anterior end short.

R. pedroana- white, with concentrically rugose pale-brownish epidermis. Posterior end short.

Thomas A. Burch, who drew the following figure made these comments about the matter " Rochefortia pedroana Dall is described as having a brown wrinkled epidermis while R. golischi is described as having a shiny white shell with wrinkles. Our shells have a shiny white shell with wrinkles covered with a brown periostracum with wrinkles. Therefore, I believe that in 1899 Dall described a live shell and that in 1916 he described a dead shell. It also seems probable to me that Dall got his wires crossed when he called the short end posterior on one species and anterior on the other species. I do'nt know which end actually is anterior and posterior but I'll bet that the short end is on the same end in both species. If this be true the correct name is Rochefortia pedroana Dall since it was described 17 years earlier than R. golischi."

The identity of this species therefore remains a subject of debate.



Rochefortia pedroana Dall, 1899.
Venice, Calif. 8/1937 on Blepharopoda occidentalis.

Genus Serridens Dall, 1899. Type, Phistiphora oblonga Carpenter
Lateral teeth absent, same number of cardinal teeth in each valve, cardinal teeth two in each valve, ligament external, shell inequilateral. Serridens oblonga Carpenter, 1864. Monterey, Calif. (Chace) to San Hipolito Point, Lower Calif. (Eric Jordan). Dall gave the range San Pedro to Coronado Islands. Dr. A. Myra Keen " Abridged Check List" noted the range down to San Hipolito Point. Our members here extend the range north ward, the Chaces to Monterey, Morris E. Caruthers took the species at San Simeon, Calif.

The species is found commensal with both Ischnochiton conspicuous Carp. and I. magdalensis Hinds, especially large chitons in such a situation that they are inactive. The mollusks are found under the mantle, among the gills, and also on the bottom of the foot.

Genus Pseudopythina Fischer, 1884. Type Kellia MacAndrewi Fischer,1867. Cardinal teeth one in each valve, outline quadrangular or trapezoidal.

" Shell rather large for the family, reniform, with a coarse rugose peri--ostracum; hinge with two projections of the right dorsal margin fitting into sulci of the opposite valve, one right and one left cardinal, a strong inter--nal resilium, sometimes with a lithodesma, and an evident but small external ligament; laminae absent or not distinct." (Dall).

Species of Pseudopythina are usually found commensal on crustaceans. It is the belief of MacGinitie that these mollusks attach and detach them--selves at will.

Pseudopythina rugifera Carpenter, 1864. " Commensal with Gebia. Puget Sound" (Dall). Craig, Alaska (G. Willett) to San Bartholome, Lower California (G. Willett).

The species is found also attached to the foot of the sea mouse, Aphrodite.

Collecting data: off Orcas Island, Puget Sound 10-30 fms. (Dr. Fred Baker); Craig, Alaska and San Bartholome, Lower Calif. (G. Willett).

Note by Mr. George Willett " If my understanding of these species is correct (rugifera and compressa), Oldroyd has the illustrations reversed." And a note from Dr. A. Myra Keen " The figure of P. compressa in Mrs . Old--royds Marine Shells, vol. 1, pl. 11, fig. 11 is of P. rugifera. Of the figur--es Mrs. Oldroyd gives of P. rugifera,pl. 15, fig. 9 is identical with pl. 38, fig.8; we have the specimens in our type collection. They are more tumid than P. compressa and of a slightly different outline; I believe they are P. rugif--era. The figure in pl. 38, fig.9 is copied from Dall, Proc. U.S.N.M., v. 21, pl. 87, fig.4. "

Pseudopythina compressa Dall,1899. " Cape Lisburne, Arctic Ocean, to Acapulco" Commensal on crustaceans" (Dall). Type locality, Bering Sea , south of Nunivak Island, in 4-28 fathoms.

Collecting data: Craig, Alaska 20-40 fathoms (G. Willett);

Pseudopythina myaciformis Dall,1916. " Commensal with crustaceans. Puget Sound" (Dall).

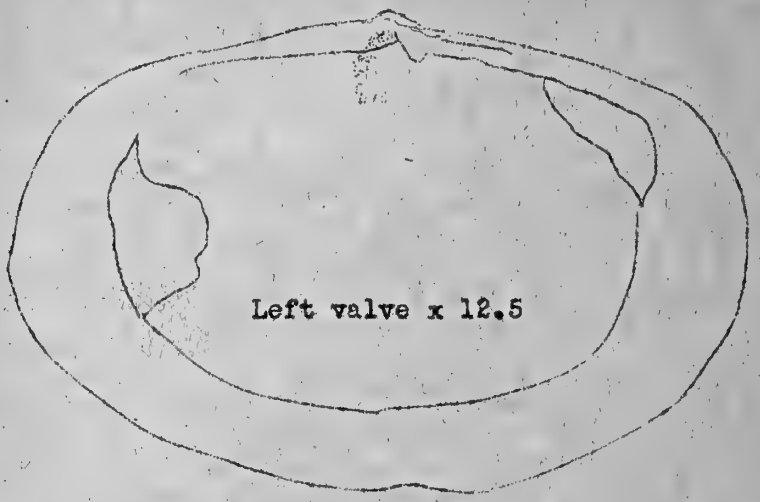
Dr. A. Myra Keen (Per. Comm. Sept. 1944) " I have a photograph of the holotype of P. myaciformis, furnished by the National Museum. The posterior end seems to be more attenuated than in other Pseudopythinas. "

Pseudopythina bakeri (Dall), 1916. " Off south Coronado Island, L.C."(Dall). See discussion of Erycina bakeri Dall on page 13.

Pseudopythina chacei (Dall), 1916. Described as Erycina chacei Dall, 1916 (Proc. U.S.N.M. vol. 52, p. 410). " Santa Rosa Island to Coronado Islands" (Dall).

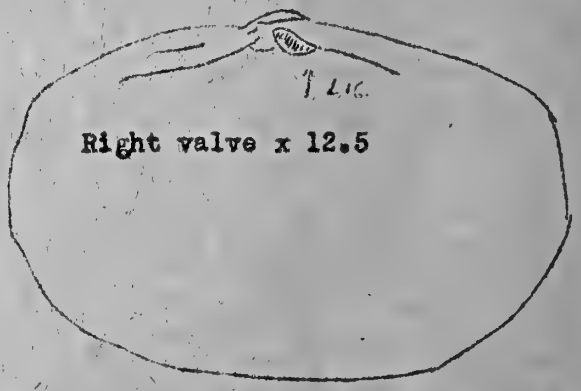
In August, 1939 the Burches dredged certain specimens off Redondo Beach, Calif. in 75 fathoms, mud bottom which had not been classified to species. These were recently sent to Dr. A. Myra Keen for identification. The following report was returned with the specimens " The packet of leptonids arrived this morning. You have one real find-- two specimens of " Erycina chacei", one with both valves intact. I took my life in my hands and opened the latter specimen, although one valve was already broken and looked ready to crumble. By coating it with a thin solution of ambroid I was able to keep it together and thus was able to see for the first time the other side of the hinge. The holotype, of which I sent you a camera lucida drawing, was said by Dall to be a right valve, but your specimen, with ligament in place, shows it to be a left valve instead. Below are camera lucida drawings of your larger specimen (a left valve very like the holotype except it is larger, 8 x 5 mm, as opposed to 5.3 x 3.5) and of the right valve of the smaller specimen. After comparison with the genotype of Pseudopythina , P. macandrewi,as well as with other possibil--ities , I have come to the conclusion that Dr. Dall's second hunch was cor--ect and that this does turn out to be a Pseudopythina (see Proc. U.S. Nat. Mus. vol. 52, p. 410). The species is close to P. compressa but differs in

smaller size, greater proportionate length, and more nearly equilateral out-
-line. I am delighted to have had a crack at the re-allocation of Erycina
chacei. "



Pseudopythina chacei (Dall)

75 fms. off Redondo Beach



Genus Bornia Philippi, 1836. Type (by subsequent desig. Stoliczka,1871),
Bornia corbuloides Philippi.

Shell with minute punctations, not inflated.

" Shell ovate or subtrigonal, subequilateral, with a more or less flat-
-tened disk, the periostracum usually brilliant, the surface smooth or div-
-aricately more or less plicate; an obsolete amphidetic external ligament
present, a short, slightly posterior, subumbonal internal resilium without
a lithodesma, the pallial line not sinuated, and the pallial area frequently
punctate or radially striate; hinge with one moderately long posterior and
two shorter anterior laminae in the left valve, and in the right one anterior
and one longer, sometimes remote, posterior lamina; one or both the anterior
laminae in either valve may have the aspect of cardinals; hinge-plate usually
excavated." (Dall ,1900).

Bornia retifera Dall,1899. " Monterey to Santa Barbara Islands, Calif."(Dall
Type locality, off Santa Rosa Island in 13 fathoms.

The microscopic sculpture distinctly separates it from any other Ameri-
-can species. The surface is polished, with faint incremental lines and minute
close punctations whose interspaces give the effect of a fine netting.

Collecting data: Mugu, Ventura Co., Malaga Cove, L.A. Co., and in the
Del Rey Pleistocene deposits (G. Willett).

Genus Lepton Turton, 1822. Type. Solen squamosus Montagu.
Outline not quadrangular- Beaks subcentral.

" Shell orbicular, compressed, smooth or shagreened, a little opened at the ends and longest behind; right valve with or without one cardinal tooth and with two laterals or only one; left valve with one cardinal and one or two laterals" (Cotton and Godfrey, 1938).

Lepton meroeum Carpenter, 1864. See figure on page 12. " San Diego, Calif." (Dall). " San Pedro to San Diego" (Oldroyd). Keen " Abridged Check List" gives lat. 33-48 which would take the northern end of the range on up to Puget Sound.

Dr. A. Myra Keen (Per. Comm. Sept. 1944) advises " The Puget Sound record of Lepton meroeum was based on a specimen in the Fred Baker collect--ion identified at the National Museum, probably by Dr. Dall. It seems to agree with the holotype, but I doubt if the allocation to Lepton is correct. I am not prepared, however, to suggest a better one. Perhaps we should put the generic name in quotation marks to indicate uncertainty."

Genus Lasaea Brown, 1827. Type (by monotypy), Lasaea rubra (Montagu) -- Cardium rubrum Montagu, 1803.
Reference- Keen, 1938, Proc. Malac. Soc., vol. 23, pp 18-30.
Cardinal teeth two in right valve- shell minute, inequilateral.

" Shell inequilateral, anterior end longer. Right valve with one pustular cardinal and one pair of laminae on each side; left valve with one cardinal and two laminae diverging from the umbo" (Suter).

The species of Lasaea are nestlers, adhering by a byssus to the rugosit--ies of calcarious algae, barnacles etc. They are abundant in many of the Mytilus beds. Lasaea rubra (Montagu) 1804 is the type species and for a long time was thought to have been carried all over the world on the bottoms of ships from Europe. This theory received a disastrous setback, however, when it was discovered that Lasaea occured in the fossil deposits on some of our west coast islands. Even so it was still considered to have a world wide range with a variety subviridis occuring on the west coast of north America.
Lasaea cistula Keen, 1938. Proc. Mal. Soc. vol. 23, pp.25-26, pl.2, figs 7-9.
Point Arena, Calif. (Keen) to Ensenada, Mexico (Burch).
Description by Keen " Shell minute, quadrate, ventricose, especially above the horizontal mid-line, greatest dimension parallel to dorsal margin and to a line joining the muscle-scars; beaks at the posterior 2/5, umbones tending to be squarish, conspicuous, more than 1/10 the height of the shell; anterior margin joining dorsal at an angle (often a right angle) , not sloping immed--iately downward from the beaks; colour usually medium to dark carmine-red, (not brownish red as in true rubra), occasionally white; surface, as in sub--viridis, sculptured by concentric growth-constrictions and minute, wavy, conc--entric striae resembling, especially near the margins, the irregular grooves and ridges of the skin of the human hand; hinge heavy for the size of the shell, consisting of, in the right valve, a lamellar anterior lateral and nymph, an excavated pit into which a cardinal of the left valve fits, and a lamellar posterior cardinal above a deep, transverse resilium; hinge of left valve with two lamellar laterals which engage the single lateral of the right valve, a thorn like cardinal, and a small lamellar posterior lateral; muscle scars two, pallial line simple" Holotype- Length 1.9 mm, Ht. 1.6, Thickness 1.2 mm. Discussion.-- " Although an occasional specimen of L. cistula may attain the size of 3.0 mm., the usual size is only about two-thirds of that of subviridis. Proportionately, cistula is consistently higher than subviridis and true rubra; it also is markedly ventricose, which fact, together with its frequently squarish outline, has suggested the name, a Latin noun, feminine in gender, meaning " little box". Like subviridis this species is distinguished

from other Lasaea by the wavy-wrinkled concentric sculpture. "

Collecting data: Mytilus beds at Playa del Rey, Los Angeles Co., Calif. 1938 and 5 miles north of Ensenada,Mex. (Burch); Malibu and Laguna, Calif. 1917 (H. N. Lowe); Mission Bay (bridge), Calif. (Emerson, 1943); Ensenada Mexico on Balanus (MacLean 1941).

Type locality: Moss Beach, Half Moon Bay, Calif.

Lasaea subviridis Dall, 1899. (Lasaea rubra subviridis Dall, ex Carpenter MS, Proc. U.S.N.M., vol. 21, no. 1177, p. 881). The original description is " (L. rubra), variety subviridis Carpenter, is pale greenish yellow. It is reported from Lower California". Redescription by Keen " Shell minute, ineq--uilateral (anterior end longer), oblique, rather flat, greatest dimension parallel to postero-dorsal margin, but not parallel to a line joining the muscle-scars, beaks at posterior 2/5 , umbones low (usually less than 1/10 the height of the shell); junction of anterior and ventral margins somewhat attenuated , ventral margin rounded, joining posterior in a smooth curve; colour greenish or yellowish grey, suffused with pink at the beaks, the colour sometimes extending down into the ventral half of the shell, hinge tinged with pink; surface sculptured by irregular growth constrictions and minute , wavy concentric striae, especially near the ventral margins; hinge of right valve with a lamellar (sometimes bifid) anterior lateral and nymph, a deep cardinal pit, and a lamellar posterior cardinal above the long, oblique resilium, hinge of left valve with two lamellar anterior laterals receiving the single lateral of the right valve, a thorn like cardinal, and a small lamellar posterior lateral."

Type locality.- " Lower California". Neotype from San Martin Island, Lower Cal.

The above descriptions are included because the Proc. Mal. Soc. of London are not readily available to many of the members.

Dr. Keen gives the range in " Abridged Check List" lat 30-40. This should be from about Humboldt County, Calif. to the tip of Lower California.

Collecting data: Monterey, San Pedro, Santa Monica, Playa del Rey, Dana Point, La Jolla, Punta Banda, Lower Calif. (Burch); Government jetty, North Island, Calif. (Kate Stephens, 1907).

Genus Turtonia Alder, 1848. Type. Venus minuta Fabricius.

Fewer cardinal teeth in one valve than in other- cardinal teeth 3 in one valve 2 in other.

" Shell ovate, smooth, closed, with an elongated external combined resil--ium and ligament; margins entire; hinge with, in the right valve, two stout cardinals, prolonged into slightly prominent laminae anteriorly, in the left valve one stout and one slender arched laminar cardinal and an obscure lateral lamina entering a sulcus in the opposite valve; pallial line distinct, not sinuate, adductor scars ovate, distinct, surmounted by a smaller pedal scar from the retractors" (Dall, 1900).

Turtonia minuta Fabricius, 1780. " Bering Strait and south to Magdalena Bay, Lower Calif." (Dall) . Type locality, Greenland. Johnson goves Atlantic range " Greenland to Massachusetts".

Collecting data: Friday Harbor,Wash. Ginsberg. (G. Willett); Crescent City, Calif. (Chace); Rodman Bay, Peril Strs. , Alaska,(Kate Stephens); Elrington Island, Pr. Wm. Sound, on nullipores (W.J. Eyerdam).

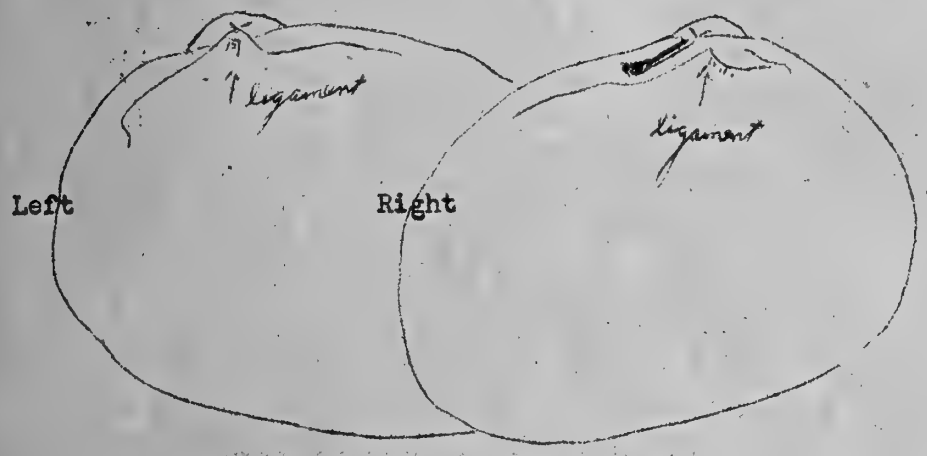
Turtonia occidentalis Dall,1871. " Plover Bay, Bering Sea" (Dall). Keen " Abridged Check List" gives lat. 55-60. Dr. A. Myra Keen advises on this " We have specimens I identify as Turtonia occidentalis from Rodman Bay, Alaska."

Genus Montacuta Turton, 1822. Type, Montacuta substriata Montagu.

" Shell small, more or less transversely ovate, posterior end usually shorter;anterior part of the hinge provided, in the right valve, with a nar--row lamina having a minute cardinal hook at the proximal end; the left valve with a similar lamina on which the hook is less prominent or even absent; external ligament obsolete, amphidetic, leaving no traces on the shell; res--ilium strong, internal,posterior, seated on nymphs of which the right one is usually less strong; the ventral surface of the resilium, in the larger species, with a thin calcareous deposit, often wholly absent and never form--ing a developed lithodesma; the distal portions of the laminae sometimes obsolete."

Montacuta balliana (Dall), 1916. Described as Erycina balliana Dall . See figure on page 11. " Off South Coronado Island, Lower Calif." (Dall).

In allocating this species to Montacuta Dr. A. Myra Keen comments that it is the first to be recorded from this coast.



Montacuta substriata (Montagu)
Camera lucida drawing of a specimen in the Stanford Collection from Plym--outh, England by Dr. A. Myra Keen.

Genus Aligena H.C. Lea, 1843. Type, Aligena striata H.C.Lea,1845 (by sub--sequent designation, Dall, 1900) -- A. aequata (Conrad), 1843.

References: Lea, H.C., Proc. Amer. Phil. Soc., vol.3, p. 163,1843 (Sept.); Trans. Amer. Phil. Soc., Ser.2, vol.9, p. 238,1845. Dall, Trans. Wagner Free Inst. Sci. vol.3, pt. 5, p. 1175, 1900. Amphidesma aequata Conrad, Proc. Phila. Acad. Sci. vol.1, p. 307, 1843 (Oct.). Aligena aequata (Conrad), Dall, Trans. Wagner Free Inst. Sci. vol. 3, pt. 3, p. 919, pl. 24, 1895; ibid vol.3, pt. 5, p. 1175, 1900.

Burch, Tom, " A Survey of the West American Aligenas with a Description of a New Species", Nautilus, vol.55, pp.48-51, pl.4, figs. 5,6,7, 1941, (Oct.)

The following notes on this genus are by Tom Burch.

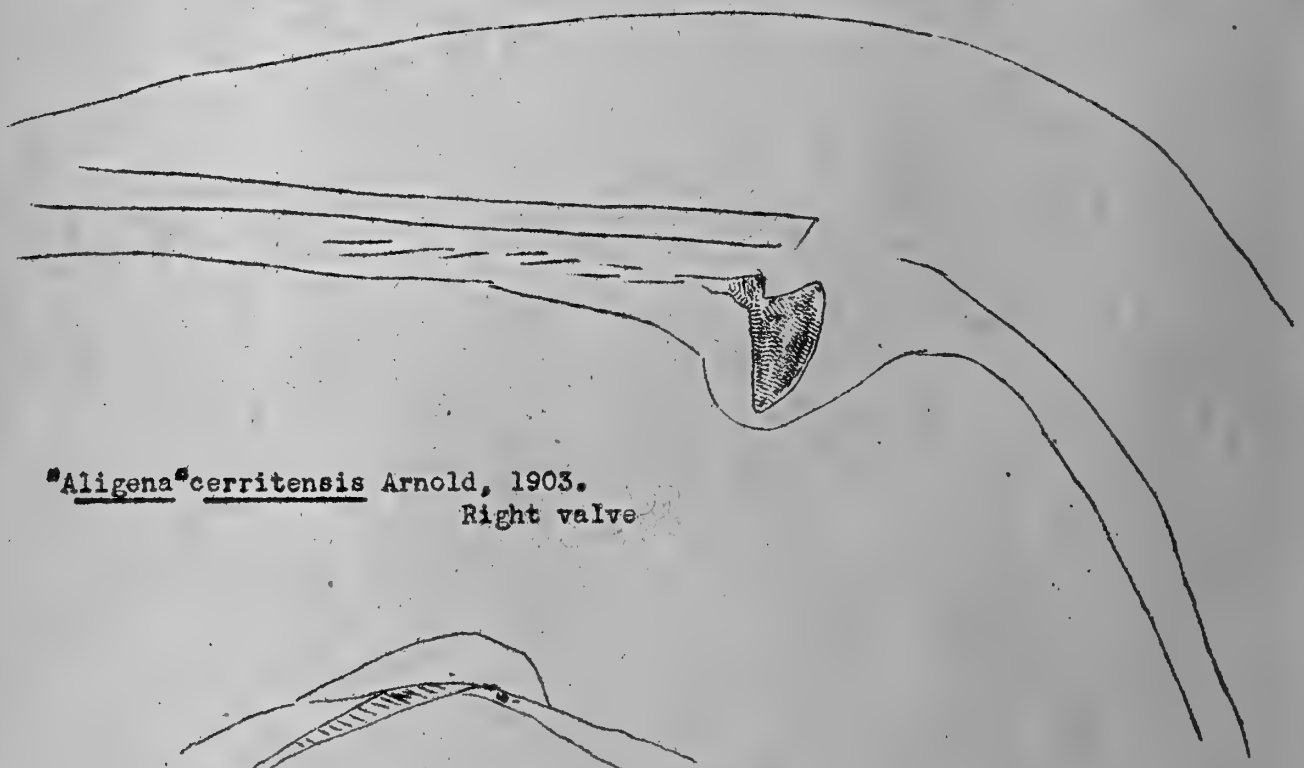
This genus was originally (1843) described as follows: " Testa aequi--valvi, subaequilaterali, postice et antice clausa; cardine dente cardinale uno, sulco sub natibus longo, minime profundo." Two name, A. striata and A. laevis, were assigned to it, unaccompanied by figures or descriptions, but followed (1845) with characterization. Dall (1900) designated A striata as type of the genus and placed it in synonymy with Amphidesma aequata Conrad (1843) (Proc. Phila. Acad. Sci. vol.1., p. 307, 1843).

At the same time Dall recharacterized the genus as having " a rounded triangular inflated shell with only a single small anterior tooth under the

beaks, separated by a gap from the surface of attachment, under the poster--ior dorsal margins, of an elongate internal resilium carrying a lithodesma. The pallial line is simple and the cardinal of the left valve is more feeble than the other."

Thiele has made Aligena a subgenus of Montacuta, Turton, 1822, and says of it " Aligena is von Montacuta nicht wesentlich verschrieden. Ligament mit einem verkalkten Teil, die vorderen Zahne konnen rudementar werden". The hinge of Montacuta is described by Dall as follows: " Anterior part of hinge prov--ided in the right valve with a narrow lamina having a minute cardinal hook at the proximal end; left valve with a similar lamina on which the hook is less prominent or even absent; external ligament obsolete, amphidetic, leav--ing no trace on the shell; resilium strong, internal, posterior, seated on nymphs of which the right one is usually less strong; the distal portions og the laminae sometimes obsolete."

I have a camera lucida drawing by Dr. Myra Keen of a specimen of Monta--cuta substriata which is the type species of Montacuta, and also of the holotype of Erycina balliana which Dr. Keen believes is the only representat--ive of Montacuta on this coast. Neither of these drawings shows the " minute cardinal hook" mentioned in the description of the genus. Either this "hook" is inconstant and thus unimportant or it was overlooked by the artist. Until I received the drawings of Montacuta substriata I had thought that Aligena cerritensis Arnold might actually be a Montacuta since it definitely does have a " narrow lamina having a minute cardinal hook at the proximal end" as can be seen in the accompanying drawing. However, the other hinge characters are not alike at all.



"Aligena" cerritensis Arnold, 1903.
Right valve

Aligena nucea Dall
Left valve

Aligena is known from the Pacific Coast of North America through three species which can be separated by the following key:

Anterior part of shell sloping abruptly down ..... A. cerritensis
Anterior part of shell not sloping abruptly down
  Posterior portion of shell sloping gently down,
    left valve with a tooth .....A. nucea
  Posterior portion of shell sloping abruptly down,
    left valve edentulous .....A. redondoensis

Aligena cerritensis Arnold, 1903.

Paleo. & Strat. of San Pedro, Mem. Calif. Acad. Sci. vol.3, p. 138, pl. 13, fig.3, 1903.

A. cerritensis was described from the Pleistocene of San Pedro, Calif. and has been reported from La Jolla, Calif. to Magdalena Bay, Mexico (Dall, 1921) and has been collected at the Playa del Rey Pleistocene deposits by G. Willett. The shell resembles Acila castrensis in outline and size.

Aligena nucea Dall,1913.

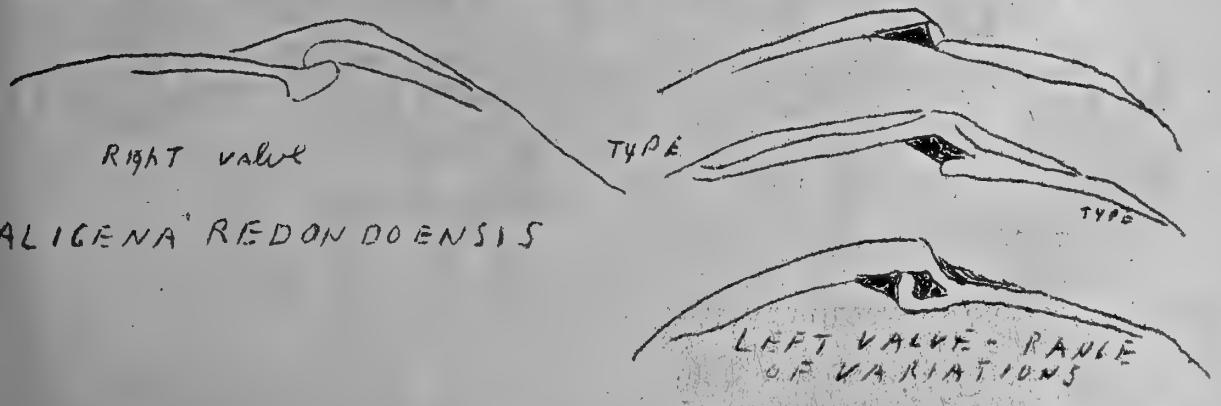
Proc. U.S. Nat. Mus. vol. 45, p. 597, 1913; ibid, vol. 66, p. 2, pl.28, fig.2, 1925.

This was described from the Gulf of California. The shell was said to have the " beaks posterior, the anterior end of the shell shorter". Obviously the anterior end would have to be longer, if the beaks are posterior. The hinge of the left valve is described as having " a long strong narrow chon--drophore with a small pustular projection in front of it". Between the chon--drophore and the small tooth is a triangular socket for the reception of a tooth from the other valve. The chondrophore to which Dall refers is a little laminar plate ventral to the ligament. The A. nucea Dall in Keen's checklist of W.N. Am. Marine Moll., 1939 is based on two lots of shells dredged off La Jolla, Calif. and off Santa Rosa Island, Calif. which are Aligena redondoensis Burch and not A. nucea as identified by Dall.

Aligena redondoensis Burch, 1941.

Nautilus, vol. 55, p. 50, pl. 4, figs. 5,6,7.

This species lives in a very restricted habitat in the submarine canyon off Redondo Beach. The mollusk lives in mud mixed with some fine gray gravel. On all sides of this " gravel bed" the pure mud is barren of shells when compared to the rich fauna associated with the Aligena. Reference has already been made to the specimens from off Santa Rosa Island and La Jolla. The hinge of the right valve is fairly constant and is similar to that of A. aequata in that it has a single large tooth. The hinge of the left valve varies considerably, some specimens being similar to that of aequata . However, the lamina in the left hinge ranges from being practically obsolete to being pronounced and resembling a spoon shaped chondrophore. In the most extreme variant there is a rounded pit above the spoon-like lamina behind which is a narrow thickening resembling a tooth. (see accompanying figures).



Genus Sportella Deshayes,1858. Type. Psammotea dubia Deshayes.
Cardinal teeth present in both valves- Outline quadrangular- Beaks nearer posterior.

" Shell oblong, smooth, depressed, subequilateral; valves closed. Hinge narrow, with two unequal, diverging teeth in the left valve, one in the other; the lateral teeth are wanting. Muscular scars large, oval, nearly equal; pallial line simple. Ligament external." (Tryon).

Sportella californica Dall,1899. " Monterey, Calif." (Dall,1921).

[illegible] The following note (Personal Comm. Sept. 1944) from Dr. Keen is very interesting " Sportella" californica is very obviously not a Sportella. Perhaps it represents an unnamed genus. So far I know of only two valves, one taken by Dall in 1870, the other by MacKenzie Gordon, both at Monterey. The outline somewhat resembles Pseudopythina, but the hinge seems to be different. "

Genus Anisodonta Deshayes,1858. Type. Anisodonta complanatum Deshayes.
Both cardinal and lateral teeth present- Cardinal teeth 3 in one valve, 2 in other.

Anisodonta is one of the many puzzles of the Leptonidae. The gills are like those of Thyasira and, contrary to the rule in Leptonacea, the incurrent opening though not developed into a siphon is complete and posterior.
Anisodonta pellucida Dall, 1916. " Monterey Bay, Calif. off Del Monte" (Dall).

Family CHLAMYDOCONCHIDAE
Genus Chlamydoconcha Dall,1884. Type. Chlamydoconcha orcutti Dall.

The generic description by Dall is entirely devoted to the characters of the animal. The shellsa re internal. The animal sluglike.
Chlamydoconcha orcutti Dall, 1884. " Monterey to False Bay, San Diego Co." (Dall).

" The shells are enclosed in two little sacs in the substance of the mantle. The umbones are close together, apparently connected by a brown gristle resembling an abortive ligament, and are nearly over the heart. The valves are about 10 mm/ long and 1 mm. wide, destitute of epidermis, prismatic, or pearly layers. There are no muscular or pallial impressions, no adductor , hinge or teeth. The embryonic valves are retained like two tiny bubbles on the umbones." (Dall).
Type locality, San Diego.

Collecting data: Mr. and Mrs. E.P. Chace report having taken this species in both Mission Bay, San Diego Co. and in Newport Bay. It is a sluglike amber brown animal. Mr. Morris Caruthers reported having taken a number of specimens in Newport Bay. H.N. Lowe had specimens collected in 1929 in Newport Bay.

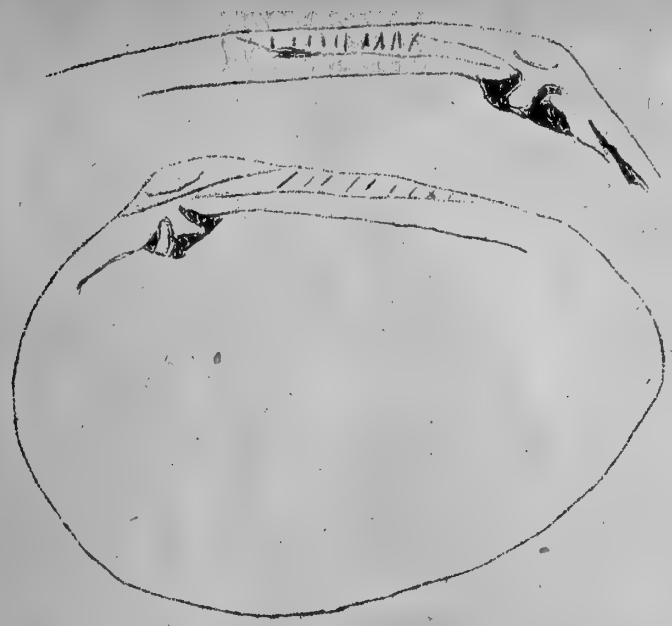
Correction and Additions

Minutes # 39, p 14 Cardita nodulosa off Catalina Island by G. Willett in 200 fathoms- not 50 fathoms.

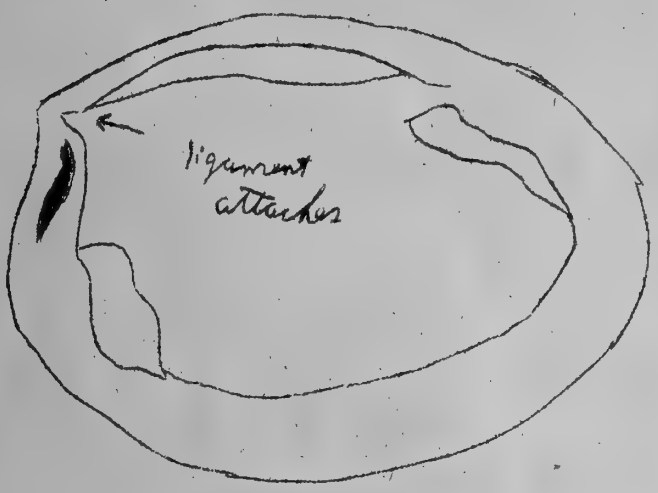
Minutes # 39- p 21- Thyasira trisinuata collected by Lewis in Frederick Sound , not Frederick Island.

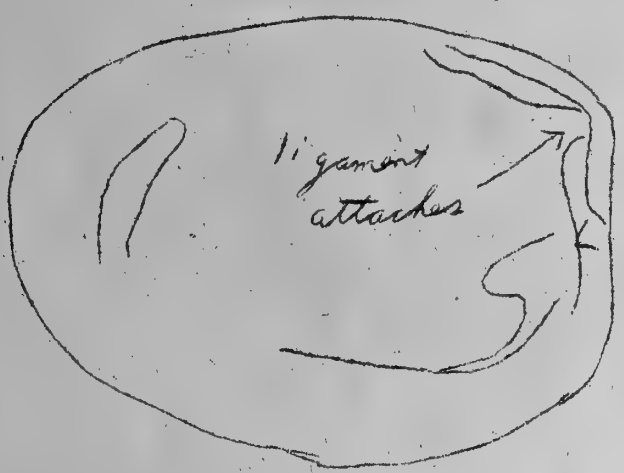
Minutes # 39- p 22- Axinopsis viridis collected at Victoria, B.C. 5-15 fms. not as types 5015.

Minutes # 40- p 15- additional records of Rochefortia tumida Carp. San Diego (Hemphill); Mole Harbor & Rodman Bay, Alaska (Kate Stephens); 15-30 fms. San Diego (Dr. F. Baker); Ballard Beach, Seattle, Wash (Dr. F.Baker And additional records of Rochefortia aleutica Dall- 10 fms. Reef Point, Los Angeles Co. (A.M. Strong); Port Graham, Alaska (Dr. Fred Baker).

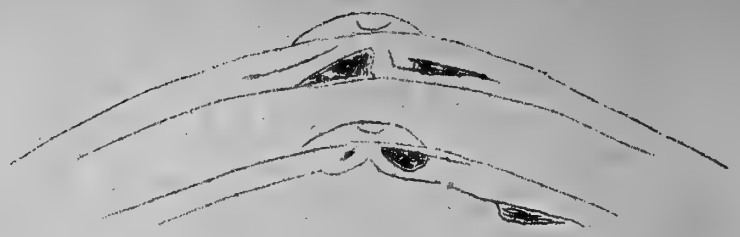


Turtonia

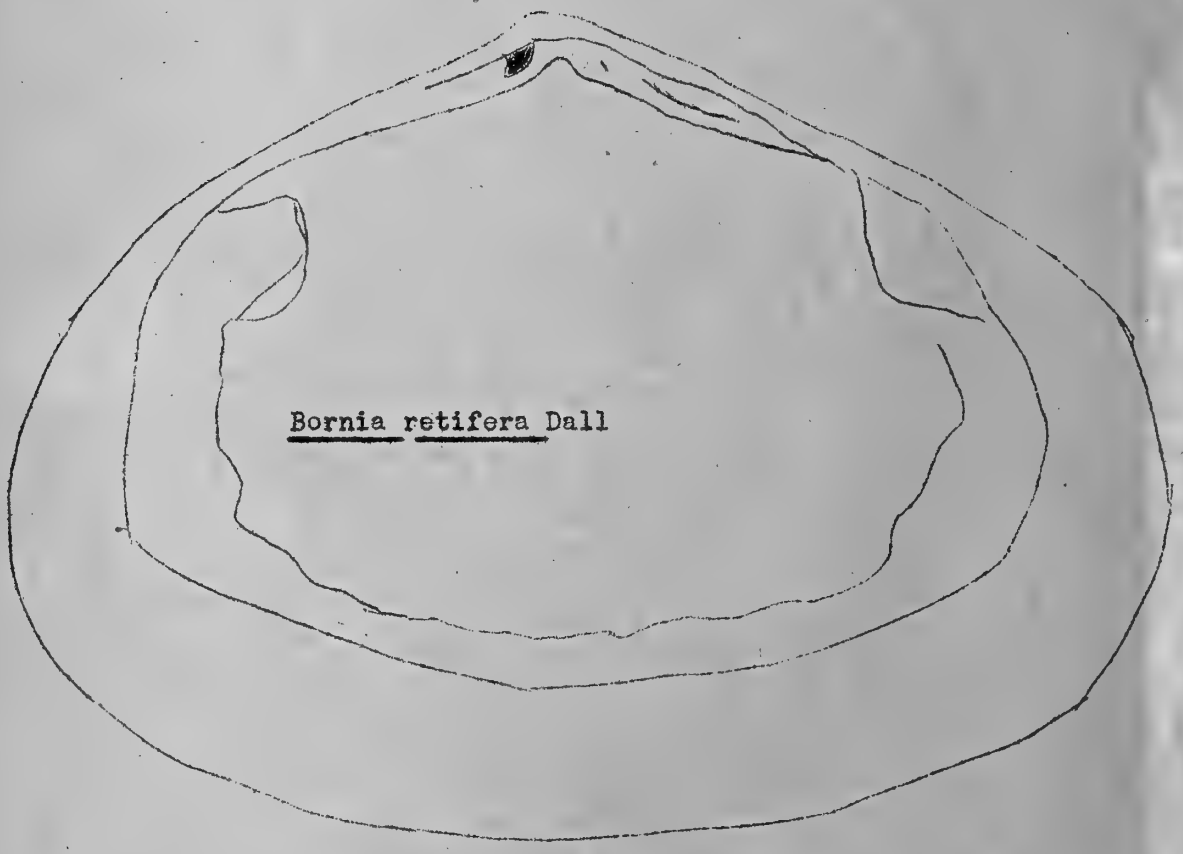




Serridens oblonga Carpentar



Bornia (from Keen)

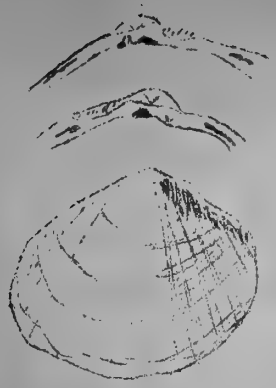


Bornia retifera Dall

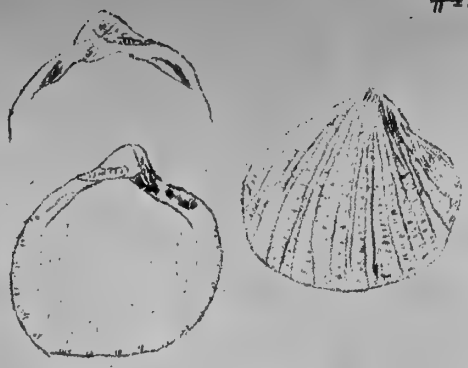
Additions- Corrections

Minutes # 37- p 14

Thracia challisiana Dall - Dredged by the Burches in 10 fms. off Monterey, Calif. in Aug., 1940. The following note from Dr. A. Myra Keen advises us as follows " I should identify it as Thracia challisiana Dall, perhaps a variety. We have a specimen from Monterey with a manuscript varietal name of Dall's, a specimen Mrs. Oldroyd had evidently sent to the National Museum for iden--tification. However, Dr. Dall evidently didn't feel sure enough of its being a valid subspecies to publish the name."



Serripes



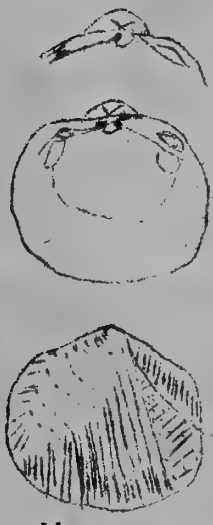
Clinocardium

Laevicardium

Trachycardium

Americardia

Trigoniocardia



Nemocardium

Vesicomya

Additions and Corrections

Minutes #40- p 14

Kellia laperousii Deshayes - Seattle, King Co., & Port Orchard, Kitsap Co., Wash. Dutch Harbor, Aleutian Islands, Izhut Bay, Afognak Id., and Drier Bay and Thum Bay, Knight Id., Pr. Wm. Sound, Alaska; mostly found in empty clam shells. (W.J. Eyerdam).

Rochefortia tumida Carpenter- Minutes #40- p 15- Drier Bay, Knight Id., Alaska, 15 fms. mud, 1923 (W.J. Eyerdam).

Rochefortia planata Dall- Under rocks on reef.. Unalaska, Aleutian Id., 1932 (W.J. Eyerdam).

Rochefortia aleutica Dall- Minutes #40- p 15- Illuliak Bay, Unalaska, Aleu--tian Islands, dredged.. mud.., 1932 (W.J. Eyerdam).

Rochefortia pedroana Dall- Minutes #40- p 15- " I find in the current Minutes an interesting account of finding on Blepharopoda occidentalis Randall a Rochefortia sp. I collected species resembling your description on this sand crab at Pacific Beach, San Diego Co., In 1940 , they were common on the crustaceans near the Crystal Pier. Other B. occidentalis examined near miss--ion Beach, Calif. possessed no shells attached to them. My specimens are white, with wrinkled , tan colored epidermis. I also have one complete Roche--fortia sp. taken in sand at Coronado which is altogether different, and not identified. I understand Miss Edna Wilson has also collected Rochefortia from sand crabs from La Jolla, Calif. (Wm. Keith Emerson).

Pseudopythina rugifera Carpenter- Minutes #40- p 17- Port Orchard , Kitsap Co., Wash. Commensal on Gebia pugetensis. (W.J. Eyerdam).

Lasaea sp. - Minutes #40- pp 19-20. An interesting report has been received from our member Mr. W.J. Eyerdam reporting Lasaea rubra Montagu from Vancou--ver Island, British Columbia and Port Orchard, Kitsap Co., Wash. In sand in Mytilus beds. This is the most northern record of this genus on our coast and so listed in Bulletin 112. However, our decision was that we have Lasaea cistula and L. subviridis and do not have rubra. Therefore, it will be of interest to discover which of the two species Mr. Eyerdam has- or both.

Thyasira gouldii Philippi- Minutes #39- p 20- Set in the San Diego Museum of this label from Maine a nd Winter Harbor, British Columbia.

Thyasira barbarensis Dall- Minutes # 39- p 21- 1 valve from Carmen Id., Gulf of Calif. in H.N. Lowe Coll. in San Diego Museum.

Axinulus Verrill and Bush,1898. Subgenus of Thyasira. Minutes # 39- p 21.

It has been called to our attention that we ommited the type of this section. Dall, 1903, Trans. Wag. Free Inst. Sci. p 1338 gives Type Thyasira (Axinulus) brevis Verrill and Bush, Proc. U.S. Nat. Mus. xx, p. 790,1898.

Taras subquadratus (Carpenter)- Minutes # 39- p 24 Imperial Beach, Calif (Stephens); San Quintin, L.C. (Orcutt); Tepoca Bay, Sonora, Mex. (Lowe); Pta. Penasco, San Carlos Bay, Santa Maria Bay, Caremen Ids., San Benito Ids. Espiritu Santo , La Paz (Lowe).

Taras (Pelaniella) scricatus (Reeve)- Minutes # 39- p 24 . Reported from 4 stations in Lower Calif., 5 from the lower Mexican coast, Salvador,Nicaragua Costa Rica, and Panama (Lowe).

Lucina (Lucinisca) nuttallii Conrad- Minutes # 40- p 6- Ensenada, & La Paz L.C. and Guaymas, Sonora, Mexico (Lowe).

Lucina (Epilucina) californica Conrad- Minutes # 40- p 7-8. San Felipe (Abbott Todos Santos Bay, L.C., Cedros Island (Lowe).

Lucina (Parvilucina) approximata Dall- Minutes # 40- p 8 . 30 and 35 fms. off Catalina Island, San Benito Islands in 10 fms., Magdalena Bay (Lowe).

Plectodon scaber Carpenter- Minutes # 38- p 14. 35 fms. Catalina Island (Lowe); 10 fms. San Benito Is, L.C. & 20 fms. Carmen Id., Gulf Cal. (Lowe).

Family CARDIIDAE

Genus Cardium Linnaeus, 1758. Type (by subsequent designation, Children,1823) Cardium costatum Linnaeus.

It is generally considered that Cardium s.s. is not represented in the fauna of this coast. Some authors have been disposed to place all of our spec--ies in various subgenera of Cardium. However, the consensus of opinion at this time seems to be to give them generic standing.

The members are by no means in accord on the proper taxonomy to follow with this group. Mr. George Willett made the following comments: " Am return--ing your manuscript with quite a number of notes on the different species. Regarding the Cardium group as a whole (that is, our west American species), excluding Serripes, our species appear to me to group more or less naturally as follows:

quadragenarium	elatum	procerum
nuttalli	substriatum	
ciliatum		biangulatum
californicum		
fucanum		
centifilosum		

If Cardium is to be discarded as a genus for our shells, my main criticism of your arrangement would be:

I see no good reason for recognition of Clinocardium as a full genus. To me, nuttalli, ciliatum, etc. are much more like quadragenarium than is procer--um which you include with it, and the latter in hinge characters is very close to biangulatum. Also, it looks to me as though centifilosum is not more than subgenerically different from californicum or fucanum. If Cardium is not to be used- and you have plenty of good authority for not using it- I think I would prefer Grant and Gale's arrangement to yours, though I think they have procerum in the wrong place and I am not sure that biangulatum is more than subgeneri--cally different.

The type of Cardium is superficially very different from any of our spec--ies, but in hinge and thinness of shell it is very similar to some of them. I admit that the continued use of Cardium may be regarded as a concession to convenience, but to me other arrangements so far proposed are so inconvincing as regards their taxonomic accuracy that I am continuing to follow Bull. 112, except in the use of Protocardia."

Genus Trachycardium Morch, 1853. Type (by subsequent designation, von Martens 1870), Cardium isocardia Linnaeus.

" Shell strongly ribbed and generally with numerous arched, recurved or denticulated scales on the r ibs. The posterior slope has these scales much accentuated and may be the only area on the shell surface where scales occur. Shells in this genus are generally higher than long" (Clench & Smith-Johnsonia)

Subgenus Dallocardia Stewart, 1930. Type (by original designation) ,Cardium quadragenarium Conrad:

Dallocardia differs from Trachycardium s.s. " The cardinals are slightly posterior and the hinge seems to be the same as that of T. isocardia, except that it is not so heavy." (Stewart, Spec. Pub. #3, Acad. Nat. Sci. Phila. p264)

Trachycardium (Dallocardia) quadragenarium Conrad, 1837. " Santa Barbara,Calif. to Todos Santos Bay, Lower Calif. (Dall, 1921). Type Loc. near Santa Barbara

Collecting data: We have taken this species living in upper Newport Bay, Calif., the Estero below Ensenada, Mexico and have dredged it in many localit--ies off the coast. It has an interesting habit of seeming to literally leap out of the sand immediately before the return of the tide. Collecting gets good just before you have to start running or swimming. The bathymetric range

is rather interesting. We have dredged it plentifully off Redondo Beach in the 25 fathoms gravel and have also brought up young specimens only from as deep as 75 fathoms. It is odd that the young should seem to be taken in deeper water than the adults. We also dredged it off Avalon, Cat-alina Island in 25 fathoms and elsewhere along the coast of southern Cal-ifornia. It is not uncommon in the San Pedro Pleistocene (Burch); off Pt. Loma and in Mission Bay (San Diego Museum); Mission Bay (W. K. Emerson).

Subgenus Mexicardia Stewart, 1930. Type (by original designation), Cardium procerum Sowerby.

Dall placed C. procerum under Ringicardium Fischer, 1887. Stewart says of this " Superficially T. procerum resembles Ringicardium ... but T. procerum has a heavier hinge and the cardinals are equidistant between the laterals while in Ringicardium the cardinals are close to the posterior laterals. The hinge and outline of T. procerum are similar to Trachycardium." (Stew-art, 1930).

Trachycardium (Mexicardia) procerum Sowerby, 1833. Pleistocene of Baldwin Hills, Los Angeles County and San Diego. Range living by Dall " Cerros Island to Payta, Peru." This species is not of the Recent fauna of the California coast and should be ommitted . However, Dall listed it in Bull. 112.

Genus Clinocardium Keen, 1936. Type (by original designation), Cardium nuttallii Conrad.

" Shell medium to large, trigonal, oblique, usually ventricose; beaks recurved, prosogyrate; position of the umbones varying with age but usually at two thirds the distance between posterior and anterior ends of the shell; dorsal margin very broadly arched, sloping downward at an angle of about 25 degrees, ventral and anterior margins broadly rounded; epidermis closely adherent, brownish; sculpture of 28 to 55 rounded radial ribs and concentr-ic growth lines which may cross the ribs as conspicuous loops, never as spines; lunule when present circumscribed , never impressed; escutcheon inconspicuous; ligament in dorsal view long, narrow and oval. Interior porcellaneous, ventral and anterior margins crenulate; hinge arched; card-inals in each valve slightly nearer anterior than posterior laterals; ant-erior cardinal of left valve stronger than posterior, recurved, posterior cardinal of right valve stronger than anterior, also recurved; ligament not elevated on a short shelly platform; beaks originating at a point sli-ghtly anterior to the anterior cardinals; muscle scars large; pallial line simple. Specimens arnge in length up to about 120 mm" (Keen, 1936, Trans. San Diego Soc. Nat. Hist., vol. 8, no. 17, pp. 119-120).

Dr. A. Myra Keen has sent us a key to our species of Clinocardium.

1. Ribs nodosely sculptured ..... nuttallii
   Ribs not nodosely sculptured 2
2. Ribs heavy; posterior area with one or more flexuous furrows ..... .californiense
   Ribs not heavy; posterior area without flexuous furrows .. 3
3. Ribs more widely spaced on anterior third than on middle third of the shell ..... ciliatum
   Ribs about evenly spaced on the anterior and middle thirds .. 4
4. Length of shell greater than height, valves not consp-icuously ventricose, ribs about 45-50 in number ..... fucanum
   Length of shell equal to height, valves ventricose, ribs about 40 in number ..... blandum

Clinocardium blandum (Gould), 1850. Proc. Boston. Soc. Nat. Hist. vol. 3, p. 276. Type locality, Puget Sound, Washington.

The original description of this species which was ommitted from Bull. 112 and Oldroyd follows: " Testa parva, tenuis, subcircularis, vix transversa, ventricosa, postice subtruncata, cinereo-rufescens, costis planulatis radian--tibus ad 40 insculpta, sulco angusto sejunctis, et liris concentricis tenu--issimis, arcuatis, reflexis, decussatis: umbonibus medianis, tumidis, denud--atis, eburneis: cavositas albida; margine interno crenulato; cardine debili. Long. 1; alt. 4/5; lat. 3/5 poll. Hab. Puget Sound."

Dr. A. Myra Keen (Personal Comm. Sept. 1944) states " The species C. blandum has been confused with both californiense and fucanum. It is distinct by reason of number of ribs, ventricosity, ovate outline, and deep channels between the ribs along the central area of the shell. I have seen the holotype in the National Museum and have studied a large growth series from Puget Sound. The characters seem to be constant witha ge. I have seem it living only from Puget Sound, but it did occur as far south as San Pedro in the Pleistocene. I can submit sample specimens if you find you have none; you may have it labelled fucanum."

Grant and Gale, 1931, placed the above species in t he synonymy of californiense Deshayes.

Clinocardium nuttallii (Conrad), 1837. " Nunivak, Pribilof, and Commander Islands, Bering Sea, south to Hakodate, Japan, and San Diego, California, (Lower California ?) (Dall, 1921).

It is unfortunate that the name of this species must be changed. A host of collectors have sets labelled Cardium corbis Martyn.This has been the accepted name of this species from " time out of mind". However, there seems to be no doubt but that Martyn's names are in many instances too confused for explanation and use. An excellent discussion of this matter is given by Stewart, 1930, Spec. Pub. No. 3, Acad. Nat. Sci. Phila., p. 260.

Collecting data: We have collected this species common in Puget Sound near Port Orchard, Wash. It is not uncommon in Morro Bay, San Luis Obispo Co. We dredged it off Monterey, Calif. in less than 20 fathoms. Our most southerly record is Mugu, Ventura Co., Calif. where we took specimens in Jab 1941. It is not uncommon in some of the San Pedro Pleistocene deposits(Burch); southeast Alaska, common at low tide (G. Willett); reported by W.J. Eyerdam from " many places in State of Washington a nd British Columbia, and Alaska as far as Adak Island in the Aleutian Islands, also in the gulf of Kronotski and Avatcha Bay, Kamchatka. This species reaches its maximum size in the cold waters of Alaska. The following are a few large specimens of my collection:

Length	Width	Height
Afognak I. 100 mm	95 mm	75 mm
Sitkalidak I. 112 mm	106 mm	80 mm
Cordova 112 mm	110 mm	85 mm
Raspberry 125 mm	120 mm	74 mm.. 8 fms

But we have a recent note from Dr. A. Myra Keen of Stanford University in which she states " We have recently received a specimen of Clinocardium nuttallii larger than Mr. Eyerdam's record-sized specimens. This was collec--ted on Atka Island, Alaska, by J.T. Barnaby, a member of the U.S. Fish and Wildlife Service, in 1941. Both valves are intact and in perfeet condition. The measurements are: length, 145 mm, height 138 mm, thickness, 102 mm."

Other collecting records of this species are, Windfall Harbor, Admiralty Is., Alaska (Kate Stephens); Puget Sound (Hemphill); Orcas Id., 10-30 fms. (F. Baker); Japan (Anderson Collection); Morro and San Francisco Bays (Lowe Vancouver Island, B.C. (Baker).

Clinocardium ciliatum (Fabricius), 1780. " Circumboreal. Arctic Ocean and southward to Puget Sound and North Japan" (Dall, 1921). Johnson gives the Atlantic range " Greenland to Cape Cod, Mass." Type locality, Greenland.

Collecting data: Kukak, Alaska Pen. beach, Wrangel, 50 fms., Ketchikan, Alaska 20-40 fms. (G. Willett); Punuk I., Bering Sea, 15 fms., Prince Wm. Id., 18 fms., Frederick Sound 12 fms. (Lewis); Izhut Bay, Afognak Id... dredged sandy bottom 1922 (W.J. Eyerdam); Bering Id... 65 fms. clay,Vega Expd. 1879 (Eyerdam); Tromsosund, Norway and Hinchinbrook Id. dredged (Nor--berg)(Eyerdam);

Clinocardium californiense (Deshayes), 1841. " Japan, Bering Sea eastward to Sitka, Alaska. Type locality, Kamchatka.

There has been so much confusion about the differences between this species and C. fucanum that many of our collecting records are in question and the specimens in our collections should be studied again. The matter is stated by Dr. A. Myra Keen (Personal Comm. Sept. 1944) as follows:

" The species C. californiense is Asiatic in distribution and occurs no farther east than Sitka, Alaska. Most of the specimens I have seen come from Japanand the Bering Sea area. The type locality is Kamchatka, at least as indicated by the only specimen in the Paris Museum that seems to corres--pond with the original figure. The original description said " Cotes de Californie", which apparently was a bit of poetic license. The shell is much heavier than the west American form usually labelled " californiense", and the posterior slope, even in young specimens, has a peculiar undulating furrow in addition to the normal ribbing.

C. fucanum Dall is the common West American form, most abundant in Puget Sound, but ranging from Sitka, Alaska, to Monterey. Dall cites it from the Bering Sea, but I have not seen specimens from there. It is dist--inguished from true " californiense by its squarish ribs and rounded, shallow interspaces, especially on the middle third of the shell, where the ribbing is often faint. In the Pleistocene it ranged as far south as San Pedro."

Collecting data: In view of the above statement by Dr. Keen the follow--ing collecting records are given with the suggestion that most of the specimens involved will prove to be C. fucanum after further study. 5-20 fms. from Norton Sd., Bering Sea to S.E. Alaska, Forrester I., Craig etc. (G. Willett); San Juan I., Puget Sound (Lowe Coll.); Nemuro, Japan, (Dr. Fred Baker); many places in Puget Sound and in Alaska at Izhut Bay, Afognak I, Evans, Knight, Sitkalidak I. and Kodiak I. (W.J. Eyerdam)

Clinocardium fucanum (Dall), 1907. " Southern Bering Sea, off Unimak Island, and south to Monterey, Calif." (Dall, 1921). Keen " Abridged Check List" gives lat. 37 to 57. Type locality, Juan de Fuca Strait.

Collecting data: Dredged off Monterey, Calif. in 10,25 and 40 fathoms (Burch); Forrester Island, Alaska (G. Willett); San Juan Islands, Puget So --und. dredged (Dr. Fred Baker); Puget Sound (Oldroyd); Strait of Fuca, Victoria, B.C. and Sawmill Bay, Pr. Wm. Sound, and Sitkalidak I., Alaska (W.J. Eyerdam).

Two species reported only fossil were listed in Bulletin 112. Unless advised otherwise we shall not consider them as part of the Recent fauna of this coast. They are: Clinocardium decoratum Grewingk, 1850 from the Pleistocene of Alaska and British Columbia, and Clinocardium californiense comoxense Dall, 1900 from the Pleistocene of Vancouver Island.

Dr. A. Myra Keen advises us on this " I know of no Recent records of C. decoratum or C. comoxense".

Genus Trigoniocardia Dall, 1900. Type (by original designation) Cardium graniferum Broderip and Sowerby.

" Shell with the posterior slope sharply to moderately descending. Strongly ribbed, the ribs generally being somewhat smaller on the posterior slope. Channels between the ribs concentrically sculptured with fine thread like ridges. The anterior lateral teeth are crowded against the cardinals." (Clench a nd Smith- Johnsonia).

Subgenus Trigoniocardia s.s.

" Shell with posterior slope moderately descending, strongly ribbed and possessing concentric sculpture between the ribs; generally white or grayish on the outside, white or slightly colored with streaks or a blotch of reddish brown on the inside. Hinge having the anterior lateral teeth close to the cardinal teeth, the posterior laterals more distant." (Clench and Smith- Johnsonia).

Trigoniocardia (Trigoniocardia) eudoxia Dall, 1916. " Catalina Island to Gulf of California" (Dall, 1921). Type locality, Gulf of California.

This species is stated in full above. However, the species will be ommited from our permanent list. Dr. A. Myra Keen advises us about the two records of this species as follows (Per. Comm. Sept. 1944) " Trigonio--cardia eudoxia Dall should be stricken from the list. The holotype, from the Gulf of California , is a young Trachycardium (Mexicardia) procerum. The specimen from Catalina Island recorded in Bull. 112 is at the National Museum; it is a Trachycardium of some sort, young, about 3 mm. in diameter, with 24 sharp ribs, bearing prickles on the posterior slope. It may be a ballast shell. The label carried no collecting data".

Subgenus Americardia Stewart, 1930. Type (by original designation), Cardium medium Linnaeus.

" Shell fairly heavy and generally blotched with brown or brownish red. Hinge having the anterior lateral and posterior lateral teeth about the same distance from the cardinal teeth." (Clenchand Smith-Johnsonia).

There has been some difference of opinion about considering Americardia and Trigoniocardia as separate genera. Dr. A. Myra Keen advises (Per. Note Sept. 1944) " Americardia looks like a good genus to me, but I hold no special brief for it if you prefer to subordinate it to Trigoniocardia." However, Stewart described it as a subgenus and it is used as a subgenus by Clench and Smith in Johnsonia. Dr. Joshua L. Baily Jr. writes " I say subgenus".

Trigoniocardia (Americardia) biangulata Sowerby, 1829. " San Pedro, Calif. to Panama" (Dall, 1921). to Guayaquil (Jordan 1924). Type locality, St. Elena and Isle of Plata, W. Colombia. to Redondo Beach (Burch).

Collecting data: Dredged in 10,25,35 fms. off Avalon, Catalina Island, Calif, also off Redondo Beach, Calif. in 25 fms. gravel, dredged off Punta Banda, Todos Santos Bay, Mexico and also dead valves taken littoralat Punta Banda and also on Catalina Island. In connection with the bathymetric range we hesitate to list one of 100 fathoms off Redondo Beach in which we brought up a number of dead valves but no living specimens. (Burch); Mission Bay, San Diego Co. (W.K. Emerson); Catalina Island in 30 fms. (Lowe Coll.).

Genus Laevicardium Swainson, 1840. Type (by subsequent designation) Stol--iczka, 1871), Cardium oblongum Gmelin.

" Shell generally inflated, moderately thin, smooth to very finely ribbed, not gaping. Lateral teeth prominent and large, the anterior laterals being nearer to the cardinals. Cardinal teeth small but well developed." (Clench a nd Smith- Johnsonia).

Laevicardium elatum Sowerby, 1833. " San Pedro, Calif. south to Panama" (Dall Type locality, Gulf of California.

Collecting data: Dead valves are commonly washed in from the shallow off shore reef between Huntington Beach and Long Beach, Calif. It is common in many of the local Pleistocene deposits. However, I have never seen a specimen said to have been taken alive in southern California leaving the question that the specimens washed in are either fossil or subfossil. Mr. W. K. Emerson writes that it is found in a semifossil condition in San Diego Bay. Specimens from the Gulf of California are abundant and in most collec--tions.(Burch). Reported from Corinto, Nicaragua by W.J. Eyerdam, 1938. Laevicardium substriatum Conrad, 1837. Mugu, Ventura Co., Calif. south to Acapulco. Dall in Bull. 112 gave the range " Catalina Island and San Pedro south.." Cooper listed it " Monterey to South America". However, it is a southern shell and I have seen no specimens from farther north than our own collection at Mugu. Type locality, San Diego.

Collecting data: We found this species very common in the slough at Mugu, Ventura Co. which is an extention of the range as given of some 75 miles. It is not uncommon off Redondo Beach in water as deep as 25 fathoms. It is, of course, one of the most abundant species in such localities as Anaheim, Alamitos, Newport, Mission Bays on south to the Estero below Ensen--ada in our experience. (Burch).

Genus Serripes Gould,1841. Type (by monotypy), Cardium groenlandicum Brug--uiere, 1789.

" Shell subcordiform, compressed, subequilateral; surface smooth or slightly radiately striate; beaks prominent; cardinal and lateral teeth obtuse, small, almost obsolete." (Tryon S.S. Conch.).
Serripes groenlandicus Bruguiere ,1789. " Circumboreal. Arctic Seas and south to Hakodate, Japan, and Puget Sound" (Dall, 1921). Johnson gives Atlantic range " Greenland to Cape Cod, Mass." and lists a subspecies pro--tractus Dall.

Collecting data: Umnak I. to Petersburg, Alaska (G. Willett); Norton Sound, Bering Sea, 5 fms. , Kodiak Island, 13-15 fms., Frederick Sound, 12 fms. (Lewis); Izhut Bay, Afognak Island, Sawmill Bay, Port Huron, Sitkalidak Id., Alaska ... dredged in mud (W.J. Eyerdam); Hinchinbrook Id. and Tromso--sund, Norway.. Ingvard (Norberg); Godhaven, Greebland.. coll. by Johann Moller .. Topotypes , Bering Island by Vega Exped. 1879, 65 fms. clay-sand (Eyerdam Collection);
Serripes laperousii Deshayes, 1839. " Bering Strait to Hakodate,Japan, and Sitka, Alaska" (Dall, 1921). Type locality, " Mers de California".

It has been our opinion that this is a West Coast species. However, Mr. George Willett of the Los Angeles Museum recently worked up some material from Greenland and found S. laperousii in it. Therefore it seems that both laperousii and groenlandicus are circumboreal.

Collecting data: Mr. George Willett informed us that this species is taken usually in shallow water. Reported, Kodiak Island, dead on the beach (G. Willett); Punuk I., Bering Sea, 18 fms., Nunivak I., Bering Sea, 8-10 fms., Prince Wm. Sound 18 fms., (Lewis); near Victoria, British Columbia, (Whiteaves); Kodiak, Woody and Raspberry Islands in the Kodiak group, coll--ected by W.J. Eyerdam .. dredged on sandy bottom. Dimensions of the two largest specimens are as follows:

Length	Width	Height
110 mm.	85 mm	53 mm
120 mm	95 mm	60 mm

Genus Nemocardium Meek, 1876. Type (by monotypy), Cardium semiasperum Desh.

" Shell comparatively small, with fine ribs, the ribs of different character on the posterior part of the shell, being spinose, tuberculate, or cancellate instead of simple." (Grant & Gale,1931).

Dall placed the species involved here under the genus Protocardia Beyrich, 1845, and was, of course, followed by Oldroyd and others. Stewart in Spec. Pub. No. 3, ANCP, states of Nemocardium, " This genus is separated from Protocardia by the fine radiating ribs of the anterior region which are represented by the fine crenulations on the internal margin of the shell. In Protocardia this region has concentric ribs."

Dr. A. Myra Keen in " Abridged Check List" uses Nemocardium. Grant and Gale,1931, also used Nemocardium but considered it a subgenus of Laevicardium, a conclusion apparently not generally accepted.

Dr. A. Myra Keen (Personal Comm. Sept. 1944) says of this " In my revision of the Cardiidae, on which I have been working for about nine years now, I regard Nemocardium as a member of a different subfamily from Laevicardium. Naturally, I can't agree with Grant and Gale classification of this and Trachycardium as subgenera of Laevicardium. The species of centifilosum and richardsonii are not Nemocardium in the strict sense, but until a revision of the whole group is published, this is the best allocation available. The allocation to Protocardia, a Cretaceous genus, is definitely out."

Nemocardium centifilosum (Carpenter), 1864. " Bodega Bay to Lower Calif." (Dall, 1921). Type locality, Monterey, Calif.

Collecting data: We have found this species a very common dredged shell all along the coast recording it from off Monterey in 10-40 fms., El Segundo in 35 fms., Redondo Beach in 25-75 fms. , Avalon, Catalina Island in 25 fms., Santa Cruz Island in 50 fms., and off Ensenada, Mexico in 50 fms. (Burch); off San Diego, Calif. in 55 fms. (Dr. Fred Baker); San Pedro, Calif. in 20 fms., Catalina Island in 30 fms., Newport, Calif. in 30 fms. (G. Willett).

Nemocardium centifilosum richardsonii Whiteaves, 1878. " Queen Charlotte Islands, British Columbia to San Francisco" (Dall). Keen " Abridged Check List" gives lat. 38-55 which is from about San Francisco to Forrester Island, Alaska where it was taken by Mr. George Willett. Type locality, Straits of Georgia between Race Island, and Lighthouse and Victoria Harbor, British Columbia.

Collecting data: Mr. George Willett reported taking this species off Forrester Island, Alaska in 60-60 fms. but also comments " I can see no difference between this and the last except size." Mr. W.J. Eyerdam reports it from Strait of Georgia, B.C. ... Izhut Bay, Afognak Id. and Smith's Cove, Seattle, Wash. in mud 15 fms.

Family VESICOMYACIDAE

Genus Vesicomya Dall, 1886. Type, Callocardia atlantica Smith.

" Meiocardia but without lateral teeth; epidermis polished, umbones moderately prominent; lunule circumscribed by a groove; otherwise as in Meiocardia"(Dall

The treatment of this section is a little puzzling as used by some authors. For example Johnson in Mollusca of the Atlantic Coast uses Vesicomya as a subgenus of Pitar in the Veneridae. However, Dr. Joshua L. Baily Jr. advises that the consensus of opinion is against such usage.

None of the members report having specimens of this family.

Vesicomya ovalis Dall, 1896. " Clarence Strait, Alaska, 322 fathoms, and in Panama Bay, in 1,672 fathoms" (Dall).

Vesicomya lepta Dall, 1896. " Off Tillamook, Oregon and south to the Gulf of California in deep water." (Dall).

Vesicomya stearnsii Dall, 1895. " Off La Jolla, Calif. and south to the Gulf of California in deep water" (Dall).

Subgenus Archivesica Dall, 1908. Type, Vesicomya gigas Dall, Gulf of Calif. Mus. Comp. Zool., vol. 43, p. 418.

" Shell inflatedly modioliform, mesially slightly constricted, with the hinge plate short and broad and the hinge teeth radially disposed; lunule not circumscribed by an impressed line; pallial line without a sinus, but descending nearly vertically from the middle of the posterior aductor scar."
Vesicomya (Archivesica) gigas Dall,1896. " Off Point Sur, California, and in the Gulf of California in deep water." (Dall, 1921).

Dr. A. Myra Keen advises "Woodring, 1938, Prof. Paper, U.S. Geol. Survey no. 190, p. 50, places Calyptogena in the Vesicomyacidae also. Apparently the group is better regarded as of the Isocardiacea than of the Veneracea."

We discussed the genus Calyptogena under the Carditidae.

Additions and Corrections

The genus Nuculana was discussed in our Minutes # 33, pp 9-11. The following new species described by Mr. George Willett of the Los Angeles Museum should be added to the list.

Nuculana burchi Willett, 1944. Bulletin, So. Calif. Academy of Sciences, vol. 43, pt. 2, 1944, pp 71-73, Pl. 14, fig.3.

" Shell brownish or olivaceous,trigonal, oblong,rather flat; rounded anteriorly, bluntly pointed posteriorly; posterior dorsal margin slightly curved; beaks subcentral, not prominent. Exterior sculpture of flattened ribs with narrower interspaces; sculpture less arcuate than growth lines. Anterior teeth 20-22, posterior teeth about 15. Resilium triangular, short, projecting.

Type, right and left valves, No. 1066 Los Angeles County Museum. Type and 10 additional valves collected by John Q. and Tom Burch, in 50 fathoms off Redondo, California. Two additional valves taken 5 miles off El Segundo, Calif. The type right valve measures: long. 12.2, alt. 7.7, lat. 2.4 mm. The largest valve in the type lot (Burch coll.) measures 14x8.7x2.5 mm.

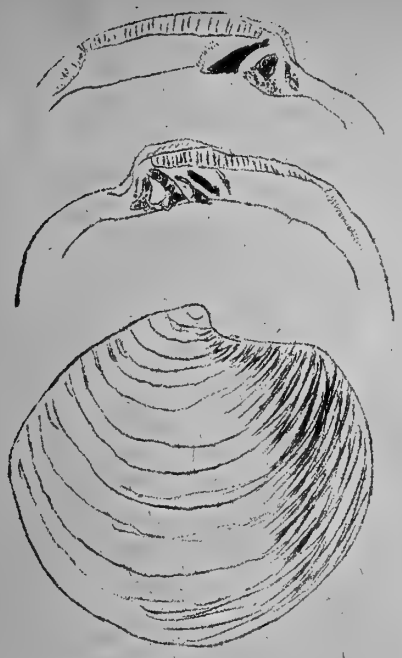
This shell is very similar to N. cellulita Dall, but differs from that species in flatter ribs and narrower interspaces, producing a smoother surface; and shorter and more projecting resilium. It is also proportionately more slender than cellulita, and no specimens seen are as large as adults of that species. Burchi differs from N. taphria in being flatter , with blunter posterior end, straighter posterior dorsal margin, and very much finer ribbing."

Periploma (Halistrepta) sulcata Dall, 1904. See Minutes # 37, p 12.

Among the shells dredged off Redondo Beach, Calif. by the Burches were specimens questionably allocated to the above species- from the 25 fathom gravel beds. Dr. A. Myra Keen recently examined one of them and returned the following note " .. The larger is more like P. (Halistrepta) sulcata Dall than anything else in the literature. It is evidently immature and is longer than the holotype of sulcata , with less regular concentric ridges, but otherwise conforms well with the figure and description."

We were rather disposed to think we had a new species, but will accept Dr. Keen's advice and leave the label sulcata, for the time being.

Minutes # 40, pp 9-10 - We have quoted so freely from Dr. Dall's great work in the Transactions of the Wagner Free Institute of Science of Philadelphia Vol. III, that we may ask to be excused if we occasionally run a quotation and fail to give the proper reference and place our quotation marks where they should be placed. The above pages contained such a case. We mentioned Dr. Dall at the bottom of page 9 but failed to give the reference from which it was copied. It was the above work Vol. III, pt. 5, pp 1114-1115.

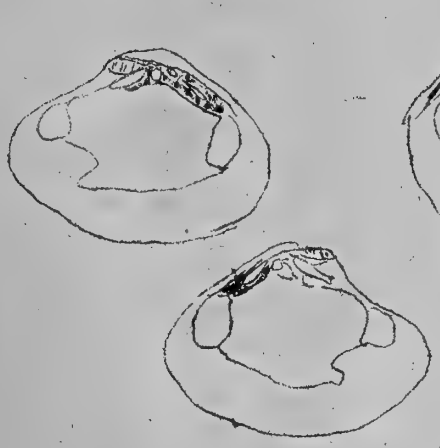


Dosinia

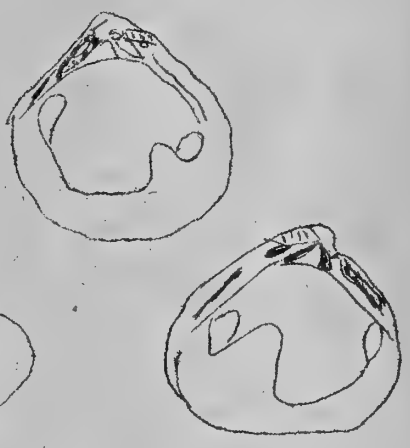
Ventricola

Saxidomus

Pitar



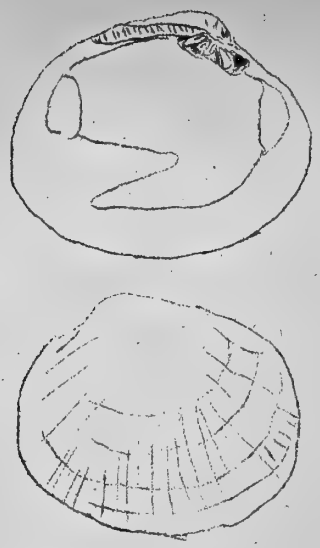
Tivela



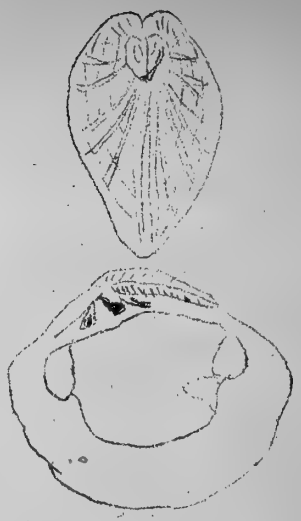
Gemma

Transennella

Irus

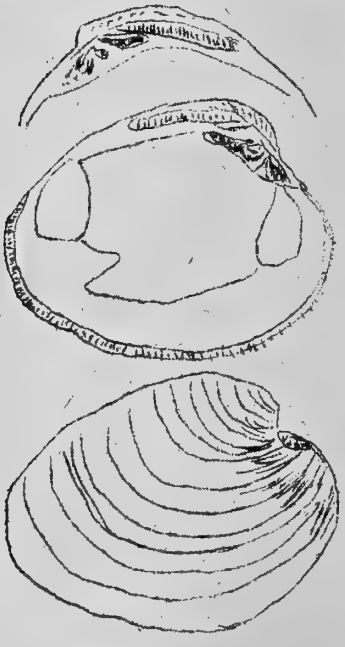


Protothaca

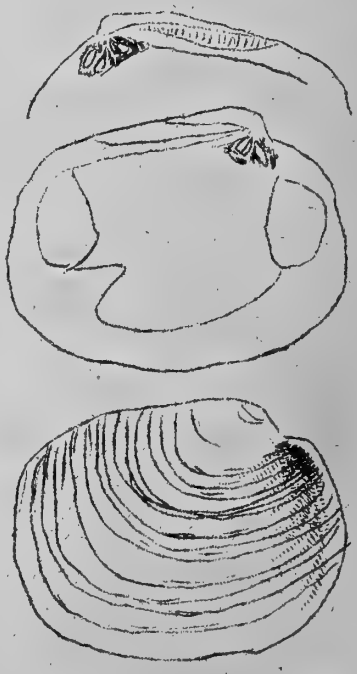


Chione

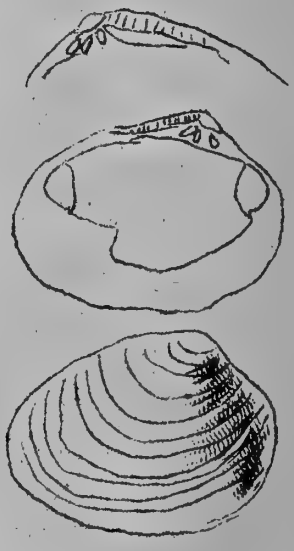
Psephidia



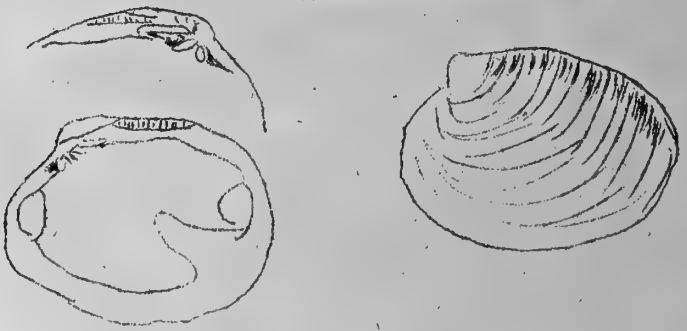
Mercenaria



Humilaria



Liocyma



Compsomyax

Superfamily VENERACEA

Cotton and Godfrey, 1938 in their fine work on " The Molluscs of South Australia" include some interesting and useful keys. The following key to families is from their work.

a. Shell closed, regular; hinge with or without laterals, three diverging cardinal, non-bifid, in each valve .... VENERIDAE

aa. Shell gaping behind, often irregular in form; hinge without laterals, two or three small bifid radial teeth in each valve ..... .PETRICOLIDAE

Family VENERIDAE

This is one family on which there is no dirth of literature. A few of the works consulted follow.

Dall, W.H. " Synopsis of the Family Veneridae and of the North American Recent Species", Proc. U.S. Nat. Mus. 1902.

Dall, W.H. " Transactions of the Wagner Free Institute of Science of Phila." Vol. III, Part VI, 1903.

Palmer, Katherine Van Winkle " The Veneridae of Eastern America, Cenozoic and Recent", Paleo. Amer. 1927.

Stewart, Ralph B. " Gabb's Calif. Cretaceous and Tertiary Type Lamellibran-chs" Spec. Pub. #3, Acad. Nat. Sci. Phila., 1930.

Grant and Gale, Mem. San Diego Soc. Nat. Hist. vol. 1, 1931.

Jukes-Browne, A.J. published a series of articles in the Proc. Malac. Soc. London vols. 9,10,11.

Frizzell, Don L. Trans. San Diego Soc. Nat. Hist. vol. VI, no. 21, 1931.

Cottonand Godfrey " The Molluscs of South Australia", 1938

Dall, Bartsch, Rehder " Marine Molls. of Hawaii, Bernice P. Bishop Museum, Bulletin 153, 1938.

It is quite obvious that a detailed discussion of the various classifi-cations of this family would become a thesis of a size impossible in our discussions. It is therefore suggested that we follow Dall unless the evid-ence against such usage is too preponderant. Some of Dall's nomenclature will have to be changed.

Genus Dosinia Scopoli, 1777. Type (by monotypy), Chama dosin Adanson -- Dosinia africana Hanley.

" Shell prbicular, generally compressed, with a long and strong liga-ment seated in a groove and enfolding a heavy resilium; lunule small, im-pressed; escutcheon narrow, nearly linear, or absent; hinge plate broad and thick; right valve with two anterior laterals and four cardinals but the posterior cardinal , being extremely thin, is often broken off, eroded, or obsolete; left valve with one anterior lateral and three cardinals; valve margins smooth; pallial sinus rather long and usually acute; sculpture gen-erally of elegantly concentric grooves and interspaces, sometimes raised into lamellae at the borders of the lunule and escutcheon, crossed rarely with weak radial threads; colouration rarely disposed in patterns, and usually pale, many species being white; periostracum nearly always thin and polished" (Cotton and Godfrey, 1938).

Subgenus Dosinidia Dall, 1902. Type , Venus concentrica Born.

" Valves suborbicular, more or less compressed, white, with a sculpture of concentric grooving, the interspaces never lamellose; furbished with an obvious periostracum; lunule small, impressed; escutcheon absent: pallial sinus ample, ascending, angular in front; middle cardinals broad, sulcate or bifid, anterior lateral small, feeble, smooth" (Dall, 1903).

Dr. Dall placed all of our Recent Central American and West Indian species in this subgenus, or section in his usage.

Dosinia (Dosinidia) ponderosa Gray, 1838. " San Diego, Calif. and south to Payta, Peru" (Dall, 1921). Orcutt listed it from San Pedro south.

Practically all faunal lists place the northern end of the range of this species at San Diego. Of course, it is a common species in the Pleist-ocene deposits, but I have never seen a Recent specimen said to have been collected near San Diego, much less San Pedro. The California record is open to such question as to be disputed unless verified.

Genus Tivela Link, 1807. Type (by subsequent desig. Dall, 1902), Venus corbicula Gmelin (V. mactroides Born).

" Shell porcellanous, smooth, sometimes heavy, trigonal, with prominent beaks and short but stout ligament; hinge with three radiating cardinals in each valve, an anterior lateral in the left valve and a corresponding socket in the right valve, but the teeth variable, sometimes with accessories; pallial sinus distinct, short or long."

Subgenus Pachydesma Conrad, 1854. Type, Donax stultorum Mawe.

" Shell very large and ponderous, with smooth interior margins and a thick vernicose periostracum; hinge with four cardinals in each valve" (Dall

Tivela (Pachydesma) stultorum Mawe, 1823. " Half Moon Bay, San Mateo Co., California to Lower California " (Grant and Gale, 1931).

The older lists used the name crassatelloides. Stearns, R.E.C. in 1899 published a paper " Notes on Cytherea (Tivela) crassatelloides Conrad, with Descriptions of Many Varieties", And Dr. Stearns certainly meant it. He des-cribed 16 varieties in this one paper. They were all based on color or other minor variations.

Collecting data: Few of us but have enjoyed fried Pismo Clams in many localities. We find them in shallow water in open surf, never in stagnant lagoons. It is odd that this species seems to be found in certain sections so much larger and finer than in others. They are large and common enough to be of commercial importance in San Luis Obispo County, Oceano, Pismo on up past Morro Bay. From there south while an occasional specimen may appear it is not really common again until we reach Todos Santos Bay. (Burch).

Genus Transennella Dall, 1883. Type (by monotypy), T. conradina Dall.

" Shell small, having the general form and coloration of Tivela, but a hinge with three cardinals in each valve, the middle left cardinal bifid, and an elongateleft lateral received into a socket in the opposite valve; the hinge has no rugosities, the lumule but not the escutcheon is definad internal margins sharply tangentially grooved with numerous sulci; the pallial sinus angular, free, obliquely ascending" (Dall).

This genus differs from Psephidea in the presence of an anterior lateral tooth in the left valve.

Transennella tantilla (Gould), 1852. " Sitka Harbor, Alaska and south to Lower California" (Dall). Type locality, Pliocene of Kettleman Hills, Calif.

Specimens of this species are white with splotches of brown on the posterior portion of the shell.

Collecting data: Dredged in great abundance off Monterey, Calif. on shale bottom in 10-20 fms., collected littoral at San Simeon, Calif., Cauyocos specimens taken from the backs of Haliotis rufescens brought into the market at Morro Bay, San Luis Obispo Co., also taken in Morro Bay proper, and not uncommon all down the coast to El Morro Point, Ensenada, Mexico(Burch); Santa Cruz, Catalina and San Martin Islands (G. Willett);

Genus Amiantis Carpenter, 1863. Type (by monotypy), Cytherea callosa Conrad.

" Shell large, solid, ovate, concentrically waved, with vernicose

periostracum; lunule and a linear escutcheon defined by an impressed line; inner margins smooth; pallial sinus ample, acute in front, free below, sligh--tly ascending; three cardinals in each valve, the anterior one very thin, anterior laterals large and strong." (Dall, 1903).

The name Amiantis has been the source of a great deal of discussion. It was originally described as a subgenus. Dr. Joshua L. Baily Jr. (Per. Comm. Nov. 1944) states the opposition very well as follows: " The subgenus Amiantis I do not think to be worthy of generic rank. It was formerly in--cluded under the genera Cytherea or Callista. Certain nomenclatorial artists have put these two names on the index expurgatorius, so that it becomes a matter of expediency to raise the subgenera under them to the rank of genera. The case of Humilaria is somewhat parallel, but not exactly. The systematic position of this group seems to be uncertain and until we know more about it, it seems wiser to make a genus of it than not."

Amiantis callosa (Conrad) ,1837 " Santa Monica, Calif. (Weymouth) to Gulf of Tehuantepec, Mexico" (Grant and Gale, 1931). Dall gave the range San Pedro south.

Collecting data: The habitat is just below the low tide line on sandy bottoms in the open surf. There have been several efforts to plant this sp--ecies in the bays without success. Sam of Anaheim Bay planted great numbers of them. They all died very soon.

Dredged off Santa Monica, Calif., also at Malaga Cove, in shallow water not over 7 to 10 fathoms. Very abundant along the stretch of beach between Seal Beach and Huntington Beach, Calif. being washed in alive by the thous--ands after storms. The same condition exists along the beach south of Ensen--ada, Mexico (Burch).

Genus Pitar Romer, 1857. Type (by monotypy), Venus tumens Gmelin.

" Shell subtrigonal or ovate, convex, solid, smooth or concentrically sulcate or waved; pallial sinus ample, deep, reaching the middle of the shell, moderately ascending; hinge with a well developed anterior lateral , the pos--terior cardinals often grooved; lunule not deeply impressed, bounded by an incised line, escutcheon not limited or well defined ; internal margins smooth. (Dall, 1903).

Dr. Dall renamed this species Pitaria in 1902 on the grounds that Pitar is a vernacular African word and not entitled to be used without Latinization. Quite a lot of ink has been wasted in argument about this, and it has been generally rejected and Pitar as originally proposed accepted. The storm was briefly about the rules stated as follows " The scientific names of animals must be words which are either Latin or Latinized, or considered and treated as such in case they are not of classic origin" Art. 3, Int. Rules Zool. Nom. Ralph B. Stewart and most other writers feel that the name Pitar while not Latin or Latinized comes under the " considered and treated as such" part of the rule.

Pitar newcombianus (Gabb), 1865. " Monterey, Calif. to the Gulf of Calif. and Clarion Island " (Dall). Type locality, Catalina Island, Calif. in 120 fms.

Collecting data: Catalina Island, in 30 fms. and South Coronado Island in 15 fms. (G. Willett); dredged off Catalina Island, in 35 fms. 8/1937(Burch

Pitar ida Tegland, 1928. (Nautilus, vol. 42, no. 1, pp 4-5, July, 1928) Type locality, Sitka, Alaska. The shell was originally identified as Marcia oregonensis.

In the preliminary discussions of this group the following query was made by John Burch with an amusing conflict of opinions on the matter. " Will one of our Latin scholars give this matter a thought, and please advise me. I find Pitaria newcombiana which I am changing back to Pitar and note that Grant and Gale have Pitar newcombianus. And ida was described as Pitaria ida. What happens to ida if anything?" But my Latin scholars failed to agree

Dr. Joshua L. Baily Jr. comments " You ask some Latin scholar to enlighten you as to the gender of the name Pitar. Unfortunately the name is not Latin, nor is it Greek. I believe it is Hottentot. Anyway authorities are disagreed as to whether the specific name should be in the masculine or the feminine form. The specific name ida suggests that this species was named after Mrs. Oldroyd, and since there is no doubt as to her gender, I would suggest not altering it". George Willett very briefly " Let it stand". But Dr. A. Myra Keen states " Pitar ida should be emended to Pitar idae, since Tegland states it is named for Ida Oldroyd.".

Genus Antigona Schumacher, 1817. Type (by monotypy), Antigona lamellaria Schumacher.

" Shell similar to that of Chione, but with a small part of the anterior cardinal in the left valve separated off into a pseudolateral, and a corresponding pit in the right valve" (Grant and Gale).

Subgenus Ventricola Roemer, 1857. Type, Venus rugosa Gmelin.

" Shell large with strong, distant, evenly spaced concentric lamellae, between which are smaller concentric threads; pallial sinus small, angular, lunule deeply impressed; right part of the escutcheon obsolete" (Dall,1902).

Antigona (Ventricola) fordi (Yates) , 1890. " Monterey, Calif. to Lower California. Panama? " (Dall). Type locality, Santa Barbara, Calif.

Collecting data: Dredged off Catalina Island in 25 fms., off San Pedro in 20 fms. sand bottom (G. Willett); dredged off Monterey, Calif. in 40 fms. and also in 20 fms. shale 8/1940, abundant off Redondo Beach, Calif. in 20 to 30 fms. sand bottom/. In the Redondo Beach dredgings the species seems to prefer the coarse red sand although occasional specimens came up from the gravel. We failed to find it in any of the deeper dredgings. Dredged in 25 fms. off Avalon, Catalina Island, off Point Loma, San Diego Co. Occasional specimens a re thrown up on t he beaches after storms but the habitat is obviously in several fathoms off shore. (Burch); reported from Point Loma, San Diego Co. by Mr. W.K. Emerson.

Genus Saxidomus Conrad, 1837. Type (by monotypy), Saxidomus nuttalli Conrad

" Shell equivalve, gaping posteriorly; hinge with from four to five compressed cardinal teeth in the right valve; in the left valve, four; muscular impressions two, large, rounded; pallial impression with a profound sinus"

Saxidomus nuttalli Conrad, 1837. " Humboldt Bay, Calif. to Lower Calif., San Martin Island (Baker) (Grant and Gale, 1931). Type locality, San Diego (Oldroyd.

The specific name nuttalli is the correct spelling according to Dr. Myra Keen and not the nuttallii of Dall, Bull. 112, Oldroyd etc.

Collecting data: Our experience has been that the normal habitat of the adult of this species is several fathoms off shore although good specimens are frequently thrown up on shore. We have dredged it as deep as 25 fathoms off Redondo Beach, 10-20 fms. off Monterey, Calif. An interesting feature of this species is that the young are often striped and are colored black on the posterior third of the shell. This coloration evidently dissapears with age. When taking the first juveniles of this species the collector is almost certain to think that he has something different. Mr. W.J. Eyerdam recently sent us for study a striped specimen of the northern species gigan-teus which he had taken in Puget Sound, Port Orchard I believe. Immature specimens are common enough in the sloughs. A large colony inside Newport Bay on the landward side seems to produce specimens about half the normal adult size or is it possible that the food supply and environment of the open water simply develops larger specimens ? (Burch).

Saxidomus giganteus Deshayes, 1839. " Aleutian Islands from Attu eastward and south to Monterey, California" (Dall, 1921). Type locality, "Californie"

In the discussion of this species John Burch made the following state-ment which did not meet with the approval of the majority, " Grant and Gale, 1931 make this species a subspecies of nuttalli. In my opinion this is good proceedure. While it is possible to separate the extremes with ease it is also true that certain specimens from Puget Sound and northward, especially immature specimens , if mixed with a lot of southern nuttalli would be impossible to separate again. Therefore subject to correction I propose that the name S. nuttalli giganteus (Deshayes) be used." However, we will retain the two specific names, accepting Mr. George Willett's advice which is " I have not seen adults that intergrade."

Collecting data: Collected by W.J. Eyerdam at many stations in Puget Sound, Alaska and the Aleutian Islands. It is our most common and best food clam. Specimens taken from Raspberry Strait, Raspberry Island, Alaska have a reddish brown stained shell, probably due to inorganic matter in the mud. The two largest shells in my collection are:
No. 2584.. length .. 110 mm.. width 90 mm.. Seldovia, Alaska
No. 2157.. length .. 120 mm.. width.. 100 mm.. Mud Bay, Thurston Co., Wash.

Saxidomus giganteus brevis Dall, 1916. " Admiralty Island, Alaska, to Tacoma Wash." (Dall). Type locality, Mole Harbor, Admiralty Islands.
" New variety brevis. Shell short, subtriangular, small in comparison with type and much less elongated. Length , 60; height, 50; diameter 33 mm" (Dall)

Collecting data: We have specimens labelled brevis from the north given us I think by Dr. Fred Baker. They seem to be of slightly different outline but still very obviously the species. My vote is to abandon brevis to the synonymy." (Burch). O.K. (George Willett).

Genus Chione Megerle von Muhlfeld, 1811. Type (by subsequent designation, Gray, 1847) Venus dydera Chemnitz ** Venus cancellata Linnaeus.

Grant and Gale, 1931 reduce Chione to a subgenus of Venus and on pp 317-18 make some very interesting comparisons of Venus verrucossa L. (type of Venus) and V. cancellata. It must be admitted that with the two shells in hand, Grant and Gale make rather a good case. In the discussion of the above statement Mr. George Willett commented " I think so too.". However, Dr. A. Myra Keen stated " I believe Frizzell's work on the Veneracea will stand the test of time better than that of Grant and Gale. Notice his dis-cussion on p. 65 with regard to the relationships of Chione and Venus."

We will therefore stay with Chione until more evidence is presented.

Chione fluctifraga (Sowerby), 1853. " San Pedro, Calif. to the Gulf of California" (Dall). The type locality of this species is stated as Austr-alia even though obviously illogical. Dr. A. Myra Keen advises on this matter " The stated type locality of Chione fluctifraga (Sowerby) is Austr-alia , which either is an error or subsequent revisers have misidentified the West Coast form with Sowerby's figures."

Collecting data: This is not the common species in Anaheim and Newport Bays, Calif. but neither is it rare. Undatella in our experience is the com-mon form. However, in the Estero below Ensenada, Mexico, fluctifraga seems to be the predominant species and attains a greater size than any of the genus I have ever collected in this section. (Burch).

Chione undatella(Sowerby), 1835. " San Pedro, Calif. and south to Guayaquil" (Dall). Mugu, Ventura Co. (Burch) Type locality, Gulf of California.

Collecting data: The inlet at Mugu, Ventura Co., dredged in 10- to 25 fms. off Redondo Beach, and abundant in all sloughs southward such as Anaheim, Alamitos, Newport Bay, Mission etc. to the Estero south of Ensenada.

Chione californiensis (Broderip), 1835. (C. succinta Valenciennes). " Mugu, Calif. to Panama" (Dall).

Collecting data: Mugu, Ventura Co., dredged in 15-25 fms. off Redondo Beach, off Avalon, Catalina Island, and common in the sloughs as well as the beaches down the coast to Ensenada in our experience (Burch).

Discussion- Dr. A. Myra Keen (per. comm. Nov. 1944) states " Chione succ--incta (Valenciennes), 1832, which was described as a Venus , is a primary homonym of Venus succincta Linne, 1771. The next available synonym is Chione californiensis (Broderip) . I have checked this matter very carefully. The Venus succincta Linne is not our West Coast shell." We have accepted the advice of Dr. Keen on this problem.

Grant and Gale, 1931 place undatella in the synonymy of C. succincta , the species we are calling californiensis. In discussing this matter John Burch stated " It is my opinion that the two species can be definitely dis--tinguished not only by the coarser and more distant sculpture of californ--iensis but also the habit of californiensis as Dall states " the ribs of the middle of the lower half of the disk generally are thickened and flattened, showing a polished surface which nearly covers the interspaces" . Mr. George Willett comments " To me , succincta and fluctifraga are more alike than are the former and undatella."

Genus Venus Linnaeus, 1758. Type (by subsequent designation Gray, 1847), Venus verrucossa Linnaeus.

The type of the genus Venus has been the subject of extensive debate . Dall used Venus with type V. mercenaria L. However, the statement above seems to be very generally accepted at this time.

Dr. Joshua L. Baily Jr. (Per. Comm. Nov. 1944) comments " Stewart designated Venus verrucosa as the type of this genus, but he acknowledged that there was an earlier designation, of Venus dione. His reason for not recognizing this earlier designation was that it would cause too much con--fusion if the shift of names was made. It seems to me that this argument would apply equally well to Venus verrucosa, and that it would be better to use Venus mercenaria for the type. The objection to this course of action is that nobody else would agree with me.

I think Grant and Gale are quite right in making Chione a subgenus of Venus."

Subgenus Mercenaria Schumacher, 1817. Type (by monotypy), Mercenaria vic--lacea Schumacher -- Venus mercenaria Linnaeus.

" Shell large, heavy; radial sculpture absent, concentric sculpture of fine growth lamellae or striae."

Venus (Mercenaria) kennicottii Dall, 1871. " Neah Bay, Washington, to Little River, Mendocino County, Calif." (Dall, 1921).

Grant and Gale, 1931 state " V. kennicottii Dall from Washington is so similar to the Atlantic V. mercenaria that the two are very difficult to distinguish; and the fact that it is very rare suggests that it may have been founded on adventitous specimens of the latter".

Genus Humilaria Grant and Gale, 1931. Type (by original designation) Venus kennerlyi Carpenter in Reeve, 1863.

" Shell rather large, ovate-quadrate, flattened, beaks anterior; sculp--tured with fine concentric lines and periodic sharp lamellae but no radial sculpture; pallial sinus rather short, angular, but abruptly rounded at apex; anterior extremity of hinge buttressed just above the anterior adductor scar; valve margins crenulated or smooth." (Grant and Gale, 1931).

Dr. A. Myra Keen (Per. Comm. Nov. 1944) advises " I still feel that Humil--aria is a good genus. The only very closely related group, so far as I can discover from a study of our collection, is Samarangia Dall. Would it make anybody happier to write it Samarangia (Humilaria) kennerleyi ? "

Note- Dall placed kennerleyi under the genus Marcia H. and A. Adams, 1857. Ralph B. Stewart (Spec. Pub. #3, A.N.S.P.) p. 221 seems to have been the first to discuss the confusion of types of Marcia. His conclusions were followed by Grant and Gale, 1931, p. 325. However, Grant and Gale accept Venerupis for the entire group and described Humilaria as a subgenus of Venerupis. But Venerupis s.s. seems to be such a distinctly different thing that it is difficult to consider kennerleyi in the same genus. We will, therefore follow Dr. Keen in giving Humilaria generic value.

Humilaria kennerleyi Carpenter in Reeve, 1863. " Kodiak Island, Alaska, to Carmel Bay, California " (Dall, 1921). Type locality, Puget Sound.

Collecting data: Prince William Sound, Alaska, 18 fms. (Lewis); Ketchi--kan, Forrester Island, 20 fms., Craig from low tide to 20 fms. (G. Willett); shore specimens are much smoother than dredged ones (G. Willett); Izhut Bay, Afognak Id., Sitkalidak Island, Alaska 1922 and 1931.. San Juan Id. 1920.. dredged in sandy mud by W.J. Eyerdam; growing shells from mud bottom have sharp, deep grooved furrows, while some of the older fully grown shells with ridges ground off are easily mistaken for Saxidomus giganteus except for the crenulated margins of the inside of the shells.. this species lives apparently on the surface of the bottom below the lowest tide mark. (W.J. Eyerdam); dredged in shallow water off Monterey, Calif. 8/1940 (Burch).

Genus Compsomyax Stewart, 1930. Type (by original designation), Saxidomus gibbosus Gabb -- V. subdiaphana (Carpenter).

Dall placed subdiaphana in the genus Marcia and under Section Venerella Cossmann. Ralph B. Stewart, 1930, described Compsomyax as a new subgenus of Venerella Cossmann which he raised to generic standing there. Grant and Gale, 1931, accept Stewart's Compsomyax but place it as subgenus under the genus Clementia Gray, 1842. Dr. A. Myra Keen in her " Abridged Check List " again simplifies the matter by simply raising Stewart's Compsomyax to generic standing. The question seems to come to a question of whether or not that bifid right posterior cardinal is sufficient to establish a distinct genus.

Compsomyax subdiaphana Carpenter, 1864. " Sannakh Islands, Alaska to Santa Barbara Islands, Calif. and San Pedro " (Oldroyd) extended here to Todos Santos Bay, Lower California 7/4/38 (Burch). Type locality, Puget Sound.

Collecting data: Dredged in 10 fms. off Monterey, Calif. 8/37, off San Pedro, Calif. 5 to 25 fms., abundant off Redondo Beach in 1-25 fms. and off Ensenada, Lower Calif., Mexico in 20 to 50 fms. (Burch); Prince William Sound, Alaska, 18 fms. (Lewis); Craig, Ketchikan, Alaska in 10-20 fms. mud and off San Pedro, Calif. in 8 fms. mud (G. Willett); Drier Bay, Knight Island, Alaska, dreged in soft mud, 1923 and Victoria, B.C. and dredged off San Juan Islands, Puget Sound (W.J. Eyerdam); common in many southern California Pleistocene deposits.

Genus Protothaca Dall, 1902. Type (by original designation), Chama thaca Molina.

" Shell with the hinge of Paphia and of Venerupis s.s., but with a shorter, more ventricose shape, with more uniform concentric sculpture, and equally strong radial ribs."

Protothaca was described by Dall as a subgenus of Paphia Bolten, 1798.

Stewart, 1930 , followed by Grant and Gale, 1931 used Protothaca as a sub--genus of Venerupis.

Mr. George Willett comments " I think Protothaca is genus". Dr. A. Myra Keen in " Abridged Check List" uses Protothaca as a genus, and (Per. Comm. Nov. 1944) states " I still beat the drum for Protothaca. Paphia roding is a vastly different thing." Dr. Keen also kindly sent us an abstract of some of the work of Don L. Frizzell, Bivalves of the Genus Protothaca", (Abstract; Proc. Geol. Soc. America for 1934(1935), p. 387-388.

" The genotype of the genus Protothaca Dall 1902 (generally known as Tapes or Paphia) is Chama thaca Molina. The subgenus Callithaca Dall 1902 (type: Tapes tenerrima Carpenter) is tentatively considered a synonym of Proto--thaca, sensu stricto. The subgenera Rhomalea Jukes-Brown 1914 (type: Venus rufa Lamarck) and Tuangia Marwick (type: Venus crassacosta Deshayes) may prove desirable and are tentatively accepted. Twenty five fossil and Recent species are now known to belong to the genus Protothaca , all (with one possible exception in the Caribbean) are distributed around the Pacific Ocean. The genus is thought to have originated on the west side of South America in the Eocene. Species occur in the middle Miocene of the west coast of North America and in the Pliocene of Japan. One species lives in the Philippine Islands * and in New Zealand, also occuring in the Pleistocene of the latter locality. The conclusion seems justified that migration of the genus was northward along the coast of South and North America, by way of the Aleutian Islands of Japan, eventually reaching New Zealand. No evid--ence has been found to support the alternative theory of a south polar migration. Since the genus is essentailly littoral, this migration implies land or island chain connections along the route during some of the time when migration took place" . * Note by M. Keen : " Frizzell later found that the Philippine Island record was in error, the result of a wrongly written label in one of the collections he had studied."

" Don Frizzell made an extensive study of Protothaca which was incorpor--ated in his Doctoral thesis. He recognized as valid species only tenerimma, staminea, laciniata, and restorationensis from our section of the coast. Thus, ruderata, petitii, orbella, and spatiosa may all be regarded as ecol--ogic forms, not as valid varieties."

Protothaca tenerrima (Carpenter),1856. " Vancouver, B.C. to Cape San Lucas, Lower Calif" (Keen " Abridged Check List" lat 23-49.

Dall placed this species in section Callithaca Dall, 1902. Grant and Gale, 1931 say of Callithaca " This subgenus is like the subgenus Humilaria in its shape and concentric sculpture, but it is like Protothaca in its pallial sinus and non-crenulated inner margins. It has a much more flattened shell and less conspicuous radial sculpture than Protothaca." However, our disposition is to abandon the use of Callithaca and consider all of our species as in Protothaca s.s.

This species is another of those puzzles described with a type locality Panama.

Collecting data: Tacoma, Wash. (G. Willett); fine living specimens in upper Morro Bay, San Luis Obispo Co., Calif. Jan. 1937, dredged off Redondo Beach, Calif. as deep as 25 fms., often washed in on the beaches from Sea Beach to Huntington Beach (Burch); Mud Bay, Thurston Co.,Port Madison, Kitsap Co., Friday Harbor, San Juan Id., Puget Sound (W.J. Eyer--dam); this species probably occurs on many beaches of the Puget Sound region but seems to be quite uncommon. I have only found a few specimens and have never seen them in the local markets.(W.J. Eyerdam).

Protothaca restorationensis (Frizzell), 1930 Nautilus, Vol. 43, 1930, p. 120;Trans. San Diego Soc. Nat. Hist. Vol. VI, No. 21, pp 319-324,pl.22.

Puget Sound (Frizzell) to Half Moon,Bay, Calif. (M. Keen). Type locality, Recent, Little Beef Harbor, near Seabeck, Wash. Holotype from Upper Pleistocene of Restoration Point, near Blakely, Wash.

This species is said by Frizzell to be intermediate between Protothaca staminea and tenerrima. The original description follows: " Shell large and heavy, subquadrate, convex; surface sculptured by numerous rather fine but conspicuous radiating lines and a few raised , irregular, discontinuous con--centric lines, the former markedly wider at both anterior and posterior ends, the latter high and most prominent on the anterior part of the shell; a very thin epidermis seems to have been present, although almost completely eroded on type; no lunule present; inner margins smooth; hinge long, rather narrow, greatly arched; three teeth in each valve, the posterior two in the right valve and the middle one in the left valve bifid; pallial sinus long, narrow and rounded. Length 96.7, height 74.3, thickness 45.3 mm."

Collecting data: Specimen which Frizzell identified as the species from Half Moon Bay (lat 38) (M. Keen); specimens taken from type locality in Jan. 1922 and 1931, Restoration Point, Bainbridge Island, Kitsap Co., Wash by W.J. Eyerdam Pleistocene- Recent living specimens seem to be quite rare (W.J. Eyerdam).

Protothaca staminea (Conrad), 1837. " Aleutian Islands south to Kamtchatka and northern Japan and to San Quintin Bay, Lower Calif.and Soccorro Island" (Grant and Gale, 1931). Dr. A. Myra Keen " Abridged Check List" gives lat. 23-73 which would take the northern range on up to the Arctic Ocean.

In regard to the subspecies ruderata, orbella and spatiosa while we will list them below with some discussion, it is our opinion that they are not good subspecies and should be abandoned to the synonymy of the typical. We shall omit them from our final list of species. Laciniata was listed by Dall as a subspecies of staminea but it is our opinion that it is a distinct species. See our note under petitii.

Protothaca staminea ruderata(Deshayes) 1853. " Southern Bering Sea to Lobitas, Calif." (Dall, 1921). " Status questionable" (G. Willett). Grant and Gale, 1931 say of this named variety " This variety is of consid--erable interest as it shows a transitional step toward Irus. However, the radial riblets , which tend to occur in pairs, have a Chione aspect. It is an inhabitant of holes in rocks". Walter J. Eyerdam reports taking it in soft shale at Port Orchard and Alki Pt., Seattle, Wash. but agrees with the consensus of opinion that it is merely an ecologic form and the name ruderata at best a mere convenience. We are abandoning this variety.

Protothaca staminea orbella (Carpenter), 1864. " Kodiak Island, Alaska to San Diego, Calif." (Dall, 1921). Again this form is the globular shape caused from confinement in pholad holes and is certainly not a true subspecies Eyerdam reports taking the form in many localities in Puget Sound.

Protothaca staminea spatiosa (Dall), 1916. " Puget Sound to Anaheim Bay, Calif." (Dall, 1921). As stated above this form is not distinctive and we propose to abandon the name. However, if it were of value we have taken specimens fitting the description exactly in many localities far to the south of the range given by Dall. This form is very abundant all the way south past San Diego.

Protothaca staminea petitii (Deshayes) 1839. " Aleutian Islands to San Quintin Bay, Lower Calif." (Dall, 1921). Type locality, Columbia River.

None of the members seem to be quite sure what this variety may be. Grant and Gale,1931 say" It may be necessary to substitute the varietal name petitii Deshayes for laciniata ". Deshayes name is the older name. However, Frizzell abandons it to the synonymy of staminea. Mr. George Willett says

" Dont know how this can be settled without seeing type or original illus--tration." However, subject to later correction we propose to abandon the name following Frizzell.

Protothaca laciniata Carpenter, 1864. " Unalaska, Alaska to San Diego, Calif. (Dall, 1921) extended to the Estero south of Ensenada, Mexico 10/1936(Burch). Type locality, Monterey or San Diego.

This reticulated form is easily distinguished and it is the opinion of the majority that it is a distinct species. It has strong ribs crossed by concentric ribs usually making it spinose.

Collecting data: While the published range seems to extend far to the north it seems that the collecting records are so largely from the south as to indicate that it is a southern species. Our experience has been to find it from Morro Bay, San Luis Obispo Co. south to Ensenada, Mexico. While not rare it is much less common than the abundant staminea. (Burch).

Protothaca grata (Say), 1831. This species was listed in Bulletin 112 by Dr. Dall because of a record from San Pedro by Williamson. However, it is the unanimous opinion of the members that any San Pedro record must have been based on some misidentification because grata is of the Gulf fauna. Typical of the opinions on this is Mr. George Willett's brief " Not Calif--ornian".

Genus Venerupis Lamarck, 1818. Type: Venus perforans Montagu (-- Venus pullastra Montagu) (by subsequent designation Children, 1823.)

" Shell of moderate size and thickness, ovate-quadrate in outline, sculp--tured with concentric lines or threads of variable strength and with strong or fine radial striations or ribs; hinge plate narrow, dentition like that of Paphia; pallial sinus of variable depth, ascending, rounded at apex" (Grant and Gale, 1931).

It is our opinion that Venerupis s.s. is not represented in our fauna.

Subgenus Ruditapes Chiamenti, 1900. Riv. Ital. Sci. Nat. vol.20, p.13. Type: Venus decussata Linnaeus (by monotypy).

" Shell of medium size, transversely broadly ovate, inflated, moderately stout, yellow or whitish, maculated with brown; umbones prominent, curved forward, halfway between the middle and the anterior end. The sculpture con--sists of radial ribs, strongest at the anterior and posterior ends, decuss--ated by weaker concentric lirations. Ligament external, sunken and situated on a rather broad nymph. The hinge consists of three rather short, prominent slightly diverging cardinals in each valve; the two anterior cardinals in the left valve and the two posterior cardinals in the right valve are some--what thicker and with a shallow cleft on top; no laterals. Interior white or pale salmon colored, sometimes tinged with purple. Ventral margin simple. Posterior muscle scar somewhat larger than anterior one; pallial line with a deep posterior sinus." Dall, Bartsch, Rehder (Molls. of Hawaii).

Venerupis (Ruditapes) philippinarum Adams and Reeve ,1850. Zoology Voy. H.M.S. Samarang, p. 79, pl. 32, fig. 10. This species indigineous to Japan has recently been introduced into Puget Sound with seed oysters from Japan and has bceome firmly established. The species seems to have been introduced into Hawaii also and is now established there.

In the discussions of this species the following opinion from Dr. A. Myra Keen is of interest (Per. Comm. Nov. 1944) " The name Ruditapes seems to be a synonym of Amygdala, which looks to me to be more closely related to Tapes than to Venerupis. However, this whole group of veneraceans is tough. Differences that to the layman are hardly noticeable seem to have a profound significance in the eyes of the specialist. Frizzell argued that that was because the superfamily represents the highest development of the pelecupods. Lack of crenulations on the interior margins and differences in lunule and escutcheon rule philippinarum out of Protothaca I believe"

Under the discussion of this species no doubt we should mention Paphia bif-urcata Quayle, 1938 (D.B. Quayle, Jour. Fisheries Research Board of Canada, vol. 4, no. 1.). In Nautilus, vol. 52, no. 4, 1939, pp. 139-40, Quayle synonymizes this with V. philippinarum.

Collecting data: Kitsap Co., Puget Sound, Wash. in 1943 and being sold in Seattle fish markets.(W.J. Eyerdam); also reported originally by Professor Trevor Kincaid ; Ladysmith Harbor (Quayle).

Genus Irus Oken, 1815. Type (by absolute tautonomy) Donax irus Linnaeus.

" Shell of small or medium size and thickness; sculptured with period-ically elevated concentric lamellae, and on the early part of the shell fine radial striations; hinge similar to the hinges of Paphia and Venerupis except that the hinge plate is narrower and the teeth usually small and degenerate." (Grant and Gale, 1931).

Dall placed our species lamellifera under the genus Venerupis following a host of other authors before and since. A number of us find this group a little puzzling. The Chaces have a mount in their collection which they call their puzzle set in which you are invited to try to separate the Irus from the Protothaca. Grant and Gale recognize this close relationship with the following comment " This genus appears to be a specialized derivative of Venerupis, modified in characters by the burrowing habitof the animal. It lives in holes burrowed pholad fashion into soft mudstones, and like Petricola may take almost any shape according to the varrying hardness of the surrounding material. The variety ruderata of V. staminea is an indpp-endent adaptation of a related venerid to similar conditions and shows how close the relation is between Irus and Venerupis (Protothaca)."

However, Dr. A. Myra Keen gives the key to the distinction (Per. Comm. Nov. 1944) " Does Irus lamellifer show internal marginal crenulations ? If not, that alone would rule it out of Protothaca."

Irus lamellifer (Conrad), 1837. " Monterey to San Diego, Calif." (Dall,1921 Type locality, Monterey, Calif. San Diego ?

Collecting data: San Pedro, Calif. in 15-20 fms. (G. Willett); dredged in shale off Monterey in 10-20 fms., taken littoral from stones at Cauyocos, Calif. Jan/1938, Shell Beach below Pismo, Calif. (Burch).

Genus Liocyma Dall, 1870. Type (by original designation), Venus fluctuosa Gould.

" Shell trigonal or elongate-ovate, small, thin, smooth; furnished with concentric undulations and occasionally fine radiating lines; provided with a polished epidermis; pallial sinus small, rounded triangular; hinge teeth three in each valve, divaricate; middle tooth largest, grooved on the upper edge. Lunule faint, no areola ligament set in below the exterior sur-face" (Dall).

Liocyma beckii Dall, 1870. " Plover Bay to North Japan, on the east to Port Althorp, Alaska" (Dall,1921). Type locality, Plover Bay, East Siberia.

Liocyma scammoni Dall, 1871. " Port Simpson, British Columbia" (Dall).

Liocyma viridis Dall, 1871. " Arctic Sea southward to North Japan, and on the east to the Kodiak Islands, Alaska" (Dall,1921). Type locality,Arctic Ocean.

Collecting data: Punuk Id., Bering Sea in 15 fms., and Prince William Sound in 18 fms. (Lewis); Izhut Bay, Afognak Id., dredged in 10 fms. sandy bottom (W.J. Eyerdam, 1922); Hinchinbrook Island, dredged (I. Norberg) (Eyerdam).

Liocyma schefferi Bartsch and Rehder, 1939. Nautilus, vol. 52, no. 4, p. 111, April, 1939. Described from specimens taken in 10 fms. off Chuginadak Id. Aleutians. In Nautilus vol. 57, no. 4, p. 143, Walter J. E Eyerdam extends the range 250 miles westward to Atka Id., Aleutians. Eyerdam also reports

the species from Wislow, Unalaska Island on sandy bottom.

The authors state that this species is close to L. viridis " .. but the sculpture is weaker, the concentric ridges being fewer and more distantly separated. The shell is also broader and the umbones seem to be generally more centrally located." The figures in the Nautilus 52(4), Pl.8 are very clear and complete.

Genus Gemma Deshayes, 1853. Type, Venus gemma Totten.

" Shell rounded, subtriangular, subequilateral, smooth, margins crenulated within; hinge short and narrow; three teeth in the left valve, the middle one conical arcuated; two divergent teeth and an intermediate pit in the right valve; pallial impression marginal, with a narrow deep sinus."(Tryon)

Gemma gemma Totten, 1834. " San Juan Islands to San Francisco Bay. Introd--uced from the Atlantic with seed oysters. (San Diego ?)" (Dall, 1921).

Collecting data: This species is said to be established in San Francis co Bay. Mr. George Willett reports it from Oakland, Calif.

Genus Psephidia Dall, 1902. Type(by designation Dall, 1902), Psephis lordi (Baird).

" Shell small, veneriform, polished, with only concentric sculpture if any; beaks not prominent, valves inequilateral, with a narrow, feebly defined lunule and no escutcheon; surface feebly concentrically striate or smooth, with a polished periostracum; inner margins not crenate; pallial sinus ang--ular , well defined; hinge with three delicate cardinal teeth in each valve, with no lateral teeth; dorsal margins outside the hinge plate, faintly grooved. " (Dall, 1903).

Psephidia lordi (Baird), 1863. " Unalaska, Alaska to Coronado Island" (Dall) Type locality, Esquimault Harbor, Vancouver Island, British Columbia.

Collecting data: S.E. Alaska, comm. 20-30 fms., and off Catalina Island in 30 fms. .. 1 specimen (G. Willett); off Friday Harbor, Wash. (T. Kincaid) Izhut Bay, Afignak Id. and Drier Bay, Knight Island, Alaska and also the San Juan Islands (W.J. Eyerdam).

Psephidia ovalis Dall, 1902. " St. Paul Island, Bering Sea to San Diego, Calif." (Dall). Type locality, north side of Catalina Island, Calif.

Grant and Gale, 1931 make this a subspecies of lordi Baird. However, the consensus of opinion may be stated in one of Mr. George Willett's terse comments " Two species". The two seem to be easily separable. However, Mr. Willett also adds the following note " Would like to see northern records confirmed; have only found it in California".

Collecting data: Dredged in great abundance off Redondo Beach and also off Catalina Island (Burch). Eyerdam reports from Hinchinbrook Id., Alaska.

Psephidia cymata Dall,1913. " Santa Barbara Islands to the Gulf of Calif." (Dall). Type locality, near Cerros Island, Lower California.

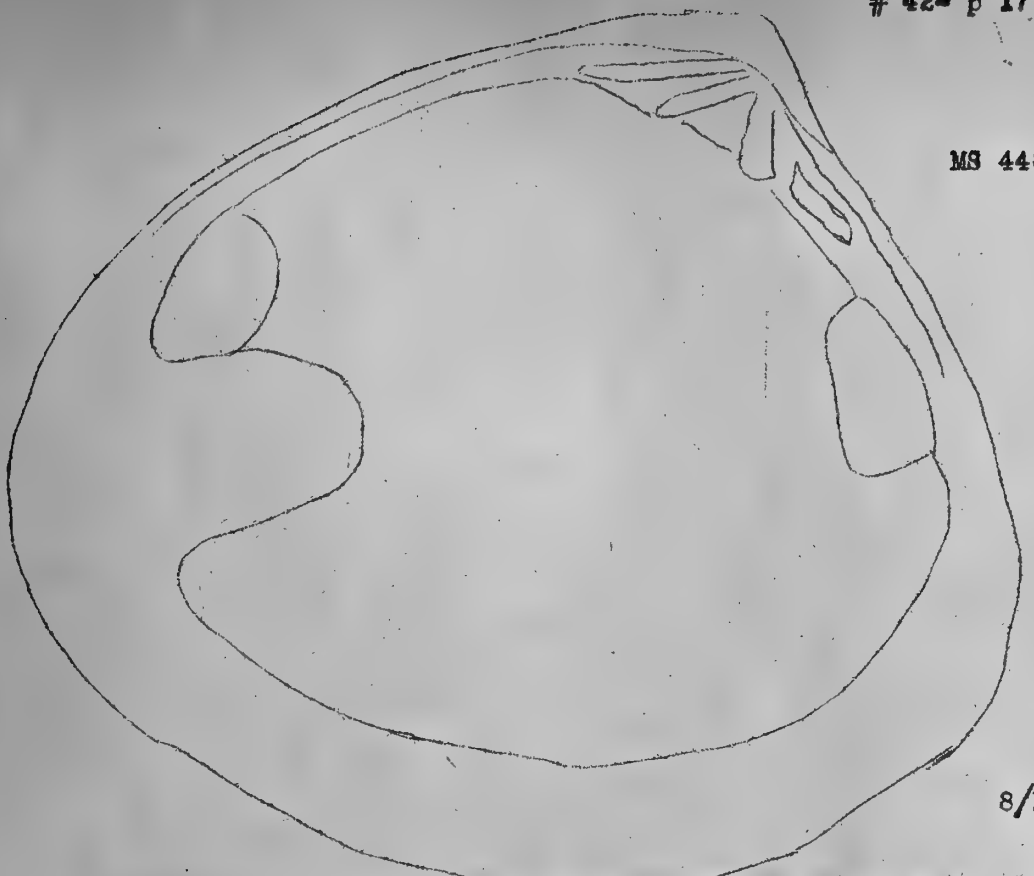
Collecting data: We have this species from the Pleistocene of Timm's Point, San Pedro, but have never recognized it in any of our Recent material. (Burch). And none of the members report taking it.

Psephidia brunnea Dall, 1916. " Monterey, Calif. to San Ipolito Point, Lower Calif." (Dall). Type locality, Catalina Island, Calif.

Collecting data: This species is easily separated from other material of the same size and we have dredged it consistently off Redondo Beach in from 25 to 50 fms. and also off Catalina Island. However, it has been compar--atively rare in our experience in comparison with the exceedingly common ovalis.(Burch); Catalina Island in 30 fms. and off San Pedro in 20 fms. (G. Willett).

Psephidia salmonea(Carpenter), 1864. " Farralone Ids. to San Diego; also at San Martin Island, Lower Calif.(Baker) (Grant and Gale, 1931).

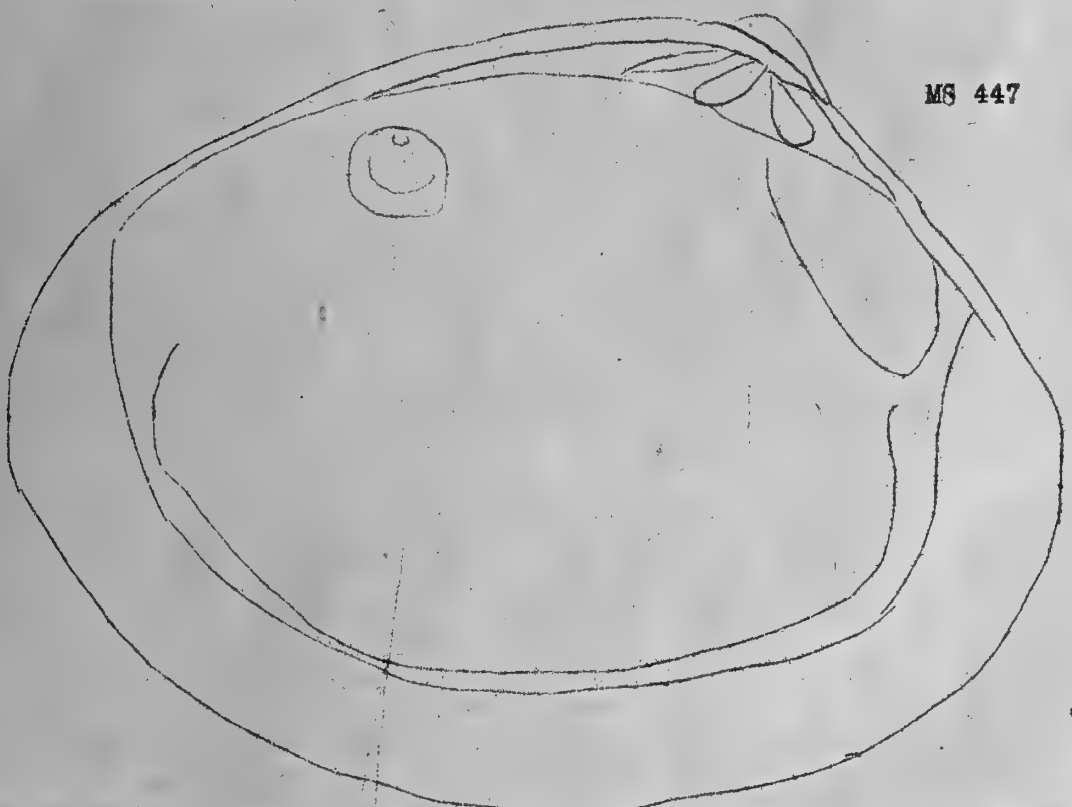
Collecting data: Dredged off Catalina Id. in 25 fms. (Burch).



MS 448

8/1940

Transennella tantilla (Gould),1852. Monterey, Calif. 20 fms. shale



MS 447

Psephidia ovalis Dall, 1902. Avalon, Catalina Island, 25 fms. 8/1937

Note: When this specimen was opened (dried spec.) about a dozen small round shells as shown above were inside. I assume that this genus is viv-

-iparous and that these are its young. These small shells varied quite a bit in their size and development. Also from the date of collection it is obvious that this species " spawns" during August- at least off Catal-ina. T. Burch

Family PETRICOLIDAE

" Valves, when not distorted, equal, free, somewhat gaping behind, radiately sculptured with plain margins and inconspicuous umbos; posterior adductor scar larger than the anterior, pedal narrow, elongated, distinct; ligament and resilium external; area obscure or not defined; hinge without lateral laminae, with two or three small, usually bifid, radial cardinal teeth in each valve." (Cotton and Godfrey, 1938).

Genus Petricola Lamarck, 1801

There has been a diversity of opinions regarding the type of this genus. Dr. A. Myra Keen (Personal Communication, Nov. 1944) advises " The type of Petricola is P. costata Lam. -- Venus lapicida Gmelin, fixed by Fleuriau-Bellevue, 1802, and also designated by Schmidt, 1818. Naronia Gray is a synonym. Rupellaria Fleuriau-Bellevue, 1802, of which the type by sub-sequent designation of Dall, 1900, is Petricola lithophaga (Retzius), seems to be a valid subgenus of Petricola, not a synonym as stated by those authors who take lithophaga as type of Petricola. I believe none of our species fit in Petricola s.s. which has zigzag sculpture; carditoides, tellimyalis, and californiensis would go in subgenus Rupellaria; pholadiformis etc. in subgenus Petricolaria."

Subgenus Petricolaria Stoliczka, 1870. Type (by subsequent designation Tryon, 1884), Petricola pholadiformis Lamarck.

" Shell elongated, pholadiform, thin; hinge-teeth protracted, slender; pallial sinus deep."

Petricola (Petricolaria) pholadiformis Lamarck, 1818. Willapa Harbor, Pacific County, Wash. (Kincaid-Eyerdam), and San Francisco Bay, introduced with seed oysters from the Atlantic.

Collecting data: In our Minutes #26, p. 2, Aug. 1943, we reported this species from Washington in an article by Walter J. Eyerdam. Dr. G. Dallas Hanna " Exotic Mollusca in California", Bull. Dept. Agric. vol. 28, no.5, May, 1939, reports this species from Lake Merritt, Oakland and also the mud flats between South San Francisco and Burlingame. The Burches found it in great numbers on the mud flats along the Bay Shore highway just north of San Mateo, Calif., Jan. 1938. An additional note from W.J. Eyerdam states " Native to the Atlantic coast of America from Prince Edward Island to the West Indies and Texas, also introduced into Europe. Reported by Hans Schlesch in 1932 as living in England and France on Dover Strait and in Belgium and Denmark."

Subgenus Rupellaria Fleuriau-Bellevue ,1802. Type(by subsequent designation Dall, 1900), Petricola lithophaga (Retzius).

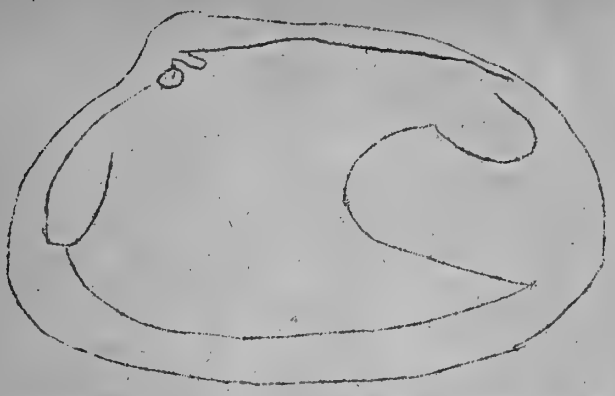
" Shell inflated and rounded in front, attenuated and more compressed behind; sculpture chiefly radial, stronger anteriorly." (Dall, 1900).

Petricola (Rupellaria) tellimyalis (Carpenter),1864. Described as Psephis tellimyalis, Rep. B.A. Rep. Moll. W.N. Am., 1864, p. 641. Range: Santa Monica, California to San Martin Island, Mexico.

The following references should be examined by those interested in this species which was thought by Dr. Dall to be the young of P. denticulata. Willett, G., Bull. So. Calif. Acad. Sci. vol. 30, pt.2, pp 39, figs. 1,2,3, 1931; Pilsbry & Lowe, Proc. Acad. Nat. Sci. Phila., vol. 84, p.97,1932.

Collecting data: Dredged off Santa Monica, Calif. in 7 fms., among Mytilus at Redondo Beach and also off Redondo as deep as 25 fms., in great

MS 4410



Petricola tellimyalis (Carp.), Malaga Cove, L.A. Co., Calif. on algae. Nov. 1940.

MS 449

Petricola tellimyalis (Carpenter), San Martin Island, Lower Calif., Mexico from the Dr. Fred Baker collection.

Note: As you can see the Malaga Cove shell is more elongate than the spec--imens from Lower California and the hinge, while showing a variation from Dr. Baker's specimens, is very nearly the same. It seems to me that many species have been described on smaller variations. T.A. Burch.

(con. fr page 18)

numbers on algae off Malaga Cove, Los Angeles county, Calif. and a set from Dr. Fred Baker labelled San Martin Island.

Sets of this species have been labelled almost everything in some of the local collections. It is not well known even though a comparatively common species.

Petricola (Rupellaria) carditoides Conrad, 1837. " Vancouver Island to Magdalena Bay, Lower California" (Dall). Type locality, near Santa Barbara.

Collecting data: Boring in shale at Crescent City, Calif., dredged in shale off Monterey in 20-40 fms., off Redondo Beach in 25 fms., littoral at Long Beach, Cauycos.(Burch); Alki Point, Seattle, Wash. and Restor--ation Point, Bainbridge Island, Kitsap Co., Wash. H. Rankin, 1933, Newport Oregon, clay rock, coll. by John Malone (W.J. Eyerdam).

Petricola (Rupellaria) californiensis Pilsbry and Lowe, 1932. Proc. Acad. Nat. Sci. of Philadelphia, vol. 84, pp. 96-97, 1932.

This has been the subject of extensive debate. It is safe to assume that at least 9 out of every 10 sets of this species in collections bear

the label Petricola denticulata Sowerby, 1834.

Pilsbry and Lowe state that denticulata is confined to the Panamic province and that our shells are all californiensis. The range of californ--iensis is given " California and ocean coast of Lower California, San Pedro to San Ignacio Lagoon, the type from San Pedro.." A portion of their key follows:

Anterior end evenly rounded; pallial sinus broadly rounded at end; shell thin. California.

Shell small, short, with weak sculpture, the height about 70-77 percent of the length .....P. tellimyalis

Shell larger, about 26 mm. long, oblong, white, ribbed anteriorly .....P. californiensis

Anterior end tapering to a narrowly rounded point; pallial sinus tapering, long-triangular; shell more solid, partly purplish-brown. Panamic province .....P. denticulata

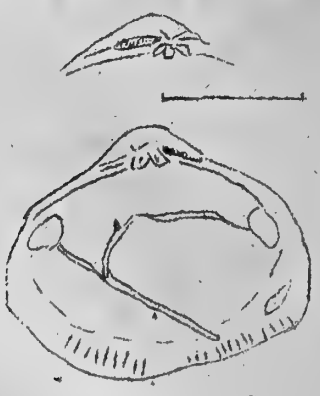
Note of opinion of John Q. Burch- The above distinctions between californ--iensis and denticulata has always been very unconvincing to me. It is quite possible that we have two species here, perhaps we have, but this species or several species seems to assume almost any shape. Those from Santa Monica and off Redondo Beach in the dredgings do seem to match the described characters of californiensis very well. However, those that come out of the shale at Playa del Rey and also those from Anaheim Landing with the pholads seem to me to be just about perfect examples of denticulata by the discussion of Pilsbryand Lowe. They have the purplish brown color, the anterior end tapers to a narrowly rounded point, the pallial sinus is long-triangular etc. Sets from San Onofre, Santa Monica,Newport Bay, Red--ondo Beach etc. show the anterior end rounded and even show a surprising difference in the pallial sinus as described for californiensis. However, it is my personal opinion that this is but one species showing these varia--tions caused by the material in which they live.

Family COOPERELLIDAE

Genus Cooperella Carpenter,,1864. Type, Oedalia subdiaphana Carpenter, 1864. " .Hinge plate narrow, carrying two right and three left subumbonal divar--icating short cardinal teeth, of which the left central tooth is always, and the others frequently bifid; laterals none; muscular impressions small,oval; pallial line narrow with an ample sinus.." (Dall, 1900).

Cooperella subdiaphana (Carpenter),1864. " Queen Charlotte Islands to Gulf of California" (Dall). Type locality, San Diego, Calif.

Collecting data; Santa Monica, 10 fms. (G. Willett); Alamitos Bay, Mission Bay, Estero south of Ensenada, Mexico. Dredged off Redondo Beach, Calif. in a s deep as 25 fathoms. (Burch).



Cooperella

Petricola

MOLLUSCAN ANATOMY

by Thomas A. Burch

Instead of merely describing the anatomy and morphology of mollusks, I shall discuss their anatomy as it bears on their classification. Instead of describing the structure and functions of the various organs, glands etc., in the molluscan body, it will be my aim principally to show the distinction and similarities between the various classes, orders, suborders, and super--families of Pelecypoda and Gasteropoda.

Before I begin, however, I believe it would be best to say something about the development of a mollusk. The early development of all mollusks, except the Cephalopods, is fundamentally the same. Thus the following descr--iption could apply to any of the other classes with but a few modifications. All mollusks pass through a free-swimming stage-- the trochosphere, which is similar to a corresponding stage in Annelidan and Arthropodan development. The trochosphere stage is characterized by a top-shaped body with cilia con--fined to the blunt anterior end and the foot, and by the appearance of a shell gland opposite the mouth (fig.1.). In the twenty four hours after becoming a trochosphere, a shell is secreted by the shell gland, a velum of cilia is formed for swimming and food getting, and the foot becomes larger. This sec--ond free-swimming larva is called the veliger (fig.2.). The change from trochosphere to veliger is accompanied by very little increase in size; but at the end of the veliger period, which is usually from 6 to 12 days (dep--ending upon the temperature of the water), important changes occur and the adult form is assumed very rapidly. The animal increases in size. The velum dissapears, and the foot loses its swimming function, the shell becomes bivalved in Pelecypoda- (fig.3) and coiled in Gastropods. The young embryo then leaves its free-swimming life and sinks to the bottom.

From here on the development of the various classes and orders differs . In most pelecypods a gland in the foot secretes a byssus by which the animal attaches itself. During this attached life the various organs of the body slowly take on adult characteristics. So small is any one individual's chance of surviving the various unfavorable conditions and the many enemies surround--ing it that it has been estimated that about one in 20,000 of the tiny embryos reaches maturity.

While we do not know exactly what the ancestral mollusk looked like, it is possible to make a guess at their structure (fig.4.). They possessed the usual molluscan characters, they had a head with tentacles, a flat creeping foot, a conical visceral hump covered by a mantle, which possibly contained numerous calcareous spicules and not a complete shell. The mantle cavity was posterior and contained the gills, anus, and common apertures of the kidneys and gonads. The alimentary canal contained a radula in a mus--cular buccal mass. (Borradaile & Potts). The heart had a median ventricle and a pair of auricles. In the nervous system there were as in annelids and arthropods, a circumoesophageal commissure or " brain" which may or may not have been ganglionated. Ventral pedal cords, a visceral commissure coming from the pleural part of the brain, and a pallial commissure in the mantle edge were also present. From this beginning diverged the different groups which we know today.

The chitons (Amphineura) (fig.5) which departed least from the ances--tral structure became elongated but limpet-like forms, their mantle cavity extended all around the foot while instead of a single pair of gills many such pairs arose.

The Gasteropoda (fig.6) remained as short creeping forms; they are characterized by the growth of the visceral hump dorsally, but unequally so that it has coiled in a spiral, which is covered by a single shell. This caused readjustment of the visceral hump which has revolved (usually to the right) on the rest of the body through 180 making the mantle cavity anterior. This

process is called torsion and is characteristic of all gastropods.

In development from the larva the mantle cavity first appears behind the visceral hump (fig. 8a & 9a) and at a particular stage rotates in a counterclockwise direction through and angle of 180 on the rest of the body . (figs. 8a & 9a). Only the narrow neck of tissue and the organs which pass through it, between the visceral hump and the rest of the body, are actually twisted, but the orientation of the mantle cavity and its organs is changed . Before torsion the gills and anus point backwards, (figs. 8a & 9a) and the auricles are in front of the ventricles. After torsion the gills and anus project forward, (figs. 8d & 9c) and the auricles are in back of the ventricle The uncoiled visceral nerve loops have been caught in the twisting and one laid over the other, one over and one under the intestine, both coming together near the anus forming a figure eight. This whole process takes only a few minutes for completion.

The large majority of gastropods belong to the order which exhibits torsion in full development , called Streptoneura or Prosobranchiata (see table I). The order may be divided into two groups, a primitive one, Aspidobranchiata or Diotocardia in which two gills and thus two auricles are preserved, and a more specialized one, Pectinibranchiata or Monotocardia in which the right (primitive left) gill, its auricles and even kidney have dissapeared. Some of the Aspidobranchiata like Trochus are in an intermediate stage.

It is possible that the dissapearance of the organs of one side is to be regarded as a consequence of processes concerned in torsion and that in Aspidobranchiata the phenomenon cannot be regarded as having reached its climax. On the other hand the Opisthobranchiata show that the changes occuring in torsion are to a certain extent reversible. They have the gill pointing, backwards (as in fig. 9a), the auricle behind the ventricle and the visceral loop untwisted and symmetrical. There are some forms (Bullomorpha, Acteon) in Opisthobranchiata which possess a complete coiled shell but show only 90 of torsion (fig. 10 & 11), so that the anus and gill point laterally instead of anteriorly. The visceral nerve loop also shows untwisting and the forms of this division are thus supposed to show partial reversion of torsion or detorsion. Forms like this pass into the typical Opisthobranchs with complete detorsion,(Tethys) in which the shell is reduced or lost, the gills directed posteriorly and the visceral nerve loop is completely untwisted (as in fig 9a)

The Pulmonata are usually united with Opisthobranchiata to form the subclass Euthyneura, as does Dall in Bull. 112. But " Euthyneury" or symmetry of the nervous system (more particularly the visceral part of it) is arrived at in different ways in the two divisions. In the Opisthobranchiata it is by, detorsion. In Pulmonata the shell is retained and the visceral hump coiled in typical members of the group, but the visceral nerve loop is shortened and untwisted at the same time and is incorporated with its ganglia into the circumoesophageal nerve collar,so the nervous system becomes symmetrical (figs. 12 & 13). The most primitive members of the Pulmonata still show a twisted visceral nerve loop which is beginning to shorten (fig.12). All of the group have lost the gill but they retain the single auricle which shows them to be derived from the Pectinibranchiata.

One of the most characteristic structures of all mollusks, with the exception of the Pelecypoda, is the possession of a radula, which is a thin membraneous ribbon bearing transverse rows of many tiny chitinous teeth. The radula is usually borne on a cartilagihous support, the odontophore, furnished with protractor and retractor muscles by whose action the radula may be sent out through the mouth and work to and fro like a rasp upon the animal's prey (fig. 14). It is also used as a tool for boring into other shells in order to extract their contents. Only a small portion of the radula is used at one time.

The radula becomes modified differently according to the use to which it is put. Thus the radula of a carniverous snail, like Murex,(fig. 22a) is different from that of a herbiverous snail, like Tegula (fig. 17). All mod--ification in the teeth proceeds from the median line of the radula outwards toward the edge, the outer marginal teeth being the last to be modified. Thus a study of the marginal teeth often gives a clue in many cases to the ancestral condition of a much modified radula; although in many groups the change has been so long established and has proceeded so far that even the outermost teeth no longer retain their primitive form.

The medial or Rachidian tooth of the radula is the central one (fig. 17) The lateral or Amedian teeth lie between the other two sets and a re less num--erous but usually larger and more variable. The marginal teeth or Uncini near the margin are s mall, simple, and very much alike. The radula is bilat--erally summetrical. Any series of teeth may be absent or repeated.

The structure of the radulae are used in the classification of all mol--lusks which possess them. The superfamilies of the Streptoneura or Proso--branchia are usually based upon the structure of the radula. Suborder Aspid--obranchia

Docoglossa; Radula with a few strong teeth. The number in a row range from two to twelve. The ribbon is often very long, the teeth heavy. This includes Acmaeidae,Patellidae, and Lepetidae (fig. 16).

Rhipidoglossa; The radula is remarkable in the development of the uncini or outer teeth. They are long, hooked, often cusped, arranged like a fan's ribs, curving backwards as they diminish in size. In only a few cases are they countable. This includes about seventeen families among which are Turbinidae, Trochidae,Phasianellidae, Haliotidae, and Fissurellidae. Dall included the last two in a separate superfamily, Zygobranchia, but other authors place them here (figs. 17 & 18).

Pectinibranchiata

Gymnoglossa; Both jaw and radula are absent. This includes the Mellanellidae and Pyramidellidae.

Ptenoglossa; The radula possesses an indefinite number of hooked teeth, the outside being the largest. In Janthina the central tooth is absent, the ribbon being of two large divisions with a gap between them down the center. This includes Janthinidae and Epitonidae (fig. 19).

Taenoglossa; The central tooth is very variable, usually multicuspid, the central cusp being dominant; a single lateral, more or less cusped; two uncini, simply hooked or a little cusped. This superfamily contains about 46 families including Cypraeidae, Bursidae,Cerithidae, Littorinidae,Crepidul--idae,Naticidae (fig. 20).

Dactyloglossa; Ovulidae and Pediculariidae (fig. 21).

Rhachiglossa; Most all are carniverous. The radula consists of a central tooth with one to 14 cusps, and a single lateral with more or less cusps. The teeth are mostly sharp, hooked, and with a broad cutting edge. This includes Olividae,Mitridae,Fasciolaridae, Neptuneidae,Nassidae,Muricidae, and Coraliophilidae. The later does not have a radula (fig. 22).

Toxoglossa; The radula consists merely of large marginal teeth on each side, no central tooth and no laterals. This includes Terebridae,Conidae, and Can--cellariidae. (fig. 23).

See figs. 24-27 for radulae of other orders of Gasteropods.

The details of the reproductive system are of great importance in the classification of the other orders of Gasteropods and also the Scaphopods and Amphineura.

The sexes are separate in most Streptoneura but are united in Opistho--branchiata and Pulmonata. ' fig. 29). In dioecious forms the reproductive apparatus is simple, consisting of an ovary or testis situated dorsally in

the visceral spiral with gonoducts forward on the right hand side of the rec-
-tum. In the male there is a non-retractable penis (fig. 29a). Hermaphroditic forms, such as Helix (fig. 29c) and Navanax (fig. 29b) have a complex appar-
-atus consisting of an ovatestis or ' hermaphrodite gland', convoluted 'her-
-maphrodite duct','an albumen gland, sometimes a separate oviduct and sperm duct and sometimes a single duct. Usually a retractable penis.

The Pelecypoda or Lamellibranchiata are flattened from side to side, the whole body being covered by two mantle lobes secreting two shell valves united by a median hinge. The gills inside the greatly enlarged mantle cavity have developed into huge organs of automatic food collection and so the head thus rendered unnecessary and withdrawn into the mantle cavity has become vestigal. Similarly the foot has lost its flat sole and has to be extended between the valves to move the animal.

The facts that the pelecypod shell, at its first appearance is univalve and the foot of the most primitive forms is of the creeping type and their gills plume-like, suggest that the class was derived from a form resembling a simple type of gasteropod with bilateral symmetry, paired gills, kidneys and auricles; and the fact that those organs are also paired in the lower gasteropods seems to point to a common ancestor for Pelecypoda, Amphineura, and Gasteropoda.

The organs of respiration are the gills and mantle. The gills are two in number-- right and left-- each consisting of a horizontal axis bearing two rows of filaments-- an outer and an inner.(fig.30). The British usually arrange the Pelecypoda according to the structure of their gills. There are three groups which can be arranged in an evolutionary series showing the gills becoming larger, more complex and solid forms. Lastly there is an isolated group, Septibranchia, in which the habit of life has completely changed and the gills have practically dissapeared. Protobranchia-- Nucula, Solemya-- filaments short, compressed and free from one another; Filibranchia-- Arca, Pec-
-ten, & Mytilus -- filaments delicate and somewhat flattened threads, each bends upon itself in a "V"; Eulamellibranchia-- Ostrea, Cardium, Mya, Anodonta-- gill filaments united by vascular interfilaments resulting in firm basket-like gills; Septibranchia- gills reduced to horizontal muscular partitions. This includes Poromya, Cuspidaria etc.

The systemetists of this country, including both Dall and Johnson, have arranged the pelecypods according to their hinge structure. It is interesting to note, however, that the two systems correspond fairly well if the Proto-
-branchia and Filibranchia of the British are lumped (see table II).

The peculiarity of the digestive system of Pelecypoda is the presence of a diverticulum of the intestine, the cells of which secrete a Crystalline Style. This structure projects into the stomach against a structure called the gastric shield. It is constantly worn away and the style material is mixed with the contents of the stomach. There is no doubt that this represents a special provision for the digestion of carbyhydrates. It is also found in some gasteropods. No portion of the digestive tract of Pelecypods is used in classification as in the gasteropods.

The nervous system of molluscs in general is fundamentally the same, each class and order merely having modifications of typical arrangement. The more primitive pelecypods have four distinct pairs of ganglia,(fig.7) but in the remainder of the class the number is reduced to three by the fusion of cere-
-bral and pleural ganglia.

The reproductive system of the Pelecypoda is likewise of little impor-
-tance in classification.

In the Cephalopods the primitive bilateral symmetry is retained; though there is an unequal growth of the visceral hump relative to the rest of the body, as in gasteropods, however, it is coiled in a plane spiral. There is no torsion, the mantle cavity remaining posterior. The primitive forms in the

group have an external shell which is divided into chambers, those behind the body chamber containing gas. This has had a great effect on the development of the group, for by diminishing the specific gravity of the animals it has enabled them to become more or less free swimming. They have tended with the loss of the shell to become more and more efficient swimmers, and this is associated with the development of their preditory habits.

The most characteristic special feature of the group is the extraordinary modification of the foot into arms or tentacles and the funnel. The class is raised far above the remaining Mollusca by its wonderfully high organization, especially of the nervous systemand the eye. There is nothing to indicate close relationship with any of the lower classes beyond the general conformity to the molluscan plan of organization and the presence of a radula (fig.28). The Cephalopod form is, in fact, a singularly isolated group. Paleontology has not hitherto given any indication of their origin; and embryology is equal-ly silent; the absence of free swimming larva and the profound modification in development produced by the enormous mass of egg yolk, sharply separates them from all other members of the phylum.

Table I. Classification of Gasteropoda

Prosobranchiata or Streptoneura
Aspidobranchia (Diotocardia)
Docoglossa
Rhipidoglossa
(Zygobranchia)
Pectinibranchia (Monotocardia)
Gymnoglossa
Ptenoglossa
Taenioglossa
Dactyloglossa
Rhachiglossa
Toxoglossa
Opisthobranchiata
Tectibranchia
Nudibranchia
Pteropoda
Pulmonata

Table II Classification of Pelecypoda

American	British
Prionodesmacia	Protobranchiata
Nuculacea	Nucula
	Filibranchiata
Arcacea	Arca
Pectinacea	Pecten
Mytilacea	Mytilus
Ostracea	
Teleodesmacea	Eulamellibranchiata
	Ostraea
Cardacea	Cardium
Veneracea	Mya
Mactracea	Anodonta
Myacea	
Anomalodesmacea	Septibranchiata
Poromyacea	Poromya
	Cuspidaria

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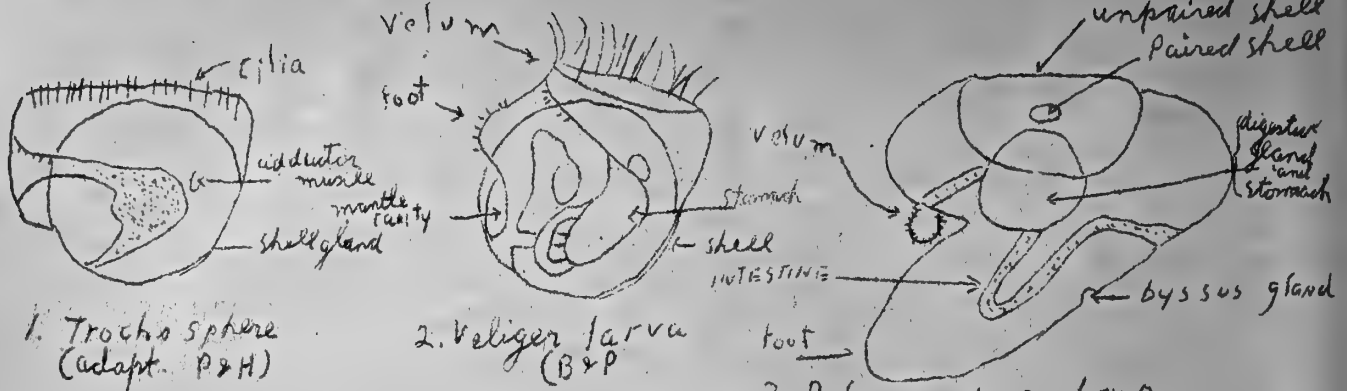
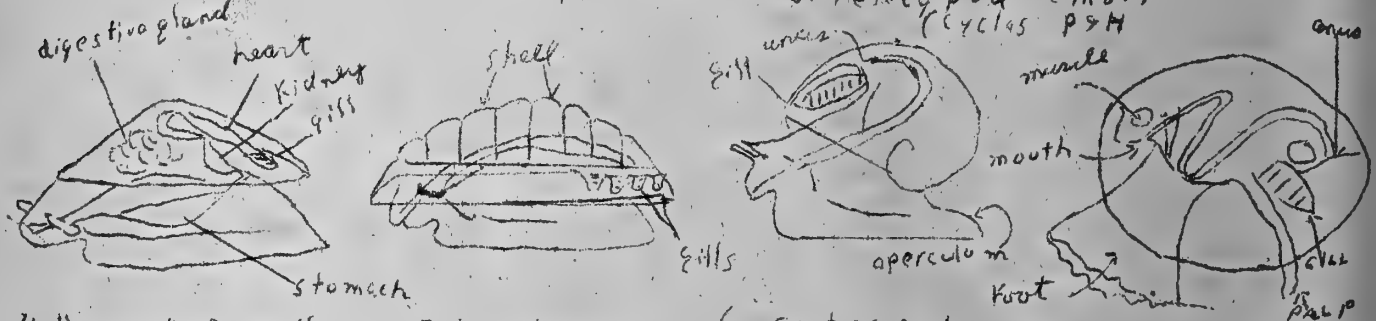
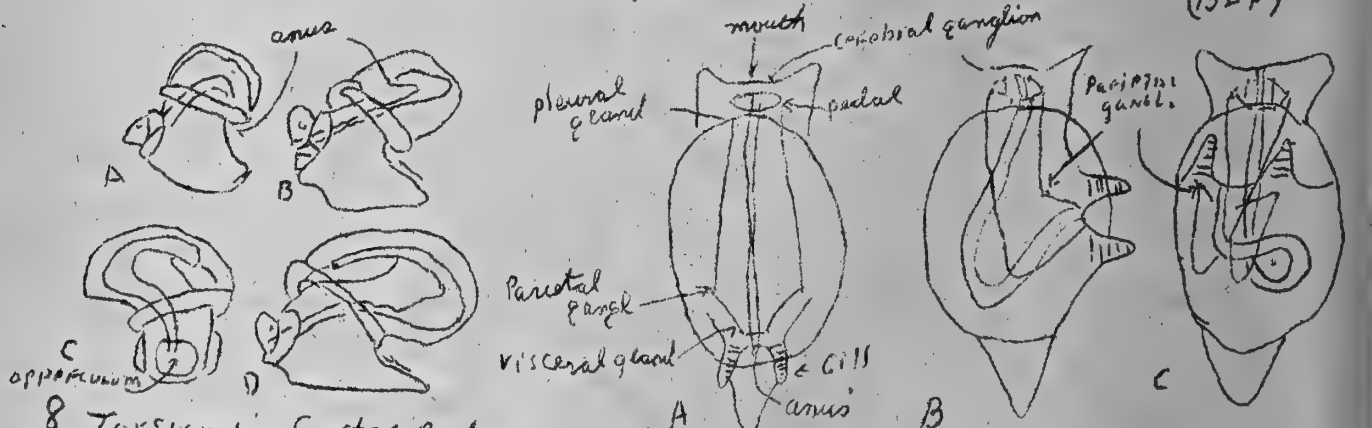
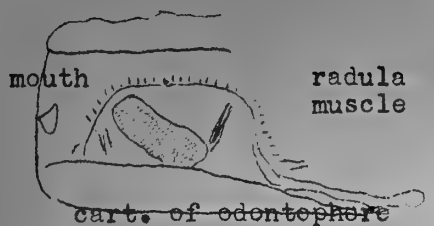


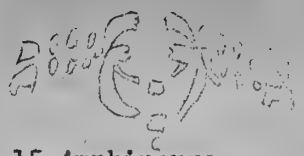




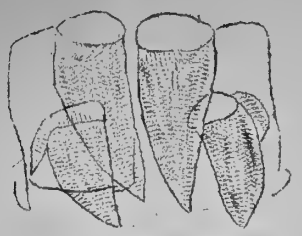
To illustrate the origin of euthneury in Opisthobranchiata- 10,11 (by detorsion) and in Pulmonata- 12,13 (by shortening of nerve connectives)



f.14. Diagramatic sec. thru mouth of Triton (P. & H. , B. & P.)

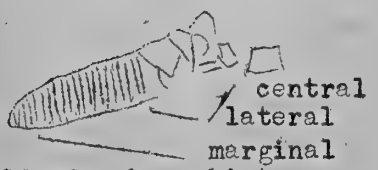


f.15. Amphineura Cryptochiton (Tryon)

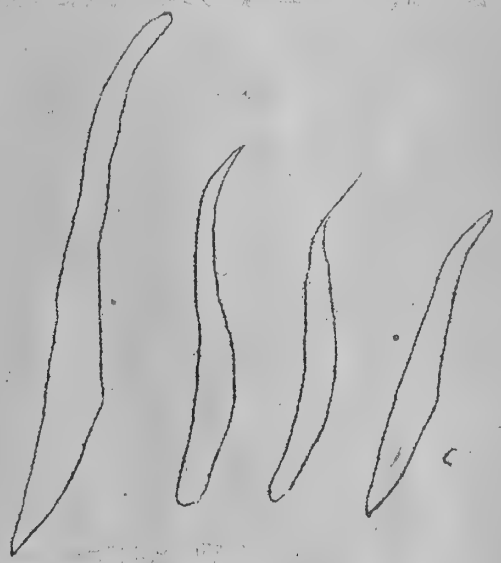


f.16. Docoglossa Lottia gigantea (T.B.)

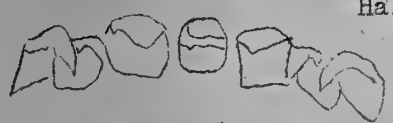
f.17 Rhipidoglossa Phasianella pulla (Tryon)



f.18. Zygobranchiata Haliotis (B. & P.)



f.19. Ptenoglossa Janthina exigua (T.B.)



f.20. Taenioglossa Cypraea exanthema (Tryon)

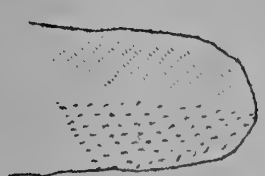
f.23. Toxoglossa Conus californicus (T.B.)

f.22. Rhachiglossa Kellettia kellettii (T.B.)

f.24. Tectibranchiata Bulla gouldiana (T.B.)

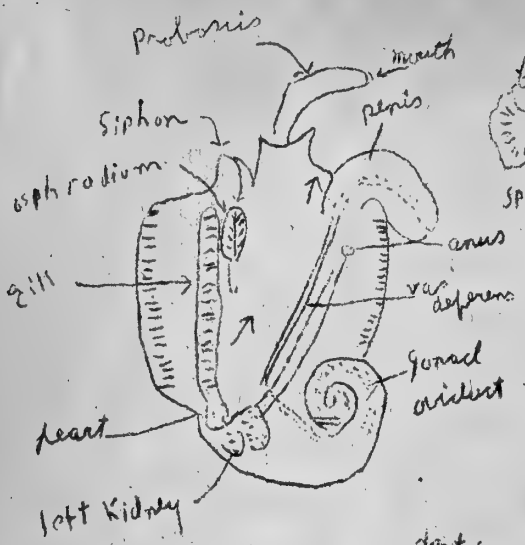
f.26. Pteropoda Hyalea tridentata (Tryon)

f.25. Nudibranchiata Doris obvelata (Tryon)

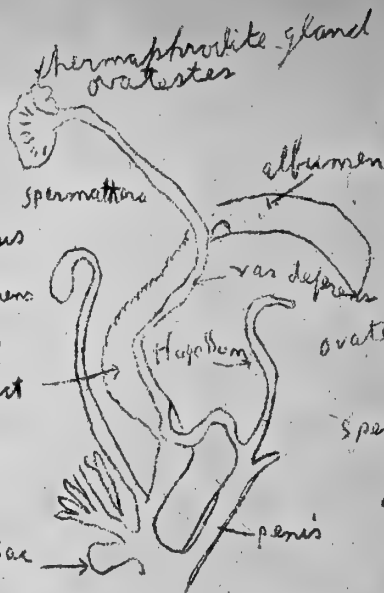


f.27. Pulmonata sketch of entire radula of Helix.

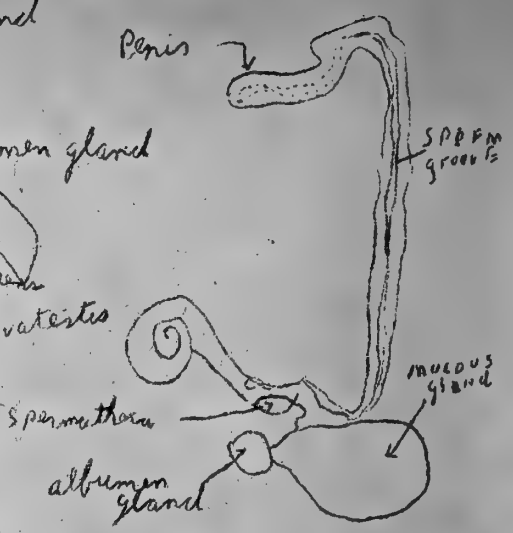
f.28. Cephalopoda Loligo pallida (Tryon).



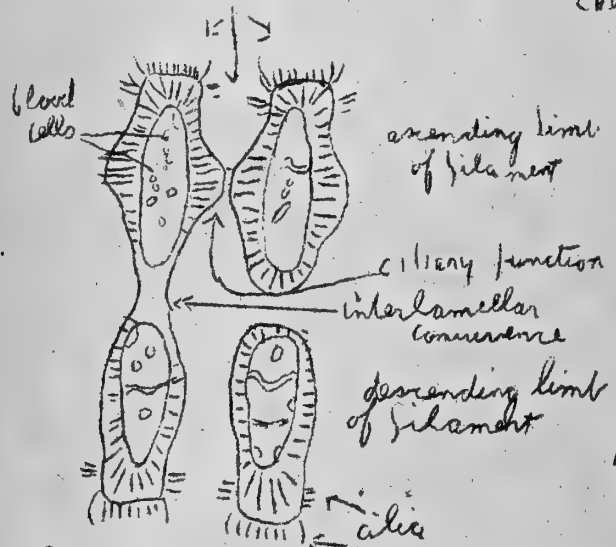
29a Streptoneura
(Bucinum - B&P)



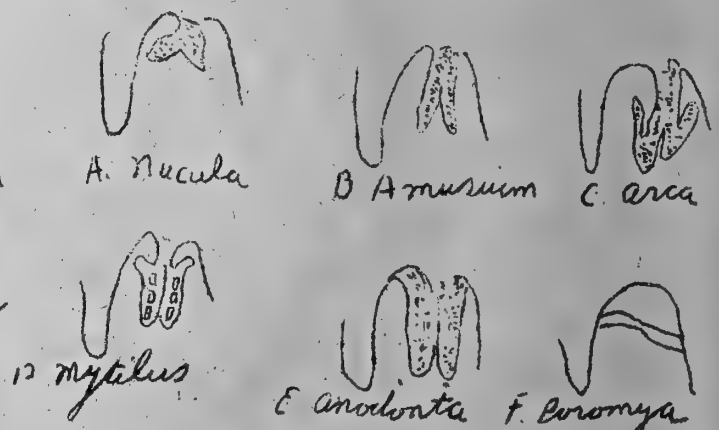
29c Pulmonata
(Helix - B&P)



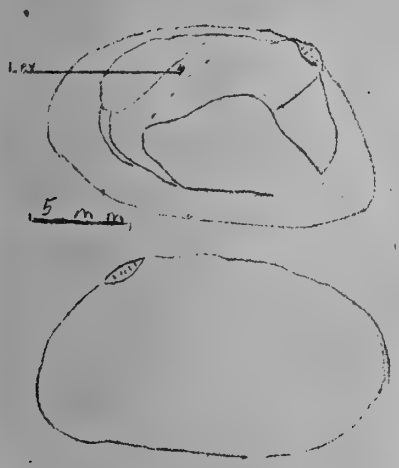
29b Opisthobranchiata
(Navanax - T.B.)



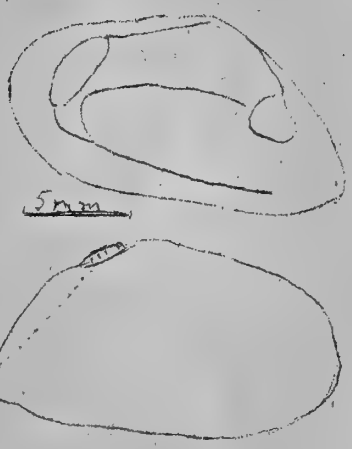
30. Structure of Mytilus gill
(horizontal section through two adjacent filaments (B&P)



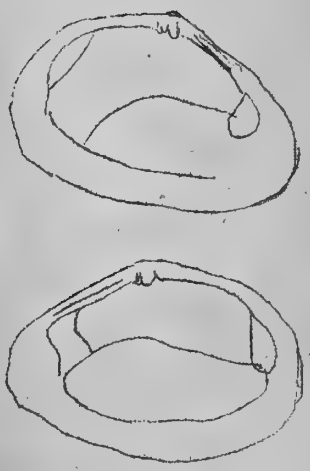
31. Types of pelecypod gills
(B&P & H)



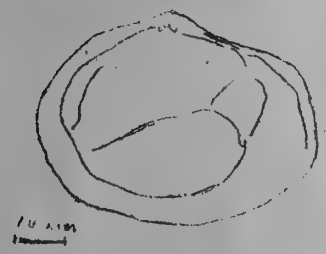
Tellina buttoni

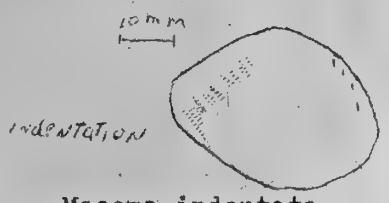


T. carpenteri

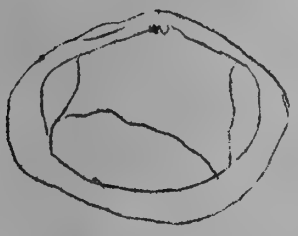


Macoma nasuta





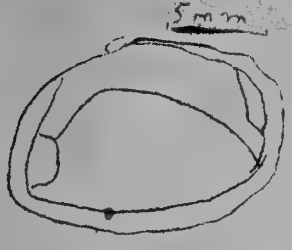
Macoma indentata



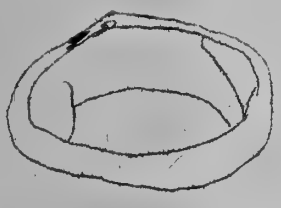
Macoma inquinata

M. incongrua

Macoma secta

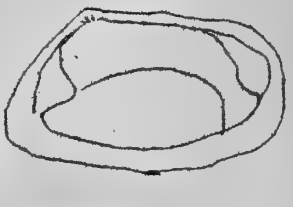


M. carlotensis

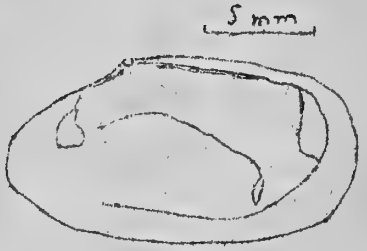


M. quadrana

M. planiuscula
(topotype)



M. alaskana

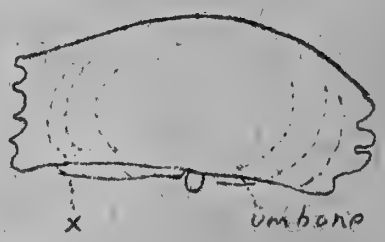


Macoma yoldiformis

Hinge of
Macoma carlottensis

Hinge of
Tellina bodegensis

Hinge of
Macoma nasuta



Hinge of Apolymetis biangulata

These figures have been retraced from the report on Tellinidae made to the club in July ,1943 and published in Minutes #25, 9-26. They are from the work of Beatrice L. and Thomas A. Burch.

Superfamily TELLINACEA Key to Families

a. Valves slightly unequal and twisted.
   b. Resilium embraced in the ligament, subexternal ..... Tellinidae
   bb. Resilium internal, often on a distinct chondrophore. Semelidae
aa. Valves subequivalve, little twisted
   c. Shell subovate; ligament external and conspicuous ... Garidae
   cc. Shell subtrigonal or wedge shaped; ligament short, external, seated in a deep groove ..... Donacidae

(The above key taken from Cotton and Godfrey " The Mollusks of South Australia).

Family TELLINIDAE

Genus Tellina Linnaeus, 1758. Type (by subsequent designation, Schmidt,1818), Tellina radiata Linnaeus.

" The shell is slightly inequivalve, compressed, rounded in front, angular and slightly folded posteriorly, umbones subcentral. The pallial sinus is very wide and deep, the ligament is external and prominent. Teeth 2,2; laterals 1,1."

This genus has been divided into three groups on the basis of lateral teeth by Dall, 1900 (Trans. Wagner Free. Inst.). However, his subgenera are subject to some discussion.

A. With two lateral laminae in each valve, those in the left valve always less strong.

Subgenus Tellina s.s. However, Dr. Dall uses Tellina (Lam) with the type T. virgata Linnaeus Dr. A. Myra Keen advises on this matter as follows (Per. Comm. Dec. 1944) " Tellina s.s. must have the same type as Tellina s.l., namely , T. radiata . Tellina idae may be assigned to subgenus Tellinella Morch, 1853, type (designated by Stoliczka,1871, Tellina virgata Linnaeus."

B. With two lateral laminae in the right valve, one or both of those of the left valve absent or obsolete.

Subgenus Merisca Dall, 1900 ex. T. declivis Sowerby.
Subgenus Moerella Fischer,1887 ex. T. salmonea Carpenter.

C. Hinge with a strong right anterior lateral , closely adjacent to the cardinals, the left laterals absent, the posterior right lateral obsolete.

Subgenus Angulus Megerle, 1811 ex. T. carpenteri Dall
Subgenus Oudardia Monterosato,1885 ex. T. buttoni Dall.
Subgenus Peronidia Dall,1900 ex. T. bodegensis Hinds.

Subgenus Tellinella " Gray" Morch, 1853. Type (by subsequent designation, Stoliczka, 1871), Tellina virgata Linnaeus.

" Shell of medium size, ovate to elongate ovate, posteriorly more or less rostrate and twisted to the right, with a fold in the right valve, and a corresponding furrow in the left, compresses, rather stout, white or yellowish, more or less broadly rayed with red or red brown; umbones prominent, median or slightly posterior. The sculpture consists of rather fine,strong, crowded concentric lirations, strongest and often sublamellar posteriorly, with fine microscopic radial threads, most prominent near the umbones. Ligament external,rather stout, dark brown, lying in a narrow elongate, depressed escutcheon, and situated on a rather stout, posteriorly truncate nymph. The hinge consists of two cardinals in each valve, one strong, triangular and grooved(the posterior one in the right valve,the anterior one in the left) and the other smaller, more slender and divergent; there are two laterals in each valve, those in the right valve strong,sublamellar,triangular, and those in the left valve rather low and somewhat fused with the margin. Interior white or yellow, often with red rays showing through; muscle scars typical, the posterior one suborbicular, the anterior one elongate. The pallial sinus

is rather large, extending about four fifths or more of the distance between the two muscle scars" (Dall,Bartsch & Rehder- Molls. of Hawaii).

Tellina (Tellinella) idae Dall, 1891. " Santa Barbara Islands and San Pedro, Calif." (Dall). Type locality, Long Beach, Calif.

In our experience the range of this species along the mainland would be from Newport Bay north to Santa Monica, Calif.

Collecting data: San Pedro,Terminal Island,19355, Newport Bay 10/35, and not uncommon in the dredgings off Redondo Beach between 25 fms. and as deep as 50 fms. Specimens from San Pedro are difficult to identify because of the fact that so much fossil material is washed into the bay that it is confusing to determine whether or not the specimen is Recent or fossil(Burch)

Young specimens are equilateral and triangular in shape with much coarser sculpture than the adults. In fact,thhe very young are common in the Redondo Beach dredgings and usually take a second look to classify on the first trip.

Subgenus Merisca Dall, 1900. Type (by original designation), Tellina crys-tallina Wood. "..... the laterals of the right valve are strongly developed but the left valve is without lateral teeth, its margin fitting above the laterals of the opposite valve.." (Dall).

Dr. Dall used Merisca as a section of the subgenus Arcopagia Leach,1827 of which Dall says " posterior left lateral absent, and the anterior obsolete, other teeth normal". It seems that the strongly developed right laterals are sufficient to distinguish this section as a subgenus.

Tellina (Merisca) lamellata Carpenter,18857. " San Diego, Calif. to Mazat-lan" (Dall). Type locality, Mazatlan.

None of the members report having taken either this species or the following. However, Mr. A.M. Strong comments " Know of no records for these species. However, they both range up along the Lower California coast and strays could come up as far as Catalina."

Tellina (Merisca) declivis Sowerby, 1868/ " Catalina Island, Calif. to Panama" (Dall).

Subgenus Moerella Fischer, 1887. Type (by monotypy), Tellina donacina Linne.

" Shell small, compressed, hardly folded, acute behind, rounded in front, with feeble concentric sculpture; left laterals obsolete; no interior radii; the sinus long, coalescent with the pallial line below" (Dall,1900).

Dall says this section is closely related to Angulus but has the laterals better developed and is without the internal radii.

Tellina (Moerella) salmonea Carpenter, 1864. " Aleutian Islands to San Pedro, Calif." (Dall). Type locality, Monterey, Calif.

Collecting data: Umnak Island, Atka Bay, Forrester Island, Alaska- Mal-aga Cove, Los Angeles county, Calif.- S. Coronado Island in 15 fms. (Willett) dredged off Pacific Grove, Calif. Aug. 1937 in 15 fms. sand (Burch); Drier Bay, Knight Island, Afognak Id., Mitrofinis Id., Sitkalidak Id., Kodiak Id ., Alaska and Dutch Harbor,Unimak Id.,Atka Id. Aleutians (W.J. Eyerdam); Hinch-inbrook Is. coll. by Ingvar Norbegg (Eyerdam).

Before 1922 a number of specimens were taken from San Pedro Bay. This seems to be one of quite a number of species which Mr. A.M. Strong found before the dredging and filling operations.

Tellina (Moerella) meropsis Dall, 1900. " San Diego, Calif. to Gulf of California" (Dall). Type locality, San Diego, Calif.

Collecting data: San Diego and La Jolla, Calif., April 1935(Burch); San Diego Bay, 1916 (Chace); San Diego Bay, common (W.K. Emerson).

Subgenus Angulus Megerle, 1811. Type(by subsequent designation, Gray,1847), Tellina lanceolata Linnaeus.

" Shells elongated, variable in size but chiefly small, compressed, with the posterior end angularly pointed and not twisted, the surface smooth or with fine concentric sculpture; nymphs short and prominent, the ligament short; hinge with a single adjacent lateral well developed in the right valve anteriorly; internally a thickened ray passes from the umbo just beh--ing the anterior adductor scars and one or two narrower similar rays in front of the posterior adductors, often stronger in the left valve, the pos--terior rays sometimes obsolete; sinus largely or wholly coalescent with the pallial line below" (Dall).

Tellina (Angulus) carpenteri Dall, 1900. " Forrester Island, Alaska to Gulf of California" (Dall, 1921) " Panama" (Dall,1908). Type locality, Monterey and Catalina Island.

Collecting data: The bathymetric range of this species is somewhat amazing. We have collected it in great numbers in such sloughs as Anaheim Bay,Mugu,Newport Bay etc. apparently spawning in the summer months, and have also dredged it at all depths down to below 100 fathoms off Redondo Beach, Calif. Dredged off Monterey,Calif. in 40 fms. 8/1937. Specimens dredged off Santa Monica in shallow water 12/1936 have no pink color in them as have the typical specimens. Dredged in abundance off Ensenada, Mexico and also taken in the Estero below Ensenada. (Burch).

Comment on this species by Beatrice L. and Thomas A. Burch , Minutes Conch. Club. So. Calif. #25,p. 12 " Resembles T. modesta and T. buttoni . It is glossy, flat, narrow,hardly $\frac{1}{2}$ inch long (Keep). It can be distingui--shed from T. buttoni by the absence of a ray behind the anterior muscle scar. There is a slight difference in sculpture. The T. buttoni has a blunter posterior end. The color ranges from white, pink stripes,through solid pink, even purplish. Many collectors note that they find specimens lacking in pink but the Burches find many colored forms. Mud bank forms are usually pink and smaller than the sand forms. Mr. George Willett notes that the Forrester Island, Alaska specimens are more striped and of a muddy yellow with rays"

This species is amazingly common when found. To quote from A.M. Strong, 1922 " This species is to be found in large numbers in the shallow water of the upper portions of the tide channels at Anaheim Bay, living just under the surface of the black ooze. It is also dredged in Catalina Harbor (CEW and AMS). Formerly (before 1920) plentiful in San Pedro Bay (Tremper).

Tellina (Angulus) tabogensis Salisbury 34 " Catalina Island, Calif. to Panama" (Dall). Type locality, Panama Bay. (T. panamensis Dall,1900.)

The question of just what this species is has been the subject of a great deal of discussion between local collectors. We have a statement on it from Mr. A.M. Strong (Per. Comm. Dec. 1944) " Have specimens dredged off Catalina so identified by Dall. They are very small, pure white and smooth. I can see nothing which would distinguish them from the young of the white phase of T. carpenteri Dall. The Beebe-Crocker Exped. material contained many small valves of Tellina which I could not place. Tellina panamensis Dall , if there is such a thing, should be among them. " T. tabog--ensis, new name for panamensis (Proc. Malac. Soc. vol.21,pt.2,p,86,1934.

Subgenus Oudardia Monterosato, 1885. Type (by original designation),Tellina oudardii Payraudeau -- Tellina compressa Brocchi.

" with a thick internal anterior rib" (Dall, 1900).

Tellina (Oudardia) modesta Carpenter, 1864. " Vancouver Island to Lower Calif." (Dall). Type locality, Puget Sound.

Beatrice L. and Thomas A. Burch in Minutes #25, p. 13 discuss this spec--ies as follows: " This is a typical sand shell, found only by dredging. The shell is small, white, rather short, with a thick but rather obscurely def--ined ray behind the anterior adductor scar. The Burches have dredged some specimens off Santa Monica, Calif. which appear to be intermediate between T. modesta and T. buttoni. Therefore these may be but varieties of the same species."

Dall placed this species in the subgenus Angulus which does not have an internal rib even though the species is described as having an internal rib. It seems clear that T. modesta should be placed in the subgenus Oudar--dia."

Collecting data: Dredged off Avalon, Catalina Island in 35 fms. 8/1937, off Monterey, Calif. in 20 fms. shale bottom 8/1940, off Santa Monica in 10 fms. sand 12/1935, off Redondo Beach, Calif. in 25 fms. sandand gravel 12/1937, off Malaga Cove, Los Angeles Co., Calif. in 15 fms. sand (Burch): off South Coronado Island in 10 fms. (G. Willett); Victoria, B.C. in 5 fms. (Lewis) (Willett).

Tellina (Oudardia) buttoni Dall, 1900. " Lituya Bay, Alaska to the Gulf of California" (Dall). Type locality, Guadalupe Island, Lower California.

Comment from Minutes #25, p. 13 " The shell is white, the surface con--centrically grooved with the sculpture stronger on the right valve anter--iorly. There is a well thickened ray behind the anterior adductor scar."

Collecting data: Morro Bay, Calif. 10/1936, and 5/1940 on sandy shore, Cauyocos, Calif. 1940, Monterey, Calif. 8/1937 in 10 fms. and 25 fms. and 8/1940 in 20 fms. on shale bottom, Mugu, Ventura Co., Calif. 12/1937 from sand bar, off Redondo Beach, Calif. in 25 fms. 12/1937(Burch)

From Mr. A.M. Strong we learn that these were formerly to be found in large numbers at the westerly end of Terminal Island (Tremper). Quite a number of specimens dredged in Catalina Harbor in about 3 fms.

Subgenus Peronidia Dall, 1900. Type (by original designation), Tellina albicans Gmelin.

" Shell without laterals, having the characters of Angulus s.s. and the external appearance of Eurytellina." (Dall).

Tellina (Peronidia) bodegensis Hinds, 1844. " Queen Charlotte Islands, British Columbia to Gulf of California. Japan?" (Dall, 1921). Type locality, Bodegas Bay, California.

Comment on this species from Minutes #25, pp 14-15 " This is a beautiful species but difficult to distinguish from Tellina santarosae Dall. The edit--ors believe the two are synonymous; T. santarosae the more southern form. Further discussion of these species is found under T. santarosae. "

MacGinitie notes (1935) that Tellina bodegensis has long, split siphons and that the incurrent one is much longer than the excurrent one. Portions of the siphons often autotomize when the clam is disturbed. In the slough in which he worked, he found that if the species were left exposed too long by a low tide, they came to the surface in search of water and remained at the surface. Mr. and Mrs. E.P. Chace note that T. bodegensis crawls on edge just below the surface of the sand leaving a slit like groove.

This species is found in bays, in shallows, and also in deep water.

Older forms show a tendency to thicken the shell from the inside.

Mr. George Willett believes that T. bodegensis and T. santarosae are not identical but just similar.

Collecting data: Morro Bay, Calif. just beyond the breakwater, June 1935, adult alive; Crescent City, Calif. (E.P. & E.M. Chace); Pacific Grove, Cal if. Aug. 1937, 15 fms., Santa Cruz Island, young forms dredged in 10 fms., Term--inal Island, San Pedro, San Diego, Calif. shore, Anaheim Landing, one valve (Burch).

Tellina (Peronidia) santarosae Dall, 1900. " Santa Barbara Islands and San Diego, Calif." (Dall) to Ensenada, Lower California, Mexico (Burch). Type locality, Santa Rosa, Island, California.

Comment by Beatrice L. and Thomas A. Burch in Minutes #25, p. 15 " This species is flat, thin and less bent posteriorly than T. bodegensis. Also the typical T. santarosae, on the posterior fourth of the right valve has much

narrower interspaces which are elevated. The left valve sculpture is more feeble than the right. It never seems to thicken on the inside of the shell as does a typical old T. bodegensis. The southern form, T. santarosae seems to be so similar to the more northerly T. bodegensis that it is exceedingly difficult to separate them especially in these local regions in which they overlap."

In the discussions of this group the following note was made by John Q. Burch " Dr. Dall in his discussion of this species states " This form, which may prove a special race of Tellina bodegensis , ...". In my opinion we have here another of the many species in which the northern specimens differ from those from the south. It must be conceded that a typical specimen of adult bodegensis is quite different from a typical specimen of adult santarosae, that is, if you take your bodegensis from northern California and your santarosae from perhaps Ensenada, Mexico. I am not in favor of putting santarosae in the synonymy because it seems to be certainly a good subspecies if it is not a species. I suggest Tellina bodegensis santarosae Dall." However, this theory did not meet with the approval of the majority and the consensus of opinion is to retain the two species as distinct.

Collecting data: Anaheim Landing, Calif. 1937, Ensenada, Lower Calif. Mexico June 1938, and many dead valves washed up on the beach (Burch); liv--ing specimens taken with T. idae at the time of the first dredging in San Pedro Bay (Mrs. W.H. Eshnaur); formerly plentiful on the ocaan side of Terminal Island (Tremper).

Tellina (Peronidia) lutea Wood,1828. " Arctic Ocean, Bering Sea, North Hapan , the Aleutian Islands and east to Cook's Inlet, Alaska" (Dall,1921).

Dr. Dall in Bulletin 112 and other authors have given ' Gray 1828' as the author of this species. Dr. A. Myra Keen (Per. Comm. Dec. 1944) explains this as follows " According to the International Rules, the author of a species name is the person who publishes it; Wood published the name from Gray's manuscript museum label. One could write " Wood, ex Gray MS", but not just"Gray". The type locality for this species was not given in the orig--inal; Mrs. Oldroyd's mention of Icy Cape is incorrect".

Collecting data: Unimak Island and Kodiak Island, Alaska, 1926 (Willett); Kukak Island, Alaska 3/15/36 (G. Willett); Nunivak Island in 3 fms.(Lewis); Izhut Bay, Afognak Id.,1922-- Mitrofania Id., and Uyak, Kodiak Id.,1928, Unalaska and Bering Id., 1932 and Raspberry Id., Alaska 1939 (W.J. Eyerdam).

Tellina (Peronidia) lutea venulosa Schrenck, 1861. " Schumagin Islands, Alaska; Sakhalin Island, Japan" (Dall, 1921). Type locality according to Dr. A. Myra Keen is " Sakhalin Island".

Collecting data: Gulf of Peter the Great, East Siberia, 1938 (Eyerdam).

Genus Apolymetis Salisbury,1929. Type (by monotypy), Tellina meyeri Phil. -- T. meyeri Dunker (fide Grant and Gale,1931).

Metis H. & A. Adams as used by Dall and others is replaced by Apolymetis (Salisbury, Proc. Malac. Soc. Lon. vol. 18, pp 255 & 258).

" Shell suborbicular, compressed, valves sillonated, posterior flexuosity submedian; no lateral teeth" (Tryon S.S. Conch.).

Apolymetis biangulata (Carpenter), 1856. (Metis alta Conrad)

" Santa Barbara, Calif. to San Diego" (Dall, 1921) extended to Ensenada, Mexico (Burch).

Dr. A. Myra Keen advises on this species as follows (Per. Comm. Dec. 1944) " The type locality of Apolymetis biangulata (Carpenter) is Santa Barbara. The date is 1856, not 1855 as given in my check list. The descrip--tion was published in the P.Z.S. for 1855, but in a part that did not actually appear until 1856. The original description follows:

? Scrobicularia biangulata
? S. t. suborbiculari, subaequilaterali, convexiuscula, striis concentricis vix regularibus, postice undata, angulis duobus subobsoletis; ligamento externo tenuissimo, in sulcos alte impresso, semi-interne sito; ligamento interno fossa trigonali scalena sito, alteri adjacente; dentibus cardinal--ibus in utraque valve duobus, contiguis, vix radiantibus; cicatricibus muscularibus subovalvibus, sinu pallii maximo; alba, intus aureo tincta. Long. 1/5, lat. 1/78, alt. .. 8 poll. Hab. Sta. Barbara"

Collecting data: Formerly plentiful around Terminal Island (Tremper); also from A.M. Strong,1922 " valves not uncommon on the beach at Terminal Island in 1912 and 1913. These may have come from dredging in San Pedro Harbor. I have taken a few small ones at different times in Anaheim Bay (E.P. Chace); dredged off Redondo Beach in 25 fms. gravel, collected littoral on Terminal Island, 1936, Anaheim Bay, Huntington Beach, dead valves by the hundreds, living specimens few, in upper Newport Bay, 1937, dug from fine sand about 6 inches deep and about 20 living adult specimens, Mugu Bay, Ventura Co., Calif. 5/1937 , Mission Bay, San Diego Co. 1936-1937, alive but not common, in the Estero de Todos Santos Bay below Ensenada, Mexico 11/1937 (Burch); reported from Mission Bay but not common (W.K. Emerson) ; common in San Pedro Harbor just outside the outer harbor berths (E.P. Chace).

Genus Macoma Leach, 1819. Type (by monotypy), Macoma tenera Leach-- Tellina calcarea Gmelin.

" Shell without lateral teeth; of a rounded subtrigonal shape, usually but slightly inflated, generally with a marked posterior flexure; sculpture lacking or of feeble concentric growth lines; pallial sinus generally con--fluent with the pallial line".

Quoting from Minutes #25, p. 17 " The Pacific Coast Macomas may be separated into four groups,
1. A miscellaneous group
2. A group resembling M. nasuta in shape
3. The M. quadrana and carlottensis group.
4. The M. indentata group. Usually placed in Section Rexithaerus.

In the second group, M. nasuta is easily distinguished since the pallial sinus in the left valve reaches the anterior adductor scar. M. in--quinata is more equilateral than M. nasuta but not as much as M. incongrua which is also more inflated."

Macoma middendorffii Dall, 1884. " Bering Strait, south to the Commander and Aleutian Islands and eastward to Chirikoff Island, Alaska" (Dall,1921). Type locality, Bering Island

" Recognizable by its high triangular form, solid shell, with broad hinge plate and flattened left valve" (Dall, 1900).

Collecting data: Gulf of Kronotsky, Kamchatka, 1925; Nome, Atka Id.; Bering Sea, Alaska 1932 (W.J. Eyerdam).
Macoma incongrua (Martens), 1865. " Arctic Ocean, south to Japan on the west and to San Diego, Calif. on the east" (Dall, 1921). Type locality, Yokohama, Japan.

Comment from Minutes #25, p. 19 " Distinguished from M. inquinata in being more inflated and equilateral. This shell seems to be identical with M. inquinata arnheimi Dall. Found in soft muddy sand."

Collecting data: Kodiak Island, Alaska to Tacoma, Wash. (G. Willett); Nunival Island, Bering Sea, in 10 fms. (Lewis) (Willett); taken in many localities in Alaska (W.J. Eyerdam).
Macoma brota Dall, 1916. " Bering Sea to Puget Sound" (Dall,1921). Note by Dr. A. Myra Keen " The type locality of the holotype of Macoma brota is

Puget Sound".

Comment, Min. #25, p. 19 " Surface dull; umbones further posterior than M. calcarea".

Collecting data: Wrangel, Alaska in 60 fms. (G. Willett); Unalaska and Atka Island, Aleutian Islands (W.J. Eyerdam); Aputan Island, Aleutian Islands (Ingvard Norberg) (Eyerdam).

Macoma brota lipara Dall, 1916. " Bering Sea to Puget Sound" (Dall, 1921) . Dr. A. Myra Keen advises that the type locality of this species is off Queen Charlotte Islands in 142 fathoms.

Comment, Minutes #25, p. 19 " Similar to M. inquinata, live in muddy sand".

Collecting data: Ketchikan and Unilaska, dredged (G. Willett);.Craig, Alaska (Willett); Kodiak Island (Lewis) (Willett); Atka Island, Aleutian Islands, and Elk River, Oregon(Pleistocene)(W.J. Eyerdam). Eyerdam comments on this species as follows " Although perhaps not a variety of M. brota it is not exactly the same as M. inquinata and should be allowed to stand".

Macoma sitkana Dall, 1900. " Kodiak Island to Lituya Bay and Sitka, Alaska" (Dall, 1921). Type locality, Sitka Harbor, Alaska.

" Shell like Macoma calcarea, but more slender, more equilateral, less flexuous, with the pallial sinus more regular, oval, and confluent below, and with the posterior end somewhat recurves dorsally" (Dall, 1900).

Collecting data: Izhut Bay, Afognak Island, Alaska, 1932 (Eyerdam).

Macoma calcarea Gmelin, 1792. " Arctic Ocean to North Japan and to Monterey Bay, California. Circumboreal." (Dall, 1921). Type locality, Iceland or Faeroes (Dr. M. Keen). Johnson gives the Atlantic range " Greenland to Long Island Sound 5-40 fms."

Comment, Minutes #25, p. 20- " Similar to M. brota but with a chalky shell and with the posterior flexure more pronounced. The species prefers deep water, or, at least, is not littoral or estuarine" (Dall, 1900).

Collecting data: Wrangel, Alaska in 60 fms. (G. Willett); Punuk Id., Bering Sea in 15 fms. (Lewis); Izhut Bay, Afognak Id., Alaska, 1922 (Eyer--dam) and the following sets in the Eyerdam collection : Godhaven, Greenland (Torrell), Luartlek,Headland, Spitzbergen, Koefjord, Swedish West Coast.

Macoma moesta (Deshayes), 1854. " Arctic Ocean ,Bering Sea and eastward to the Shumagin Islands. Circumboreal." (Dall, 1921). Type locality, North--ern Ocean.

" The species is characterized by its oval compressed form, low poster--ior beaks, and short, hardly flexed posterior end" (Dall in discussion of M. krausei Dall, 1900)

Macoma krausei Dall, 1900 was apparently placed in the synonymy of moesta by Dall himself. However, a number of authors use krausei. Johnson " Moll of Atlantic" lists M. krausei Dall, 1900 from Greenland.

Macoma nasuta (Conrad), 1837. " Kodiak Island and Cook's Inlet, Alaska , south to Scammons Lagoon, Lower California" (Dall, ,1921). Type locality, near San Diego, Calif.

Comment. Minutes #25, p. 18 " M. nasuta can be readily distinguished from other west coast Macomas since the pallial sinus in the left valve reaches the anterior adductor scar."

Weymouth states " It is a hardy species, flourishing under conditions speedily fatal to many other forms. This is particularly true of brackish water which is encountered in small lagoons with little, or only intermitt--ent communication with the oceans, and its wide distribution undoubtedly depends on this hardiness. The most favored locality is in fine mud little exposed to wave or current and it is regularly found in mud too soft for any other species" (Fish and Game Bull. #4, Calif. Fish and Game).

" In April, 1943, we collected M. nasuta in Newport Bay and observed that they lived about six inches beneath the surface of the mud with the long axis parallel to the surface of the mud and the umbones uppermost. The

animals were arranged around Callianassa burrows, and hence we assumed that these specimens extended their siphons into the burrows instead of to the surface of the mud." (Min. #25, p. 18).

Collecting data: One of the most common species the length of the coast in sloughs and also the opean ocean. The bathymetric range in our experience goes down as deep as 25 fms. off Monterey, Calif. and also off Redondo Beach, Calif. (Burch); Craig and Ketchikan, Alaska (G. Willett): note on the species from W.J. Eyerdam follows " This is our commonest Macoma on Puget Sound. It is apparently uncommon in Alaska as I have only found a few spec--imens on Afognak Id. and in Prince William Sound."

Macoma irus (Hanley) , 1845 (Macoma inquinata (Deshayes), " Bering Strait to Japan on the west and to Monterey Bay, California on the east" (Dall,1921) extended to Terminal Island, San Pedro Bay, Calif. (Burch).

Dr. A. Myra Keen advises as follows regarding this species (Personal Comm. Dec. 1944) " Salisbury, Proc. Malac. Soc. vol. 21, 1934, p. 85, points out that M. irus of Hanley has priority. It was described without locality in 1845 (Proc. Zool. Soc. for 1844, p. 166). Salisbury figures the holotype (pl. 12, figs. 7,8), which is at the British Museum, and also the holotype of Deshayes' M. inquinata (pl. 12, fig.5). The original description of Han--ley's species follows:

Tellina irus " Tel. testa ovata aut obovata, crassa (in adultis), subven--tricosa, subequilaterali, impolita, extus intusque albida, concentrice fugulosa; rugis interruptis minimus, confertissimis, subelevatis; margine ventrali magis minusve arcuato; dorsali antice convexo et subdeclivi, postice convexiusculo, elongato et declivi; latere antico paululum breviore, rotun--dato; postico inferne angulato; lunula (in adultis) parva, profunda; lig--amento infosso; costa umbonali subobsoleta; dentibus satis magnis. Long. 1.10; lat. 1.40 poll.

Comment, Min. #25, p. 18 " Distinguished from M. nasuta since pallial sinus does not reach the anterior adductor scar in either valve and from M. incongrua by being less inflated. Found usually in soft muddy sand."

Collecting data: Kodiak, Dall Id., Ketchikan, Alaska (G. Willett); Terminal Island, Los Angeles County, winter of 1934, washed in alive after storm; Morro Bay, Calif. 1936 and also 6/1940, not common; San Francisco Bay, San Mateo 1/1938 ; Port Orchard, Wash. 8/1936 and Alki Point,Seattle, Wash. common (Burch); Akutan Id/ (Norberg); Atka Id. (W.J. Eyerdam, 1932)

Mr. Eyerdam obviously considers irus and inquinata two species and makes this comment on irus " This seems to be an overgrown thick-shelled variety of Macoma inquinata." Eyerdam also makes the following collecting notes for M. inquinata " Not uncommon in Puget Sound; also collected by Eyerdam in Alaska at the following places, Izhut Bay, Afognak Id., Mitro--fania Id.,Knight Id., and Unalaska Id. Often together with Macoma incongrua Macoma nasuta, Saxidomus giganteus and Protothaca staminea."

Macoma inquinata arnheimi Dall, 1916. " Kodiak Idland, Alaska and south to San Francisco" (Dall,1921). Type locality, Kodiak Island, Alaska.

Dall, 1900, described this as a variety " Shell resembling the typical inquinata but shorter, and relatively more plump ..."

In Minutes #25, p. 19 the authors expressed the opinion that this species seems to be identical with M. incongrua (von Martens).

However, we have the following note from Mr. W.J. Eyerdam along with collecting localities " My specimens which were identified by the U.S. Nat--ional Museum do not resemble M. incongrua as has been suggested but are much closer to typical M. inquinata. Perhaps the southern shells are differ--ent or there has been a mistake in determinations"- Eyerdam reports it from: Afognak Id. and Raspberry Id. , in Kodiak Ids. and Evand Id. and Knight Id., in Prince William Sound, Alaska: and Akutan Id. collected by I. Norberg.

Macoma inconspicua (Broderip and Sowerby), 1829. Arctic Ocean to San Diego. Dall in Bulletin 112 listed our west coast species as M. balthica Linnaeus,1758. A number of later authors have considered inconspicua a subspecies of balthica. We are of the opinion that inconspicua is a good valid distinct species. Dr. A. Myra Keen advises on this as follows (Pers--onal Comm. Dec. 1944) " Macoma inconspicua (Brod. and Sby., 1829), descr--ibed as Tellina, was figured by Gray in Zool. Beechey's Voyage, pl. 41, fig.6. The original description: " T. testa obovata, sublenticulari,antice breviore; ligamento magno,dentibus cardinalibus parvis,lateralibus nullis; long. 19/20, lat. 4/10. alt. 15/20 poll. Hab. in Oceano Arctico.

From Icy Cape. It bears a general resemblance to Tellina solidula, but it has not the acuminated posterior extremity of that species. A thin corn--eous epidermis is observable on the lower edges, but the umbones are eroded, and a great part of the surface has a chalky appearance. The remains of the dried animal were still within the shells from which this description was made. We have only seen two specimens, one of which is colourless, the other has a flesh-coloured surface with darker umbones."

In shape and texture it seems to differ enough from M. balthica to warrant specific differentiation. In fact, I am puzzled as to why the iden--tification as balthica was ever made for our west coast form."

The above statements by Dr. Keen check exactly with the opinions of other members reporting the species. In the discussion John Q. Burch made the following note which was generally accepted " An examination of the s ets in our collection indicate that the Pacific specimens are quite different from the Atlantic shells. Johnson " Moll. of Atl. Coast" gives the range of balthica " Arctic Ocean southward in deep water to Georgia". It is apparently rather common over there since we have at least 8 or 9 sets from Maryland north to Cape Cod. None could possibly be confused with our specimens from Puget Sound."

Collecting data: Ketchikan,Craig, Dall Id., Alaska (G. Willett); Alki Pt., Seattle, Wash., Puget Sound, Aug. 1936, also Raymond, Wash. and other lagoons along the Washington coast and along the Oregon coast in bays (Burch); Drier Bay, Knight Island, Alaska 1923.. dredged in mud (W.J. Eyerdam). Mr . Eyerdam attached a note to this report as follows " This variety is quite different from any of the shells in the more than 20 lots of typical Macoma balthica in my collection and can easily pass for a distinct species." Eyerdam also sent in an interesting report on a Macoma balthica var fragilis Dall which was collected at Izhut Bay, Afignak Island, Alaska and identified by Dr. Dall, in 1922. Eyerdam comments on this " As this collection closely resembles some of the more typical M. balthica it is possible that Dall intended the Pacific form as a variety of the European species. I doubt whether there is enough difference to make ours a variety".

So the question remains of the possibility of not one but two or more species being involved here.

Macoma inflatula Dall ,1897. In synonymy of M. carlottensis which see.

Macoma leptonidea Dall, 1895. " Santa Barbara Channel. Also Texas coast. " (Dall, 1921). Type locality, Matagordo Bay, Texas.

" Santa Barbara channel, California, in 314 to 322 fathoms. Also at Matagordo Bay, Texas. This very distinct species occurs in shallow water on the Texas coast and in very deep water on the coast off California. It probably antedates the separation of the two oceans." (Dall, 1900).

This is an interesting situation at least. There is no record of the species ever being taken since the description. The species was described in Nautilus IX, July, 1895, p. 33 and later figured in 1900, Proc. U.S.N.M. vol. 23.

(next)

The original description of this species is easily available in Old-royd and the only additional comment by Dr. Dall at the time follows: " This little shell looks curiously like a Lepton. Its outline though larger differs little from that of Lepton longipes Stm."

Macoma oneilli Dall, 1919. " Dolphin and Union Straits, Arctic Coast"(Dall).

We mention this species because Dr. Dall listed it in Bulletin 112. However, it has been generally omitted from west c ast faunal lists. Dr. A . Myra Keen advises as follows (Per. Comm. Dec. 1954) " I omitted Macoma oneilli because the type locality is so far east of Icy Cape, Alaska, that it seemed unlikely the species is part of our fauna". And George Willett comments " Not known from west coast". We will, therefore follow this plan.

Macoma kelseyi Dall, 1900. " Living in Puget Sound" (Oldroyd) extended to Coos Bay, Oregon (Keen). Described from the Pleistocene of San Diego, and so listed in Bulletin 112 by Dall. Dr. A. Myra Keen advises on this species (Per. Comm. Dec. 1954) " Macoma kelseyi was collected in Puget Sound by the Oldroyds. Recently a Stanford student, Maxwell S. Doty, showed me a valve of what I identify as M. kelseyi from Coos Bay; the preservation of the specimen suggested that it might be sub-fossil, but fossil or living, this constitutes a new record for the species."

Grant and Gale make it a subspecies of nasuta calling it Macoma nasuta kelseyi Dall. Dall, 1900, following the description stated " closely related to M. nasuta Conrad from which it differs as follows: it is larger heavier, and flatter than any specimens of M. nasuta yet recorded.."

Macoma quadrana Dall, 1916. " Boca de Quadra, Alaska, a nd s outh to Coronado Islands, Lower California" (Dall, 1921). Type locality, Point Conception, Calif. in 284 fathoms.

Comment, Minutes #25, p.21 " After examining topotypes of Macoma plan-iuscula Grant and Gale, 1931, Mr. George Willett believes that what we have been calling M. planiuscula is really M. quadrana Dall, 1916.

Collecting data: Dredged off Redondo Beach, Calif. in 75 fms. mud bottom (Burch); Ketchikan and Craig, Alaska, 25-50 fms. (G. Willett); Victoria, B.C. in 5 fms. (Lewis); Olga, Wash. (Engberg); Skidegate, Queen Charlotte Islands (Eyerdam).

Macoma planiuscula Grant and Gale, 1931. (Catalogue Marine Pliocene a nd Pleistocene Mollusca of California, Mem. San Diego Soc. Nat. Hist. vol.1, p. 372, pl. 14, figs. 11a & 11b, pl.20, figs. 8a & 8b). Range: Arctic Ocean to Puget Sound. (Dall, 1921 as carlottensis). Type locality, Nunivak Island, Alaska, Recent.

Comment, Minutes #25, p. 21 " See comment under M. quadrana. This species probably does not occur in California. According to Grant and Gale, Dall confused M. carlottensis with an undescribed species which they named M. planiuscula. Therefore, all references by Dall to M. carlottensis are in reality to M. planiuscula."

Mr. George Willett makes the following comment here " I doubt all records except Nunivak Island."

Macoma carlottensis (Whiteaves), 1880. " Arctic Ocean and south to Ballenas Lagoon, Lower Calif." (Dall, 1921 for M. inflatula). Type locality, Virago Sound, Queen Charlotte Island, British Columbia.

Comment, Minutes #25, p. 21 " Since Dall confused M. carlottensis with what is now M. planiuscula he redescribed M. carlottensis as M. inflatula. Therefore, M. inflatula is synonymous with M. carlottensis. This is an in-flated subtriangular form which is distinct from all other west coast Macomas.

Collecting data: Dredged common off Redondo Beach, Calif. 1938-41 in 50-75 fms. mud bottom (Burch); Ketchikan, Craig, Dall Id., Alaska (Willett); in 30-50 fms.; Victoria, B.C. in 5 fms. (Lewis); Akutan Id., Aleutians (Nor-berg) (Eyerdam).

Macoma liotricha Dall, 1897. " Aleutian Islands and eastward to the Shumagin Islands, Alaska," (Dall). Type locality: Dr. A. Myra Keen advises " The type locality of M. liotricha is Atka Island, Aleutians according to the holotype label".

" A thin oval shell, with glossy yellow periostracum" (Dall, 1900).

Macoma expansa Carpenter, 1864. " Puget Sound to La Jolla, Calif." (Dall). Type locality, Puget Sound.

" This must be regarded as a doubtful species. The two specimens upon which it was founded belong to different species and neither agrees with Carpenter's diagnosis. A large broken valve with the teeth wanting probably belongs to the preceding species. The originally more perfect pair has also met with accidents, and is really too young for satisfactory determination. Specimens from Baulinas Bay, California, collected by Stearns, which have been associated with the specimens named by Carpenter, may belong to a valid species which will carry the name." (Dall,1900).

Macoma yoldiformis Carpenter, 1864. " Fuca Strait to San Diego, Calif." (Dall) Type locality, Neah Bay, Washington.

Comment, Minutes #25, p. 22 " .. cannot be confused with any other species. They are found occasionally in our bays, but live in shallow water along the coast." " A very uniform, brilliantly polished species" (Dall),

Collecting data: Santa Monica, Calif. 5 fms. 12/1935; Anaheim Bay(dead), 3/1936; Morro Bay, 2/1937 by shore screening; Monterey, Calif. 8/1937 in 10 fms. and 25 fms. and 8/1940 in 25 fms. shale and mud; Redondo Beach, Calif . 1937-41 in 15-25 fms. gravel and sand, common. (Burch); Dall Island, Alaska in 15 fms. (G. Willett); washed in on Terminal Island, 1918 (Chace); Vancouver, B.C., sandy beach,1931 (W.J. Eyerdam);Mission Bay(W.K. Emerson)

Macoma truncaria Dall, 1916. " Island near Cape Halkett, Arctic Ocean" (Dall)

This species is mentioned here because Dall listed it in Bulletin 112. However, it has never been reported from the west coast and is apparently of the Arctic fauna and should be omitted from west coast faunal lists.

Macoma alaskana Dall, 1900. " Lituya Bay to Gulf of Georgia" (Dall, 1921). Type locality, Lituya Bay, Alaska.

Comment, Minutes #25, p.22 " This species looks externally like an Angulus (subgenus of Tellina) but has the hinge of a Macoma. Lives on sandy bottom, coarse, perhaps with rocks".

Collecting data: Forrester Island, Alaska in 50 fms., Ketchikan, Alaska and Craig, Alaska in 20-30 fms. (G. Willett); Izhut Bay, Afognak Island, Alaska, 1922 (W.J. Eyerdam) (" apparently a very rare shell").

Subgenus Rexithaerus Conrad, 1869. Type (by subsequent designation, Dall, 1900), Macoma secta Conrad.

" Shell large, inequivalve, with a smooth surface, a large and strong deep-set ligament, behind which the dorsal margin is conspicuously produced upward" (Dall, 1900).

Macoma (Rexithaerus) indentata Carpenter, 1864. " Puget Sound to Lower Calif." (Dall,1921). Type locality, San Pedro, Calif.

Comment, Minutes #25, p. 23 " Like a young M. secta but beaked, indented and ventrally produced (Carpenter). As very large M. secta have a slight indentation, one might confuse this species with M. indentata. If specimens the same size are compared, however, the difference is apparent. A small M. secta is very much rounder and does not have any trace of the indentation that the very large specimens show. This species usually lives buried in sandy mud or sand in bays but is found in deeper water."

Collecting data: Off Redondo Beach in 25 fms. gravel 1938-41, Playa del Rey lagoon 12/1936; Morro Bay, Calif. 1/1937; very common; Surf, Calif. common on beach; off Monterey, Calif. 8/1940 in 20 fms. on shale; Estero de Punta Banda, Mexico 11/1937 (Burch).

Macoma (Rexithaerus) indentata tenuirostris Dall, 1900. * San Pedro and Santa Barbara Islands to San Diego(Kelsey) (Dall, 1921). Type locality, San Pedro, Calif.

* Differs from M. indentata in being more elongated, with a shorter and more pointed end and a deeper flexure* (Dall, 1900).

Mr. George Willett comments on this as follows * I doubt this as a race; individual or sexual variant?*

Collecting data: Dredged off Redondo Beach, Calif. 8/1939 in 25 fms. gravel, in 50-75 fms. mud a nd gravel 7/1938, also taken washed in on Terminal Island (Burch).

Macoma (Rexithaerus) secta (Conrad), 1869. * Vancouver Island and south to the Gulf of California* (Dall, 1921). Type locality, San Diego. Japan? Dall.

Comment, Minutes #25, p. 23 * We have never found specimensas large as those which wash up on the beach between Seal Beach and Huntington Beach. These large specimens probably live near the outer edge of the surf on the surface of the sand. Specimens from Seattle sent us by Eyerdam have the left convex valve badly eroded. This valve looks more like a part of the shell substance has been dissolved, then eroded by sand. If this is true it would indicate that the left side is up and the flat right side is kept down.*

All collectors observe the great difference between specimens of this species taken from the sloughs or bays and those from the open sea. This bay race has been thought by some to be worthy of a subspecific name. However, they are obviously the same species and the differences in all probability merely caused by the habitat. Mr. A.M. Strong advises on this point (Per. Comm. Dec. 1944) * The typical variety if the large shell washed in on the sand beaches. Dall identified a smaller shell from the Mugu lagoon as a var--iety. He stated that the typical variety lives in the open sea and in gen--eral is more northern in its distribution. The small variety is more south--ern in its distribution and is usually found in more protected waters such as bays*.

In the discussion of this species John Q. Burch made the following note * Dr. Dall placed the Japan? in the range of this species. We have a set from the Frederick Stearns collection of Japanese Shells labelled Sakai,In--land Sea, Japan. This set was sent us by Dr. W.J. Clench. It is obvious though that these shells are of a quite different species than anything found in local waters. If this is the species on which the Japan record was based, then we can erase the Japanese connection with this species.* But it seems that Dr. A. Myra Keen had commented on the same matter before * The species of Macoma from Japan identified as secta is clearly distinct and should be named as new by some enterprising person, as I pointed out in a paper published in 1940.*

Collecting data: Our experience has been to find this too common a species to record in all bays and on all beaches from Morro to Ensenada,Mex. The bathymetric range in our experience takes it down a s deep as 25 fms. off Redondo Beach (Burch); Tacoma, Wash. (G. Willett); many localities on Puget Sound where it is often quite common on sandy mud beaches at low tide (W.J. Eyerdam).

Family SEMELIDAE

Genus Semele Schumacher, 1817. Type (by monotypy), Tellina reticulata Spen--gler -- Tellina proficua Pulteney.

* Shell rounded, subequilateral, beaks turned forward; posterior side slightly folded; hinge teeth 2.2, laterals elongated, distinct in the right valve; external ligament short, cartilage internal, long, oblique; pallial sinus deep, dounded* (Tryon. S.S. Conch.)

Semele decisa (Conrad), 1837. " San Pedro, Calif. to San Martin Island, Lower Calif. (Baker), Point Abrejos, Lower Calif. (Hemphill collection at Stanford). Type locality, San Diego, Calif.

Collecting data: In our experience the habitat of this species is in rocky rubble. We have taken it in abundance from the rubble reef off San Onofre, Calif., La Jolla, Calif. to Punta Banda, Lower Calif. in about the same type of shore (Burch); San Pedro, Calif. and Newport Bay (Willett); Newport Bay, Calif. and young at Point Vicente (Chace); Mission Bay (Emerson)

Semele flavescens Gould, 1851. Boston Soc. Nat. Hist., 4:392 " San Pedro, Calif. (in Oldroyd collection at Stanford University), to Callao, Peru (Jordan); Scammons Lagoon, Lower Calif., Mexico (in Hemphill collection at Stanford University) " (Grant and Gale, 1931). Type locality, San Diego, Calif.

We have this species from numerous localities in Lower California, San Felipe, Magdalena Bay etc. but have never seen a local specimen. It is, of course, possible that it might have been overlooked thinking it a juvenile decisa. Nevertheless we kept on the alert for it over a period of years. There seems to be no question about the fact that it has been taken on the California coast but it must be exceedingly rare here at the northern end of its range.

Semele striosa C.B. Adams, 1852. " Catalina Island, California to Panama" (Dall, 1921). Type locality, Panama.

Collecting data: Our experience has been to take one specimen of this species at Punta Banda across the bay from Ensenada, Mexico 12/1937. There is, therefore, no reason not to expect it occasionally as far north as Catalina Island (Burch).

Semele rupicola Dall, 1915. " Santa Cruz, California to Gulf of California" (Dall). Type locality, Santa Cruz, Calif.

Dr. Dall stated " This is Semele rupium of California authors, follow--ing Carpenter; not Sowerby, 1832". Some are still disposed to give this species Sowerby's name. Dr. A. Myra Keen advises on the matter " Type locality of Semele rupium not given in original; holotype not as yet selected."

Collecting data: Our experience has been to find this species in Chama beds, Mytilus beds, and in rock crevices, especially worm tube covered rocks providing protected holes. Laguna Beach, common at La Jolla, Calif., San Onofre, and rather common below Ensenada, Mex. (Burch).

Semele rubropicta Dall, 1871. " Forrester Island, Alaska to Tia Juana, Mex " (Dall, 1921). Type locality, Beach at Soquel, Monterey Bay, Calif.

This Tia Juana locality must refer to the beaches below Tia Juana because the city of Tia Juana proper is quite a drive inland.

There has been a great deal of discussion about whether or not this species represents one species, several species or several subspecies. Mr. A.M. Strong mentioned that at one time several years ago Dr. G.D. Hanna made a study of the variations of this species. A number of us have some puzzles indicating that a careful study of this species should be made by some competent student.

Collecting data: Our experience has been to find this a fairly deep water species. We have dredged it in great numbers off Redondo Beach from 25 fathoms to below 50 fathoms and never in shallow water. Our shallowest record for it is in 20 fathoms off Monterey, Calif. (Burch); Forrester Islandand Craig, Alaska in 25 fms.; San Pedro in 20 fms. (G. Willett).

Semele pacifica Dall, 1915. " Catalina Island, California to Acapulco"(Dall). Dr. A. Myra Keen advises " Type locality of S. pacifica is: U.S.B.F. Sta. 2022, off La Paz, in 21 fms."

There is rather a poor figure of this species given in Oldroyd. We have never seen a specimen said to have been taken off California. Mr. George Willett reports taking it in 20 fms. in Sta. Maria Bay, Lower Calif. Pilsbry and Lowe list it from Guaymas and San Juan del Sur. It must be a rare species.

Semele californica A. Adams, 1854. Proc. Zool. Soc. London for 1853(1854), p. 96. This species is not listed in Bulletin 112 nor has it been reported by any member of the club. However, it is mentioned in " West Coast Shells " by Keep and Baily, 1935 with the note " occasionally found near San Diego though their true home is in Mexican waters". The original description is not to be found in Oldroyd and therefore we are glad to have it as sent by Dr. A. Myra Keen a s follows:

" S. testa oblongo-ovali,subaequilaterali, sordide pallide fusca, radiatum striata; transversim sulcata, liris elevatis, subcorrugatis, ornata, inter--stitiis creberrime longitudinaliter striatis;latere rotundato, postico subtruncato, valde flecuoso; intus lutescente, margine luteo. Hab. Gulf of California"

Semele incongrua Carpenter, 1864. " Monterey, Calif. to the Coronado Islands" (Dall, 1921). Type locality, Santa Barbara Islands (not Santa Barbara as given in Oldroyd) according to Dr. A. Myra Keen.

Collecting data: Our experience has been to find this species a dredged form but in somewhat shallower water than we found rubropicta and more often on sand bottom whereas rubropicta came up with gravel and rocks.

We have dredged it off Monterey in 20 fathoms on shale, off Avalon, Catalina Island in 25 fms., off Malaga Cove, Los Angeles Co. in 15 fms., off Redondo Beach, Calif. common in 15 to 25 fms. on sand bottom. We have sets from off South Coronado Island in 7-10 fms. collected by Dr. Fred Baker. This gives us sets from both extreme ends of the recorded range and they do seem to be a bit different. Arnold described a subspecies montereyi in 1903. Dall reported this living at Monterey and Arnold so reported it. Grant and Gale, 1931, claim that it is in the synonymy of the typical Recent although listing it fossil. I am disposed to think that the first guess was correct and that the Monterey shellsare sufficiently different from the more south--ern forms to warrant the subspecific name which follows. (Burch).

Semele incongrua montereyi Arnold, 1903. Mem. Calif. Acad. Sci. Vol.3, p. 166, pl. 15, figs. 3,3a (not 4,4a as labelled,1903. This was described by Arnold as a variety of S. pulchra, but the figure indicates incongrua.

" Shell small, oval, ventricose, thin; beaks quite posterior to middle of shell; anterior dorsal margin long, nearly straight; anterior extremity evenly curved; posterior end much shorter than anterior, evenly rounded; fold obsolete; cartilage-process deep, oblique; one prominent cardinal tooth in each valve; lateral teeth distinct; pallial sinus very large, rounded, expanded interiorly. Long. 23 mm; alt. 17.5 mm.; diam. 11.5mm".

Collecting data: " I have montereyi fossil, San Pedro but not recent" (G. Willett); off Monterey in 20 fms. ? (Burch).

Semele pulchra Sowerby, 1832. " Monterey, California to Ecuador" (Dall,1921). Type locality on advice of Dr. A. Myra Keen ".. was originally given as Sinu Caraccensis; in modern geographical terminology it is Bahia de Caraques, Ecuador."

Collecting data: We have taken this species in a variety of different habitats. In the lagoon as Point Mugu, Ventura Co. it was not uncommon while sifting the sand about 6 inches deep in connection with large numbers of Cryptomya californica 6/1935, and in about the same habitat in upper Newport Bay. We have also taken it from Bird Rock, San Diego county which is rocky and on the open coast. (Burch)

Genus Cumingia Sowerby, 1833. Type (by subsequent designation Gray, 1847), Cumingia lamellosa Sowerby.

" Shell transversely oval, equivalve, rounded in front, subrostrated and slightly gaping behind, small, thin, often irregular in form; hinge with a spoon shaped cartilage pit, and a small anterior cardinal tooth in each valve;

two elongate lateral teeth in the right valve, less developed in the left; beaks small; surface concentrically ridged; pallial sinus very wide. living in sponges, sand, and in the fissures of rocks" (Tryon S.S. Conch.)

Cumingia californica Conrad, 1837. (Cumingia lamellosa of authors not of Sowerby) Jour. Acad. Nat. Sci. Phila., vol.7, p. 234, pl. 17, fig.12.

" Shell triangular, convex, thick, with numerous irregular lamellar concentric striae; posterior side compressed, cuneiform; beaks central, rather prominent; lateral teeth prominent. Length, one inch and one fourth." Type locality, Santa Barbara, Calif.

The range of this species is subject to great question due to confusion of identifications. Dr. A. Myra Keen in " Abridged Check List" gives 23-41 which would be from Cape San Lucas to Mendocino Co., Calif. However, we have the following advise on this species from Mr. A.M. Strong (Per. Comm. Dec. 1944) " There seems to be three species which Dall lumped under the name Cumingia lamellosa Sowerby as the sculpture and habitat seems to be the same. Our shell should be called C. californica Conrad. It is much the larger of the three and more elongate when not distorted. C. lamellosa is known to range from Panama south. It is only about a quarter the size of our shell and more triangular but not as triangular as triangularis which seems to have a middle range. Due to the mix up in the use of the names nothing is known about the limits of the ranges of the three."

Collecting data: This species is a nestler taken in rock crevices. Abundant in many wharf piles. We have collected it at many localities in r rocky rubble, Monterey, San Simeon, Cauyocos, Palos Verdes, San Pedro, Lagguna Beach, south to Punta Banda, Lower California. It was not uncommon in dredgings from as deepas 20 fathoms in the shale off Monterey and in the gravel at 25 fathoms off Redondo Beach (Burch)

Semele

Cumingia

Family DONACIDAE

Genus Donax Linnaeus, 1758. Type (by subsequent designation, Anton, 1839), Donax rugosus Linnaeus (on advice of Dr. A. Myra Keen. Grant and Gale cite designations of Herrmannsen, 1847 and Gray 1847).

" Shell trigonal, wedge-like, closed; front produced, rounded; posterior side short, straight; margins usually crenulated; hinge teeth 2.2; laterals 1-1 in each valve; ligament external, prominent; pallial sinus deep, hori--zontal" (Tryon S.S. Conch.).

Santa Barbara,Calif.

Donax californica Conrad, 1837. ") to Panama (Dall). Maxwell Smith in " Panamic Marine Shells" 1944 gives the range of californica south to Ecuador, but he places under it such forms as culter Hanley, and if my specimens are correctly identified culter is certainly another species.(Burch). Type locality, near Santa Barbara, Calif.

Collecting data: In our experience this species is a bay form. We have taken it in Alamitos Bay, Anaheim Bay just inside the entrance at Anaheim Landing, in upper Newport Bay, Mission Bay, and very common in the Estero below Ensenada, Mexico. We have never dredged it nor taken it from the open coast. (Burch).

Donax gouldii Dall, 1919. (Donax obesus Gould, Donax laevigatus Deshayes), " San Luis Obispo (Keen) to Acapulco, Mexico (Dall). Type locality, San Diego, Calif.

Collecting data: Our experience has been to find this a very abundant species with a preferred habitat on sandy beached along the open sea. Beds of them are common all around Santa Monica Bay including Redondo Beach. Nearly all sandy beaches from Long Beach to Ensenada, Mexico have colonies of this species. While it is a shallow water or littoral species we have brought it up with dredgings off Redondo Beach down to perhaps 15 fathoms. It was at one time of commercial importance below Long Beach being collected in quantities to make chowder.

Our Common Wedge Shell By Dr. W.O. Gregg

" As pointed out by Strong (Nautilus 37(3):81 and also by Grant and Gale (p. 380) it was first named and described by Gould as obesa(1851). The name was preoccupied by D. obesa d' Orbigny, 1846. Then came D. laevigata Deshayes, 1854, which was preoccupied by D. laevigata Gmelin, 1791. Since neither of the above names could be used, Dall uses the name Donax gouldii and refers in Bulletin 112 to Gould's description and figure of obesa. In the case of a preoccupied name the mere reference to the original descrip--tion in connection with a proposed new name is sufficient to validate the new name. However, in Bulletin 112, p.49, the name gouldii is not designated as a new name but listed thus- Donax gouldii Dall, 1919, indicating that the name had been published in a 1919 article. Did such article ever appear or is the use of that date an "error" or just plain incorrect usage ? I have searched in vain to find any reference to the 1919 article. In connec--tion with Dall's name, gouldii, Grant and Gale refer only to Bulletin 112, which would indicate that that was the first publication in which it had appeared. If any one knows of the 1919 reference he should not keep it a secret. Oldroyd gives Gould's original description and figures Gould's types. These clearly indicate that the shell which Gould described was the short obese form which almost entirely lacks the colored rays. This form is also illustrated in Johnson and Snook, p. 452, fig. 451. This typical form of D. gouldii appears in the collections of certain southern Calif--ornia collections under the name D. conradi, a much different shell which does not occur in our waters. There is a much more common form which is more elongate, less obese, and conspicuously marked by colored rays. We have been applying the name gouldii to this common form. Is this merely a differ-

-ent form which is influenced by a somewhat different ecology as is known to occur in the case of certain fresh-water bivalves suchas Gonidia angul--ata, or is this common form a distinct entity? The short obese form is of a more southern distribution. I have material from San Diego and Todos Santos Bay. I also have from both localities sets of the more common form. It would appear that all the more northern records of D. gouldii are based on the common form rather than on typical gouldii . Both forms occur in pure colonies. "

Editors Note: The two forms discussed by Dr. Gregg are so obvious that the beginner usually insists that he has two different species. It is my opin--ion that one of them should bear at least a subspecific name..

Donax punctatostriata Hanley, 1843. While this species is listed in Bulletin 112 by Dall as ranging from San Pedro south to Peru, it is certainly of the southern fauna and not of that of California. We shall, therefore, omit it from our California lists.

Donax conradi Deshayes, 1854. " San Diego, California to Central America" (Dall). Type locality, Gulf of California.

" Shell large, radially striate, somewhat like that of D. punctatostr--iatas Hanley, but more elongate. Length 27 mm., height 17 mm."

Several of our members have sets labelled with this specific name from Mission Bay and also from the Estero below Ensenada. However, those I have seen are obviously nothing like the above description. It is our opinion that this species is another of the southern fauna. We shall omit it from our California lists.

We note a paragraph from Dr. A. Myra Keen (Per. Comm. Dec. 1944) " Donax conradi was first published by Reeve in Sept. 1854; Deshayes des--cription did not appear until the following year. Our only specimens are from the Gulf of California". Mr. A.M. Strong advises " D. punctatostriata and D. conradi almost certainly do not belong in our fauna".

Family Garidae (Psammobiidae, Sanguinolariidae)

Genus Gari Schumacher, 1817 (Psammobia Lamarck, 1818) Type (by absolute tautonymy), Gari vulgaris Schumacher -- Tellina gari Spengler -- " Psammobia" caerulescens Lamarck fife Grant and Gale, 1931.

" Shell elongate ovate, generally rather thin, equivalve; hinge with one or two bifid teeth in each valve, part or all of one or more teeth sometimes being obsolete or much reduced; pallial sinus large; sculpture absent or of moderate strength, radial or concentric".

Subgenus Gobraeus Leach,1852. Type G. variabilis Leach -- Solen vespertinus Gmelin.

" This group has no circumscription of the dorsal areas,and differs from Psammobia most obviously in its blunt and inflated form, with a distinct posterior gape" (Dall, 1900).

Gari (Gobraeus) regularis(Carpenter), 1864. " San Diego, Calif. to Cape San Lucas" (Dall, 1921). Type locality, Cape San Lucas.

This seems to be a good species but must be exceedingly rare. It has never been reported by any member of the club.

Gari (Gobraeus) californica (Conrad), 1848. " Japan, Kamtchatka, the Aleutian Islands and south to San Diego, Calif. " (Dall, 1921). Type loc--ality, California.

Collecting data: Our experience has been to find this a comparatively rare species. We have dredged it off Monterey in 20 fms. on the shale and also taken it from the Redondo Beach dredgings as deep as the 25 fathom gravel. Probably the best locality we know of to collect this species is the stretch of beach between Sea Beach and Huntington Beach. There is an off shore reef along there and after storms it is possible to pick up great

numbers of Gari californica, many of them perfect with the animals still alive. Theyare usually associated in this case with great numbers of several other species such as Amiantis callosa, Macoma secta, Saxidomus nuttalli, Mactra hemphilli etc. We have heard of members taking the species in the bays but have never been fortunate enough to take such a specimen in southern California" (Burch); Sitka and Craig, Alaska (George Willett) Gari (Gobraeus) edentula (Gabb), 1869. " San Pedro and Catalina Island, to San Diego" (Dall, 1921). Type locality, Pliocene of San Fernando,Calif .

Collecting data: We have dredged this species off Redondo Beach,Calif always in comparatively shallow water, perhaps 15 fathoms. It has never been common in the dredgings although large dead valves often came up showing that the species was there but probably below our dredge cut. We have a finne pair or two taken by Mrs. W.H. Eshnaur on Terminal Island after the blows but collected some 30 years ago(Burch)

Genus Sanguinolaria Lamarck, 1799. Type (by monotypy), Solen sanguinolentus Gmelin.

Sanguinolaria s.s. " Shell moderately large, thin, equivalve, short, rose-colored or white, with short, inconspicuous nymphs, two bifid cardinal teeth in each valve; pallial sinus deep, widest in front, confluent with the pallial line below, the epidermis thin,dehiscent" (Dall, 1900).

Subgenus Nuttallia Dall, 1898. Type, S. nuttallii Conrad.

" Shell large, suborbicular, inequivalve, more or less twisted, the right valve slightly flatter, the posterior cardinal in the left valve obsolete; the pallial sinus narrower in front and somewhat detached from the pallial line" (Dall, 1900).

Sanguinolaria (Nuttallia) nuttallii Conrad, 1837. " San Pedro to Magdalena Bay, Lower Calif." (Dall, 1921). Dr. A. Myra Keen lists it from Monterey, Calif. collected by Mackenzie Gordon and also MacGinitie.Type locality, near San Diego, Calif.

Collecting data: While it is true that valves of this species wash in on the beaches occasionally from the open sea, our experience has been to find the species estuarine. We have spaded them up by the hundreds in such localities as the lagoon at Mugu, Ventura Co. , Anaheim Bay etc. We found the species as a rule about 6 to 8 inches below the surface of the sand, (Burch).

Genus Heterodonax Morch, 1853. Type, Tellina bimaculata Linnaeus, 1758.

" Shell rounded-triangular, smooth, rather solid; two lateral teeth in each valve" (Tryon S.S. Conch.).

Heterodonax bimaculata Linnaeus, 1758. " Monterey, California to Panama. Also Atlantic" (Dall, 1921). Johnson gives the Atlantic range " Florida to Brazil".

Collecting data: Our experience has been to find this species a bay form and always at the very highest portion of a sandy shore very close to the high tide line. In such localities as the lagoon at Mugu, Ventura Co., this species may be taken by the thousands within few inches of the surface marking a definite stratum along the edge of the lagoon. A few feet, perhaps 8 or 10, nearer the water, below the stratum of the Heterodonax one comes to another strip in which Cryptomya californica is almost as common, although associated with several other genera such as Semele pulchra. The Heterodonax seem to be almost the entire fauna of their particular strip. Alamitos Bay is another bay in which this species seems to thrive under about the same conditions. We have sets from the West Indies and are unable to see the slightest difference between them. (Burch).

Genus Tagelus Gray, 1847. Type (by original designation), Solen guinensis Gray. " Beaks median or subposterior; teeth two in each valve, simple, pedunculate; valves without constriction or clavicle, straight; pallial sinus deep, reaching to or beyond the beaks; posterior adductor scar rounded ; pallial sinus with the ventral part partially coalescent with the pallial line; situs estuarine or marine" (Dall, 1900).

Tagelus californianus (Conrad), 1837. Monterey Bay, Calif. (MacGinitie 1935) to Gulf of Tehuantepec (Dall). Type locality, near Santa Barbara.

Collecting data: Our experience has been to find this a very common bay form. The habitat if from 8 to 12 inches below the surface of the sand in the intertidal zone of such bays as Anaheim, Alamitos, Newport, Mission, Estero below Ensenada etc. (Burch). " I have a growth series from 3 to 9 cm. long, taken alive in the Venice Canal a short distance from where I collected T. affinis (C.B. Adams). There is not the slightest suggestion of intergradation" (Dr. W.O. Gregg).

Tagelus affinis (C.B. Adams), 1852. " Santa Barbara, Calif. to Panama" (Dall, 1921). Type locality, Panama.

Collecting data: Of course, this species is so close to californianus that it could very easily be confused without careful study. When we first got them from Lower Calif. we started checking and looking. The result was to find a number of sets labelled affinis from California but they all proved to be californianus. The beaks of the species affinis are definitely behind the center of the shell when compared to californianus with its centrally located beaks. T. affinis is very rare at this end of its range. The only set known from local waters is a large set collected by Dr. W.O. Gregg in the Venice Canal near Playa del Rey, Calif.

Subgenus Mesopleura Conrad, 1837. Type, Solen divisus Spengler.
" Shell with an internal radial rib, ventrally directed from the submedian beaks; ends of the valves rounded, and the form of the shell usually more or less arcuate; otherwise like Tagelus."

Note by John Q. Burch " I have just picked out a set of Tagelus divisus type of the subgenus Mesopleura and the internal rib is apparent. Then I picked out a few sets of our Tagelus subteres and perhaps with the assistance of immagination a vague rib could be noted on an occasional specimen but even then it would be preferable to take some else's word for it. In fact I see little of anything to encourage me in a division of our Tagelus into subgenera. Therefore until advised, I propose to ignore subgenera.

Tagelus subteres (Conrad), 1837. " Santa Barbara, Calif. to Panama" (Dall). Type locality, near Santa Barbara, Calif.

Collecting data: Almost identical habitat and localities as californianus , Mugu, Ventura Co., Anaheim Bay, Playa del Rey, Mission Bay, Estero below Ensenada etc. (Burch); " I have three or four specimens which show the internal rib; three or four specimens out of that many dozen examines." (Dr. W.O. Gregg).

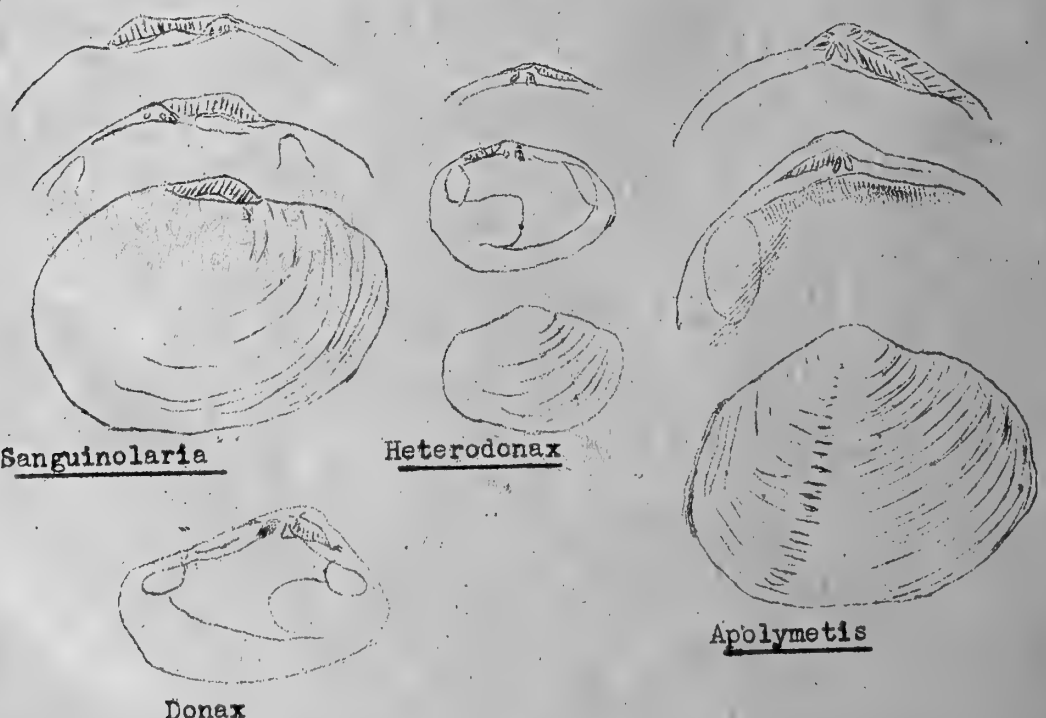
Tagelus politus (Carpenter), 1857. Mazatlan Cat., 1857:27.
" S. t. forma "S. affini" simili, sed subtranslucida, violacea, extus linea fusca et lineis albicantibus nonnullis radiata; epidermide politissima , fusco-rubente: intus nymphis elongatis, denticulus 1-2 acutis, sinu palii versus umbones maxime arcuato; callositate ab umbonibus, linea fusca exteriore conveniente, subexpressa decurrente.

Known at once by the brownish violet colour, glossy epidermis, and dark ray corresponding with a slightly prominent ridge within. In this res-

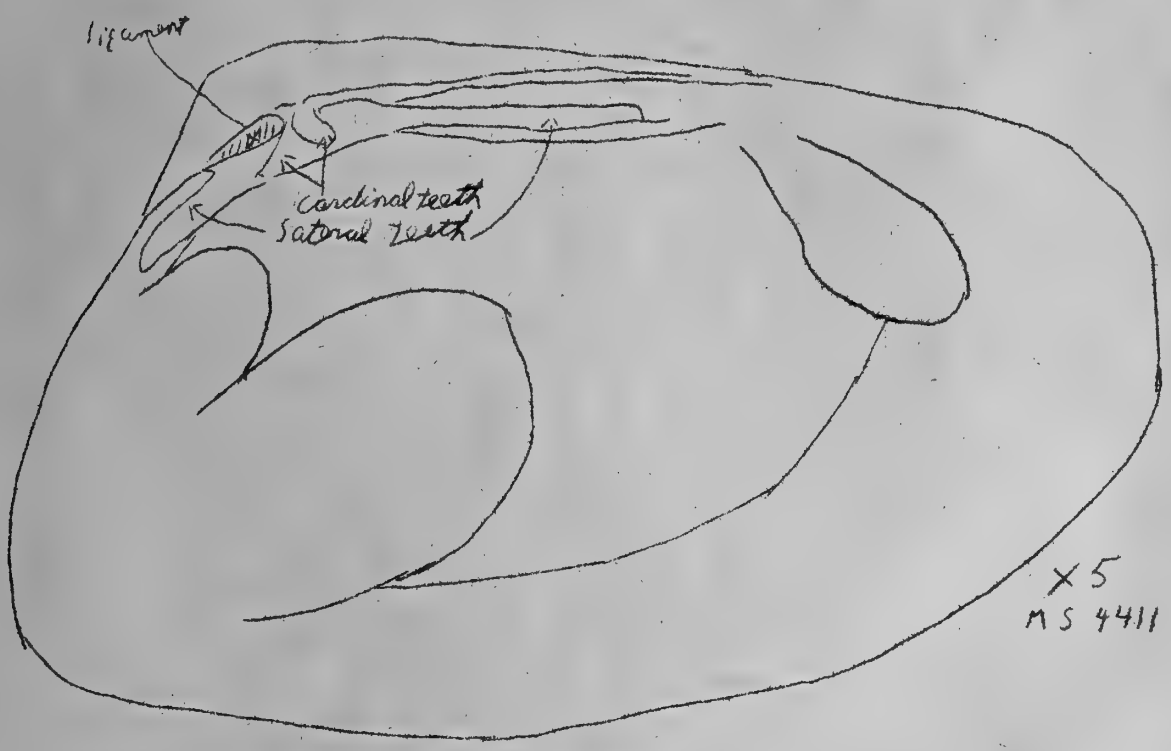
-pect alone it resembles Machaera. In the pallial sinus S. affinis is inter--mediate between politus and violascens; in colour S. violaceas is inter--mediate: in the prolongation of the nymphae, S. politus. This species dis--plays 2 small distinct muscular impressions between the umbo and the anter--ior adductor, which is oblong, but well defined: in S. violacens, it tapers off irregularly, uniting with these two: in S. affinis it is irregular, not tapering, uniting with the others which are also irregular. The largest specimen measures long. .48, lat. 1.45, alt. .23. "

The range of this species is something of a problem due to questionable identifications. However, Dr. Keen in " Abridged Check List" gives 8-34 which would be from about Santa Barbara south to Panama. Type locality, Mazatlan

Collecting data: " Have specimens from Terminal Island so identified by Dall and a set from Magdalena Bay collected by Orcutt and so labelled. The Terminal Island shells were collected alive on the surface of the sand in the same manner as T. subteres is frequently found. They may be small, light colored specimens of T. californianus living in loose sand where a fixed burrow could not be made, but I am inclined to consider them distinct. Lowe had specimens of a quite different shell from further south which he checked up in the U.S. National Museum and decided were the true politus. As I remember it Dall stated that Carpenter based his species on fragmentary material and it was difficult to place it." (A.M. Strong)(Per. Comm. Dec. 1944); " We have Tagelus politus from Laguna Beach, collected by A.M. Strong. Dall reported it from San Pedro (Proc. Acad. Nat. Sci. Philadelphia for 1898, p. 59)" (Dr. A. Myra Keen); " See Maxwell Smith, Panamic Marine Shells, p. 64: " The late Dr. Fred Baker considered politus to be a young californianus". I have a set of Tagelus collected many years ago which A.M. Strong identified as politus. They match with specimens of the above men--tioned growth series of T. californianus (Dr. W.O. Gregg);"I have 6 specimens from San Pedro, collected by Dr. Tremper, and named politus. They are much lighter colored than subteres, and somewhat darker than affinis. They have a central internal rib which appears to be lacking in affinis, and either lacking or indistinct in subteres."(George Willett).



Donax sp. San Diego Bay



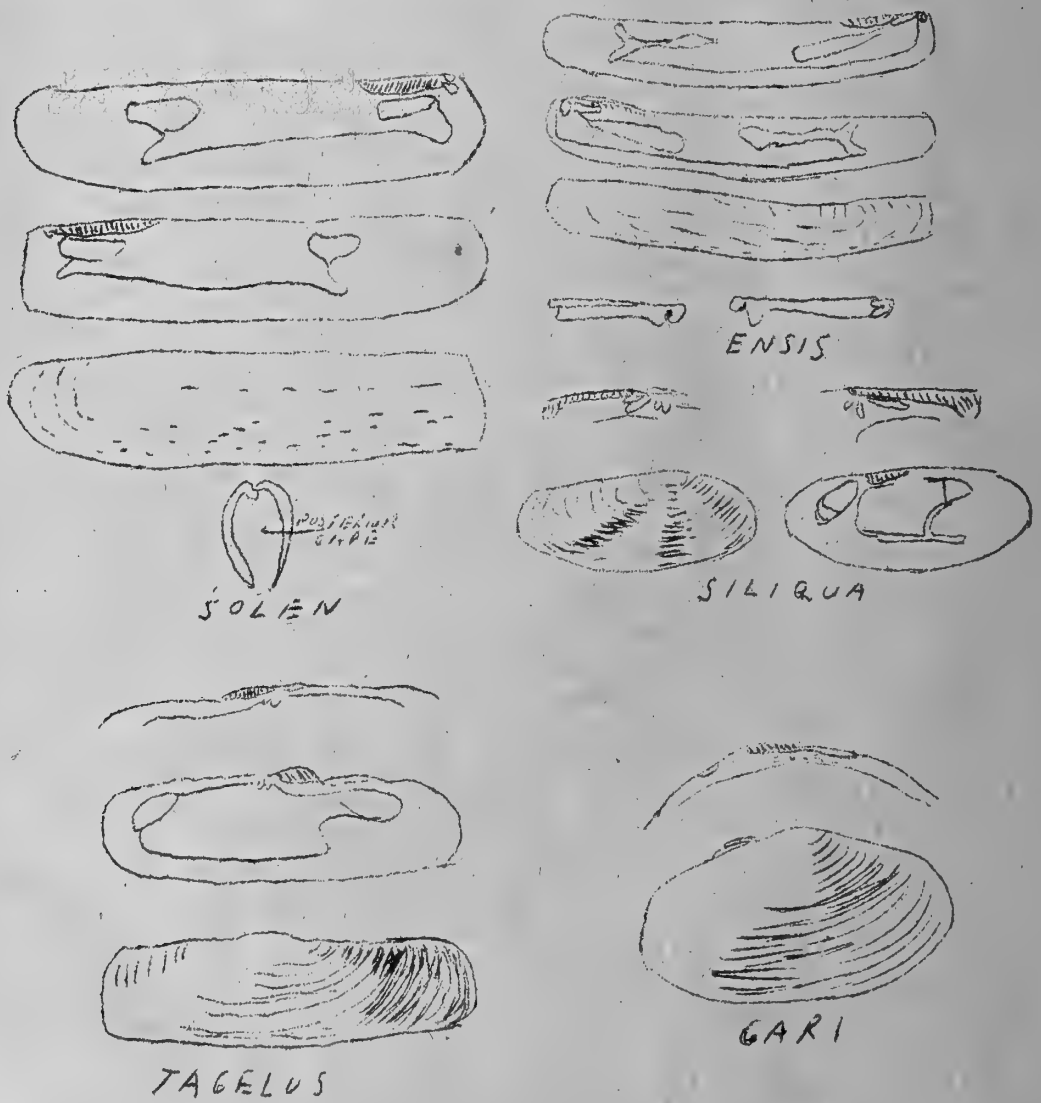
Donax gouldii Dall San Diego Bay

For discussion of the species figured above see pp 20-21 and the following page.

Editors Note- A typical specimen of the two species known as Donax gouldii Dall were handed Thomas A. Burch with a request that he make drawings of them. The figure MS 4410 is of the more common form with the colored rays. The figure MS 4411 is of the form described by Gould as D. obesa and renamed by Dall as Donax gouldii. The following comments by Thomas A. Burch are of particular interest under the circum--stances.

" Just finished the drawings of the Donax. I have read nothing about these shells and tried to draw them just as they are. If the specimens you sent me are characteristic of the two lots I feel confid--ent that they are distinct species as it is apparent from these draw--ings that not only is the shape of the two different, but also the hinge is definitely different.

I did not bother to put in the serrations along the margin of the shells"



Family SOLENIDAE

Genus Solen Linnaeus, 1758. Type (by subsequent designation Children,1822), Solen vagina Linnaeus. Dall and other authors used Solen(L) Scopoli,1777 with type S. marginatus Pulteney. Dr. A. Myra Keen advises on this " Dall's usage is unacceptable. The type of a Linnaean genus must be a Linnaean species S. vagina Linne, an Indo-Pacific form usually known as S. brevis Gould, is the first species designated."

" Shell very long, subcylindrical, straight, margins parallel, ends gaping; umbos terminal, or subcentral; hinge teeth, one in each valve; liga--ment long, external; anterior muscle scar elongated, posterior oblong; pall--ial line extending beyond the adductors; sinus short and square."(Cottnm and Godfrey).

Solen sicarius Gould,1850. " Vancouver Island to San Quintin, Lower Calif." (Dall). Type locality, Strait of Juan de Fuca. Well figured in Oldroyd.

Collecting data: Dredged off Monterey, Calif. in 10 to 20 fms. on shale, 8/1940; Alki Point, Seattle, Wash. 8/1936; off Redondo Beach, Calif. in 20--25 fms. gravel and sand 8/1937; off San Pedro, Calif. in 7 fms. 5/1938; taken littoral in Alamitos Bay 10/1940; common in the San Pedro Pleistocene (Burch); Mud Bay, Mason Co., 1900; Smith's Cove, Seattle, Wash., 1909 & Port Orchard, Kitsap Co., Wash; " This species lives on sandy mud flats at low tide mark or below. It does not seem to be common. I have only found it alive once" (W.J. Eyerdam).

Solen rosaceus Carpenter, 1864. " Santa Barbara, Calif. to the Gulf of California" (Dall). Type locality, Santa Barbara and San Pedro, Calif. (on advice of Dr. A.M. Keen). Dr. Keen also advises " The figure in Old--royd is not rosaceus but is Ensis californicus."

Collecting data: Very abundant in Newport Bay, San Diego Bay and the Estero below Ensenada in our experience. Dredged as deep a s 25 fms. off Redondo Beach, Calif. (Burch).

Genus Ensis Schumacher, 1817. Type, S. magnus Schumacher (fide Dall).

" Like Solen but with one right and two left vertical cardinals and in each valve a posterior horizontal tooth; the valves usually more or less curved" (Dall, 1900).

Ensis californicus Dall,1899. " Monterey, Calif. to Gulf of California"(Dall) Type locality, off the Island of San Pedro Martir, Gulf of Calif.

Note statement under rosaceus that the figure in Oldroyd of that species is a figure of Ensis californicus.

Collecting data: Our experience has been to find this species exceed--ingly rare. We have dredged great numbers with the 25 fathom gravel off Red--ondo Beach but by the very nature of the bottom and the dredgings it was a very low ratio of recovered complete specimens. The species is quite fragile. We have sets in our collection labelled as from San Pedro Bay and from Terminal Island collected by Mrs. W.H. Eshnaur and others in the years before the dredging of Deadman's Island etc. Some of the members have repor--ted taking it in Newport Bay (Burch); specimens in the Los Angeles Museum from Long Beach collected by Mrs. Burton Williamson (Dr. H.R. Hill)

Genus Siliqua Megerle von Muhlfeld, 1811. Type, S. radiatus Linne (fide Dall, 1900). " Shell ovate, flattened, straight, with a rib or clavicle ventrally directed; hinge like Ensis, but more feeble" (Dall, 1900).

Siliqua lucida (Conrad), 1837. Bolinas Bay, Calif. (Clark, Nautilus 28, p.27) to Todos Santos Bay, Lower Calif. (Dall). Type locality, near Santa Barbara.

The problem with this species is to separate it from the young of Siliqua patula. This is particularly confusing to the collector who may as we have done at the mouth of Morro Bay, collect both species together. Grant and Gale, 1931 state, p. 390 " ... but lucida can be distinguished by its narrower and higher internal rib crossing the shell at right angles, by its shorter anterior extremity, by its blunter posterior extremity, and by its more arcuate ventral margin."

Collecting data: Taken littoral in the sand at low tide at the entrance to Morro Bay, San Luis Obispo Co., June, 1935; Avila, Calif. 5/1936; dredged off Monterey, Calif. in 20 fms.; off Santa Monica in 5 fms.; off Redondo Beach, Calif. in 15 to 25 fms.; and dredged off Ensenada in Todos Santos Bay in 15 fms.; taken littoral at Pacific Beach, San Diego Co. (Burch).

Siliqua media (Sowerby),1839. " Arctic Ocean and south to the Okhotsk Sea, Bering Sea, and eastward to Cook's Inlet, Alaska" (Dall, 1921).

This species has been the subject of rather extensive discussion. According to Grant and Gale, 1931, Dall erroneously attributed this species to Gray,1839. They furthermore place it in the synonymy of the species Siliqua alta stating " The form figured by Dall as media .., and Dall's description together with a specimen in the Oldroyd collection at Stanford University which was labelled by Dall in Washington, agree exactly with the young of S. alta. However, we have the following statement from Dr. A. Myra Keen (Personal Comm., Dec. 1944) " The type locality of Siliqua media was not given in the original. According to McQuillan, who made a special study of Siliqua on the West Coast, there are four recognizable species (See Wey--mouth and McQuillan, " Relative growth and mortality of the Pacific razor clam(Siliqua patula)..." Bull. Bureau of Fisheries, v.1. 46, Bur. Fish. Doc. no. 1099 for 1930,1931, which may be obtained from the Superintendent of Documents, Washington, D.C. for 15 cents). To quote the above reference --" We consider that there are four species of Siliqua on the West Coast of North America; S. media,found in the Bering Sea and Arctic Ocean; S. alta in Cook Inlet and westward to Bering Sea and Siberia; S. patula from the Aleutian Islands to Pismo, Calif.; and S. lucida , from Monterey, Calif. to Lower California. All authorities agree that S. media and S. lucida are distinct species. The present view differs from that of Dall in two respects. S. patula nuttallii and typical S. patula , which he considers connected by gradations, we are unable to separate on reliable criteria and are forced, therefore, to deny to nuttallii even subspecific rank. S. patula alta , considered by Dall a s a variety of S. patula, we find undoubtedly entitled to specific rank."..." The most notable character in S. alta is the pigmentation. All exposed parts of the mantle, siphon, and foot are colored by a chocolate-brown pigment which immediately distinguishes it from S. patula, which is entirely without this coloration."

Siliqua patula (Dixon), 1788. Arctic Ocean to Pismo, Calif.
Type locality, " Cook's River, northwest coast of America"

The discussion under S. media should be notes in connection with this species. Grant and Gale, 1931, p. 388 report " This species, well known as the edible razor clam, has been thoroughly studied by the Fish Commiss--ion. Thousands of specimens have been examined, their characters and habits analyzed,and the conclusion reached that the differences between the north--ern form (patula) and the southern form (nuttallii) are environmental , not genetic. Thus these two names must be considered absolutely synonymous . It is nevertheless worth while to note that the cold climate of the north causes the northerly individuals to grow more slowly, though they live longer and in the end attain a larger size, having a somewhat different, more weath--er beaten appearance than their southern brothers. On the other hand the form, alta , usually considered a variety of patula , is shown to be a dis-

-tinct and clearly recognizable species. It is distinguished by its greater proportionate altitude, increasing posteriorly, by its shorter anterior end, both of its ends being much blunter, and by the fact that the internal rib runs from the hinge nearly straight across the shell."

It is therefore, our opinion that Siliqua patula nuttallii (Conrad) should be placed in the synonymy of typical S. patula (Dixon).

Collecting data: Abundant on the beaches below Astoria, Oregon 8/1936; and common on the ocean side of the strand forming the seaward side of Morro Bay, San Luis Obispo County; S.E. Alaska to Aleutian Islands (Umnak) (G. Willett); Puget Sound (Trevor Kincaid); Cordova and Sitkalidak Id. and near Juneau, Alaska and Pacific Beach, Wash. (W.J. Eyerdam).
Siliqua alta (Broderip and Sowerby), 1829. " Arctic Ocean, south to Cook's Inlet, Alaska, and to the Okhotsk Sea" (Grant and Gale, 1931). Type locality Arctic Ocean.

Discussion of this species which was considered by Dall to be a subspecies of patula will be found above under S. media and S. patula.

Grant and Gale state that this species has a vertical internal rib whereas patula has a diagonal internal rib.

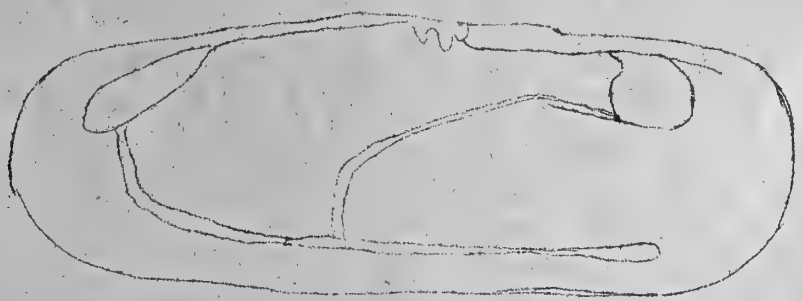
Collecting data: Mr. George Willett mentions the fact stated by Wey-mouth and McQuillan that the soft parts of alta are of a different color. Alaska Penninsula, Unalaska Island (G. Willett); Uyak Bay, Kodiak Island and Illulliak Bay, Unalaska Is. " This is a very distinct species and seems to be uncommon" (W.J. Eyerdam).

Tagelus

The following note by Thomas A. Burch is an explanation of his drawings MS 4414,4415,4416 on the following pages.

" After drawing the accompanying figures of T. californianus and T. subteres , I was at a loss to see any means of separating them without adding the violet color and characteristic epidermis to the drawings. I then looked in Grant and Gale a nd noted that T. subteres is in section Mesopleura which is distinguished from Tagelus in that the shell has an ' internal radial rib, ventrally directed '. I then reexamined my specimens and by using but a very slight amount of immagination this rib could be seenand felt with a pin. One young specimen, which incidentally was in with the T. californianus , had a very distinct internal ray, two had visible rays, but most (14) had but a slight thickening which could be felt but not easily seen.

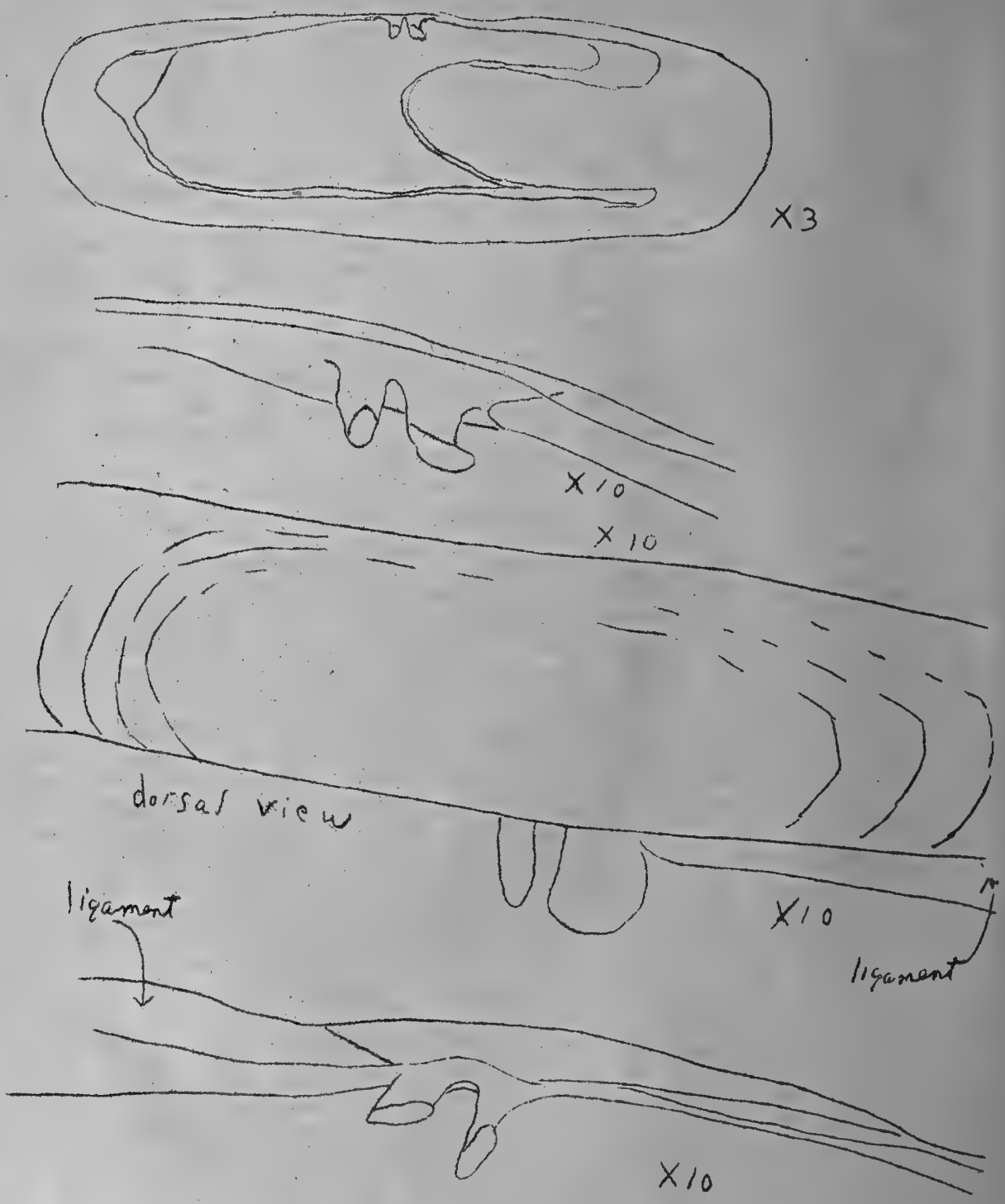
Tagelus affinis is easily distinguished from the above by its stubbier shell and by the pallial sinus which extends anterior to the hinge."



Tagelus affinis C.B. Adams, 1852 MS 4416
Almejas Bay, Lower Calif., Mex.

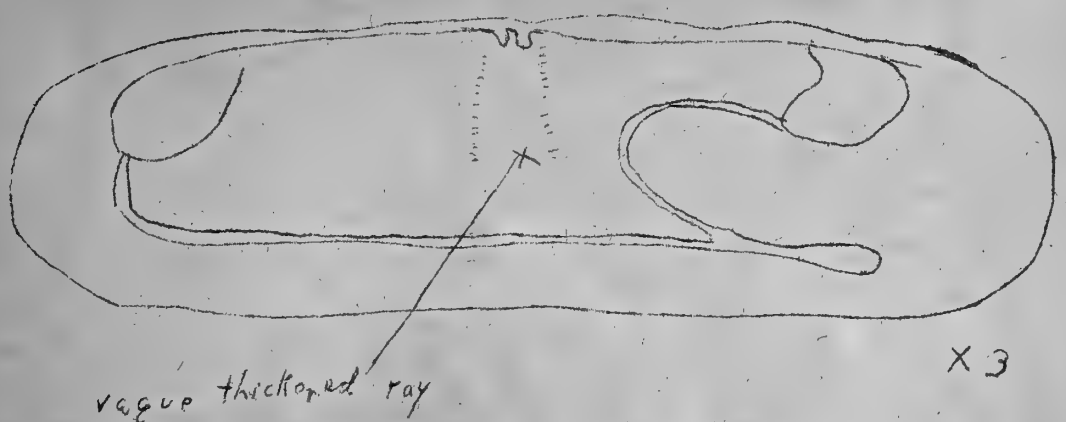
Tagelus californianus (Conrad),1837. Magu Bay,Calif. Mud flat,5/37
(Note* enlarged drawings not same specimen as smaller drawing).

MS 4414



Tagelus subteres (Conrad),1837. Mugu Bay, Calif. Mud flat. 5/37

MS 4415



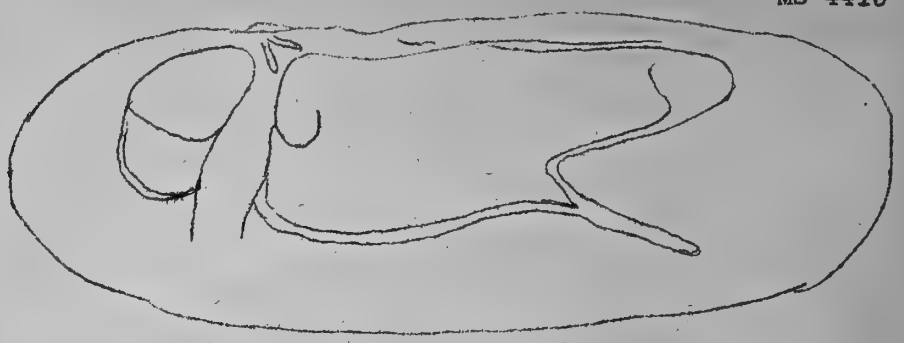
The following note by Thomas A. Burch is an explanation of his drawings of Siliqua patula and Siliqua lucida on the following two pages.

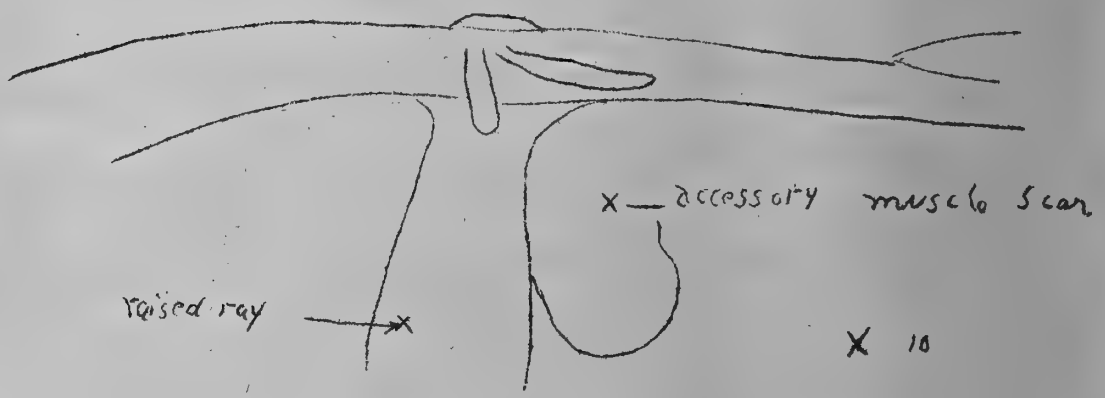
" Undoubtedly the easiest way to distinguish Siliqua patula and Siliqua lucida of the same size is by the angle that the thickened ray bears to the dorsal margin of the shell -- in S. lucida it is practically 90 degrees while in S. patula it is almost 45 degrees. In addition reference to the figures or specimens will show that while similar, the hinges in the two species are quite distinctive. Incid--entally in Dixon's original description of S. patula as given in Oldroyd, if posterior is inserted instead of ' lateral' or ' side' in referring to teeth it makes sense-- otherwise it doesnt to me since there are no lateral teeth.

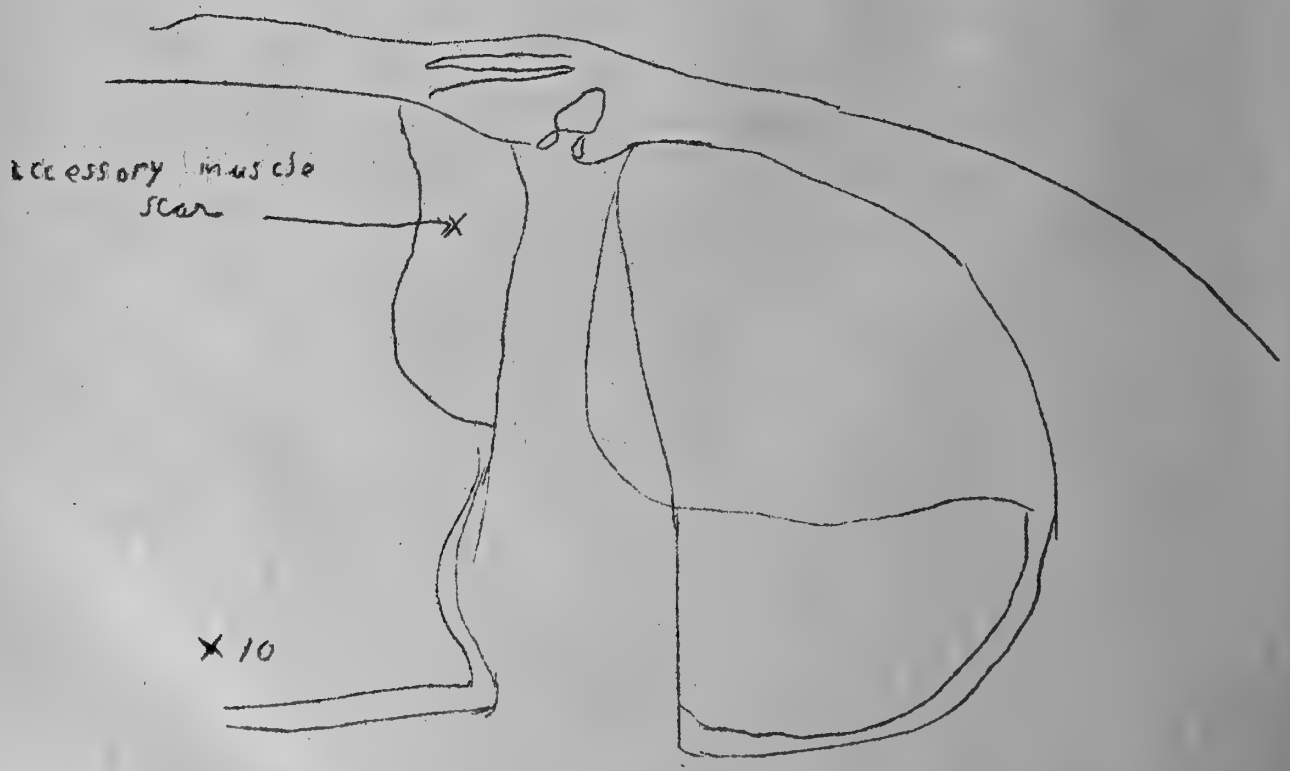
I have just looked at Keenand Frizzell's Key, Grant and Gale, and Oldroyd and in none of these do I find any mention of the fact that the thickened ray passing through, down from the hinge appar--ently divides the anterior adductor scar into two portions, thereby forming an accessory muscle scar. Another reference to the drawings shows that these muscle scars are a different size and shape in these two species, and hence may be used as a third criteria for identi--fication."

Siliqua lucida (Conrad), 1837. Santa Monica, Calif. 10 fms. 12/35

MS 4413



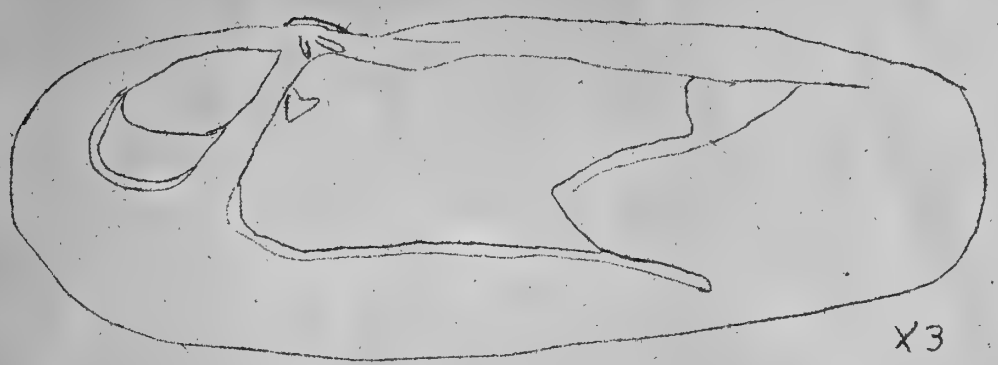




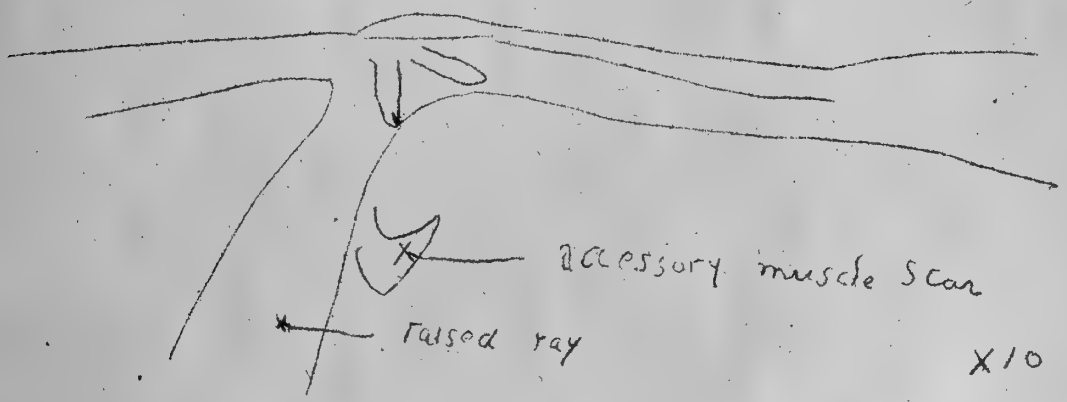
#43 p 33

Siliqua patula (Dixon), 1788. Morro Bay, Calif. Lit. Sand, 1/1938

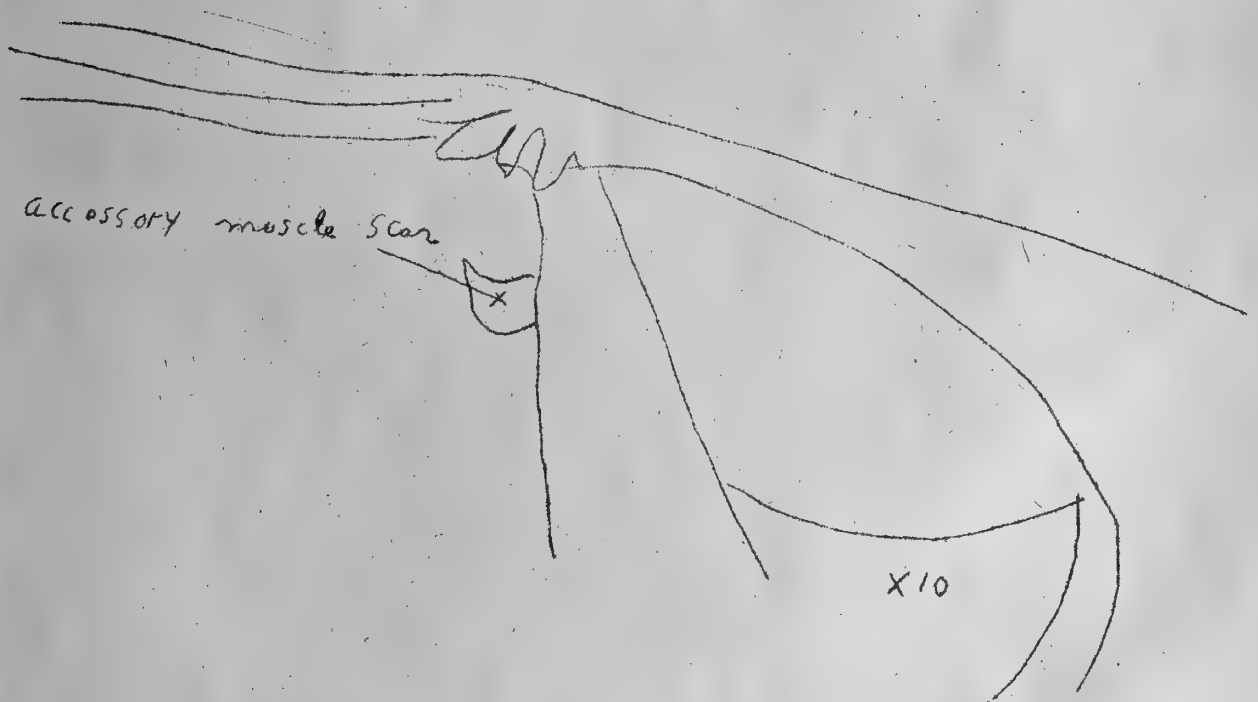
MS 4412



X3



X10



X10

Corrections and Additions

Minutes # 42, p. 6 Dr. A. Myra Keen advises that * The type locality of Transennella tantilla (Gould) is Santa Barbara not Pliocene of Kettleman Hills.

Min. #42 p 6 Dosinia ponderosa Gray,1838. Records of the San Diego Museum- La Libertad, Son., Mex. 1935; Pts. Penasco, Sonora,1934; Angeles Bay,1932; Acapulco, Mex. 1930 in 20 fms. (Lowe); Guaymas,Sonora,1930; Carmen Id. 1932; Conception Bay, 1932; San Quintin Bay (Orcutt); Mazatlan, Mex.; Scammon's Lagoon, L.C. (Capt. Porter); fossil in San Diego Bay.

Min. #42 p 6- Tivela stultorum (Mawe),1823. Cambria, Calif., large (Wilcox); Turtle Bay, L.C. (Hemphill); Long Beach, Calif. (Lowe); Coronado Beach (Bristol); San Diego, Calif. medium and small (Hemphill and Baker).

Min. #42 p 6- Transennella tantilla (Gould),1852. San Francisco Bay (Button) Santa Barbara, Calif. (Button); San Pedro, Calif. and Puget Sound (Lowe).

Min. #42 p 7 Amiantis callosa (Conrad), 1837. Magdalena Bay, L.C. (Capt. Porter); Pta. Banda (Orcutt); Todos Santos Bay (Hemphill); Santa Maria Bay (Orcutt and Harrison); Coronado Beach; Anaheim Landing (Emery). We are also given an Orcutt record of this species from Santa Barbara, Calif. but this would be an extension of range northward 100 miles and should be checked.

Min. #42 p 7 Pitar newcombianus (Gabb), 1865. La Jolla, Calif. in kelp roots (Wilson); Catalina Island (Lowe); La Paz, L.C. (Capt. Porter); Magdalena Bay, L.C. in 10 fms. (Lowe, 1931); Manzanillo, Mexico in 20 fms. (Lowe); Conception Bay, in 15 fms. (Lowe); San Jose Id. (Lowe); La Paz, L.C. (Lowe); San Carlos Bay and Angeles Bay (Lowe, 1932). Note* This Manzanillo record by Lowe is an extension of range southward being on the mainland and perhaps 100 miles south of the mouth of the Gulf of Calif.

Min. # 42 p 8 Antigona fordi (Yates), 1890. Long Beach (Orcutt); Pt. Loma (Wilson); La Jolla, Calif. (Wilson); So. Coronado Id. (Capt. Porter); Catalina Island in 35 fms. and off San Pedro (Lowe); Pt. Vicente, Calif. (Chace).

Min. #42 p 8 Saxidomus nuttalli Conrad,1837. San Diego Bay (Bristol); San Diego (Hemphill); San Pedro and Santa Barbara (Lowe).

Saxidomus giganteus Deshayes,1839. Puget Sound and Sitka (Lowe); Fidalgo Id Wash. and Orcas Id., Puget Sound in 10-20 fms. (Baker); Idaho Inlet, Alaska (Stephens).

Min. # 42 p 11 Humilaria kennerleyi (Carpenter in Reeve), 1863. San Juan Island, Puget Sound (Oldroyd)

Compsomyax subdiaphana (Carpenter), 1864. San Pedro, 15-30 fms. (Lowe); Drakes Bay, Puget Sound (Oldroyd); Orcas Id. in 10-25 fms. (Baker & Oldroyd).

Min. # 42 p 13 Protothaca staminea petitii(Deshayes) Sitka, Alaska (Lowe). This record from the San Diego Mauseum is of particular interest. We would like to know exactly what Lowe identified as petitii. Species is questioneed.

Min. # 42 p 15 Liocyma viridis Dall, 1871. Kyasaka Harbor, 50 fms. (Lowe)

Min. #42 p 15 Irus lamellifer (Conrad), 1837. Ocean Beach, Calif. not comm- -on in clay (W.K. Emerson); Monterey, Calif. (Hemphill); Cambria (Hemphill); San Diego Bay and San Pedro (Lowe).

Min. # 42 p 16 Gemma gemma Totten,1834. San Diego Bay, 3 valves (Dr. Fred Baker); San Francisco Bay (Chaney);

Min. # 42 p 16 Psephidia lordi (Baird),1863. Catalina Island in 4 fms.(Lowe); Orcas Island, Puget Sound (Baker); Drier Bay, Knight Id. Alas ka and Ellam- -ar, Alaska (Baker).

Family MACTRIDAE

Genus Anatina Schumacher,1817. Type (by monotypy), Anatina pellucida Schumacher -- Mactra anatina Spengler. (fide Grant and Gale,1931,p 406).

" Shell small or medium in size, thin-shelled, ventricose, beaks adj--acent, posterior gaping, laterally somewhat flattened, sub-rostrated; sculpture consisting of fine growth lines only or of growth lines and concentric undulations; hinge with prominent chondrophore; cardinal teeth small but definitely formed, partly overhanding the chondrophore; anterior lateral obsolete, posterior small and short; hinge plate excavated in front of cardinals, flattened behind; ligament separated from chondrophore by a shelly wall; pallial sinus short, broad, not confluent below with the pallial line."

Subgenus Raeta Gray,1853. Type (by monotypy), R. campechiensis (Gray),1825 -- canaliculata Say,1822 == Lutraria plicatella Lamarck,1818.

" Shell rather large, convex, compressed posteriorly; sculpture of concentric plications, surface of fresh specimens vermiculate" (Grant & Gale).

Anatina (Raeta) undulata (Gould), 1851. " San Pedro, Calif. to Panama" (Dall, 1921). Type locality, La Paz, Lower Calif., Mexico.

Grant and Gale,1931, p. 407 state " Recent specimens of this species from La Paz, the type locality, have the umbones noticeably anterior to the middle of the shell. In the Stanford collection specimens labelled San Pedro which look like Pleistocene fossils have the umbones nearly medial"

Our only experience in collecting this species was the finding of a number of more or less broken valves washed in on the sandy beach below Ensenada, Mexico. In these specimens the umbones are noticeably anterior as Grant and Gale state of the La Paz specimens. Later in our dredgings in Todos Santos Bay we brought up only very badly broken fragments. This species is so fragile that it sounds discouraging to me to expect to dredge them in good condition. Of course, it is not from deep water. (Burch). Dr. Howard R. Hill of the Los Angeles Museum reports that the museum has specimens from Long Beach and Terminal Island and that they all have the umbones anterior to the middle of the shell.

The distinguishing features of the four genera involved in this family in our fauna as adapted from the " Key to Pelecypod Genera" , Keen and Frizzell are:

With an A shaped cardinal toorh	Anatina
Shell broadly gaping behind	Schizothaerus
Chondrophore set off from ligament by a shelly lamina..	Mactra
Chondrophore not " " " " "	Spisula

Genus Mactra Linnaeus,1767. Type (by subsequent designation Fleming,1818) Cardium stultorum L. (The designation by Fleming is given us by Dr. A.M. Keen (Per. Comm. Dec. 1944). Grant and Gale gave designation by Gray,1847. Dall, Bartsch and Rehder,1938 refer it to Anton,1839.

" Dentition normal in number and distribution of teeth; ligament set off by a shelly lamina rising between chondrophore and ligament; cardinals generally coalescent above; laterals smooth or finely granular."

Under the subgenus Mactrotoma Dr. Dall described several Sections and each of three west coast species under different Sections. The con--sensus of opinion seems to be that the distinctions are so small that they should be adequately covered in the specific descriptions. Therefore, we shall not consider subgenera.

To state that our knowledge of this group has been in a state of confusion would be a great under statement. There seems to be little excuse for this because our species are not difficult to distinguish. The difficulty is purely one of nomenclature. Therefore, in this paper we shall not attempt to rectify the many conflicts in the taxonomy, but propose to retain the names commonly applied to each species stating the problems involved. An effort will be made to figure each species and give enough information about it to enable students to know which species we are discussing.

Mactra californica Conrad,1837. Neah Bay, Washington to Panama. The range of this species has been a matter of much discussion. Pilsbry and Lowe, (Proc. A.N.S.P. v.84,1932) discuss the species in their key on p. 88 and figure it pl. 16. Dr. A. Myra Keen (Per. Comm. Dec. 1944) states " Eric Jordan collected M. californica at Manuel's Lagoon; Wiedey and Valentine collected some specimens at La Paz, which are in our collection, and we have one lot recently sent in by a collector in Panama from Venado Island, Panama Bay which is not more than subspecifically distinct from M. californica. " " According to Pilsbry and Lowe's key the specimens of Mactra from Panama are M. californica."

The type locality is Santa Barbara. Grant and Gale, 1931, p. 393, state the data on this very well " This is the common small Mactra of southern California. It is rather flat, elongate, and the laterals are short and close to the cardinals and chondrophore. It is the type of Dall's section Micromactra."

Mr. A.M. Strong calls attention to the fact that the undulations or waves near the umbones form a distinguishing feature of this species in our fauna.

Collecting data: Very common in the lagoons and bays and easily spaded up from 3 to 6 inches below the surface of the sand. We have taken it by hundreds from Newport and Anaheim Bays. It does live in the open sea though and is rather common as a beach shell from Long Beach to Huntington Beach in our experience. (Burch). Reported by W.J. Eyerdam from Clallam Bay, Strait of Fuca.

See figure on following page.

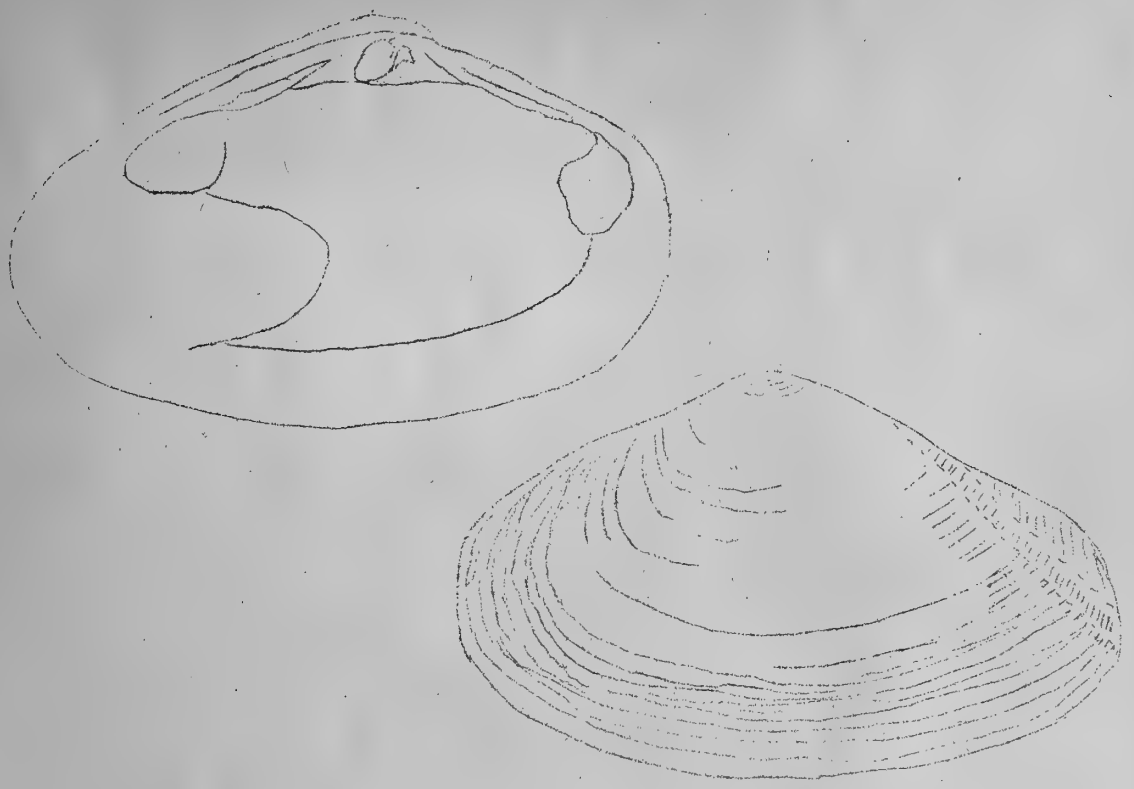
Mactra nasuta Gould,1851. San Pedro, Calif. to Mazatlan, Mexico. Type locality, San Pedro and Mazatlan.

There has been a great deal of confusion about the name nasuta , but the shell local collectors have been so labelling is certainly the same species Dr. Dall called nasuta. Our shell is almost identical with the figures of fragilis to which Dr. Dall compared nasuta. This will be shown in the following figures.

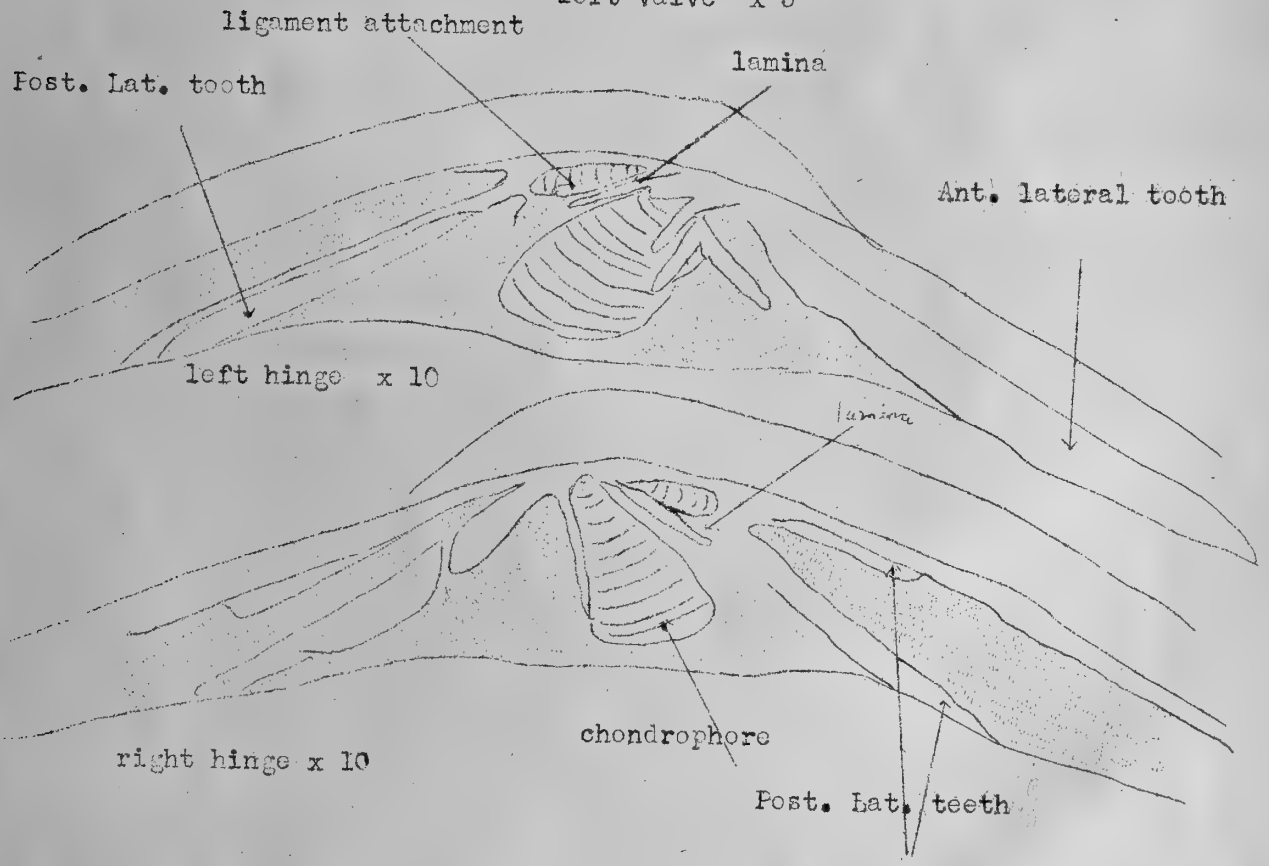
We must definitely take issue with the following statement of Grant and Gale, p. 405 " Mactra nasuta Gould, which was stated to inhabit Mazatlan, Mexico and San Pedro, California, may be a rare species which is now not definitely known. The shells in California collections which are labelled M. nasuta generally prove to be the young of Schizothaerus nuttallii." The shells we have been labelling nasuta from Newport Bay, San Onofre, Punta Banda etc. are definitely placed in Mactra by the hinge. Furthermore, in collecting them they are instantly separable from the common californica by a difference in the color of the periostracum which is rather a shiny gray on nasuta and a dull brown on californica. Habitat about 6 inches below the surface of the sand in sandy lagoons or beaches. Dr. A. Myra Keen (Per. Comm. Dec. 1944) " Our specimens, which have the shining gray epidermis you mention and are definitely not young Schizothaerus , are all from San Pedro."

Con. page 7

Mactra californica Conrad, 1837
Newport Bay, Calif. MS 451

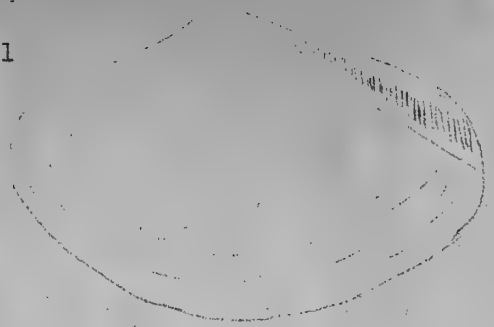


left valve x 3



Mactra nasuta Gould, 1851
Newport Bay, Calif. 2/37

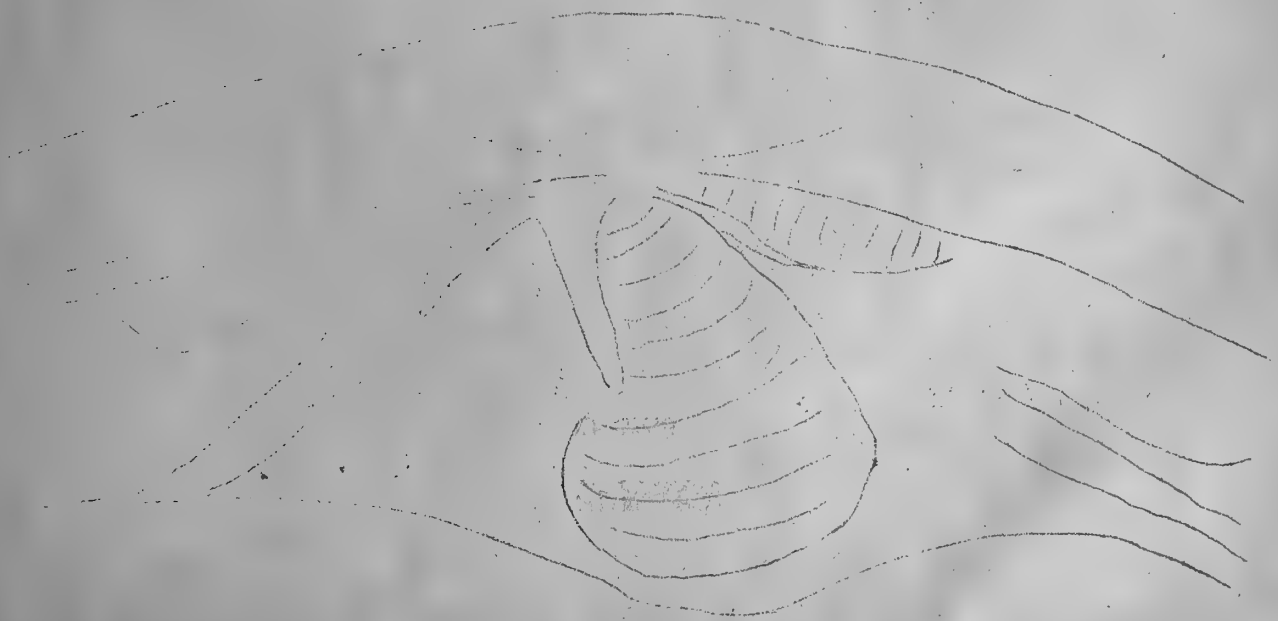
MS 459



left valve x1

Ant. lat. tooth

left hinge x 7



right hinge x 7

Mr. A.M. Strong (Per. Comm. Dec. 1944) gives some very interesting comments on Mactra nasuta Gould. " This was described in Proc. Boston Soc. Nat. Hist., vol. 4, p. 87. I find no reference to a figure. Carpenter, Rept. 1863 says (suppressed) but revived for young shells from Santa Barbara. He does not state by whom it was suppressed or why. Packard states it is not of Carpenter. Dall, Trans. Wagner Inst., vol.3, pt.4, p. 894, stated that Mactrotoma fragilis Gmelin referred to by Carpenter from the west coast should be M. nasuta Gould. Carpenter's references are Rept. 1856, p. 243,246,304. The type locality is given by Oldroyd as Mazatlan. Carpenter lists it from Lower California but not from the Gulf. Pilsbry and Lowe list it as rare, valves on the mud flats, Mexico and Central America, It probably does not reach as far north as California. The following are listed as synonyms and should be checked: M. californica Deshayes, Conch. Ic. Pl. 20, fig. 114 ; M. deshayesii Conrad, Am. Jr. Conch. vol.3, append. p. 46; M. ovalina Wein. not Lam.

The following comments by Mr. A.M. Strong should no doubt have been placed under the discussions of californica. " Spisula californica Conrad. This is the second of the species collected at Santa Barbara by Nuttall and described by Conrad in the Jr. Acad. Nat. Sci. Phila. Vol.7, p. 340, pl.18, fig.12. It definitely is not the shell identified by Cooper and Carpenter and probably by Dall in his earlier writings. Nor is it the shell figured by Packard and reproduced by Oldroyd in Pl. 20, figs. 4,5,6. It probably is the shell figured by Dall in Proc. U.S. Nat. Mus. vol. 66, pl. 20, fig.1, which shows the undulations under the beaks very plainly. It is this shell that is accepted by Pilsbry and Lowe and figured in Pl. 16, fig. 2.

Dr. A. Myra Keen (Per. Comm. Dec. 1944) ".. I include a copy of Reeve's figure of " Mactra californica Deshayes", which must be attributed to Reeve on the basis of priority. This homonym was renamed Spisula deshayesii Conrad 1868, Amer. Journ. Conch. vol.3, no.3, appendix, p. 46. Reeve remarks, "This species is not distinguished by any peculiarity of form or sculpture, and has very much the appearance of a small Mya." That comment certainly applies to his figure. As for most of the other species, the only final solution to our problem is to hunt up the types or ascertain positively that they are re lost, then designate a neotype from the type locality where this seems reasonable. Otherwise, as with the " Panama" ones, probably new descriptions based on good material would be preferable. Pending that, the best course will be, I believe, to write the names as follows : Mactra nasuta Gould (of authors) , or (auct. if you prefer. The whole thing is obviously a bigger problem than we can settle just now. The only types I located on my trip east were Spisula falcata (Gould), USNM 5843, and Mactra dolabriformis Conrad, ANSP 51411.

The following note is by Thomas A. Burch who drew the figures : "Since Dall says that Mactra nasuta is the counterpart of Mactra fragilis it may be of interest to mention a few minor distinctions apparent between our specimens and Dall's figure (of fragilis) . This is concerned with the anterior lateral tooth in the left valve which in both species is partially divided into two teeth. In M. nasuta these are side by side while in M. fragilis they are end to end. Mactra nasuta differs from M. californica in that the anterior end is more rounded in M. californica and also the anterior inferior lateral tooth in the right valve of M. californica is not divided into two separate teeth while it is in M. nasuta. In M. nasuta these two lateral teeth are in line and join the anterior cardinal tooth."

Mactra fragilis Gmelin fide Dall

In leaving the genus Mactra it is obvious that we recognize but two species, M. californica Conrad and M. nasuta Gould. The third name found on most faunal lists is Mactra dolabriformis Conrad,1867. However, the shell accepted and labelled with this name by local collectors is clearly a Spisula . It will be discussed at length.

The following note is from Thomas A. Burch, dated Jan. 10,1945. " I have just finished drawing the Spisulas and making out the key. But before getting to the key, I should explain my ideas as to the hinge of Spisula and its development as shown in our local species and in this way explain my key to species which follows. In my opinion the hinges of S. catilliformis, S. "hemphillii", and S. alaskana are the most primitive, or at least the less differentiated, since these species have but two lat--eral teeth in the left valve and four in the right valve (2 right & 2 left) In the other species of Spisula one or more of these lateral teeth is sep--arated into two more or less distinct teeth. Perhaps erroneously I have considered this a sign of differentiation and therefore advancement. Since I always get confused when teeth are numbered, as in Keen and Frizzell's Key to Pelecypod Genera, I have described the teeth according to their act--ual position with regard to the hinge. A complicated example would be proximal (near the hinge) anterior inferior lateral tooth in the right valve of S. planulata. While this may be confusing also, it can easily be figured out with the shell or drawing.

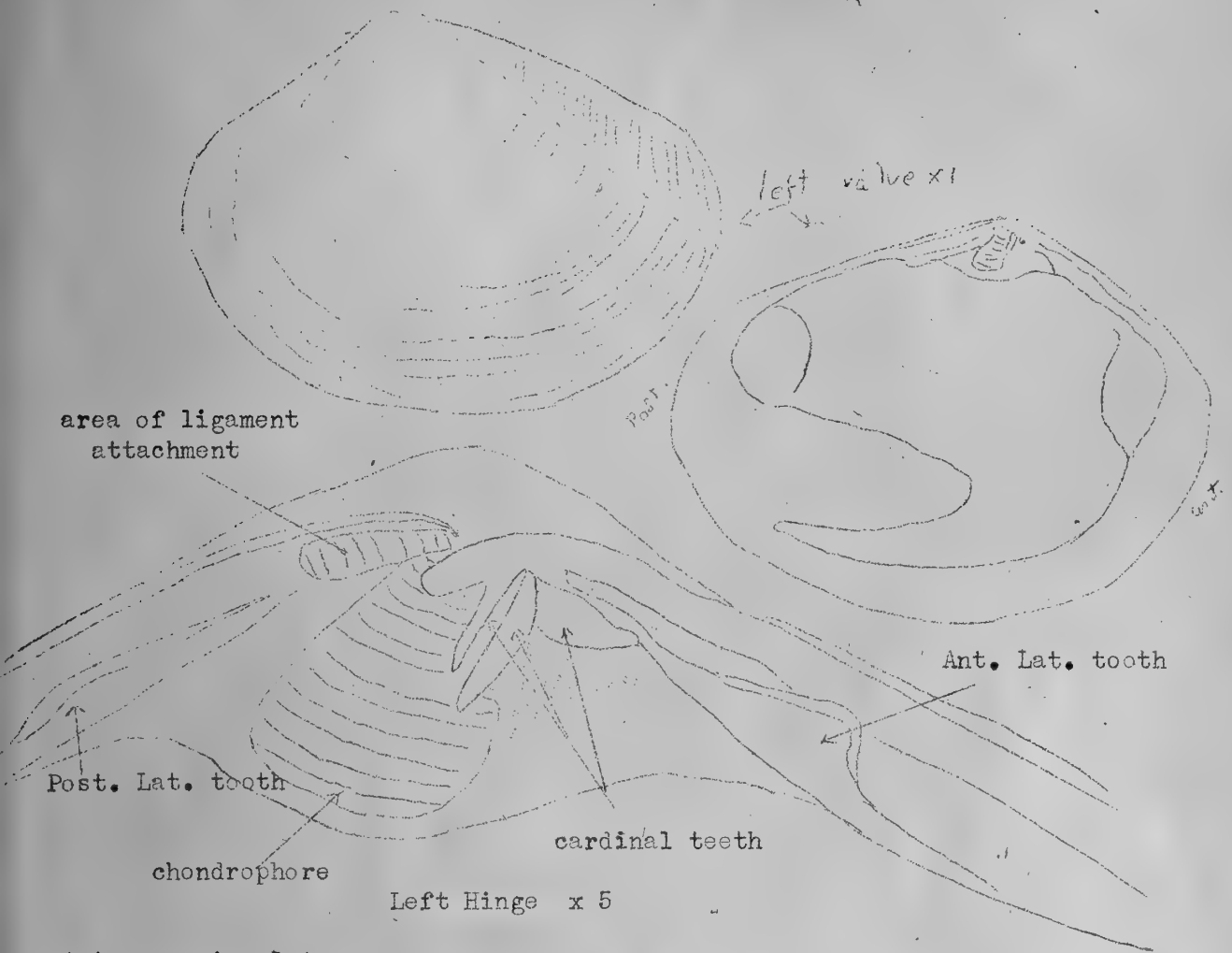
KEY TO SPECIES OF SPISULA

Posterior end longer than anterior
- Pallial sinus deep ..... S. catilliformis
- Pallial sinus shallow ..... S. polynyma alaskana

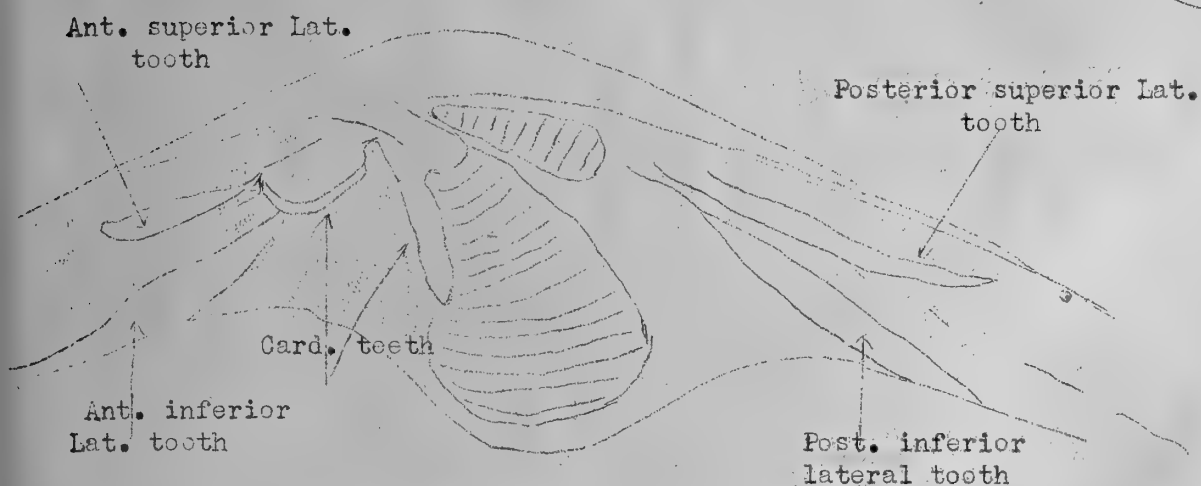
Posterior end shorter than anterior
- Right valve with anterior inferior lateral tooth not divided into two distinct teeth .....S." hemphillii"
- Right valve with anterior inferior lateral tooth divided into two distinct teeth, the proximal joining or nearly joining the anterior cardinal tooth.
  - Left valve with anterior lateral tooth not divided into two distinct teeth
    - Anterior superior margin of shell definitely convex..... ... S. falcata
    - Anterior superior margin of shell nearly straight ..... S. planulata
  - Left valve with anterior lateral tooth divided into two distinct teeth ..... S." dolabriformis"

While I believe that the above key should be adequate to separate these species, reference to the accompanying figures will bring out further differences not only in the shape but in the hinge also. For instance the hinge plate (in our small series) of S. falcata is much smaller in prop--ortion to the cardinal teeth than in either S. planulata or S. " dolabri--formis". The proximal anterior inferior lateral tooth of the right valve is nearly fused with the anterior cardinal in S. "dolabriformis", definitely separated from it in S. falcata and intermediate in S. planulata.

Spisula catilliformis Conrad, 1867 M S 456
Alamitos Bay, Los Angeles Co.



Left Hinge x 5

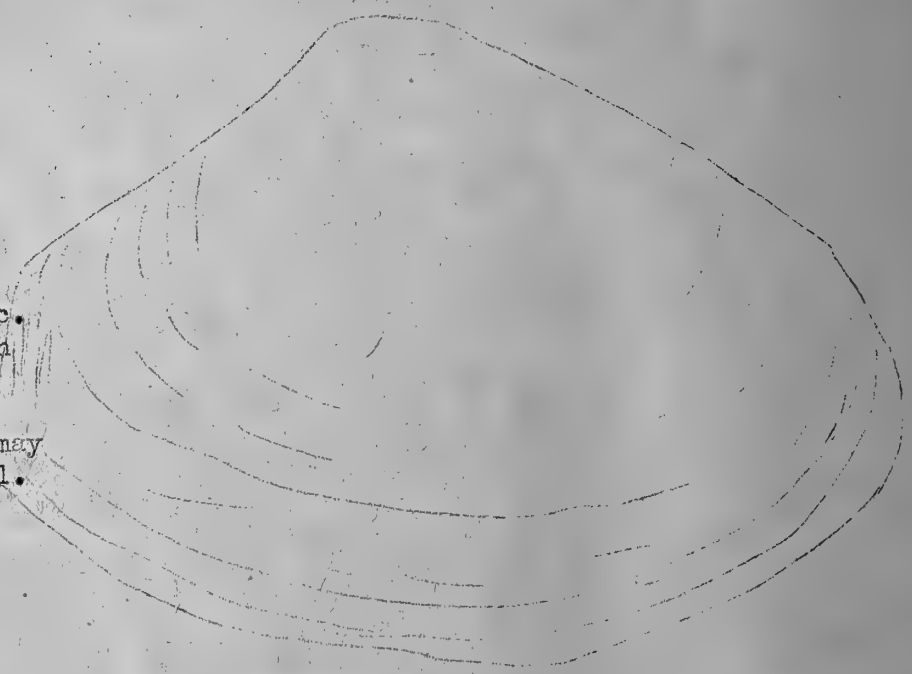


Right Hinge x 5

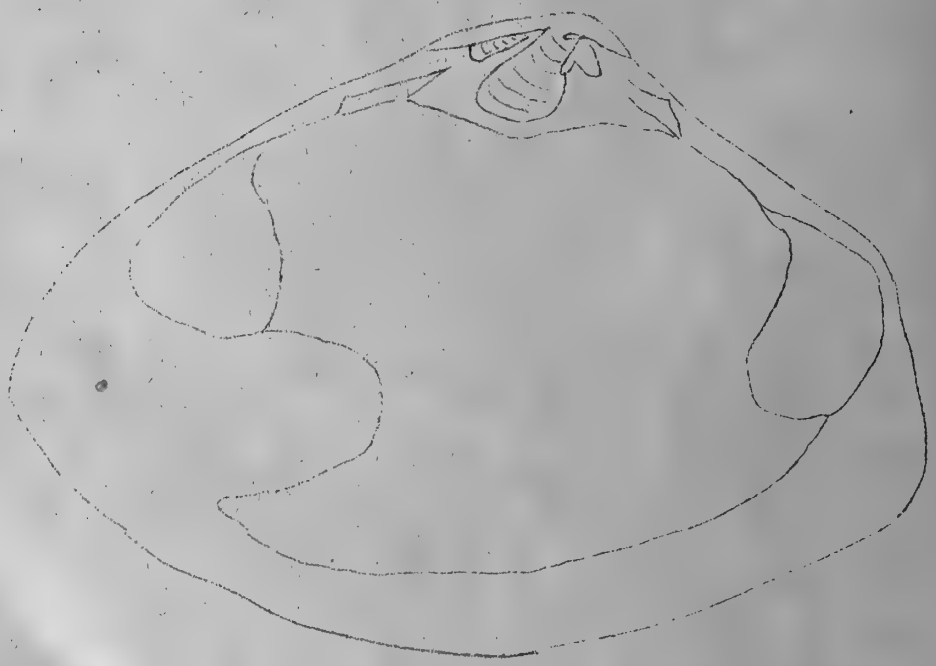
M S 457

Spisula polynyma alaskana Dall,1894
Unalaska, Aleutians, 6/1932
W.J. Eyerdam Coll.- Sandy outer beach

Note- this spec. had been broken & repaired, so this shape at anterior end may not be typical.



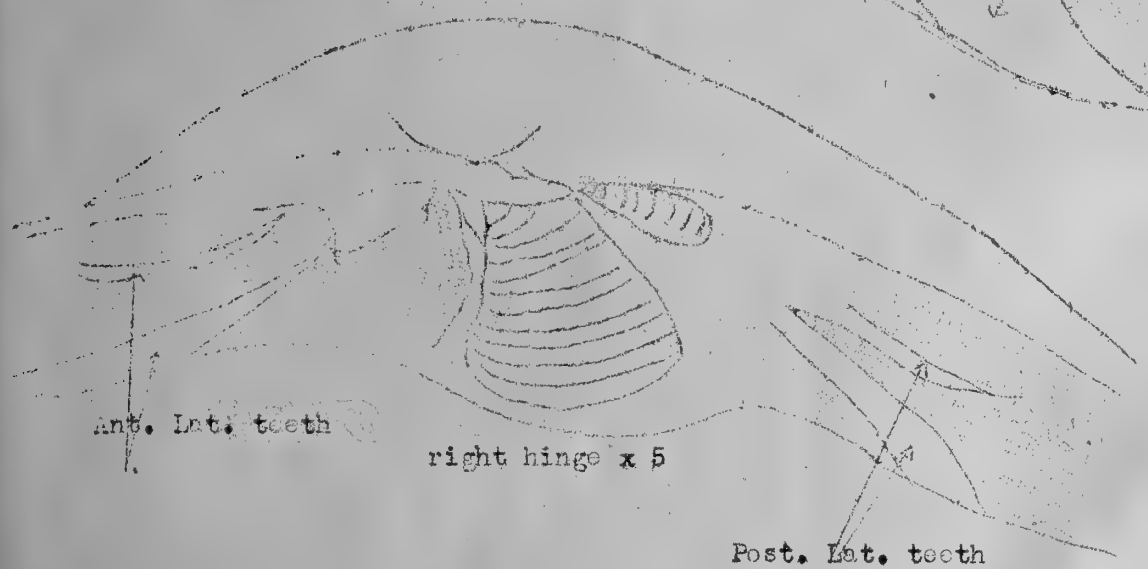
Left valve x 1



Spisula homphillii (Dall),1894
Alamitos Bay, Calif. M S 455

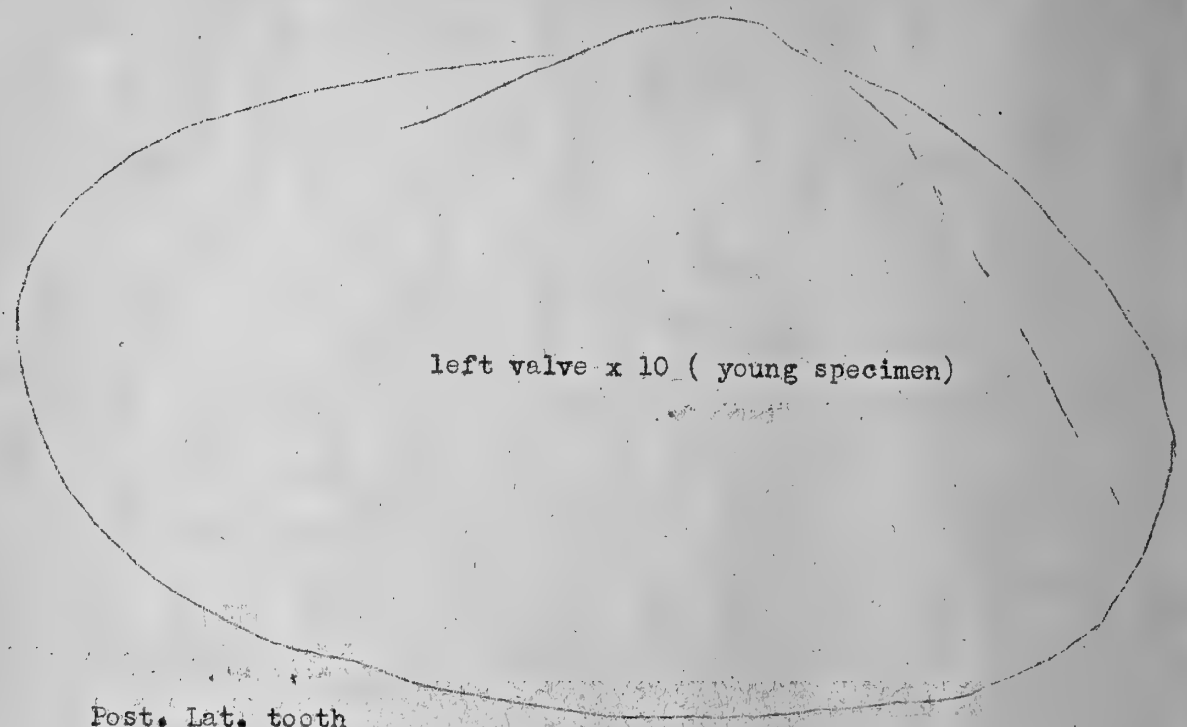
left valve x 1 (young spec.)

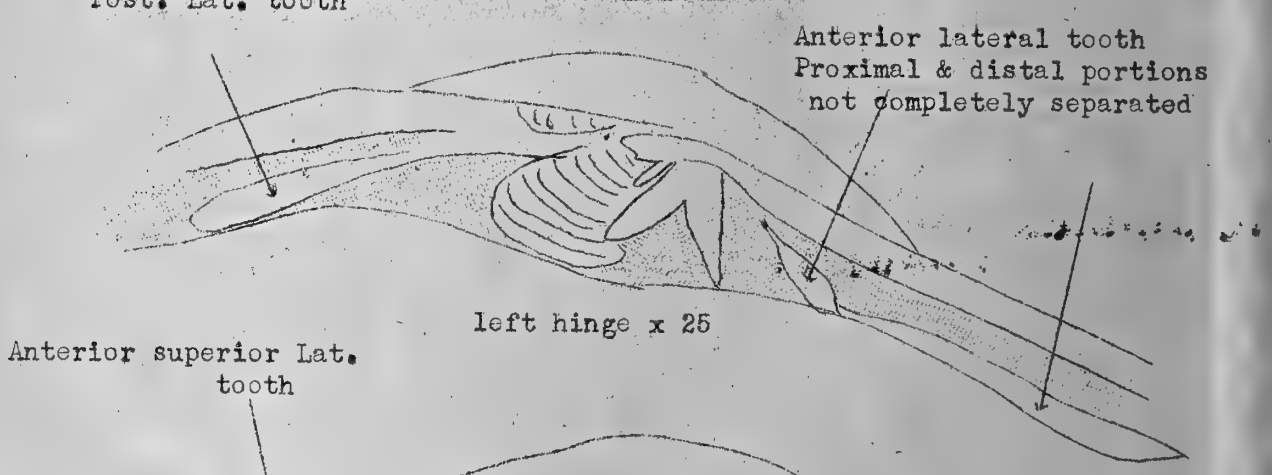
left hinge x 5

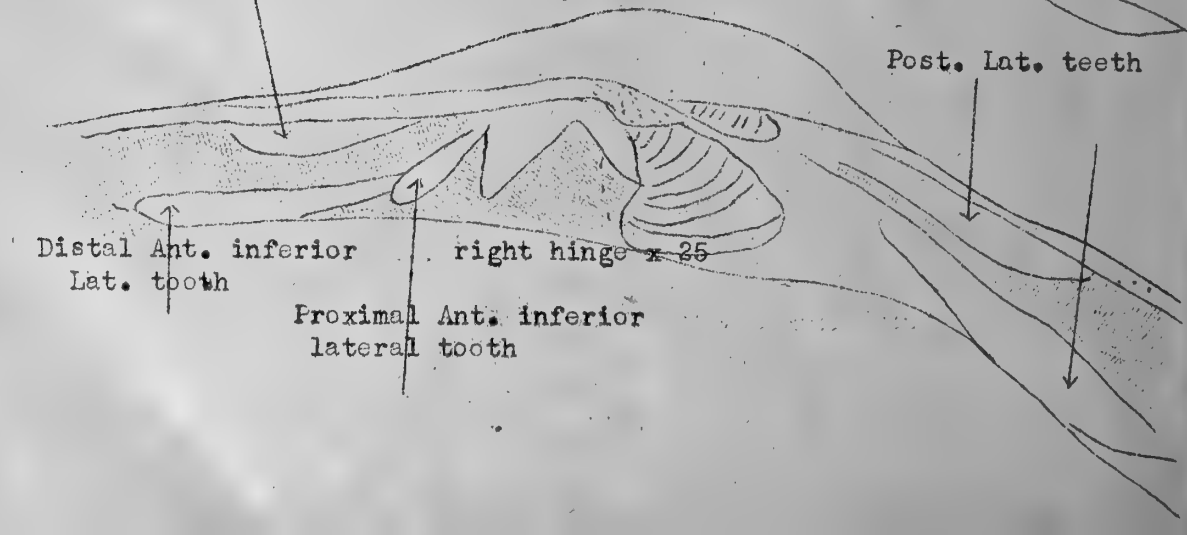


right hinge x 5

Spisula falcata (Gould),1850 M S 454
Monterey, Calif. 20 fms. shale 8/1940

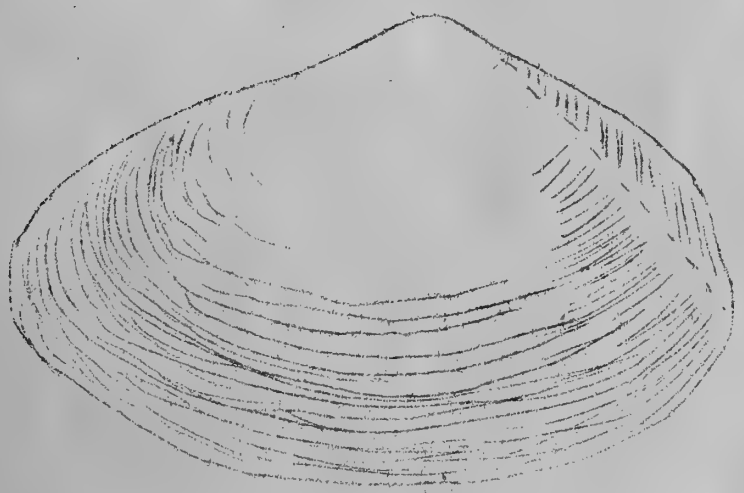




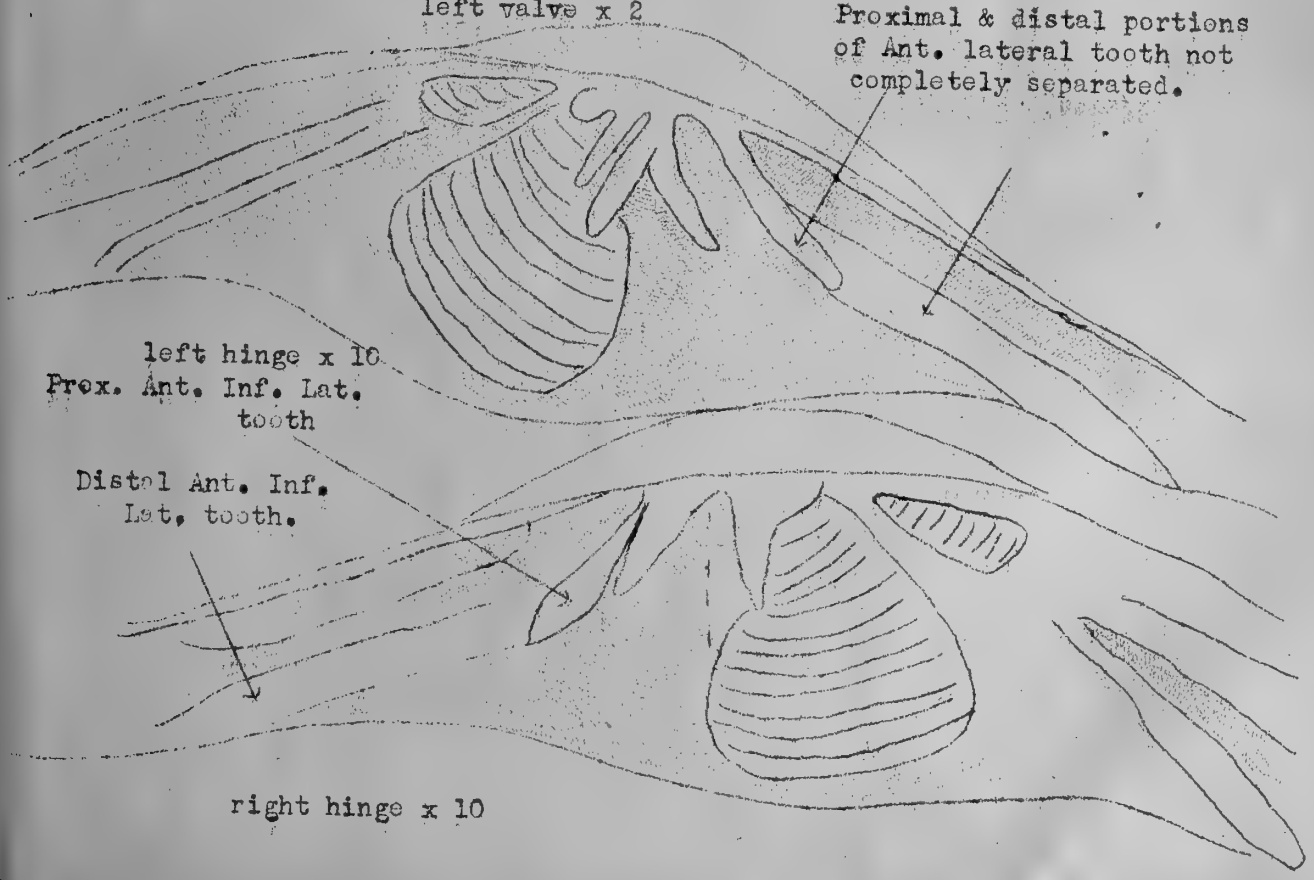


M S 452

Spisula planulata (Conrad), 1837
Morro Bay, Calif. 7/1936

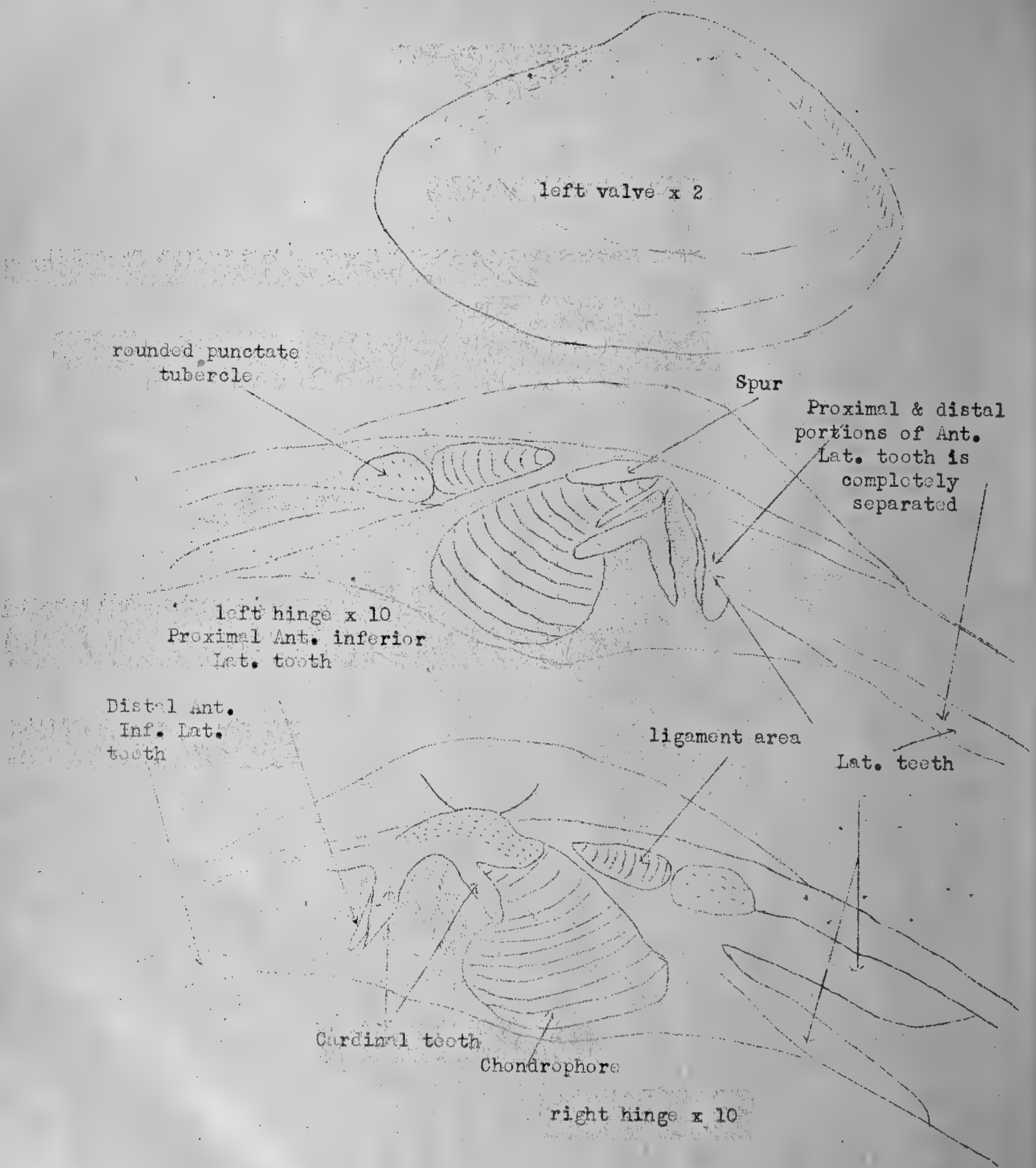


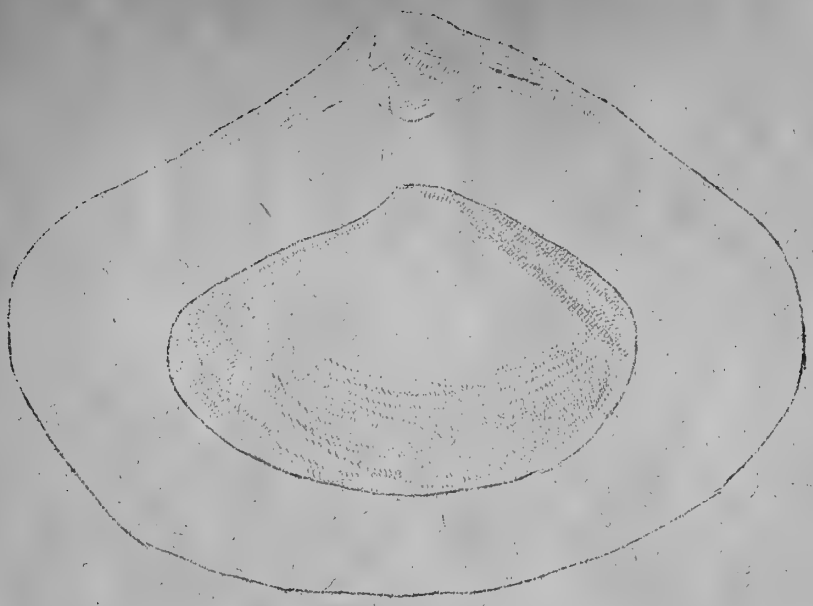
left valve x 2



#44 p 14

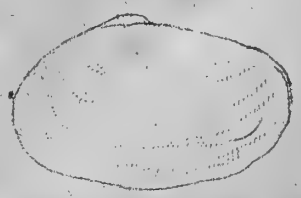
Spisula " dolabriformis" Conrad, 1867
Estero, Todos Santos Bay, Lower Calif., Mex.
10/1936 littoral- sand M S 453



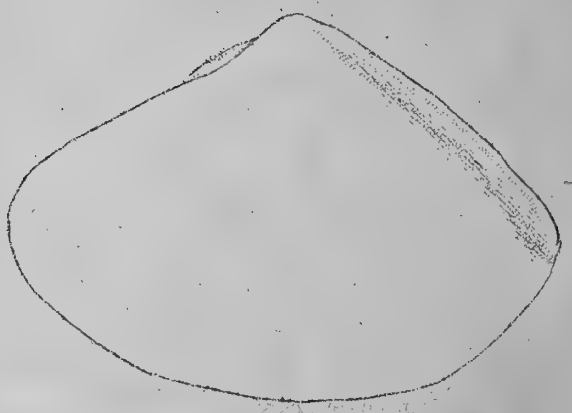


Spisula dolabriformis Conrad
Amer. Journ. Conch. v.5, pl.12, fig.1, 1869.
(original figure of species)

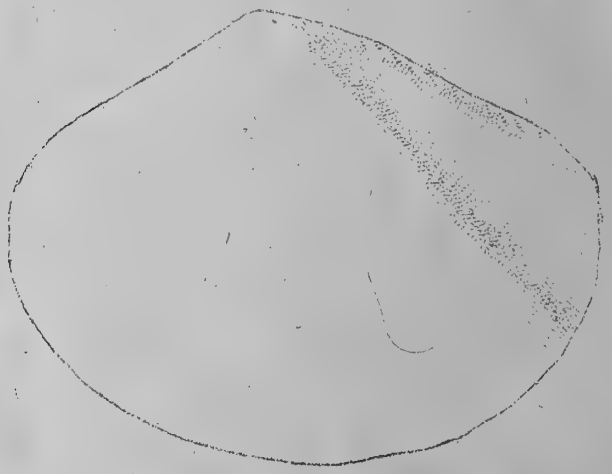
Spisula catilliformis Conrad
Amer. Journ. Conch. v.5, pl.13, fig.1.



Mactra californica "Deshayes" Reeve,1854
-- Spisula deshayesii Conrad,1868.



Mactra dolabriformis (Conrad), 1867
Nautilus, vol.7, pl.5, fig.1
as interpreted by Dall



Spisula catilliformis Conrad,1867
ibid fig.3

Before taking up our distributional study of the genus Spisula and its species it seems logical to consider the dolabriformis problem. The opinions of members and other data will simply be stated without regard for sequence here.

Mr. A.M. Strong (Per. Comm. Dec. 1944) writes of Mactra dolabriformis (Conrad),1867. " This was described in Am. Jr. Conch., vol.3, p 193 and the type locality given as Panama. It was figured in Am. Jr. Conch. ,vol.5, pl.12, fig.1 (p. 108) but this figure seems to have been overlooked as I find no reference to it. Dall redescribed it and figured it in Nautilus, vol.7, p. 138, pl. 5, fig.1. It is also mentioned in Nautilus, vo..8, p.40.

Oldroyd copies Conrad's description but does not figure it. Both Packard and Grant and Gale discuss the species but do not figure it. I find no other figure or description. It is difficult to tell what California shell Dall had in mind. Conrad seems to give a natural sized figure. It is 105 by 75 mm."

Mr. Strong's statement above outlines the question other than consideration of which species Conrad intended to describe since his figure (see figure on page 16 of these minutes) is thought by some to figure two different species. In the preliminary discussions John Burch called attention to the fact that the large outer shell in Conrad's original figure of Spisula dolabriformis is a perfect figure of the shell we have been calling Spisula hemphillii Dall, 1894 and suggested that perhaps Dr. Dall had entirely overlooked this plate of Conrad's which appeared three years later than his original description. The descriptions also seemed to bear out the conclusion that dolabriformis is hemphillii and the species described as dolabriformis by Dall without a name. Dall in his redescription of dolabriformis (Nautilus 7, p. 138) (also see figures on p. 16 of these minutes) states for example " polished white under a dull brown epidermis" which is just what we have in the species we have been labelling with this name. On the other hand Conrad's original description describes an " epidermis yellow-olive" which is exactly what we have in the species we have been calling hemphillii Dall. However, it is interesting to note that both Mr. George Willett and Dr. A. Myra Keen independently suggested that Conrad's figure (see page 15) indicates a composite type and that the smaller figure inside of the larger figure seemed to them to be of a different species. This observation is well stated by Dr. Keen (Per. Comm Dec. 1944) " Reviewing the problem of the Mactridae again, I think you have something, though I wonder if the matter does not present a further complication, thusly: The original description of Spisula dolabriformis Conrad 1867, is as Mrs. Oldroyd copies it, with the added discussion," Somewhat like Mactra exoleta in outline but less elevated and not so ventricose." The first figure, or rather, perhaps, figures, were published by Conrad in 1869, Amer. Jour, Conch. vol.5, pl.12, fig.1. This illustration shows a hinge of a right valve which seems identical to me with Dall's S. hemphillii in all respects; but it also shows the exterior of a left valve only about half as large, longer in proportion, and evidently less ventricose. This figure of a left valve corresponds pretty well with Dall's figure in Naut. vol.7,pl.5, fig.1, in his redescription of Mactra dolabriformis. I wonder, therefore, if Conrad's original specimens did not represent two species, one a Mactra, the other a Spisula. This being the case, one valve would have to be designated by some later author as the lecto-holotype. According to my notes, only one valve is extant, which is No. 51411 in the collection of the Academy of Natural Sciences, Philadelphia. If this is true, the concept of dolabriformis will be fixed when we find out which of the two valves shown in Conrad's figure (if either) is represented. Why don't you write Dr. Pilsbry about it and ask him to make the comparisom.

If you have enough specimens of M. dolabriformis Auct. to spare him one (The Academy never likes to return material), you might ask him to see whether or not this entity is one represented by their type specimen. Perhaps he could lay off their type on a piece of paper and make a tracing of the outline for you, too. Until you can get some such concrete evidence your hunch remains just a well@justified suspicion. I doubt very much whether Dr. Dall ever studied Conrad's type material. Certainly he gave no evidence of it in his discussions. Therefore,he very well could have been wrong in his interpretation of the species." Dr. Keen in another note comments " The locality label (on the type at ANSP) reads " California" even though Conrad cited Panama as the type locality in his description. "

In this connection it might be well to consider the fact that the species we know as hemphillii Dall has in recent years been collected in the Panamic province (Eyerdam from Corinto, Nicauragua), and it is there--fore quite possible that Conrad had that species from Panama.

However, we have the additional complication in that the species most of the members have been labelling Mactra dolabriformis is in fact a Spisula. This point is discussed by Thomas A. Burch in the following note.

"None of the specimens that I have seen adequately fit the smaller shell figured by Conrad as S. dolabriformis, but what we have been calling dolabriformis comes the closest to it. It is possible that when Dall redes--cribed S. dolabriformis he described this smaller shell and then described the larger shell as S. hemphillii. Against this idea is your suggestion that since Dall distinguished very carefully between Spisula and Mactra, he certainly would have realized that the shell under consideration is a Spisula and not a Mactra. Still another point is that his type figure is not the shape of the shell we have been calling S. dolabriformis-- for that matter it is not the same shape as the smaller shell figured by Conrad. In my opinion Dall did not describe either of the shells figured by Conrad but rather figured a species of Mactra which I have not seen from this coast. I also believe that Conrad figured two species, one of which we have been calling S. hemphillii and the other what we have been calling M. dolabriformis. If this be true the name S. dolabriformis should be used for whichever one of Conrad's shells is still in existence (if either). If only the small shell is found, S. hemphillii could still be used for the large shell and Dall's description and figure of S. dolabriformis should be ignored or given a new name.

If you take the opposite view and consider the large shell as type , S. hemphillii would be a synonym , and what we have been calling dolab--riformis would be without a name. It seems more intelligent to leave Dall's unknown species without a name instead."

(see figures on pages 14,15,and 16)

Genus Spisula Gray,1837. Type (by subsequent designation, Gray,1847), Mactra solida (L.).

"... ligament sagittate, set in a callous area close to the dorsal margin and not set off from the chondrophore by any shelly ridge; ."(Dall)

Grant and Gale, 1931 as wellas many others consider Spisula a subgenus of Mactra. Mr. George Willett states their position very concidely " It is easy to say that a little shelly ridge differentiates Mactra from Spisula particularly if you take the other fellow's word for it and do not try to find it for yourself. Sometimes you find it, sometimes you don't".

It is true that this little shelly ridge is easily broken off and not infrequently is lost causing a puzzle. However, it seems to be constant in fresh and well preserved specimens.

Subgenus Hemimactra Swainson,1840. Type Mactra gigantea Lamarck = Mactra solidissima Dillwyn. Dall placed most of our west coast species of Spisula under this subgenus. Grant and Gale, 1931, p. 394 state that " Swainson characterized Hemimactra as being of the general form of Mactra; but the cardinal teeth entirely wanting." For this reason they abandoned its use. However, Dr. A. Myra Keen (Per. Comm. Dec. 1944) remarks " The fact that Swainson was in error as to the presence of cardinal teeth does not invalidate the genus or subgenus. Our concept must be based on a study of the species which Swainson cites. However, none of our west coast species that I have seen seem to have the grooved anterior laterals of solidissima; perhaps Hemimactra should be abandoned on that ground.

Section Mactromeris Conrad,1868. Type (by subsequent designation Dall, 1898), M. polynyma Stimpson.

" Shell of moderate or large size, ovate, subtrigonal; beaks more anterior than in Spisula s.s.; hinge with relatively small, short laterals, an ample chondrophore, and cardinal teeth often small but well formed."

Spisula polynyma alaskana Dall, 1894. " Arctic Ocean at Cape Lisburne, south to Bering Sea and the Aleutians and eastward to Puget Sound (Dall, 1921); north Japan, the Kurile Islands and the Okhotsk Sea (Schrenck).

Two questions of taxonomy are involved here. In the first place is the variety separable from the typical Spisula polynyma (Stimpson),1860 (Checklist East Coast Shells, Smithsonian Misc. Coll. vol.2, Art.6, no.3, p.3,1860) (new name for M. ovalis Gould). Johnson gives the range of the typical from Hudson Bay to Cape Ann and Georges Bank, Mass. In Nautilus, vol.7,p. 138 Dr. Dall named the variety alaskana as follows: The northern form generally referred to M. falcata is a barely separable variety of M. polynyma which may take the name of alaskana." The variety is said to be "less elongate than the typical". Perhaps they are. I have on my table at this time a set from off the coast of Massachusetts (20 mi. N. of Thatchers Buoy), and also a set sent me by W.J. Eyerdam from Unalaska, Aleutian Islands. They are very close but we will retain the west coast name.

However, if we are going to use the varietal name at all, there seems to be an argument there. Grant and Gale, 1931, p. 395 state that " It appears quite certain that variety alaskana Dall and voyi (Gabb) are identical ". If this is to be accepted the name would therefore be Callista voyi Gabb, Geol. Surv. Calif. Palaeo., vol.2, p. 24, pl.5, fig. 41,1866 as the varietal name with alaskana Dall,1894 in the synonymy. The name would then be Spisula polynyma voyi (Gabb),1866. Dr. A. Myra Keen has accepted voyi in the ' Abridged Check List'. However, the type locality of voyi is Miocene or Pliocene near Humboldt Bay below Bear River, Humboldt Co. and it seems that the burden of proof should be definitely upon those who wish to establish a Recent name with a Miocene name.

Collecting data: Reported from S. E. Alaska to Swikshjak, Alaska Peninsula by Mr. George Willett with the comment " Apparently smoother and t thinner than polynyma"; Wachusetts Bay, Admiralty Id., S.E. Alaska,1918; Izhut Bay, Afognak Id., 1922; Cordova and Sitkalidak Id., 1931; Unalaska Id. 1932; and Raspberry Id., Kodiak Group, 1939 (W.J. Eyerdam) with the additional comment " This species does not seem to be common at any place". Chichagof Id. and Admiralty Ids. (Stephens)/

(see figures on p. 10).

Spisula hemphillii (Dall), 1894. Redondo Beach, Calif. (Burch) to Corinto, Nicauragua (Eyerdam). Type locality, San Diego, Calif.

Obviously after the dolabriformis discussion the status of this species is questionable. However, it is easily recognized and not uncommon. Grant and Gale, 1931, p. 398 state of this " This large Mactra differs

from catilliformis in the long anterior portion of the shell, which is concave in profile along a dorsal margin. The hinge is of the same type as that of catilliformis , but the laterals are a little longer. Also, the pallial sinus of hemphillii is more inclined upward ."

(See figures on page 11)

Collecting data: Our experience has been to find this a comparatively common beach shell all the way from Long Beach, Calif. to the beaches below Ensenada,Mexico. Good living specimens are exceedingly rare but are occasionally washed in after heavy blows. We have taken half grown specimens living in Alamitos Bayand other lagoons but have never seen one of the huge adults other than from the open sea. The normal habitat of this species seems to be off shore in comparatively shallow water. However, we have dredged it fromas deep as 25 fms. off Redondo Beach, Calif (Burch); Corinto, Nicauragua (W.J. Eyerdam) with the additional comment " Specimens identified from U.S. National Museum are identical with specimens from Burch collected at Ensenada, Mexico. This is an extension of range of over 1,000 miles." Reported from San Pedro and Long Beach by the San Diego Museum.

Spisula catilliformis Conrad,1867. " Neah Bay to San Diego, Calif." (Dall).

The questions involved in this specific name are well stated by Mr. A.M. Strong (Per. Comm. Dec. 1944), as follows:

" This was described in Am. Jr. Conch., vol.3, 1867, p. 193. It was figured in Am. Jr. Conch. vol.5, pl. 13, fig.1 (p. 108). The type locality is given as Panama. This figure seems to have been entirely overlooked as I find no reference to it. Dall redescribed the species in Nautilus, vol.7, p. 137 and states that nothing like it is known from Panama and the descrip-tion would fit California shells. He states that it is M. californica of Carpenter but not of Conrad. The fig. given by Dall is pl. 5, fig.3 which I do not have.

Oldroyd figured a shell, pl. 24, from the University of California, quite different from that in the Jr. of Conch. She copies Dall's descrip-tion, not Conrad's as stated. Grant and Gale figure a shell from the fossil of San Diego which seems to agree with neither of the above figures.

Packard figures a shell in Bull. Dept. Geol. Univ. Calif. vol.9, p. 285 pl.17,18,19. These should be compared.

A numver of Mactra have been described from Panama and vicinity since Dall's time so his statement that nothing like it is known from Panama is open to question.

The next question is what Spisula californica Carpenter is like. On page 613 of the Suppl. Rept., 1863, he states " Conrad's types being lost, and his descriptions from very young specimens, a difficulty attends their identification. Dr. Cooper found very large valves (resembling Schizothaerus) in abundance, but much deformed by the entrance of sand, and apparently killed by fresh water by a great flood. The larger shells belong to two very distinct species, which are probably those of Conrad. On p. 640 he lists S. californica Conrad (Not Deshayes) , large, shaped like Schizo-thaerus nuttalli , but beaks narrow. This is all the description I can find.

The shell we know as Spisula catilliformis is S. californica Carpenter (not Conrad) and all our descriptions and figures are based on Carpenter's identifications. Applying S. catilliformis Conrad to this shell is open to question. If the name can not be so used our shell is without a name. The main trouble seems to have come from the fact that Conrad's figure, published two or three years after the description has been overlooked."

However, it is the opinion of the group that the shells we are labelling catilliformis fit Conrad's figure in all respects. Check

the figures on page 9 for our shell with the figure on page 15 for Conrad's original figure and on page 16 with a tracing of Dall's figure. In my opinion they are clearly identical.

Collecting data: Our experience has been to find this a comparatively rare species. We have picked up occasional valves washed in on the beaches at a number of localities from Oceano, San Luis Obispo Co. southward. It is not an uncommon shell from Long Beach south to Huntington Beach although good complete specimens are quite rare. We have taken half grown specimens living in Alamitos Bay but like similar specimens of hemphillii they have not been of the huge size attained in the open sea. (Burch). Reported from Long Beach, San Quintin Bay, and Ensenada, Lower Calif. in the Lowe collection in the San Diego Museum.

Spisula falcata (Gould), 1850. Puget Sound to Cortez Banka nd the Coron-ado Islands (Dall). Type locality, Puget Sound.

Grant and Gale, 1931 were disposed to give the range as " Queen Charlotte Islands and Puget Sound, possibly as far south as Cape Mendo-cino but more southerly reports probably erroneous." This opinion has been rather prevalent because it simply did not seem reasonable that the small shells we call falcata in southern California could be the same thing Gould described being 3 3/4 inches long. None of the southern shells remotely approach that for size. There are some excellent figures of falcata, reproduced in Oldroyd, pl.20, figs 1,2,3.

Collecting data: Our experience has been to find this a comparatively common off shore species with a bathymetric range down to around 20 fms. preferring sand bottom. In southern California they seldom exceed an inch in length. We have dredged it from Monterey south to Ensenada.(Burch); Alki Point, Seattle, Wash.' (Eyerdam); Coronado Beach (Emery); San Diego, Calif. (Lowe).

(See figures on p. 12)

Subgenus Symmorphomactra Dall,1894. Dr. Dall in 1894 placed falcata under this subgenus. In 1921 in Bull 112 he only places planulata under it. Described as having " Teeth of Mactrotoma s.s.; hinge of Spisula" The opinion of the majority of the members is that the subgeneric distinc-tions are too small to describe. Therefore, we shall not use them.

Spisula planulata (Conrad), 1837. Monterey, Calif. to Cape San Lucas, Lower Calif.,(Dall). Type locality, near Santa Barbara, Calif.

(See figures on page 13)

The problems connected with this specific name are stated by Mr. A.M. Strong(Per. Comm. Dec. 1944) as follows: Spisula planulata (Conrad)- " This is one of two species collected at Santa Barbara by Nuttall and briefly described by Conrad in Jr. Acad. Nat. Sci. Phila. vol.7, p. 240. Carpenter reviews this paper, Rept. 1863, and says; " The work bears the appearance of undue haste---- the descriptions being in English would not have been entitled to claim of precedence were it not that they were accom-panied by tolerably recognizable figures." This particular species does not seem to have been figured.

Carpenter applied the name to specimens collected at Santa Barbara by Cooper, Rept. 1863, pp. 613,640; but is not certain about it. Packard, vol.9, p. 293, says that it is not of Cooper and Carpenter. Oldroyd fig-ured in Univ. Wash. Publ. Puget Sound Biol. Sta. p. 60, pl. 17, figs.4-6, is stated by Grant and Gale to be a reproduction of Packards illustration of M. californica.

Dall in Bull. 112, pl. 3, fig.9, figures a specimen under this name but does not state where it came from. It evidently was drawn from a shell in the collection and he generally followed Carpenter's identifications.

In spite of the many references in the literature no one seems able to state definitely what shell should take the name and the type is said to be lost.

Collecting data: San Pedro, Calif. (G. Willett); Morro Bay and San Pedro (Dr. H.R. Hill); San Diego, Long Beach (-San Diego Museum); Morro Bay, Newport Bay, Anaheim Bay, Huntington Beach, Calif. and Todos Santos Bay (Burch).

Genus Schizothaerus Conrad, 1853. Type (by monotypy), Schizothaerus nuttallii (Conrad).

" Shell ovate, oblong, ventricose, hinder gape roundish; hinge with the cardinal teeth small, lateral teeth very small, close to the cardinals; ligament external, marginal, separated from the cartilage-pit by a shelly plate." (Gray's description of Tresus) (Grant and Gale).

Schizothaerus nuttallii (Conrad), 1837. Bolinas, Calif. to Scammon's Lagoon, Lower Calif. Type locality, near Santa Barbara, Calif.

The range of this species is somewhat confused by the fact that many correspondents seem to have the typical reported instead of the variety capax. Dr. A. Myra Keen (Per. Comm. Dec. 1944) states the situation as follows: " Eric Jordan collected Schizothaerus nuttallii at Scammon's Lagoon, L.C. We have specimens from as far northas Bolinas, Calif. North of that all the specimens I have seen are the short, high form with the arched ventral margin-- S. capax. S. capax ranges from Monterey north to Kodiak Island. Although the ranges of the forms overlap, I have seen no specimens that could be said to be intergrades, so I regard them as separate species."

You will find on this page a tracing on the top half of anactual specimen of S. capax from Puget Sound. Below it is a tracing of a specimen of typical S. nuttallii from Alamitos Bay, Calif. The difference in shape is apparent.

However, this seems to be a mooted question. Mr. W.J. Eyerdam reports S. nuttallii as follows :" Very common on most sandy mud beaches on Puget Sound at low tide mark. Said to attain a length of 9 inches in record specimens, The largest in my collection is L. 180 mm- H. 120 mm. Reported from Craig, Alaska (George Willett); Alsaka to San Quintin Bay and Fukiken Japan (Dr. Fred Baker collection).

This species is unmistakable other than that perhaps the very young are occasionally puzzling. However, they take on the typical form when quite small. The long siphons connect the shell with the surface of the mud or sand. It usually requires a hole 2 ft. or so in depth to get a good specimen. It is a common species in all southern California lagoons, Alamitos, Anaheim Newport, Mission etc. It is very abundant in Morro Bay, San Luis Obispo Co. And we have dredged living young and dead valves off Monterey in 20 fms. ing off Redondo Beach in as deep as 25 fms. off Santa Monica in 20 fms. (Burch).

Schizothaerus nuttallii capax (Gould), 1850. Kodiak Island, to Monterey. This is the short, high, globose form common in Puget Sound.

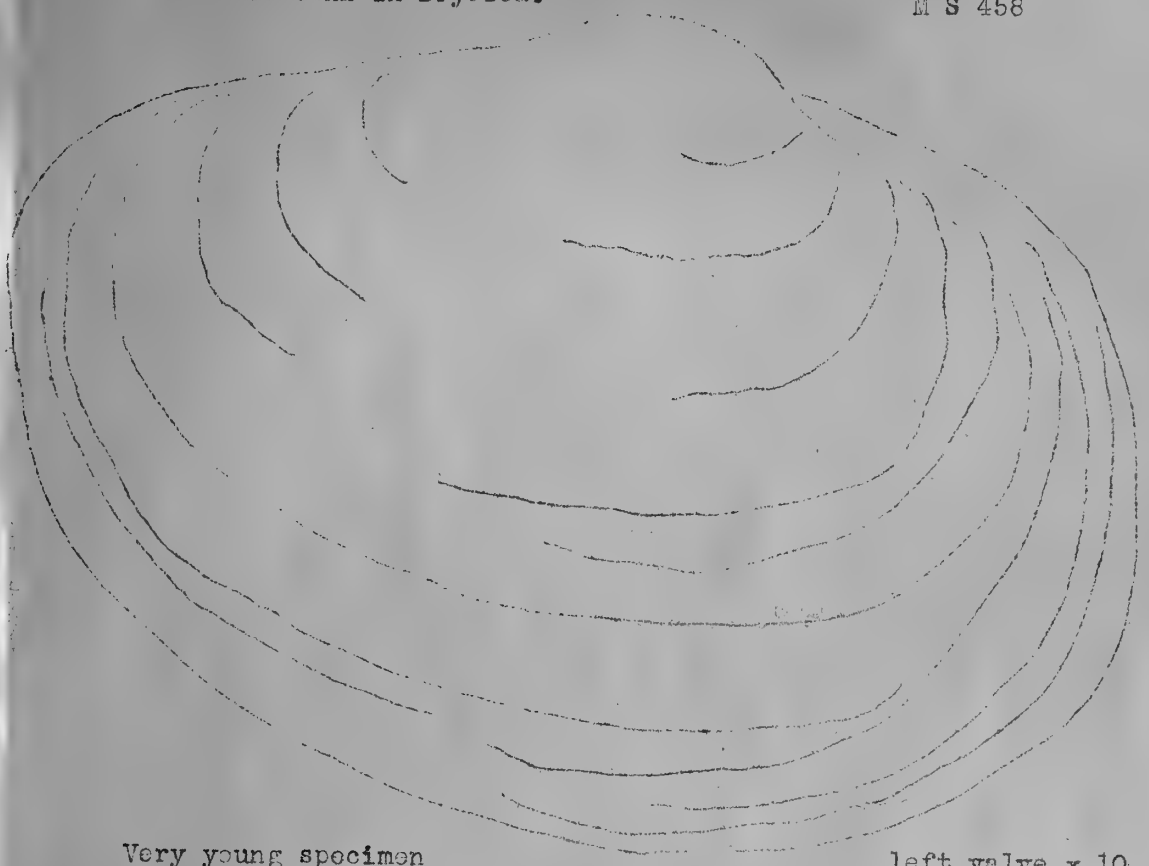
Collecting data; Port Orchard, Wash. (Burch); Tacoma, Wash. and Dall I., Alaska (G. Willett); Sitkalidak Id., and Three Sts. Bay, Kodiak Id., Alaska, 1931 (W.J. Eyerdam) who comments " Much wider and more round shell than typical and is less common" " My largest specimens are from Sitkalidak Id and are L. 175 mm. - H. 150 mm.

The following note from Thomas A. Burch " Just finished drawing the young specimens of S. nuttallii (see p. 23)that we collected off the bait tank using the Bryozoa at Santa Monica in 12/35/. Since they had everyone puzzled I think we should have them in. Incidentally I think that the date these were collected should be emphasized since it indicates that S. nuttal spawns during December."

Schizothaerus nuttallii Conrad, 1837
Santa Monica, Calif. 12/1935
Bait tank in Bryozoa.

#44 p 25

M S 458

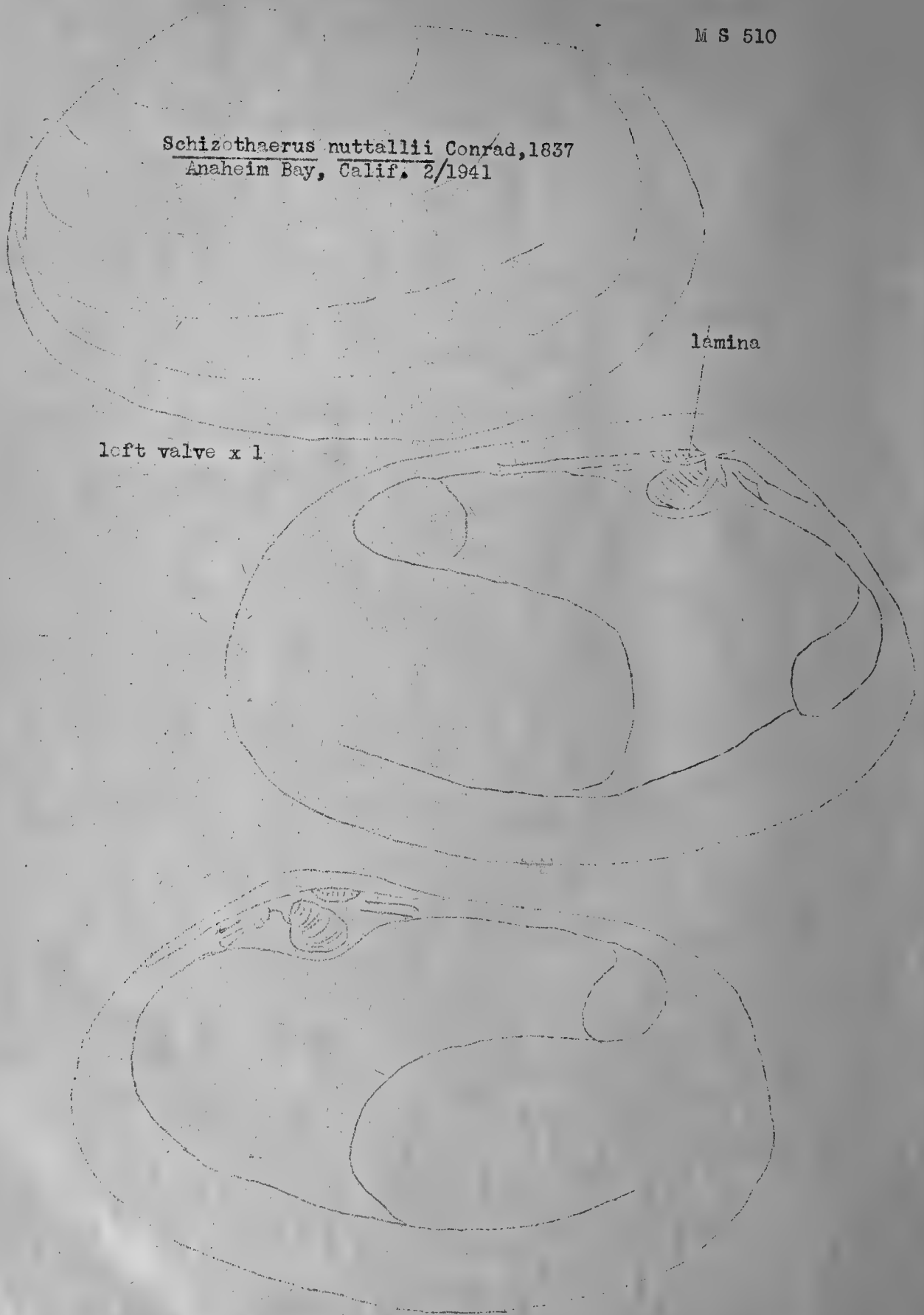


Very young specimen

left valve x 10

M S 510

Schizothaerus nuttallii Conrad, 1837
Anaheim Bay, Calif. 2/1941



The following note from Thomas A. Burch is of interest in connection with the figures on pages 23 and p 24 " As I hope you can tell from the drawings, the chondrophore is separated from the ligament area by a lamina as in Mactra. The hinge is practically identical with that of Mactra californica. In fact, if it was'nt for the radically different shaped shell I would think them the same genus".

Family MESODESMATIDAE
Genus Ervilia Turton,1822. Type (by monotypy), Mya nitens Montagu.
" Shell minute, oval, close; cartilage in a central pit; right valve with a single prominent tooth in front and obscure tooth behind; left valve with two obscure teeth; pallial sinus deep." (Tryon S.S. Conch.)
Ervilia californica Dall, 1916. " San Pedro, Calif. to Magdalena Bay" (Dall) Type locality, San Pedro, Calif. The holotype is figures in the Key to Pelecypod Genera by Keenand Frizzell.

Family MYACIDAE
Genus Mya Linnaeus, 1758. Type (by subsequent designation, Children,1822) Mya truncata L.
" Shell oblong, inequivalve, gaping at the ends; left valve smallest, with a large flattened cartilage-process; pallial sinus large" (Tryon).
Mya truncata Linnaeus,1758. " Circumboreal. Arctic Ocean to Bering Island on the west and to Puget Sound on the east" (Dall, 1921). Johnson gives the Atlantic range as " Greenland to Massachusetts".
Johnson also lists a subspecies Mya truncata uddevallensis Forbes,1846. Grant and Gale, 1931 discuss this on page 415.
" This species is usually smaller and more irregular than arenaria , and can be distinguished by its truncated posterior end and its differently shaped chondrophore." (Grant and Gale, p. 415).
Collecting data: Tacoma, Wash.; Ketchikan,Craig,Chignik, Alaska; (G. Willett); Victoria, B.C. (Lewis); Puget Sound, British Columbia, and Admiralty Ids. (Stephens); Fauntleroy Cove, Seattle and Strait of Fuca, Wash.; Izhut Bay, Afognak Id., Raspberry Id., Kodiak Id., Sitkalidak Id., Knight Id., Mitrofania Id., Unimak Id, Akutan Id., Unalaska Id., and Atka Id. (W.J. Eyerdam); also Tromso Fjord, Norway (I. Norberg); and coast of Maine (N. Lermond);
Mya truncata uddevallensis Forbes,1846. This subspecies is added on the records of our member W.J. Eyerdam who reports as follows :
" Izhut Bay, Afognak Id., and Raspberry Id., Alaska collected by W.J. Eyer-dam. I have specimens from the type locality, Kapellbackarno, Udevalla, west coast of Sweden that correspond closely to the specimens from Izhut Bay. This is a very truncated variety which is quite distinct from the typical. It is also found on the east coast of Canada. This variety seems to be quite rare on our coast and does not seem to have been previously reported perhaps because type specimens were not available for comparison. Add this variety to the list of west coast shells".
Mya japonica Jay,1857. (Mya intermedia Dall,1898). " Arctic Ocean to Japan and to Monterey, California: probably also Atlantic" (Grant and Gale, 1931).
Dr. A. Myra Keen advises (Per. Comm. Dec. 1944) " Mya intermedia Dall is a homonym, so that if the form is to be distinguished from arenaria the name japonica must be used or a new name proposed. So far I have not reached a decision on the matter, though I have reviewed the problem sev-eral times."
Grant and Gale, 1931, p 413 consider japonica a subspecies of arenaria. They also state though " The form japonica is distinguished from typical arenaria by its somewhat shorter, coarser,rougher shell. It is intermedia te

between arenaria and truncata." Mr. George Willett states " Shape much like arenaria but blunter anteriorly; surface rough like truncata."

Collecting data: Chignik, Unimak, Unalaska (G. Willett); Nunivak Id. (Lewis); Muddy Beach, Alaska (Lowe); Japan (Lowe and Anderson collections) Kiitap, hokkaido, Japan (Dr. F. Baker Coll.); W.J. Eyerdam reports as follows : " Drier Bay, Knight Id., Sitkalidak Id., Izhut Bay, Red Fox Bay, and Shuyak Strait, Afognak Id., Mitrofania Id., Unalaska Id., Atka Id., Alaska and Avatcha Bayand Gulf of Kronstski, Kamchatka.. coll. by W.J. Eyerdam. Most of the specimens that I have seen approach nearer to some forms of Mya truncata but are in the adult phase correspondingly much lar--ger and are much heavier or solid than arenaria. There arealso distinct differences inthe sinus and hinges in adult specimens. When I was at Petrop--avlovsk on Avatcha Bay in 1928 I often dug these fine clams for a meal and when they were cooked the Russians were glad to eat them but even tho many of them were half starved I never saw any of them digging these clams although the beds were in easy access and no effort required to dig them. I just figured that these Russians were too lazy to even try to keep from starvation when there was plenty of food at hand, as there were plenty of fish in the bay and millions of birds on the water and nesting on the cliffs, I never saw any of them even attempt to fish at that time. Whenever a Jap ship was in, the crew was out on the beach eagerly digging clams."

Mya arenaria Linnaeus, 1758. " Britain, Scandanavia, Greenland, Atlantic Coast of North America to Carolina, Alaska south to Japan and to Vancou--ver Island, British Columbia (found in Indian mounds on Vancouver Island - fide Oldroyd), artificially introduced about 1865 from the Atlantic coast with seed oysters into San Francisco Bay whence it has spread along the California and Oregon coasts." (Grant and Gale, p. 412).

Dr. A. Myra Keen advises about the species as follows " According to Don Frizzell, there is question as to the occurrence of Mya arenaria in the Indian mounds on Vancouver Island. Where Mrs. Oldroyd ran across the statement is something of a puzzle; at least, I haven't found the original source. The distribution of this group would make a nice problem for some one."

Collecting data: This clam is common on many sandy beaches of Puget Sound. When was it first introduced into this region or is it native? (W.J. Eyerdam); Empire, Oregon; Sinslau R., Florence, Oregon; San Juan Ids., San Francisco Bay: (San Diego Museum coll.); perhaps the easiest way to get a large set of this species is to buy a pound or two at Fisherman's Wharf, San Francisco, or other market.(Burch).

Genus Cryptomya Conrad, 1849. Type (by monotypy), Sphenia californica Conrad.

" Like a small Mya but without the long protruding siphons and con--sequently with but a slight posterior gape and the pallial sinus obsolete or very short; shell small, ovate, not very convex; chondrophore similar to that of Mya arenaria; interior of dorsal margins thickened." (Grant and Gale). Some authors consider Cryptomya a subgenus of Mya.

G.E. MacGinitie, " Ecological Aspects of a Calif. Marine Estuary", The American Midland Naturalist, vol. 16, p. 730, Sept. 1935 gives a good account of the habits of this species and the reason it can live so deep with such short siphons. It is taken as deepas 20 inches. The siphons pro--trude into the burrows of such forms as Upogebia,Urechis, and Callianassa .

Cryptomya californica (Conrad), 1837. " Chicagoff Island, Alaska and south to Topolobampo, Mexico" (Dall). Grant and Gale add, probably also Japan. Type locality: Santa Barbara, Calif.

Dr. A. Myra Keen calls attention to an interesting point " The des--cription of Cryptomya californica in Oldroyd is incorrect; actually it is

the original description of Cumingia californica."

Collecting data: An interesting note on our experience with Crypto--mya is that we have picked up dead valves in our dredgings from deeper than 50 fathoms off Redondo Beach, Calif. Valves were not uncommon off Monterey in 10 to 15 fms. We have found the species abundant in all bays and lagoons. It forms a definite stratum along the edges of the lagoon at Mugu, Ventura Co. with the Heterodonax above it and other forms below it. But we have also found it living all along the open coast having taken it at Dana Point, La Jolla etc. (Burch); Vancouver, B.C. (Eyerdam); Dall Id. and Craig, Alaska (G. Willett).

Genus Sphenia Turton, 1822. Type (by subsequent designation, Gray,1847) Sphenia binghami Turton.

" Shell like that of a small Mya, very thin, irregular in shape, the chondrophore small, thin, oblique, practically characterless." (Grant and Gale, p. 419).

Sphenia fragilis Carpenter, 1857. " Oregon to Mazatlan, Mexico" (Dall,1921) Type locality, Mazatlan.

Collecting data: San Pedro, Calif. in 15 fms. (G. Willett); Ensenada, L.C. in 15 fms. (Burch)

Sphenia ovoidea Carpenter,1864. " Aleutian Islands to Puget Sound and San Diego " (Dall). Type locality, Puget Sound.

Collecting data: Craig, Alaska (G. Willett) ; Port Armstrong, Baranof Id., Alaska in kelp holdfast (W.J. Eyerdam); we have specimens taken off Friday Harbor, Wash by Trevor Kincaid (Burch)

Sphenia trunculus Dall, 1916. " San Diego, Calif. to Panama" (Dall). Type locality, San Diego. Mr. George Willett suggests that both trunculus and the following species pholadidea may be but situs forms of fragilis.

Sphenia pholadidea Dall, 1916 " Santa Barbara, Calif. " (Dall) and off Monterey, Calif. (Burch). Type locality, Santa Barbara. to Baulinas Bay.

Dr. A. Myra Keen is of the opinion that the following should be in the synonymy of this species; Sphenia globula Dall, 1919 ; Sphenia nana (Oldroyd),1918, which was described as Cuspidaria nana Oldroyd but is really a Sphenia.

Collecting data: Dredged off Monterey in 1937 and also in 1940 from a 20 fathoms station and also a 35 fathom station (Burch); San Pedro, Calif. in 15 fms. (G. Willett); Mission Beach (Orjala); Imperial Beach (Randall).

The last reports change the range of this species from the above to Bolinas Bay to Imperial Beach, San Diego Co.

Genus Platyodon Conrad, 1837. Type (by monotypy), Mya (Platyodon) cancellata Conrad.

" Shell like that of the typical subgenus but with a smaller chondro--phore, and sculptured with concentric ridges formed by emphasizing the growth lines; animal with armor at the end of the siphons as in Mya truncata. " (Grant and Gale).

Platyodon cancellatus (Conrad), 1837. Queen Charlotte Is. to San Diego, Calif. Type locality, near Santa Barbara.

Dr. A. Myra Keen (Per. Comm. Dec. 1944) " A couple of years ago D.B. Quayle of the Pacific Biological Station, Nanaimo, B.C. sent us 3 specimens of Platyodon cancellatusthat he had taken alive at Tlell, East Coast of Graham I., Queen Charlotte Is., which extends the range to 54 degrees N.

Collecting data: G.E. MacGinitie, Am. Mid. Nat. vol.16, 1935 states " A Platyodon burrow may be distinguished from a Zirfaea burrow because the hole around the siphon of the former is always sandy, whereas around that of Zirfaea it is clayey". Our experience has been to find this species in close proximity to beds of Pholads. We found it abundant around

Terminal Island, Point Firmin, and the banks at the entrance at Anaheim Landing, Calif. (Burch);Clallam Bay, Strait of Juan de Fuca, Wash. (Eyer-dam) 1925.; Point Loma, Mission Bay, Alamitos Bay, Duxbury Reef (San Diego Museum).

Family ALOIDIDAE (CORBULIDAE)

The theory is that Aloidis Megerle von Muhlfeldt, 1811 must replace Corbula Lamarck,1799 being preoccupied by Corbula Rodina,1798 for a diff-erent group. The above from Cotton and Godfrey, Molls. of S. Australia, p. 281,1938 , but followed also by Dr. A. Myra Keen in " Abridged Check List". Grant and Gale, 1931 continue with Corbula Bruguiere,1797. Dr. A. Myra Keen (Per. Comm. Dec. 1944) states the question " The Corbula prob-lem is similar to the Lucina problem, the name having first been used by Bruguiere in 1797 at the head of a plate, with no named species. Before it was validated by Lamarck in 1799, Roding used the name for a species of Asaphis. Whether Corbula can be considered a genus without species is a question that must be submitted to the International Commission. Meanwhile either we must talk about " Corbula" or adopt the next available name, Aloidis. The latter course seems preferable to me."

Genus Aloidis Megerle von Muhlfeldt,1811. Type (by monotypy), Corbula sulcata Lamarck -- (Corbula guineensis Muhlfeldt).

Dr. Julia Gardner of the U.S. Geological Survey in Nautilus vol. 40, pp 43-44 has a detailed discussion in her article " The Nomenclature of the Superspecific Groups of Corbula in the Lower Miocene of Florida". Dr. Gardner states that the type of Aloidis, Corbula sulcata Lamarck, a Recent shell from the coast of Senegal, is such a different shell when compared to species of Corbula or those we know as Corbula as to make it distinct. Dall, Trans. Wagner Free Inst. vol.3, pt.4, pp. 836-56,1898, discusses Aloidis and uses it as a Section of Corbula s.s. distinguishing it as follows: " Like Corbula, but with strong concentric sculpture and keeled rostrum."

There is a difference of opinion on this matter as indicated above. However, it seems that the majority are in favor of the use of Aloidis until further notice.

Subgenus Lentidium Cristofori and Jan., 1832. Type (by subsequent desig. Dall,1898), Lentidium maculatum Cristofori and Jan. -- Corbula mediterranea (Costa). fide Grant and Gale, 1931 , p. 421.

" Shell nearly equivalve, elongate trapezoidal, with concentric sculpture on both valves, often rather feeble; ligament sometimes visable externally in a fissure near the umbo."

Aloidis obesa (Hinds), 1843. " Catalina, Calif. to Panama" (Dall).

Dr. A.M. Keen advises " The type locality of "C" obesa is Panama, Coast of Veragua, and San Blas, or latitudes 8) 57' to 21 32'."

Aloidis fragilis (Hinds), 1843. " Monterey to Salina Cruz, Mexico"(Dall). The type locality if West Coast of Veragua, Panama.

Collecting data: Mazatlan, Mexico (Strong).

This species is said to be larger than luteola, thinner shelled, and with more prominent concentric sculpture.

Aloidis luteola (Carpenter), 1864. " Monterey, Calif. to Acapulco, Mexico (Jordan,1924) (Grant and Gale). Type locality, San Pedro and San Diego.

A subspecies C. luteola rosea Williamson,1905 (Proc. So. Calif. Acad. Sci. 4:120) has been generally placed in the synonymy. Grant and Gale state " Pinkish or rosy-colored individuals occur indiscriminately assoc-

-iated with the yellow form" and this has been our experience especially with dredged specimens.

Collecting data: Our experience in littoral collecting has been to find this species associated with rocky rubble. It is common in certain localities and rather rare in others. We found it abundant at Dana Point, San Onofre, Bird Rock below La Jolla, the rocky rubble north of Ensenada etc. And in more or less the same type of material we found it not uncom--mon in the dredgings from off Redondo Beach, Calif. in as deep as 25 fms. and off Ensenada, Mexico in Todos Santos Bay in about 15 fms. This is the only species we have ever beenable to recognize in our material.
Aloidis porcella (Dall), 1916. " Santa Rosa Island to Panama" (Dall). Type locality, off Lower Calif. in 44 fms.
Aloidis kelseyi (Dall),1916. " Esteros Bay to Catalina Island, Calif." (Dall). Type locality, Catalina Island, Calif.

Genus Grippina Dall,1912. Type, Grippina californica Dall.

" Shell slightly inequivalve, donaciform, small, with a well-marked rounded, ascending pallial sinus; right valve receiving the dorsal edge of the left in grooves beneath its own dorsal margins; cardinal teeth two,large,sub-equal, prominent, horizontally produced and fitting under the beak of the left valve; resilium strong, compressed, situated between the two cardinals attached under the beak of the left valve,and having on its ventral surface a thin calcareous coating or ossiculum."
Grippina californica Dall, 1912. San Diego, Calif. to Guadeloupe Id. Type locality, off San Diego, Calif. Strong and Hanna reported the species from Guadeloupe Island.

Family SAXICAVIDAE

Some of the more recent authors have been using the family name HIATELLIDAE having accepted the generic name Hiatella Daudin,1801 and placing Saxicava Fleuriau de Bellevue,1802 in synonymy. Among those following this proceedure are, Cotton and Godfrey," Molls. of S. Aust.", 1938, Powell of New Zealand, Dr. Maxwell Smith in his recent World Wide Sea Shells etc. However, the majority of references continue to use the time honored name of Saxicava. It must be admitted that the advocates of Hiatella seem to make a rather strong case. Dr. A. Myra Keen (Per. Comm. Dec. 1944) states " Kennard, Salisbury and Woodward in " The types of Lamarck's genera of shells as selected by J.G. Children in 1823", Smith. Misc. Coll., vol. 82, no. 17, 1931 say, regarding Hiatella: " H. arctica (Mya arctica L.) , sole species quoted by Lamarck, who admits he was unacquainted with the genus, and certainly not one of Daudin's indetermin--able two". I take it, therefore, that we may regard Hiatella as a genus dubium and continue to use Saxicava."

Genus Panope Menard,1807. Type (virtually by monotypy, designated by Fleming,1818, as Panope faujas Menard -- Mya glycymeris Born, fide A.M. Keen. Grant and Gale give Children's designation,1823 of P. aldrovandi Menard.

" Shell equivalve, thick, oblong, gaping at each end; ligament ext--ernal, on prominent ridges; one prominent tooth in each valve; pallial sinus deep." (Tryon S.S. Conch.).
Panope generosa Gould,1850. Forrester Island, Alaska (Willett) to Scammons Lagoon, Lower Calif. (Jordan); also Gulf of California; Japan. Type locality, Puget Sound.

The subspecies P. generosa solida Dall,1898, type locality San Fran--cisco seems to be another variety based on slight differences in shape and has been generally placed in the synonymy of the typical. Dr. A.M. Keen

(Per. Comm. Dec. 1944) " As regards the subspecies proposed by Dall: I believe you are correct in disregarding them. Mrs. Oldroyd's description for P. g. solida is incorrect, as she accidentally ran instead the description of P. g. globosa, the type locality of which is head of the Gulf of California. The type locality of solida is San Francisco. The illustration she gives has me baffled. It is obviously reduced, but if it were magnified to the stated height of globosa (120 mm.), the shell would be 22 mm. longer; than globosa; if magnified to the height of solida (97 mm. it would be 30 mm shorter than solida; if to the stated typical size of generosa (110 mm) it would be 14 mm. shorter. The proportions of this illustration seem closer to what Dall says are typical (Trans. Wagner. Inst. vol.3, p. 831) than to either of the subspecies he describes. Possibly the shell was tilted in photographing and the figure distorted. In other words the figure given as solida is of a shell proportionately shorter than solida and longer than globosa; it is nearer what Dall says is typical generosa but is slightly shorter. The photograph was supplied by the National Museum I think. Study of the type specimen is obviously necessary."

Collecting data: All who have dug this species out will appreciate the reason why comparatively few of themare sent carelessly in exchanges. They are not rare but the habitat is often a full yard below the surface of the mud and to add to the difficulty it usually selects locations having such a loose nature that the hole fills as rapidly as dug.

According to MacGinitie the siphons of this species constitute at least ½ the entire weight of the clam shell included.

Our experience has been to find it very abundant in Morro Bay, San Luis Obispo Co. and in most of the bays and lagoons south to Newport Bay. It is not uncommon at Mugu, Ventura Co.

An interesting note on this species is the fact that in places while dredging off Redondo Beach on the gravel beds ranging between 20 and 25 fms . we would occasionally bring up dredge hauls composed almost entirely of well preserved dead valves of this species. They seem to be in colonies and when we hit them we simply picked our other specimens out of a bushel or more of Panopo valves. It is not uncommon in some of the Pleistocene deposits such as Timm's Pt. (Burch).
Reported from Budd Inlet, Mason Co., and Port Orchard, Wash by W.J. Eyerdam .

Genus Panomya Gray,1857. Type (by monotypy), Mya norvegica Spengler.

" Shell solid, large, irregular, with a single cardinal tooth under the beak in each valve; the pallial line of unconnected, rounded impressions; the animal larger than the shell, with large, united siphons, diverging slightly at the tips and covered with a wrinkled coriaceous epidermis; a burrower in mud and gravel, never perforating stones."

Forrester Id.,Sitkalidak,Seldovia,Ala. Vic, BC

Panomya turgida Dall, 1916. " Unalaska to the Schumagin Islands, Alaska" (Dall). Type locality, Popoff Strait in the Sohumagin group, Alaska.

Willett, G., Bull. Sc. Calif. Acad. Sci., vol. 36, no.2, p.61 states " A study of Alaskan specimens of Panomya in the writor's collection appears to indicate that there has been a rather general confusion of this species with P. ampla Dall. Dr. Dall's illustration of ampla (Proc. U.S. Nat. Mus. 24, 1902, pl.40, figs.3,4.) certainly does not represent the same shell that Oldroyd (Stanford Univ. Publ. Geol. 1, 1924, pl.10, fig 3), and Grant and Gale (op. cit. pl.21, figs. 10a,10b) figure as that species. I have not seen the specimens upon which the records of ampla from Deadmans Island (Arnold, op. cit. p.183), and Timm's Point (Clark, op. cit. p. 30) were based. However, examples secured in the latter locality by Mrs. E.M. Clark and John Q. and Tom Burch are not ampla, but nearer to, if not identical with, turgida, as figured by Dall (U.S. Nat. Mus. Bull. 112, 1921, pl.2, fig.1

Ampla is very irregular in outline, being broadly truncated at one end and rather pointed at the other, while turgida is much more equilateral."

Grant and Gale, 1931, p. 426 list Panomya arctica (LAmarck),1819. They also consider Panomya a subgenus of Panope. Dall suggested that turgida may be a variety of arctica. Grant and Gale give Dall's range of arctica as " Arctic and borcal seas of both hemispheres, on the Pacific south to the Aleutians, and in the Atlantic in cold deepwater to the Mediterranean." (Dall,1898). Johnson gives the Atlantic range as " Arctic Ocean to Georges Bank, 25-115 fms.. Circumpolar."

Collecting data: Forrester Island, Alaska in 50 fms. (G. Willett); Victoria, British Columbia (Lewis); Sitkalidak Id., 1931 and Seldovia, Alaska 1932 - Extended range about 300 miles eastward.

Panomya beringiana Dall, 1916. " Eastern Bering Sea" (Dall). Type locality, near Pribiloff Islands in 56 fms.

Collecting data: Unalaska Island, Aleutians (Eyerdam,1932)

Panomya ampla Dall, 1898. " Arctic Ocean, Aleutian Islands, southeast to Puget Sound" (Grant and Gale). Dr. A. Myra Keen advises " The type locality of Panomya ampla is Kyska Harbor, according to the holotype label."

Collecting data: Craig, 30 fms. ; Forrester Island, Alaska in 40 fms.; (G. Willett) with this additional note " I believe Puget Sound records apply to turgida not ampla." Sitka, Alaska (Oldroyd). Reported from Friday Harbor, San Juan Ids., Wash by Eyerdam.

Genus Cyrtodaria Reuss,1800. fide Grant and Gale,1931, p. 429

Type, (fide Dall,1898), Cyrtodaria siliqua Daudin.

" Shell oblong, gaping at each end; posterior side shortest; ligament large and prominent; hinge thick, without teeth; epidermis black, extending beyond the margins; anterior muscular scar long, pallial impression irregular slightly sinuated." (Tryon S.S. Conch.)

Cyrtodaria kurriana Dunker,1862. " Arctic Ocean and south to Norton Sound, Alaska. Also on the west coast of Greenland" (Dall). Type locality,Green--land. Dr. A. Myra keen advises on this species " Mrs. Oldroyd's statement of dimensions is incorrect. It should read, Long. 35; Long.:Alt. :Crass.-- 100:40:28." Dickson's Haven, N. Siberia 4-5 fms. clay, Vega Expd (Eyerdam)

Genus Saxicavella Martens,1885. Type, Mya plicata Montagu.

" Shell equivalve, inequilateral, flaring,oval,transverse or sub-trape--zoidal, obliquely angular in the rear; hinge becoming edentate or showing on the right valve, cardinal tooth, fitting into corresponding cavity in left valve; ligament short, prominent, pallial line gently sinuous, sinus very wide, not deep."

Saxicavella pacifica Dall,1916. " Redondo Beach, Calif. (Burch) to Todos Santos Bay, Lower California. (Burch). Dr. Dall described the species from off San Diego in 131 fathoms and listed it in Bull. 112 only from the type locality.

Collecting data: Dredged in about 75 fathoms off Redondo Beach, Calif. and also in about 50 fathoms off Todos Santos Islands, Lower Calif. (Burch).

Genus Saxicava Fleuriau de Bellevue,1802. Type (by subsequent designation Children,1823), Mytilus rugosus Linnaeus,1767. fide Grant and Gale, p. 427

" Shell when young symmetrical, with two minute teeth in each valve; adult rugose, toothless; oblong, equivalve, gaping, ligament external; pall--ial line sinuated , not continuous. It is found in crevices of rocks and corals, and amongst the roots of seaweed, or burrowing in limestone and shells (Tryon S.S. Conch.).

Saxicava arctica (Linnaeus),1767. " Arctic Ocean to Panama. Also Atlantic" (Dall). Johnson gives the Atlantic range " Greenland to the West Indies".

About the only problem with this genus is the occasional difficulty in separating arctica from pholadis. Grant and Gale, 1931, p. 428 state that arctica has been figured as having well developed spines in two radial series running from the umbonal region, but the spines may be obsolete on eroded or old specimens. Saxicava pholadis is smoother and lacks the spines. And of pholadis " It is edentulous, strongly concentrically wrinkled and spineless. It is generally much less quadrate than arctica and differs from the latter in the edentulous hinge." They suggest that the two may belong to one very variable species.

Collecting data: To list collecting localities for this very common species would be a waste of paper. It is a nestler and to be expected in wharf piles, dead shells of all kinds, Mytilus beds, in pholad holes, barna--cles, rock crevices, kelp holdfasts etc. Our experience was to dredge it consistently from some rather surprising depths. It is common off Monterey in all depths down to past 40 fathoms and off Redondo Beach is a common species in the 25 fathoms gravel. (Burch); very common in Puget Sound. at many stations in Alaska, Aleutian Islands and Kamchatka. I also have it from Kola Fjord, Arctic Russia, Waigatch Islands, N.W. Siberia in 60 fms. clay. Tromso Fjord, Norway and fossil from Uddevalla, Swedish west coast(Eyerdam). Puget Sound (G. Willett); Forrester Island, Alaska (Willett); Angeles Bay, Lower Calif. (Lowe).

Saxicava pholadis (Linnaeus), 1771. " Arctic Ocean to Panama; also Atlantic" (Dall). Johnson gives the Atlantic range " Greenland. Circumpolar." Type locality, Greenland.

Collecting data: We have found it abundant around San Pedro Bay in wharf piles and particularly old drawn piles. It was a common dredged shell off Monterey in the shale in 10-20 fathoms (Burch); Sitka, Alaska (Willett); San Pedro, Monterey, Santa Maria Bay, Lower Calif. (Lowe); many stations in Puget Sound and in Alaska and Kamchatka.. (Eyerdam).

Family PHOLADIDAE

Genus Pholas Linnaeus,1758. Type (by subsequent designation, Children, 1822), Pholas dactylus Linnaeus. fide Grant and Gale,1931, p. 430.

Grant and Gale placed our Barnea pacifica Stearns in the above genus and made Barnea Risso,1826 a subgenus of Pholas. This was at first accep--ted by Dr. A.M. Keen in " Abridged Check List". However, this has not been generally accepted. Barnea lacks the anterior gape of typical Pholas and differs in other particulars. Dr. A. Myra Keen (Per. Comm. Dec. 1944) states " I accepted Pholas as the correct generic name for our westcoast forms because when I tried to sort out the various exotic species on the basis of presence or absence of anterior gape, there seemed no clear cut sub-groups discernible. Therefore, I concluded that we should adopt the earliest name. However, in so doing, I overlooked the matter of the access--ory plates. Upon re-shuffling our material on the basis of accessory plates, I find the story quite different. The only true Pholas of the West Coast seems to be the P. dilecta Pilsbry and Lowe, from the Panamic fauna. The species pacifica, having only one median accessory valve, falls in Barnea. Jordan collected Barnea pacifica at Scammon's Lagoon."

Genus Barnea (Leach) Risso, 1826. Type (by monotypy), Barnea spinosa Risso-- Pholas candidus Linnaeus.

" Shell oval-oblong, anteriorly gaping, a single lanceolate dorsal accessory valve; umbonal process reflexed, closely applied." (Tryon).

Barnea pacifica Stearns,1871. " San Francisco Bay to Scammons Lagoon, Lower Calif. (Jordan). Type locality, San Francisco, Bay.

Collecting data: Our experience has been to find this species much less common than the other large pholads in southern California. We dug them out of the soft shale in great numbers in the old lagoon at Playa del Rey in 1937 but that has since been cut off from the ocean and the locality destroyed. Another very common place to get them was the north bank of the antrance at Anaheim Landing, and again the new government project there has cut that off. Of course, dead valves was in frequently from the off shore reefs at many localities and particularly between Seal Beach and Huntington Beach. We have taken a few in Newport Bay. (Burch); Anaheim Bay, Calif.; San Felipe and Guaymas, Mexico (Lowe);

Genus Zirfaea Gray, 1842. Type (by subsequent designation, Gray), Pholas crispatus Linnaeus. Grant and Gale, 1931, p. 432 made this a subgenus of Pholas. This has not been generally accepted.

" Shell oval, cardinal margin scarcely reflected, no accessory valves, the beaks protected by a membrane; usually a thin fugacious epidermis; anteriorly greatly gaping." (Tryon).

Zirfaea pilsbryi Lowe, 1931. Nautilus, vol. 45, no.2, pp. 52-53, pl.3, figs. 1 & 2, Oct. 1931. This is a new name for Zirfaea gabbi Tryon, 1863 which, according to Lowe has a type identical to P. penita concammerata Deshayes. Lowe redescribed the species and it is well figured. Type local-ity, Bolinas, Calif." Bering Sea and islands south to San Diego, Calif." (Dall), to Scammons Lagoon, Lower Calif. (Jordan). Japan.(Oldroyd).

Collecting data: A very complete and interesting account of the life history and habits of this species is given by G.E. Mac Ginitie, The Amer-ican Midland Naturalist, vol.16, pp. 731-735, Sept. 1935.

Our experience has been to find this species rather common boring in soft shale in San Francisco Bay, Playa del Rey, Anaheim Bay, Newport Bay, to the Estero below Ensenada, Mexico. Dead valves wash in by the thousands along the coast. (Burch); Puget Sound (G. Willett); Smith's Cove, and Alki Pt., Seattle, Wash. and Port Orchard, Wash. in heavy blue clay. (W.J. Eyerdam).

Genus Parapholas Conrad, 1849. Type (by monotypy), Pholas californicus Conrad.

" Shell oval-oblong; anterior gape closed by a thin, swollen, globose, callous plate; valves equal, divided by two radiating grooves into three portions; two dorsal valves." (Oldroyd).

Parapholas californica (Conrad), 1837. Coos Bay, Oregon to San Diego, Calif. Type locality, San Diego or Santa Barbara. Dr. A. Myra Keen advises (Per. Comm. Dec. 1944) " Dall reported Parapholas californica at Coos Bay, (Nautilus, vol.11, p. 66); however, this may be an error. I found large Pholadidea penita a few miles north of there that looked remarkably like Parapholas."

Collecting data: San Simeon, Cauyocos, White's Point, Playa del Rey, Anaheim Landing (Burch); San Diego, San Pedro, Laguna Beach, Pt. Firmin (San Diego Museum);

Genus Pholadidea Goodall in Turton, 1819. Type (by monotypy), Pholadidea loscombiana Goodall-- Pholas papyraceus Turton (fide Grant and Gale)

" Shell with a double or single protoplax and with or without other accessory plates, the valves prolonged posteriorly into leathery or testa-ceous cups or a tuve (siphonoplax) protecting the siphons." (Grant & Gale).

Pholadidea penita (Conrad), 1837. Chirikoff Islands, Alaska to San Diego (Dall, 1921). Type locality, near San Diego or Santa Barbara.

Grant and Gale, 1931, p. 434 state " This species is close to P. ovoidea (Gould), which is shorter, more ovoid, and has a vacant space between the umbonal plate and the umbo. In penita the plate is closely appressed to the umbo."

Collecting data: The typical of this species is common the length of the coast and easily chiseled out of stones of varying hardness. A list of collecting localities would be a waste of paper when this species may be taken almost every place there are rocks. (Burch); Alki Pt., Seattle and Port Orchard, Wash. in clay-shale (Eyerdam);

However, there has been a great deal of dispute about the subspecies. Pholadidea penita concamerata (Deshayes), 1839. Bering Sea and Islands south to San Diego, Calif. (Dall).

There are two very clear figures of this species in Oldroyd, pl.22, figs. 4 & 5. By checking against the descriptionand these figures we thought we knew concamerata and listed it from Puget Sound,and especially from the shale dredged off Monterey, Calif. However, Dr. A. Myra Keen compared our Monterey species with the types in the National Museum and classified them as the following species. Dr. Keen (Per. Comm. Dec. 1944) writes " I believe that Pholadidea penita concamerata is a synonym of P. penita. It is simply a form with extended flaps at the posterior margin. As far as I can observe, such specimens can be found anywhere within the range of penita At best it is probably only an ecologic form. The type locality is not Monterey. It is " Californie".

Pholadidea penita sagitta Dall, 1916. " Puget Sound to Socorro Island" (Dall) Type locality, Monterey, Calif.

We know of no place where a figure of this species is readily available. Dr. Keen advises us that this is the name of the predominant form of penita dredged up with the shale off Monterey, Calif. Dr. Keen writes (Per. Comm. Dec. 1944) " Below is a tracing of the holotype of P. sagitta (No. 63312, U.S. Nat. Mus., type locality Monterey. The author is Dall, not Stearns." The species is reported from Tacoma, Wash. by Mr. G. Willett.

Pholadidea melanura (Sowerby),1834. " Redondo Beach, Calif. in 40 fms. (Dall) to Colombia. Type locality, Monte Cristo, Colombia.

There are two very clear figures of this species in Oldroyd, pl. 22. figs. 9,10. Over a period of seven or eight years we dredged a great many tons of material from around the forty fathom level on all points off Red-ondo Beach, Calif. We dredged penita on countless occasions, typical penita which could not be distinguished from the same species taken littoral. Over this period we searched dilligently for anything resembling melanura without success. It is our opinion that this record is based on a misidentification. (Burch). Dr. A. Myra Keen states " It is very doubtful if P. melanura occurs in this province."

Pholadidea ovoidea (Gould),1851. " Bering Sea to Gulf of California" (Dall) Type locality, Monterey, Calif.

Collecting data: In addition to the unmistakable short ovoid form of this species our experience has been that the tubercles on the siphon are peculiar to the species. We have taken fine specimens from the stones at Monterey, Cauyocos, Morro, Pt. Firmin, Anaheim Landing, Whites Pt. etc. (Burch Kalalok,Callam Co., Wash.; Sitkalidak Id. & Knight Id.,Alaska (Eyerdam); Pt. Loma, San Diego Co., and San Mateo Co. (San Diego Museum Coll.)

Pholadidea parva Tryon,1865. San Francisco, Calif. to Scammons Lagoon, Lower Calif. Type locality, Lower Calif. in Haliotis.

In the discussions of this species the following note was made by John Burch " This species is figured in Oldroyd but not clearly and it is not easily distinguished from a small penita in my opinion. How may they be easily separated?". In response to the above the following statement was given by Dr. A. Myra Keen " Probably the easiest way to tell P. parva from P. penita is to be arbitrary and say that if you found it in Haliotis it is parva (that is, if it is'nt a Navea) , a nd otherwise it is penita (or maybe sagitta)." Mr. George Willett comments " Probably a form of penita."

Subgenus Nettastomella Carpenter,1865. Type, P. darwini Sowerby --(P. penita Tryon, not Conrad).

" Like Pholadidea, but small, with the siphonoplax prolonged as diver--ging flaps." (Dall).

Pholadidea (Nettastomella) rostrata Valenciennes,1846. " Puget Sound to San Diego, Calif." (Dall). Dr. A. Myra Keen (Per. Comm. Dec. 1944) states " The type locality of P. rostrata is Monterey, according to the holotype label; the holotype is (or was) extant in Paris and was discussed by Lamy (Jour. de Conchyl., vol.69,1925, p. 153). " " I notice that Lamy places concamerata in the synonymy of penita and makes sagitta a variety of penita."

Collecting data: This unmistakable little species is well figured in Oldroyd on two plates and four figures. We have taken it frequently, from stones at Monterey, San Simeon, Cayucos, Morro, White's Pt., Balboa Break--water: (Burch); Friday Harbor, Wash. (Eyerdam); Laguna Beach, Sab Pedro (San Diego Museum Coll.).

Genus Martesia (Leach) Blainville,1824. Type Pholas striata Linnaeus.

" Valve lengthened behind when full-grown, by a plain border; umbonal valves one or two, dorsal and ventral margins often with narrow, accessory valves; surface impressed with one or more furrows." (Tryon).

Dr. A. Myra Keen advises " The specimen of Martesia used for the illus--tration in the Pelecypod Key is in the California Academyand came from Lower California, I believe, collected by Hemphill."

Martesia xylophaga Valenciennes,1846. " San Francisco, Calif. to Panama" (Dall). From the statement in Oldroyd it seems that this species was named and figured but never described.

Martesia intercalata Carpenter,1855. " Farralone Islands to Mazatlan, Mexico" (Dall). Type locality, Mazatlan in Spondylus.

Collecting data: Long Beach and San Pedro (Lowe);

Genus Navea Gray,1851. Type, Navea subglobosa Gray.

" Shell sub-globose, closed behind; anterior gape very large, not closed up by age; edge reflected, crenulated; valves with a sunken sub-central rib; anterior dorsal edgereflected and closely appressed to the outer surface of the valve; dorsal muscles covered with a coriaceous periostracum, and with a small, transverse posterior valve placed behind the umbos; internal pro--cess simple, elongate,arched."

Navea subglobosa Gray,1851. Lobitas to San Pedro,Calif. Type locality, Calif--ornia in a shell. Dr. A. Myra Keen (Per. Comm. Dec. 1944) " The type locality of Navea subglobosa is " California in a hole in a shell". The range seems to be San Pedro (Oldroyd) to Monterey or possibly to San Mateo Co. (Lobitas as Dall states it). It is fairly common in the abalones taken at Monterey. The globose form, the heavy anterior edge, and the lack of plates

distinguish it from Pholadidea. Also, in the specimens I have seen, the myophore or styloid apophysis is weak or absent."

Collecting data: Great numbers off Monterey, Calif. (Burch); Cayucos (Chace)

Genus Xylophaga Turton,1822. Type Xylophaga dorsalis Turton.
" Shell like that of Teredo, but with a double protoplax and the internal apophyses obsolete; soft parts contained within the shell, without callum, siphonoplax, or calcareous tube. There is sometimes a calcareous lining to the excavation made by the animal; according to Fischer, but none of the borings I have seen from this animal exhibit it." (Dall).

Xylophaga mexicana Dall,1908. " Monterey, Calif. to Acapulco, Mexico" Type locality, off Acapulco, Mexico in 141 fathoms.

Collecting data: Our experience has been that when we picked up pieces of wood in our dredged off Redondo Beach we were likely to find Xylophaga boring in it. We picked it up rather frequently with the 25 fathoms gravel material.(Burch); Catalina Island in 30 fms. (G. Willett); Smith's Cove, Seattle in 10 fms. from piece of waterlogged branch in mud (Eyerdam).
Xylophaga californica Bartsch, 1921. Proc. Biol. Soc. Wash. 34:32. Type locality, Pt. Pinos Light, Calif. Range Pt. Pinos Light to Catalina Island (Willett).

Collecting data: Catalina Island in 30 fathoms (G. Willett).
Xylophaga washingtona Bartsch,1921. Proc. Biol. Soc. Wash. 34:32. Type locality, San Juan Island, Wash. Range: Puget Sound, Departure Bay, British Columbia, and off Oregon and Washington.

Collecting data: Olga, Wash. (from Engberg- G. Willett).

Family TEREDIDAE
Genus Bankia Gray,1840. Type, Teredo bipalmulata Lamarck.
" This genus is characterized by having pallets consisting of a series of cone-in-cone structures, which give to them the appearance of an ear of wheat" (Bartsch, 1922).

Bankia setacea (Tryon), 1863. " Bering Sea to Gulf of California" (Dall). Unalaska to Lower California.

Collecting data: Craig, Ketchikan, Seward, Alaska (G. Willett); Drier Bay, Knight Island, Alaska (Eyerdam); Crescent City, Calif. (Chace); Crescent City, Calif. and Victoria, B.C. (San Diego Museum.)

Genus Teredo Linnaeus,1758. Type Teredo navalis Linnaeus.
" In this genus the pallets are either paddle or spoon shaped. They may be distally cupped or not, or they may even bear a calcareous knob at the terminal portion" (Bartsch,1920).
Subgenus Teredo s.s.
" Teredo has the pallets paddle-shaped, with a decidedly cup-shaped depression at the distal end. The distal portion is covered with a dark periostracum, which terminates in the shape of two lateral horns" Bartsch,1

Teredo beachi Bartsch,1920. Proc. Biol. Soc. Wash. 34:29,30. Type locality San Pablo Bay, Calif.

Subgenus Teredops Bartsch,1921. Type, Teredo (Teredops) diegensis Bartsc
" In the subgenus Teredops the terminal portion of the pallets ends in a calcified knob." (Bartsch, 1922).

Teredo (Teredops) diegensis Bartsch, 1916. " San Diego to San Francisco Bay" Type locality, San Diego, Calif.

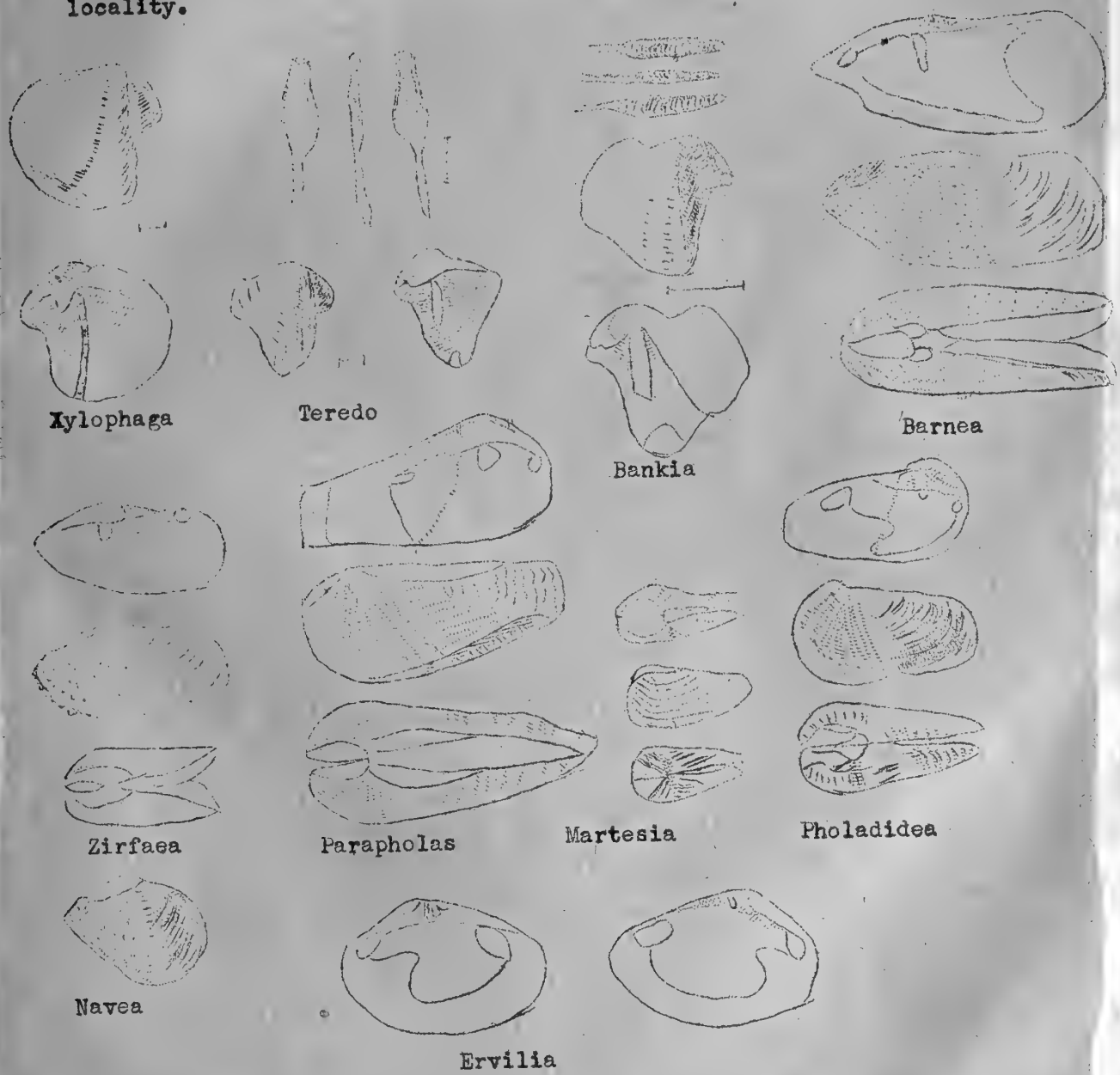
Collecting data:Taken boring in wood in the lagoon at Mugu, Ventura Co. also in San Pedro Bay, Calif. (Burch)/

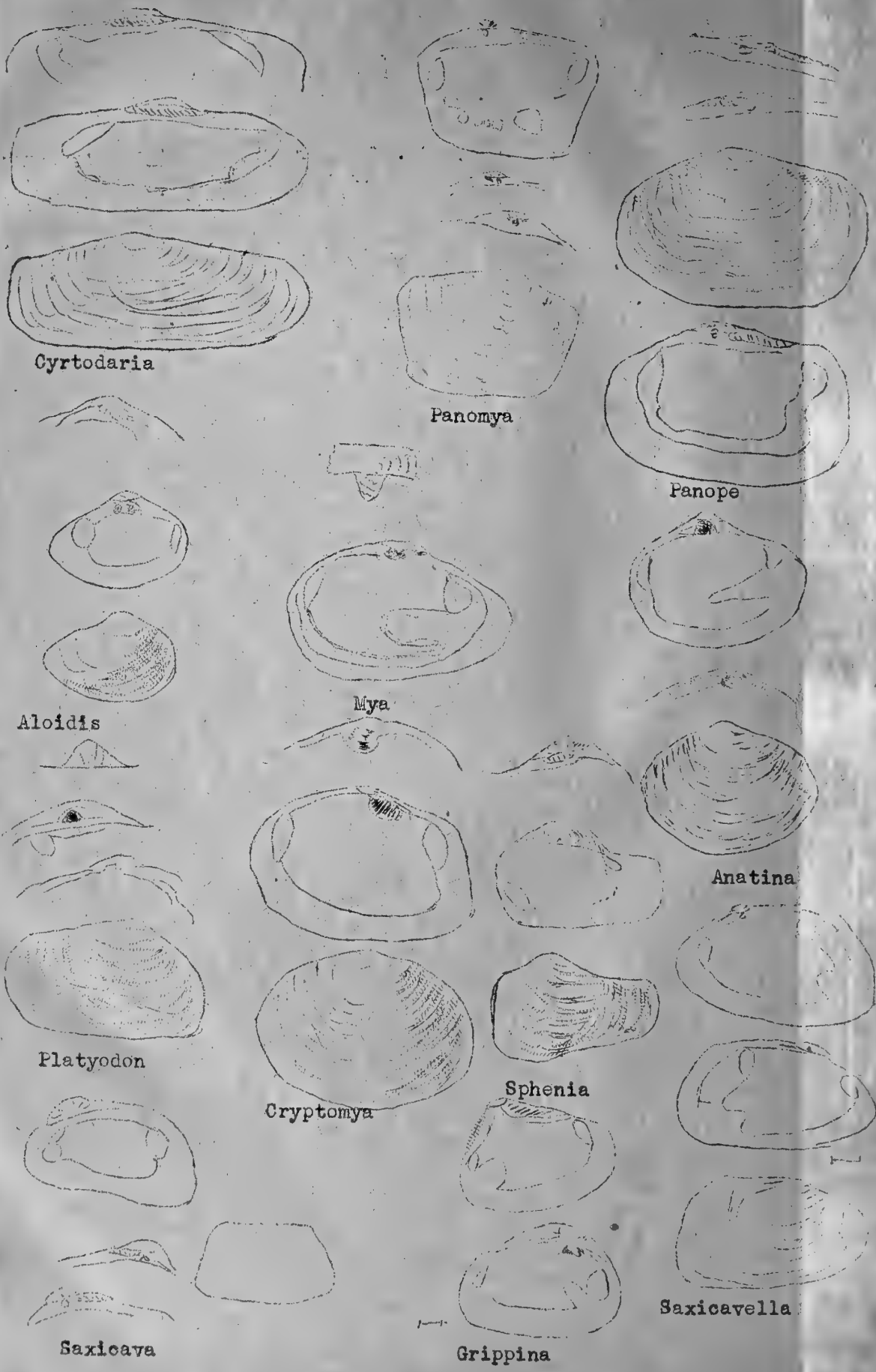
Subgenus Lyrodus Gould,1870. Type, ~~Teredo (Lyrodus)~~

" In this subgenus the terminal portion is not cupped, but ends in two lateral forks, covered with a periostracum." (Bartsch,1922).

Teredo (Lyrodus) townsendi Bartsch,1922. " A Monograph of the American Shipworms", U.S. Natl. Museum, Bulletin 122, pp 26,27,pl.22, fig.2, pl. 33, fig.2, 1922.

Type locality, South San Francisco, Calif. Known only from type locality.




Cyrtodaria
Panomya
Panope
Aloidis
Mya
Anatina
Platyodon
Cryptomya
Sphenia
Saxicavella
Saxicava
Grippina

The following list of Mollusca is composed of species reported Recent along the west coast of North America between San Diego, Calif. and the Polar Sea. Each species will be followed by a reference to the number of the Minutes and page on which it is discussed. Species and subspecies that in our opinion have been erroneously reported in other faunal lists, or placed in the synonymy of other species, will be omitted from this list, but will be found in the text discussion. An * preceeding a species indicates that it is a questionable member of our fauna but with records that we cannot definitely disprove.

CLASS PELECYPODA

Order PRIONODESMACEA

Family SOLEMYIDAE(SOLEMYACIDAE)

Genus Solemya Lamarck,1818 33:7

Subgenus Acharax Dall, 1908 33:7

Solemya agassizii Dall, 1908 Off Tillamook Bay, Oregon, south to Aguja Point, Peru, in 1036-1800 fathoms. 33:7

Solemya johnsoni Dall,1891. Puget Sound to Panama 33:7

Subgenus Petrasma Dall,1908 33:7

Solemya panamensis Dall,1908. Monterey, Calif. to Panama. 33:7

Solemya valvulus Carpenter,1864. Monterey, Calif. to Gulf of Calif. 33:7

Family NUCULIDAE

Genus Nucula Lamarck, 1799. 33:7

Nucula exigua Sowerby, 1832. Golden Gate, Calif. to Patagonia. 33:7

Subgenus Ennucula Iredale, 1931. 33:7

Nucula cardara Dall,1916. Monterey, Calif. to Lower Calif. in deep wate

Nucula carlottensis Dall,1897. Queen Charlotte Islands to Anacapa Id. 3

Nucula darella Dall, 1916. Off San Diego, Calif. in 822 fms. 33:8

Nucula linki Dall,1916. Queen Charlotte Sound, British Columbia to Guay Mexico 33:8

Nucula quirica Dall, 1916. Chugachik Bay, Cooks Inlet, Alaska. 33:8

Nucula tenuis Montagu,1808. Northern Europe, Northeastern North America Circumboreal. Point Barrow, Alaska to Cedros Id., Mexico. 33:8

Genus Acila H. & A. Adams, 1858. 33:8

Subgenus Truncacila Schenck in Grant and Gale, 1931. 33:8

Acila castrensis Hinds, 1843. Sitka, Alaska to Cedros Id.,Mex. 33:8

Family NUCULANIDAE (LEDIDAE)

Genus Nuculana Link,1807 (Leda Schumacher, 1817)

Nuculana amblia Dall,1905. Monterey Bay, Calif. 33:9

Nuculana buccata Steenstrup,1842. Arctic Ocean and Bering Strait. Also Atlantic. 33:9

Nuculana conceptionis Dall,1896. Aleutian Islands to San Diego,Calif. 33-9

Nuculana fossa Baird,1863. Kotzebue Sound, Alaska to Puget Sound. 33:9

Nuculana fossa curtulosa Dall,1916. Bering Sea and Unalaska. 33:9

Nuculana pernula Muller,1779. Arctic Ocean to Plover Bay. Atlantic. 33:9

Subgenus Saccella Woodring,1925.

Nuculana redondoensis Burch, 1944. Monterey, Calif. to Ensenada,Mex.33

Nuculana cellulita Dall,1896. Craig, Alaska to Puget Sound. 33:10

Nuculana burchi Willett,1944. Off Redondo Beach & El Segundo,Calif.

Nuculana oxia Dall, 1916. Santa Rosa Island, Calif. to Gulf of Calif.

Nuculana minuta Frbricius, 1776. Arctic Ocean to San Diego, Calif. Also Atlantic. 33:11

Nuculana minuta [illegible] ego, Calif.

Nuculana penderi Dall,1910. [illegible] Alaska to Santa Ba

Nuculana taphria Dall, 1897. Bodego Bay, Calif. to Lower Calif. 33:11

Subgenus Thestyleda Iredale,1929.

Nuculana hamata Carpenter,1864. Puget Sound to Panama Bay. 33:11

Nuculana hamata limata Dall,1916. Santa Barbara to San Diego, Calif. 33:11

Nuculana leonina Dall,1916. Straits of Fuca to Monterey Bay,Calif. 33:11

Subgenus uncertain

Nuculana amiata Dall, 1916. Off San Diego in 488 fathoms. 33:11

Nuculana dalli Krause, 1885. Unalaska, Aleutian Islands. 33:11

Nuculana extenuata Dall,1897. Off Sitka, Alaska , 1,569 fathoms. 33:11

Nuculana fiascona Dall,1916. Off San Diego, Calif. in 822 fms. 33:11

Nuculana gomphoidea Dall,1897. Off Tillamook, Oregon in 786 fms. 33:11

Nuculana liogona Dall,1916. Bering Sea in 1,401 fms. 33:11

Nuculana navissa Dall,1916. Farallones Islands to San Diego,Calif. 33:11

Nuculana phenaxia Dall,1916. Off San Diego, Calif. in 822 fms. 33:11

Nuculana pontonia Dall,1889. Santa Barbara Islands,Calif. to Peru. 33:11

Nuculana radiata Krause, 1885. Arctic Ocean; Plover Bay, E. Siberia; Okhot-
-sk and Bering Seas. 33:11

Nuculana spargana Dall,1916. Santa Barbara Islands to Point Loma, Calif.
33:11

Genus Yoldia Moller,1842 (Portlandia Morch,1853) 33 :12

Yoldia myalis Couthouyi,1838. Arctic Ocean to Puget Sound. 33:12.

Yoldia limatula Say,1831. Arctic Ocean to San Diego, Calif. 33:12

Yoldia limatula gardneri Oldroyd, 1935. Gardner Bay, Pender Harbor. 33:12

Yoldia scissurata Dall,1897. Arctic Ocean to San Diego, Calif. 33:12

Subgenus Kalayoldia Grant and Gale, 1931. 33:13

Yoldia cooperi Gabb,1865. San Francisco Bay to Todos Santos Bay,Mex. 33:13

Subgenus Megayoldia Verrill and Bush ,1897. 33:13

Yoldia thraciaeformis Storer,1838. Arctic Ocean to Oregon. Atlantic. 33:13

Yoldia secunda Dall,1916. Southeastern Alaska in deep water. 33:13

Yoldia beringiana Dall, 1916. Bering Sea to Anacapa Id., Calif. 33:13

Yoldia montereyensis Dall,1893. Chirikoff Id., Alaska to San Diego.33:13

Yoldia martyria Dall,1897. Prince of Wales Id., Alaska to Gulf of Calif.33-13

Yoldia vancouverensis Smith,1880. Vancouver Island. 33:13

Subgenus Yoldiella Verrill and Bush, 1897. 33:13

Yoldia siliqua Reeve,1855. Norton Sound, Alaska to Cape Simpson, B.C.33:13

Yoldia intermedia Sars, 1865. Bering Strait and Norton Sound, Alaska.
Circumboreal. 33:13

Yoldia oricia Dall, 1916. Oregon to San Diego. 33:13

Yoldia sanesia Dall,1916. Southeastern Alaska to Pt. Conception. 33:13

Yoldia capsa Dall,1916. Aleutian Islands to Gulf of Calif. 33:13.

Yoldia cecinella Dall, 1916. Aleutian Islands to Gulf of Calif. 33:13

Genus Cyrilla A. Adams ,1860. 33:13 (Pleurodon, Nucinella)

Cyrilla munita Carpenter in Dall,1898. Santa Rosa Island, Calif. to
Lat. 34 S. 33:13

Genus Malletia Desmoulins, 1832. 33:14

Malletia faba Dall,1897. Queen Charlotte Islands, B.C. to Lower Calif.3
33:14

Malletia fiora Dall,1916. Off Sitka, Alaska in 1,569 fms. 33:14

Malletia pacifica Dall, 1897. Chignak Bay, Alaska to Monterey, Calif. 33:14

Malletia talama Dall,1916. Bering Sea to Oregon. 33:14

Genus Tindaria Bellardi,1875. 33:14

Tindaria brunnea Dall, 1916. Bering Sea to Tillamook, Oregon.

Tindaria californica Dall, 1916. Santa Barbara to San Diego, Calif. 33:14

Tindaria cervola Dall,1916. Off San Diego in 822 fms. 33:14

Tindaria diaphana Dall,1916. Off San Diego in 822 fms. 33:14

Tindaria [illegible] Dall, 1897. Queen Charlotte Islands to Coronado [illegible]

Tindaria kennerlyi Dall, 1897. Off Sitka, Alaska to Santa Barbara Ids. in deep water. 33:14

Tindaria martiniana Dall, 1916. Cape San Martin to Santa Barbara Islands in deep water. 33:14

Tindaria mexicana Dall,1908. San Diego, Calif. to Acapulco, Mexico in deep water. 33:14

Tindaria ritteri Dall, 1916. Off La Jolla, California in 293 fms. 33:14

Family GLYCYMERIDAE

Genus Glycymeris Da Costa, 1778 34:3

Glycymeris corteziana Dall, 1916. Santa Catalina Id. to South Coronado Island. 34:3

Glycymeris keenae Willett, 1943. Forrester Island, Alaska. 34:3

* Glycymeris migueliana Dall,1916. Oregon to Magdalena Bay, Lower Calif. and the Cortez Bank. 34:3

Glycymeris profunda Dall,1879. Off Catalina Island and Redondo Beach, Cal. 34:3

* Glycymeris septentrionalis (Middendorff),1849. Aleutian Islands to Forrester Island. 34:4

Glycymeris subobsoleta Carpenter, 1864. Aleutian Islands to Lower Calif. 34:4

Subgenus Tuceta Bolten,1798. 34:4

*Glycymeris multicostata Sowerby, 1832. Newport Bay, Calif. to Guayquil. 34:4

Family LIMOPSIDAE

Genus Limopsis Sasso,1827. 34:5

Limopsis akutanica Dall,1916. Off Akutan Id., Aleutians, 72 fms. 34:5

Limopsis diegensis Dall,1908. Santa Barbara Islands to Coronado Id. 34:5

Limopsis skenea Dall,1916. Bowers Bank, Bering Sea in 30 fms. 34:5

Subgenus Empleconia Dall,1908. 34:5

Limopsis vaginatus Dall, 1891. Bering Sea and Aleutian Islands. 34:5

Family ARCIDAE

Genus Arca Linnaeus, 1758. 34:5

Subgenus Arcopsis Von Koenen,1885. 34:5

Arca solida Broderip and Sowerby,1833. Santa Monica, Calif. to Paita, Peru. 34:5

Subgenus Acar Gray,1847. 34:6

Arca pernoides Carpenter,1857. (Arca bailyi Bartsch,1931). Topanga Be[illegible] (near Santa Monica) to San Geronimo Island, Gulf of Calif. 34:6

Subgenus Barbatia Gray,1847. 34:7

Arca reeveana d'Orbigny,1846. Santa Monica, Calif. to Peru and Gallapago Islands. 34:7

Subgenus Larkinia Reinhart,1935. 34:7

Arca multicostata Sowerby,1833. Newport Bay, Calif. to Panama and the Gallapagos Islands. 34:7

Genus Bathyarca Kobelt,1891. 34:7

Bathyarca nucleator (Dall),1908. San Diego, Calif. to Panama. 34:7

Bathyarca pompholyx (Dall),1908. Santa Barbara, Calif. to the Gallapa[illegible] Islands and mid Pacific in deep water. 34:7

Family PINNIDAE

Genus Atrina Gray,1842. 34:7

Atrina oldroydi Dall,1901. San Pedro, Calif. to Cedros Island and Magda Bay, Lower Calif. 34:7

Family PTERIIDAE

Genus Pteria Scopoli,1777. 34:8

Pteria sterna Gould,1851. Hueneme Point, Calif. to the Gulf of Calif. and south to Paita, Peru. 34:8

* Pteria [illegible]idozana Dall,1916. Long Beach, Calif. 34:8

Family PEDALIONIDAE

Genus Pedalion Solander,1770 (Melina Retz.,1788, Perna Brug.,1799)34:9

Pedalion chemnitzianum d'Orbigny,1845. Coronado Islands to Chile. Also Atlantic. 34:9

Family PHILOBRYIDAE

Genus Philobrya Carpenter,1872. 34:10

Philobrya setosa Carpenter,1864. Forrester Island, Alaska to Gulf of Calif.

Family DIMYIDAE

Genus Dimya Rouault,1848. 34:10

Dimya californiana Berry,1936. Santa Monica, Calif. in 100 fms. 34:10

Dimya coralliotis Berry,1944. 10 miles off Huntington Beach, Calif. 37:11

Family OSTREIDAE

Genus Ostrea Linnaeus,1758. 34:11

* Ostrea palmula Carpenter,1857. 34:11

Ostrea lurida Carpenter,1864. Sitka, Alaska to Cape San Lucas, Lower Cal. 34:11

Ostrea lurida laticaudata Carpenter,1864. Puget Sound to Gulf of Calif.34:11

Ostrea lurida expansa Carpenter,1864. Monterey to San Diego,Calif. 34:11

Ostrea conchaphila Carpenter,1864. Redondo Beach, Calif. to Panama. 34:11

Ostrea chilensis Philippi (Introduced) Morro,Mugu,Newport Bays. 34:12

Ostrea virginica Gmelin,1792. (Introduced) 34:12

Ostrea laperousii Schrenck (Introduced) 34:12

Family PECTINIDAE

Genus Pecten Muller,1776. 35:3

Pecten diegensis Dall,1898.Monterey, Calif. to San Benito Ids. 35:4

Subgenus Chlamys Bolten,1798. 35:4

Pecten hericius Gould,1850. Port Althorp, Alaska to San Diego, Calif. 35:4,5

Pecten hericius pugetensis I.S. Oldroyd ,1920. Craig, Prince of Wales Island, to Newport Bay, Calif. 35:5

Pecten hericius albidus Dall,1906. Aleutian Islands. 35:6

Pecten hastatus Sowerby,1843. Monterey to off Newport Bay, Calif. 35:6

Pecten hindsii Carpenter,1864. Bering Sea to San Diego, Calif. 35:6

Pecten hindsii jordani Arnold,1903. Forrester Island, Alaska to Puget Sound

* Pecten hindsii kincaidi Oldroyd,1920. Portage Bay, Alaska to Puget Sound.

* Pecten islandicus Muller,1776. 35:8

Pecten beringianus Middendorff,1849. Bering Sea, Umnak Island and the Aleutians. 35:8

Pecten lowei Hertlein,1935. Catalina Island to Gulf of Calif. Galapagos.35:8

Subgenus Patinopecten Dall,1898. 35:8

Pecten caurinus Gould,1850. Wrangell, Alaska to Humboldt Bay, Calif. 35:8

Subgenus Leptopecten Verrill,1897. 35:9

Pecten latiauratus Conrad,1837. San Francisco Bay, Calif. to Gulf of California 35:9

Pecten latiauratus monotimeris Conrad,1837. Monterey, Calif. to Gulf of California 35.9

* Pecten tumbezensis d'Orbigny,1847. Santa Barbara Islands to Peru.35:10

Subgenus Plagioctenium Dall,1898. 35:10

Pecten circularis Sowerby,1835. 35:10

Pecten circularis aequisulcatus Carpenter,1865. Santa Barbara, Calif. to Cape San Lucas, Lower Calif. 35:11

Volsella recta flabellata (Gould),1850. Vancouver Island to San Die[illegible] 37:13
Volsella fornicata (Carpenter),1864. Trinidad to San Pedro and Corte[illegible]
Bank. 36:14
Subgenus Amygdalum Megerle von Muhlfeld,1811.
Volsella pallidula (Dall),1916. Off Bodega Head, Calif. and south to Cerros
Island, Lower Calif. in deep water. 36:14
Subgenus Brachidontes Swainson,1840. 36:15
Volsella demissus (Dillwyn),1817. (Introduced). San Francisco Bay. 36:[illegible]
Subgenus (Uncertain)
Volsella diegensis (Dall),1911. San Francisco Bay to Cape San Lucas. 36:15
Genus Botulina Dall,1889. 37:3,4.
Botulina denticulata (Dall),1871. Santa Barbara, Calif. to Acapulco, Mex.
37:4,5,6
Genus Botula Morch,1853. 37:6
Subgenus Adula H. & A. Adams, 1857. 37:6
Botula falcata (Gould), 1851. Coos Bay, Oregon to San Diego. 37:6
Botula californiensis (Philippi), 1847. Vancouver Island to San Diego. 37:6
Genus Dacrydium Torell,1859. 37:6
Dacrydium pacificum Dall, 1916. Bering Sea,1,401 fms. 37:6
Genus Lithophaga Roding,1798. 37:6,7
Subgenus Diverus Dall,1898. 37:7
Lithophaga plumula (Hanley),1844. Monterey, Calif. to Patagonia. 37:7
Subgenus Myoforceps Fischer,1886. 37:7
Lithophaga aristata Dillwyn,1817. La Jolla, Calif. to Peru. Atlantic. 37:7
Subgenus Labis Dall,1916. 37:7
*Lithophaga attenuata Deshayes,1836. Monterey to Patagonia. 37:7
Genus Modiolaria Beck,1838 (Musculus Roding) 37:8
Modiolaria nigra (Gray),1824. Arctic Ocean to Oregon. Circumboreal. 37:9
Modiolaria nigra obesa (Dall), 1916. Arctic Ocean to Cape Flattery. 37:9
Modiolaria protracta (Dall),1916. Nunivak Island, Bering Sea. 37:9
Modiolaria olivacea (Dall),1916. Bering Sea, Umnak Island, Alaska. 37:[illegible]
Modiolaria impressa (Dall), 1907. Petrel Bank, Bering Sea. 37:9
Modiolaria taylori (Dall),1897. Victoria, Vancouver Island, B.C. 37:9
Modiolaria substriata (Gray),1824. Arctic Ocean to Puget Sound. 37:9
Modiolaria corrugata (Stimpson), 1851. Arctic Ocean to Puget Sound. Circum-
-boreal. 37:9
Modiolaria vernicosa (Middendorff), 1849. Bering Sea to Sitka. Also
Okhotsk Sea. 37:9
Modiolaria phenax (Dall), 1915. St. George Island, Bering Sea. 37:9
Modiolaria marmorata (Forbes), 1838. Puget Sound. Circumboreal. 37:9
Modiolaria seminuda (Dall), 1897. Bering Sea to Forrester Id.,Alaska. 37:9
Genus Crenella Brown,1827. 37:9
Crenella decussata Montagu,1808. Bering Sea to San Pedro. Atlantic. 3[illegible]
Crenella divaricata d'Orbigny,1845. Santa Barbara Islands to Panama. [illegible]
West Indies. 37:10
Crenella leana Dall,1897. Aleutian Islands, eastward to Middleton Isl[illegible],
Alaska. 37:10
Crenella columbiana Dall,1897. Aleutian Islands to San Diego,Calif. 3[illegible]
Crenella grisea Dall,1897. Bering Sea to Sitka, Alaska. 37:11
Crenella rotundata Dall,1916. Santa Cruz Island, Calif. in 155 fms. 3[illegible]
Order ANOMALODESMACEA
Family PERIPLOMATIDAE
Genus Periploma Schumacher,1817. 37:12
Periploma planiuscula Sowerby,1834. Point Conception, Calif. to [illegible]
Peru. 37:12
Periploma alaskana Williams,1940. Arctic Ocean to Mac-Leod Har[illegible],
Island, Prince William Sound, Alaska. 37:12

Subgenus Propeamussium De Gregorio, 1884. 35:12

Pecten alaskensis Dall,1871. Pribiloff Islands, Bering Sea, and southward to the Santa Barbara Islands. Japan. 35:12

Pecten davidsoni Dall,1897. Davidson and Bowers Banks, Bering Sea. 35:14

Subgenus Delectopecten Stewart,1930. 35:14

Pecten randolphi Dall,1897. Bering Sea to Cape Blanco, 225-1064 fms. 35:14

Pecten randolphi tillamookensis Arnold,1906. Pribiloff Islands, Bering Sea to San Diego, Calif. 35:14a

* Pecten arcus Dall,1913. 35:14

Pecten vancouverensis Whiteaves,1893. Bering Sea to San Diego, Calif. 35:14a

Pecten bistriatus Dall,1916. Off San Diego, Calif. in 822 fms. 35:14a

Pecten incongruus Dall,1916. Off San Diego, Calif. in 684 fms. 35:14a

Pecten binominatus Hanna,1924(P. andersoni Dall,1918) Dolphin and Union Strait, Arctic Ocean. 35:14a

Subgenus Cyclopecten Verrill,1899. 35:14a

Pecten catalinensis Willett, 1931. Off Catalina Island and Redondo Beach, California in 75 to 100 fms. 35:14a

* Pecten whiteavesi Dall. 35:14a

Genus Hinnites Defrance,1821. 35:11

Hinnites giganteus Gray,1825. Aleutian Islands to Magdalena Bay, Lower Calif.

Family LIMIDAE

Genus Lima Bruguiere,1797. 35:14b

Subgenus Mantellum Roding,1798. 35:14b

Lima dehiscens Conrad,1837. Monterey, Calif. to Acapulco,Mex. 35:14b

Subgenus Limatula Wood,1839. 35:14b

Lima attenuata Dall, 1916. 35:14b

Lima subauriculata Montagu,1808. Forrester Island, Alaska to San Quintin Bay, Lower Calif. 35:14b

Family ANOMIIDAE

Genus Anomia Linnaeus,1758. 36:3

Anomia peruviana d'Orbigny,1846. San Pedro, Calif. to Peru and the Gallapagos Islands. 36:3

Genus Pododesmus Philippi,1837. 36:3

Subgenus Monia Gray,1849. 36:3

Pododesmus macroschisma (Deshayes),1839. Southern Bering Sea from the Prib-ilof Islands to Japan and the Okhotsk Sea on the west, and on the east south to and including the whole coast of Lower Calif. 36:3

Pododesmus foliata Broderip San Pedro, Calif. to Guayaquil. 36:4

Family MYTILIDAE

Genus Mytilus Linnaeus,1758. 36:7

Mytilus californianus Conrad,1837. Unalaska, Aleutian Islands, eastward and southward to Socorro Island, Mexico. 36:7

Mytilus edulis Linnaeus,1758. Arctic Ocean to Cerros Island and worldwide in temperate waters. 36:7 41:7-13

* Mytilus grayanus Dunker,1853. San Pedro to San Diego,Calif. 36:8,9.37:11, 41:7-13.

Subgenus Hormomya Morch,1850. 36:9

Mytilus stearnsi Pilsbry & Raymond,1898. Santa Barbara, Calif. to Oaxaca, Mexico. 36:10

Genus Septifer Recluz,1848. 36:11

Septifer bifurcatus (Conrad), 1837. Crescent City, Calif. to Gulf of Calif.

Septifer bifurcatus obsoletus Dall,1916. Santa Barbara to San Diego. 36:11

Genus Volsella Scopoli,1777. (Modiolus Lamarck,1799). 36:12

Volsella modiolus (Linnaeus),1758. Arctic Ocean to Monterey,Calif. 36:12

Volsella capax (Conrad),1837. Santa Barbara, Calif. to Payta,Peru. 36:13

Volsella recta (Conrad),1837. Bolinas Bay, Calif. to Magdalena Bay. 36:13

Periploma discus Stearns,1890. Monterey, Calif. to La Paz 37 :12
Subgenus Halistrepta Dall,1904. 37:12
Periploma sulcata Dall,1904. Off San Pedro & Redondo Beach, Calif. 37:12
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Family THRACIIDAE
Genus Thracia Blainville,1824. 37:13
Thracia trapezoides Conrad,1849. Craig, Alaska to Redondo Beach, Calif. 37:13
Thracia curta Conrad,1837. Icy Cape,Arctic Ocean, Bering Sea, south to San HipolitoPoint, Lower Calif. Punta Penasco,Mex. 37:13
Thracia beringi Dall,1915. Bering Sea, Aleutian Islands and south to Sitka, Alaska. 37:14
Thracia challisiana Dall,1915. Forrester Island to Monterey, Calif. 37:14
40:26
Thracia diegensis Dall,1915. San Pedro, Calif. to Magdalena Bay. 37:14
Genus Cyathodonta Conrad,1849. 37:15
Cyathodonta undulata Conrad,1849. Monterey, Calif. to Tres Marias Islands, Mexico. 37:15
Genus Asthenothaerus Carpenter,1864. 37:16 38:16
*Asthenothaerus villosior Carpenter,1864. San Pedro, Calif. to Cape San Lucas. 37:16 38:16
Family PANDORIDAE
Genus Pandora Bruguiere,1797. 37:16
Subgenus Kennerlia Carpenter,1864. 37:16
Pandora grandis Dall,1877. Pribilof Islands, Bering Sea, to Siletz Bay, Oregon. 37:16
Pandora forresterensis Willett,1918. Forrester Island, Alaska. Prince William Sound. Frederick Sound. 37:16
Pandora glacialis Leach,1819. Arctic Ocean south to Fuca Straits. Atlan-tic. 37:16
Pandora glacialis cutaenia Dall,1915. Port Etches and eastward to Sitka, Alaska. 37:16
Pandora filosa Carpenter,1864. Nunivak Island, Bering Sea to Todos Santos Bay, Lower Calif. 38:3
Pandora bilirata Conrad,1855. Prince William Sound, Alaska to Point Abrejos Lower California 38:3
* Pandora granulata Dall,1915. Santa Barbara, Calif. to Guaymas, Mex. 38:3
Subgenus Heteroclidus Dall,1903. 38:3
Pandora punctata Conrad,1837. Vancouver Island to Gulf of Calif. 38:3
Family LYONSIIDAE
Genus Lyonsia Turton,1822. 38:5
Lyonsia striata Montagu,1815. Circumboreal. Aleutian Islands to San Pedro, Calif. ? 38:5
Lyonsia gouldii Dall, 1915. San Francisco Bay to Tres Marias Islands, Mex , 38:5
Lyonsia arenosa Moller,1842. Circumboreal. Arctic Sea to Japan and the Okhotsk Sea on the west and on the east to the Aleutians and Kodiak Island, Alaska. 38:5
Lyonsia californica Conrad,1837. Sitka, Alaska to Manuel's Lagoon,Mex.38:5
Lyonsia californica haroldi Dall,1915. San Francisco Bay to Morro Bay. 38:6
*Lyonsia californica nesiotes Dall, 1915. 38:6
Lyonsia pugetensis Dall,1913. Chignik Bay, Alaska to Crescent City, Calif.
Subgenus Allogramma Dall,1903. 38:7
Lyonsia amabilis Dall,1913. Off Santa Barbara Channel, Calif. in 534 fms.
Genus Entodesma Philippi 1845. 38:7
Entodesma inflatum Conrad,1837. Vancouver Id. to Cedros Id. 38:7
to Forrester Island, Alaska.

Subgenus Agriodesma Dall,1909. 38:8
Entodesma saxicola Baird, 1863. Aleutian Islands to Cape Colnette, Lower Calif. 38:8
* Entodesma scammoni Dall,1871. Port Simpson, B.C., San Diego, Calif. 38:8
Genus Mytilimeria Conrad,1837. 38:8,9
Mytilimeria nuttallii Conrad,1837. Forrester Island, Alaska to Round Island, Lower California 38:9

Family POROMYACIDAE

Genus Dermatomya Dall,1889. 38 :11
Dermatomya tenuiconcha (Dall), 1913. Alaska Peninsula to Coronado Islands in deep water. 38:11
Dermatomya trosti (Strong and Hertlein),1937. Costes Bank off San Clemente Island. Off San Diego, Calif. 38:11
Dermatomya buttoni (Dall),1916. Monterey, Calif. in 581 fms. 38:11
Dermatomya beringiana (Dall),1916. Aleutian Islands to Tillamook, Ore.
Dermatomya leonina (Dall),1916. Off coast of Washington,877 fms. 38:11
Genus Cetoconcha Dall,1889. 38:12
Cetoconcha malespinae Dall,1916. Southwest of Sitka, Alaska.1,579 fms.

Family CUSPIDARIIDAE

Genus Cuspidaria Nardo,1840. 38:12
Cuspidaria glacialis G.O. Sars,1878. Off San Diego,239 fms. Atlantic.38:12
Cuspidaria subglacialis Dall,1913. Off California coast in deep water.38;1
Cuspidaria apodema Dall,1916. Off Sitka, Alaska to Panama Bay. 38:12
Cuspidaria chilensis Dall,1889. Off Oregon in 277 fms. and south to coast of Chile in 1,036 fms. 38:12
Genus Cardiomya A. Adams, 1864. 38:12
Cardiomya pectinata (Carpenter), 1864. Puget Sound, B.C. to Panama. 38:13
Cardiomya beringensis (Leche), 1883. Bering Sea to Kodiak Island and Panama Bay. 38:13
Cardiomya oldroydi (Dall),1924. Puget Sound to Catalina Island. 38:13
Cardiomya californica (Dall), 1886. Puget Sound to San Diego. 38:13
Cardiomya planetica (Dall), 1908. Pribiloff Islands, Bering Sea , to Coronado Islands, Lower Calif. in deep water. 38:13
Cardiomya balboae (Dall),1916. Cortez Bank, 60 fms. to Catalina Island, 50 fms. 38:13
Genus Myonera Dall and Smith,1886. 38:13
Myonera tillamookensis Dall,1916. Off Tillamook Bay, Ore.,786 fms. 38:13
Genus Plectodon Carpenter,1864. 38:13,14
Plectodon scaber Carpenter,1864. Catalina Island, Calif. to San Diego.38:1

Family VERTICORDIIDAE

Genus Verticordia J. de C. Sowerby, 1844 (ex Wood MS) 38:14,15
Subgenus Trigonulina d'Orbigny,1846. 38:15
Verticordia ornata (d'Orbigny), 1846. Monterey to Panama. Atlantic. 38:1
Genus Lyonsiella M. Sars,1872. 38:15
Lyonsiella alaskana Dall,1894. Southwest of Sitka, 1,659 fms. and off Catalina Island, Calif. in 600 fms. 38:15

Family CORBICULIDAE

Genus Corbicula Megerle von Muhlfeld,1811. 38:18
Corbicula fluminea Muller (Introduced) Columbia River, Washington.38:18

Order TELEODESMACEA

Family ASTARTIDAE

Genus Astarte Sowerby,1816. 39:5
Astarte polaris Dall,1903. Aleutian and Shumagin Ids. Circumboreal.39:6
Astarte compacta Carpenter,1864. Forrester Id. to Puget Sound. 39:6
Astarte willetti Dall,1917. Forrester Id. to Puget Sound. 39:6
Astarte rollandi Bernardi,1858. Pribilof and Aleutian Ids. to Port [illegible] William Sound, Alaska. Also Kamchatka. 39:6

Astarte rollandi loxia Dall,1902. Semidi Islands, Alaska. 39:6
Astarte arctica Gray,1824. Circumboreal. Arctic and Bering Seas and the Aleutian Islands. 39:6
Astarte borealis Schumacher,1817. Polar and Bering Seas, North Japan and eastward to Prince William Sound, Alaska. Atlantic. 39:6
Astarte alaskensis Dall,1903. Southern Bering Sea, to Aleutians and south to Puget Sound. Herschell Island, Arctic coast. 39:6
Astarte fabula Reeve,1855. Circumboreal. Arctic Sea and south in Bering Sea, Nunivak Island. 39:6
Astarte bennettii Dall,1903. Polar Sea at Bennett Island, and south in Bering Sea to Nunivak Island. 39:6
Astarte vernicosa Dall,1903. Arctic and Bering Seas. Attu to Atka ids. in the Aleutian chain. 39:7
*Astarte globosa Moller,1842. Arctic Coast to Greenland. 39:7
Astarte esquimalti Baird,1863. Aleutian Islands to Puget Sound. 39:7
Genus Bernardina Dall,1910. 39:7
Bernardina bakeri Dall, 1910. Point Loma, San Diego, Calif. to Magdalena Bay, Lower Calif. 39:7
Family CRASSATELLIDAE
Genus Crassatella Lamarck,1799 (Crassatellites Krueger,1823). 38:8
Crassatella fluctuata (Carpenter),1864. Santa Barbara Islands to San Pedro, Calif. 39:8
Genus Crassinella Guppy,1874. 39:8
Crassinella oregonensis Keen,1938. Coos Bay, Oregon. 39:9
Crassinella branneri Arnold, 1903. San Diego to Panama. 39:9
Family CARDITIDAE 39:10,11,12
Genus Glans Megerle von Muhlfeld, 1811. 39:10,11,12,13
Glans carpenteri Lamy,1922. Queen Charlotte Islands, British Columbia to Todos Santos Bay, Lower Calif. 39:13
Genus Cardita Bruguiere,1792. 39:10,11,12,13
Subgenus Cyclocardia Conrad,1867. 39:13
Cardita barbarensis Stearns,1890. Santa Barbara Channel in deep water.
Cardita gouldii Dall,1902. Off San Diego, Calif. 39:13
Cardita stearnsii Dall,1902. Puget Sound. 39:13
Cardita paucicostata Krause,1885. Arctic Sea to Fuca Straits. 39:13
Cardita crebricostata Krause,1885. Point Barrow, Alaska to Monterey, Calif. 39:13
Cardita alaskana Dall,1903. Izhut Bay,Afognak Id. to Victoria, B.C. 39:13
Cardita crassidens Broderip and Sowerby,1829. Arctic and Bering Seas and eastward to Kodiak Island, Alaska. 39:13
Cardita bailyi Burch, 1944 (Cardita nodulosa Dall) Santa Barbara to the Coronado Islands. 39:13
Cardita umnaka Willett,1932. Umnak Island, Alaska. 39:14
Cardita ventricosa Gould,1850. Belkoffski Bay, Alaska to Coronado Islands and Cortez Bank, Calif. 39:14
Cardita redondoensis Burch,1944. Off Redondo Beach, Calif. in 100 fms. 39:14,15,16
Cardita incisa Dall,1902. Unalaska to Semidi Islands, Alaska. 39:17
Genus Miodontiscus Dall,1903. 39:17
Miodontiscus prolongatus Carpenter,1864. Middleton Island, Alaska to San Diego, Calif. 39:17
Miodontiscus meridionalis Dall,1916. Off Point Loma, Calif. in 70 fms.
Genus Calyptogena Dall,1891. 39:17
Calyptogena pacifica Dall,1891. Clarence Strait, Alaska to Santa Barbara Channel. 39:17
Calyptogena elongata Dall,1916. Santa Barbara Islands to San Diego. 39:17

Genus Milneria Dall,1881. 39:17
Milneria minima Dall,1871. Monterey to Rosario Bay, Lower Calif. 39:17
Milneria kelseyi Dall,1916. Monterey to Pt. Abrejos, Lower Calif. 39:17

Family CHAMIDAE

Genus Chama Linnaeus,1758. 39:18
Chama pellucida Broderip,1835. Oregon to Chile and Galapagos. 39:18
* Chama frondosa Broderip,1835. San Diego, Calif. to Peru. 39:18
Genus Pseudochama Odhner,1917. 39:19
Pseudochama exogyra Conrad, 1837. Oregon to Panama. 39:19
Pseudochama granti Strong,1934. Monterey to Catalina Island, Calif. 39:19

Family THYASIRIDAE

Genus Thyasira Leach (in Lamarck,1818). 39:20
Thyasira bisecta Conrad, 1849. Off Alaska Peninsula and southward to the Oregon coast. 39:20
Thyasira gouldii Philippi,1845. Bering Strait to San Diego ? Atlantic.
Thyasira trisinuata d'Orbigny,1846. Sitka, Alaska to San Diego. Atlantic.
Thyasira cygnus Dall,1916. Southeastern Alaska. 39:21
Thyasira barbarensis Dall,1889. Fuca Straits to Gulf of Calif. 39:21
Thyasira excavata Dall,1901. Oregon to Gulf of Calif. 39:21
Thyasira tricarinata Dall,1916. Off Santa Barbara Islands, Calif. in 1,100 fathoms. 39:21
Subgenus Axinulus Verrill and Bush,1898. 39:21
Thyasira ferruginea Winckworth,1932(T. ferruginosa (Forbes). Aleutian Islands. Also Atlantic and Arctic. 39:21
Genus Axinopsis G.O. Sars,1878. 39:21
Axinopsis sericatus Carpenter,1864. Aleutian Islands to Todos Santos Bay, Lower Calif. 39:22
Axinopsis viridis Dall,1901. Arctic Ocean,on the west to Japan, on the east to the Aleutian and Coronado Islands. 39:22

Family UNGULINIDAE (DIPLODONTIDAE)

Genus Taras Risso,1826 (Diplodonta Brown,1831) 39:24
Taras aleuticus(Dall)1901. Cape Lisburne, Arctic Ocean, to the Aleutians and eastward to Sitka Bay, Alaska. 39:24
Taras orbellus (Gould),1852. Pribilof Islabds, Bering Sea to Gulf of California. 39:24
Taras subquadratus (Carpenter), 1855. Off Santa Monica, Calif. to Panama.
Subgenus Felaniella Dall,1899. 39:24
Taras sericatus (Reeve),1850. Monterey, Calif. to Panama. 39:24

Family LUCINIDAE

Genus Lucina Bruguiere,1797. 40:5
Subgenus Anodontia Link,1807. 40:6
*Lucina edentuloides Verrill,1870. San Clemente Id. to Gulf of Calif. 40:6
Subgenus Here Gabb,1866. 40:6
Lucina excavata Carpenter,1857. San Pedro, Calif. to Mazatlan, Mexico.
Subgenus Lucinisca Dall, 1901. 40:6
Lucina nuttallii Conrad, 1837. Monterey, Calif. to Mazatlan, Mex. 40:6
Subgenus Lucinoma Dall,1901. 40:7
Lucina annulata Reeve,1850. Port Althorp, Alaska to Coronado Ids. 40:7
Lucina aequizonata Stearns,1890. Santa Barbara Islands to south latitude 38 (Chile). 40:7
Subgenus Epilucina Dall, 1901. 40:7
Lucina californica Conrad,1837. Crescent City, Calif. to San Ignacio Lagoon, Lower Calif. 40:7,8
Subgenus Parvilucina Dall,1901. 40:8
Lucina tenuisculpta Carpenter,1865. Nunivak Id. to Coronado Ids. 40:8
Lucina approximata Dall,1901. Monterey, Calif. to Panama. 40:8

Genus Divaricella von Martens, 1880. 40:8

*Divaricella perparvula Dall, 1901. Monterey, Calif. to Ecuador. 40:8,9

Family LEPTONIDAE 40:9,10,11,12

Genus Erycina Lamarck,1805. 40:13

Erycina coronata Dall,1916 ?? Off Coronado Islands 40:13

Erycina santarosae Dall, 1916. ?? Santa Rosa Island, Calif. 40:13

Genus Kellia Turton,1822. 40:13

Kellia laperousii Deshayes,1839. Bering Sea, The Aleutian Islands and south to Panama. 40:14

Genus Rochefortia Velain,1876. 40:14

Rochefortia tumida Carpenter,1864. Shumagin Islands, Alaska to San Diego . to Scammons Lagoon, Lower Calif.

Rochefortia planata Dall,1885. Icy Cape, Arctic Ocean south to the Shumagin Islands, Alaska. 40:15

Rochefortia ferruginosa Dall, 1916. San Francisco Bay to Santa Rosa Id.

Rochefortia beringensis Dall,1916. Bering Island, Bering Sea. 40:15

Rochefortia grebnitzskii Dall, 1916. Bering Island, Bering Sea. 40:15

Rochefortia aleutica Dall,1899. Bering Sea to Coronado Islands. 40:15

Rochefortia compressa Dall,1911. Shumagin Islands,Alaska to Gulf of Calif.

Rochefortia pedroana Dall,1899. Morro Bay to San Pedro, Calif. 40:15,16

Rochefortia golischi Dall,1916. Off Santa Rosa Islands, Calif. 40:15,16

Rochefortia grippi Dall,1912. San Diego, Calif. 40:15

Genus Sorridens Dall,1899. 40:16

Sorridens oblonga Carpenter,1864. Monterey, Calif. to San Hipolito Pt. 40:16

Genus Pseudopythina Fischer,1884. 40:17

Pseudopythina rugifera Carpenter,1864. 40:17 Puget Sound to San Bartholome, Lower Calif. 40:17

Pseudopythina compressa Dall,1899. Cape Lisburne, Arctic Ocean, to Acapulco.

Pseudopythina myaciformis Dall, 1916. Puget Sound. 40:17

Pseudopythina bakeri (Dall), 1916. (Erycina bakeri Dall) Off South Coronado Island, Lower Calif. 40:17

Pseudopythina chacei (Dall), 1916. (Erycina chacei Dall). Santa Rosa Island to Coronado Islands. 40:17,18

Genus Bornia Philippi, 1836. 40:18

Bornia retifera Dall,1899. Monterey to Santa Barbara Islands. Malaga Cove, Los Angeles county, Calif. 40:18

Genus Lepton Turton,1822. 40:19

Lepton marmorum Carpenter,1864. Puget Sound to San Diego. 40:19-12

Genus Lasaea Brown, 1827. 40:19,20

Lasaea cistula Keen,1938. Pt. Arena, Calif. to Ensenada, Mex. 40:19

Lasaea subviridis Dall,1899. Humboldt Co.,Calif. to Lower Calif. 40:19,20

Genus Turtonia Alder,1848. 40:20

Turtonia minuta(Fabricius),1780. Bering Strait and south to Magdalena Bay, Lower Calif. 40:20

Turtonia occidentalis Dall,1871. Plover Bay, Bering Sea to Rodman Bay, Alaska. 40:20

Genus Montacuta Turton,1822. 40:21

Montacuta balliana (Dall), 1916. (Erycina balliana Dall). Off South Coronado Island, Lower Calif. 40:21

Genus Aligena H.C. Lea,1843. 40:21,22,23

Aligena carritensis Arnold,1903. La Jolla, Calif. to Magdalena Bay,Mex.

* Aligena nucea Dall,1913. Gulf of California. 40:23

Aligena redondoensis Burch,1941. Off Redondo Beach, Santa Rosa Id. and La Jolla, Calif. 40:23

Genus Sportella Deshayes,1858. 40:24

Sportella californica Dall,1899. ?? Monterey, Calif. 40:24

Genus Anisodonta Deshayes, 1858. 40 :24

Anisodonta pellucida Dall, 1916. Monterey Bay, Calif. off Del Monte. 40:24

Family CHLAMYDOCONCHIDAE

Genus Chlamydoconcha Dall,1884. 40:24

Chlamydoconcha orcutti Dall,1884. Monterey to Mission Bay, Calif. 40:24

Family CARDIIDAE

Genus Trachycardium Morch,1853. 41:21

Subgenus Dallocardia Stewart,1930. 41:21

Trachycardium quadragenarium (Conrad), 1837. Santa Barbara, Calif. to Todos Santos Bay, Lower Calif. 41:21

Genus Clinocardium Keen,1936. 41:22

Clinocardium blandum (Gould), 1850. Puget Sound, Wash. 41:23

Clinocardium nuttallii (Conrad), 1837. Nunivak, Pribilof, and Commander Islands, Bering Sea, south to Hakodate, Japan, and San Diego. 41 :23

Clinocardium ciliatum (Fabricius), 1780. Circumboreal. Arctic Ocean and southward to Puget Sound and North Japan. 41:24

Clinocardium californiense (Deshayes), 1841. Japan, Bering Sea eastward to Sitka, Alaska. 41:24

Clinocardium fucanum (Dall), 1907. Southern Bering Sea, off Unimak Id. and south to Monterey, Calif. 41:24

Genus Trigoniocardia Dall,1900. 41:25

Subgenus Americardia Stewart,1930. 41:25

Trigoniocardia biangulata (Sowerby), 1829. Redondo Beach, Calif. to Guayaquil. 41:25

Genus Laevicardium Swainson,1840. 41:25

Laevicardium elatum(Sowerby), 1833. San Pedro, Calif. to Panama. 41:26

Laevicardium substriatum(Conrad), 1837. Mugu, Ventura Co. to Acapulco,Mex.

Genus Serripes Gould,1841. 41:26

Serripes groenlandicus(Bruguiere),1789. Circumboreal. Arctic Seas and south to Hakodate, Japan and Puget Sound. 41:26

Serripes laperousii (Deshayes), 1839. Circumboreal. Bering Strait to Hakodate, Japan and Sitka, Alaska. 41:26

Genus Nemocardium Meek,1876. 41:27

Nemocardium centifilosum (Carpenter), 1864. Bodega Bay to Lower Calif. 41:27

Nemocardium centifilosum richardsonii (Whiteaves), 1878. Forrester Island, Alaska to San Francisco, Calif. 41:27

Family VESICOMYACIDAE

Genus Vesicomya Dall,1886. 41:27

Vesicomya ovalis Dall,1896. Clarence Strait, Alaska, 322 fms. and in Panama Bay, in 1,672 fms. 41:27

Vesicomya lepta Dall,1896. Off Tillamook,Oregon and south to the Gulf of California in deep water. 41:27

Vesicomya stearnsii Dall,1895. Off La Jolla, Calif. and south to the Gulf of California in deep water. 41:27

Subgenus Archivesica Dall,1908. 41:28

Vesicomya gigas Dall,1896. Off Point Sur, California and in the Gulf of California in deep water. 41:28

Family VENERIDAE

Genus Dosinia Scopoli,1777. 42:5

Subgenus Dosinidia Dall,1902. 42:5

* Dosinia ponderosa Gray,1838. San Diego, Calif. to Payta, Peru. 42:6

Genus Tivela Link,1807. 42:6

Subgenus Pachydesma Conrad,1854. 42:6

Tivela stultorum (Mawe), 1823. Half Moon Bay, Calif. to Lower Calif. 42:6

Genus Transennella Dall,1863. 42:6

Transennella tantilla (Gould), 1852. Sitka, Alaska to Lower Calif. 42:6

Genus Amiantis Carpenter,1863. 42:6,7

Amiantis callosa (Conrad), 1837. Santa Monica, Calif. to Gulf of Tehuan--tepec, Mexico. 42:7

Genus Pitar Romer,1857. 42:7

Pitar newcombianus (Gabb), 1865. Monterey, Calif. to Gulf of Calif. and Clarion Island. 42:7

Pitar ida Tegland,1928. Sitka, Alaska. 42:7,8

Genus Antigona Schumacher,1817. 42:8

Subgenus Tentricola Roemer,1857. 42:8

Antigona fordi (Yates), 1890. Monterey, Calif. to Panama. 42:8

Genus Saxidomus Conrad,1837. 42:8

Saxidomus nuttalli Conrad,1837. Humboldt Bay, Calif. to San Martin Island, Lower Calif. 42:8

Saxidomus giganteus (Deshayes), 1839. Aleutian Islands from Atty eastward and south to Monterey, Calif. 42:9

Genus Chione Megerle von Muhlfeld,1811. 42:7

Chione fluctifraga (Sowerby),1853. San Pedro, Calif. to Gulf of Calif.42:9

Chione undatella (Sowerby),1835. Mugu, Ventura Co. to Guayaquil. 42 :9

Chione californiensis (Broderip), 1835 (C. succincta Val.) Mugu, Calif. to Panama. 42:10

Genus Venus Linnaeus,1758. 42:10

Subgenus Mercenaria Schumacher,1817. 42:10

*Venus kennicottii Dall,1871. Neah Bay, Wash. Little River, Mendocino Co. Calif. 42:10

Genus Humilaria Grant and Gale, 1931. 42:10

Humilaria kennerleyi (Carpenter in Reeve),1863. Kodiak Island, Alaska to Carmel Bay, Calif. 42:11

Genus Compsomyax Stewart,1930. 42:11

Compsomyax subdiaphana (Carpenter), 1864. Sannakh Islands,Alaska to Todos Santos Bay, Lower Calif. 42:11

Genus Protothaca Dall,1902. 42:11,12

Protothaca tenerrima (Carpenter), 1856. Vancouver, B.C. to Cape San Lucas, Lower Calif. 42:12

Protothaca restorationensis (Frizzell), 1930. Puget Sound to Half Moon Bay, Calif. 42:13

Protothaca staminea (Conrad),1837. Aleutian Islands south to Kamtchatka and northern Japan and to San Quintin Bay,Lower Calif. and Soccorro Island. 42:13

Protothaca laciniata (Carpenter), 1864 Unalaska Island,Alaska to Estero de Todos Santos Bay, Lower Calif. 42:14

Genus Venerupis Lamarck,1818. 42:14

Subgenus Ruditapes Chiamenti,1900. 42:14

Venerupis philippinarum Adams and Reeve,1850. (Introduced). Puget Sound. Ladysmith Harbor, B.C. 42:14,15

Genus Irus Oken,1815. 42:15

Irus lamellifer (Conrad), 1837. Monterey to San Diego, Calif. 42:15

Genus Liocyma Dall,1870.

Liocyma beckii Dall,1870. Plover Bay to North Japan, on the east to Port Althorp, Alaska. 42:15

Liocyma scammoni Dall,1871. Port Simpson, British Columbia. 42:15

Liocyma viridis Dall,1871. Arctic Sea southward to North Japan and on the east to the Kodiak Islands, Alaska. 42:15

Liocyma schefferi Bartsch & Rehder,1939. Chuginadak Id., Aleutians to Atka Island. 42:15

Genus Gemma Deshayes ,1853. 42:16

Gemma gemma Totten,1834. (Introduced) San Juan Islands to San Francisco . 42:16

Genus Psephidia Dall,1902. 42:16
Psephidia lordi (Baird),1863. Unalaska, Alaska to Coronado Island.42:16
Psephidia ovalis Dall,1902. St. Paul Island, Bering Sea to San Diego.42:16
Psephidia cymata Dall, 1913. Santa Barbara Islands to Gulf of Calif. 42:16
Psephidia brunnea Dall,1916.Monterey, Calif. to San Ipolito Point, Lower California. 42:16
Psephidia salmonea (Carpenter), 1864. Farralone Islands to San Martin Island, Lower Calif. 42:16

Family PETRICOLIDAE

Genus Petricola Lamarck,1801. 42:18
Subgenus Petricolaria Stoliczka, 1870. 42:18
Petricola pholadiformis Lamarck,1818. Introduced. Willapa Harbor, Wash. and San Francisco Bay.
Subgenus Rupellaria Fleuriau-Bellevue,1802. 42:18
Petricola tellimyalis (Carpenter), 1864. Santa Monica, Calif. to San Mar--tin Island, Mexico. 42:18,19
Petricola carditoides Conrad,1837. Vancouver Island, B.C. to Magdalena Bay, Lower California. 42:19
Petricola californiensis Pilsbry and Lowe,1932. Monterey to San Ignacio Lagoon. 42:19,20

Family COOPERELLIDAE

Genus Cooperella Carpenter, 1864. 42:20
Cooperella subdiaphana (Carpenter), 1864. Queen Charlotte Islands to Gulf of California. 42:20

Family TELLINIDAE

Genus Tellina Linnaeus, 1758. 43:5
Subgenus Tellinella "Gray" Morch,1853. 43 :5
Tellina idae Dall,1891. Santa Barbara Islands and San Pedro, Calif. 43:6
Subgenus Merisca Dall,1900. 43:6
* Tellina lamellata Carpenter,1857. 43:6 San Diego to Mazatlan.
* Tellina declivis Sowerby,1868. 43:6 Catalina Id. to Panama.
Subgenus Moerella Fischer, 1887. 43:6
Tellina salmonea Carpenter,1864. Aleutian Islands to San Pedro,Calif. 43:6
Tellina meropsis Dall,1900. San Diego, Calif. to Gulf of Calif. 43:6
Subgenus Angulus Megerle,1811. 43:6,7
Tellina carpenteri Dall,1900. Forrester Island, Alaska to Panama. 43:7
Tellina tabogensis Salisbury,1934. (T. panamensis Dall,1900) Catalina Island to Panama Bay. 43:7
Subgenus Oudardia Monterosato,1885. 43:7
Tellina modesta Carpenter,1864. Vancouver Island to Lower Calif. 43:7
Tellina buttoni Dall,1900. Lituya Bay, Alaska to Gulf of Calif. 43:8
Subgenus Peronidia Dall,1900. 43:8
Tellina bodegensis Hinds,1844. Queen Charlotte Islands, B.C. to Gulf of California. Japan? 43:8
Tellina santarosae Dall,1900. Santa Barbara Islands to Ensenada,Mex. 43:8
Tellina lutea Wood,1828. Arctic Ocean,Bering Sea, North Japan, the Aleut--ian Islands and east to Cooks Inlet, Alaska. 43:9
Tellina lutea venulosa Schrenck,1861. Schumagin Islands,Alaska; Sakhalin Island, Japan. 43:9
Genus Apolymetis Salisbury,1929 43:9
Apolymetis biangulata (Carpenter),1856. (Metis alta Conrad) Santa Barbara Calif. to Ensenada, Lower Calif. 43:9,10
Genus Macoma Leach,1819. 43:10
Macoma middendorffii Dall,1884. Bering Strait, south to the Commander and Aleutian Islands and eastward to Chirikoff Island,Alaska. 43:10

Macoma incongrua (Martens), 1865. Arctic Ocean, south to Japan on the west and to San Diego, Calif. on the east. 43:10

Macoma brota Dall, 1916. Bering Sea to Puget Sound. 43:10,11

Macoma brota lipara Dall,1916. Bering Sea to Puget Sound. 43:11

Macoma sitkana Dall,1900. Kodiak Island to Lituya Bay and Sitka, Alaska.

Macoma calcarea Gmelin,1792. Circumboreal. Arctic Ocean to North Japan and to Monterey, Calif. 43:11

Macoma moesta (Deshayes), 1854. Circumboreal. Arctic Ocean, Bering Sea and eastward to the Shumagin Islands. 43:11

Macoma nasuta (Conrad), 1837. Kodiak Island and Cooks Inlet, Alaska and south to Scammon's Lagoon, Lower Calif. 43:11,12

Macoma irus (Hanley),1845 (Macoma inquinata (Deshayes) Bering Strait to Japan on the west and to Monterey on the east. 43:12

Macoma inconspicua (Broderip and Sowerby),1829. Arctic Ocean to San Diego. 43:13

* Macoma leptonidea Dall,1895. Santa Barbara Channel and Texas Coast.43:13

Macoma kelseyi Dall,1900. Puget Sound to Coos Bay, Oregon. 43:14

Macoma quadrana Dall,1916. Boca de Quadra, Alaska and south to Coronado Islands,Lower Calif. 43:14

Macoma planiuscula Grant and Gale, 1931. Nunivak Island, Alaska. 43:14

Macoma carlottensis (Whiteaves),1880. Arctic Ocean and south to Ballenas Lagoon, Lower Calif. 43:14

Macoma liotricha Dall,1897. Aleutian Islands and eastward to the Shumagin Islands, Alaska. 43:15

* Macoma expansa Carpenter,1864. Puget Sound to La Jolla, Calif. 43:15

Macoma yoldiformis Carpenter,1864. Fuca Strait to San Diego,Calif. 43:15

Macoma alaskana Dall,1900. Lituya Bay to Gulf of Georgia. 43:15

Section Rexithaerus Conrad,1869. 43:15

Macoma indentata Carpenter,1864. Puget Sound to Lower Calif. 43:15

Macoma indentata tenuirostris Dall,1900. San Pedro and Santa Barbara Islands to San Diego, Calif. 43:16

Macoma secta (Conrad),1869. Vancouver Island and south to Gulf of Calif.

Family SEMELIDAE

Genus Semele Schumacher,1817. 43:16

Semele decisa (Conrad),1837. San Pedro, Calif. to San Martin Island.43:17

Semele flavescens Gould,1851. San Pedro, Calif. to Callao, Peru. 43:17

Semele striosa C.B. Adams, 1852. Catalina Island to Panama. 43:17

Semele rupicola Dall,1915. Santa Cruz, Calif. to Gulf of Calif. 43:17

Semele rubropicta Dall,1871. Forrester Island, Alaska to Tia Juana,Mex.

Semele pacifica Dall, 1915. Catalina Island, Calif. to Acapulco, Mex. 43:17

*Semele californica A. Adams, 1854. San Diego, Calif. south. 43:18

Semele incongrua Carpenter,1864.Monterey, Calif. to Coronado Islands.43:18

Semele pulchra Sowerby,1832. Monterey, Calif. to Ecuador. 43:18

Genus Cumingia Sowerby,1833. 43:18,19

Cumingia californica Conrad,1837. Mendocino Co., Calif. to Cape San Lucas, Lower Calif. ? 43:19

Family DONACIDAE

Genus Donax Linnaeus,1758. 43:20

Donax californica Conrad,1837. Santa Barbara, Calif. to Panama. 43:20

Donax gouldii Dall,1919. San Luis Obispo, Calif. to Acapulco,Mexico.43:20

Family GARIDAE (PSAMMOBIIDAE SANGUINOLARIIDAE)

Genus Gari Schumacher,1817. 43:21

Subgenus Gobraeus Leach,1852. 43:21

Gari regularis (Carpenter), 1864. San Diego, Calif. to Cape San Lucas.

Gari californica (Conrad),1848. Japan,Kamtchatka, the Aleutian Islands and south to San Diego, Calif. 43:21

Gari edentula (Gabb),1869. San Pedro and Catalina Island to San Diego. Off Redondo Beach, Calif. 43:22

Genus Sanguinolaria Lamarck,1799. 43:22

Subgenus Nuttallia Dall,1898. 43:22

Sanguinolaria nuttallii Conrad,1837. San Pedro, Calif. to Magdalena Bay, Lower Calif. 43:22

Genus Heterodonax Morch,1853. 43:22

Heterodonax bimaculata Linnaeus,1758. Monterey, Calif. to Panama. Also Atlantic. 43:22

Genus Tagelus Gray,1847. 43:23

Tagelus californianus (Conrad),1837. Monterey Bay, Calif. to Gulf of Tehuantepec. 43:23

Tagelus affinis (C.B. Adams),1852. Santa Barbara, Calif. to Panama. 43:23

Tagelus subteres (Conrad),1837. Santa Barbara, Calif. to Panama. 43:23

Tagelus politus (Carpenter),1857. Santa Barbara, Calif. to Panama. 43:23

Family SOLENIDAE

Genus Solen Linnaeus,1758. 43:27

Solen sicarius Gould,1850. Vancouver Island, B.C. to San Quintin, Lower California. 43:27

Solen rosaceus Carpenter,1864. Santa Barbara, Calif. to Gulf of Calif. 43:27

Genus Ensis Schumacher,1817. 43:27

Ensis californicus Dall,1899. Monterey, Calif. to Gulf of Calif. 43:27

Genus Siliqua Megerle von Muhlfeld,1811. 43:27

Siliqua lucida (Conrad),1837. Bolinas Bay, Calif. to Todos Santos Bay, Lower California. 43:27

Siliqua media (Sowerby),1839. Bering Sea and Arctic Ocean. 43:28

Siliqua patula (Dixon),1788. Aleutian Islands to Pismo, Calif.

Siliqua alta (Broderip and Sowerby),1829. Cooks Inlet, Alaska and westward to Bering Sea and Siberia. 43:29

Family MACTRIDAE

Genus Anatina Schumacher,1817. 44:3

Subgenus Raeta Gray,1853. 44:3

Anatina undulata (Gould),1851. San Pedro, Calif. to Panama. 44:3

Genus Mactra Linnaeus,1767. 44:3-8

Mactra californica Conrad,1837. Neah Bay, Washington to Panama 44:4,5

Mactra nasuta Gould,1851. San Pedro, Calif. to Mazatlan,Mexico. 44:4,6

Genus Spisula Gray,1837. 44:5-22

Spisula dolabriformis Conrad,1867. Redondo Beach, Calif. to Lower Calif. 44: 14-17

Spisula polynyma alaskana Dall,1894. Arctic Ocean at Cape Lisburne, south to Bering Sea and the Aleutians and eastward to Puget Sound, north Japan, the Kurile Islands and the Okhotsk Sea. 44:10,19

Spisula hemphillii (Dall),1894. Redondo Beach, Calif. to Corinto, Nicaragus. 44:19,20

Spisula catilliformis Conrad,1867. Neah Bay to San Diego,Calif. 44:20,21

Spisula falcata (Gould),1850. Puget Sound to Cortez Banks and the Coronado Islands. 44:12,21

Spisula planulata (Conrad),1837. Monterey, Calif. to Cape San Lucas.44:13,21

Genus Schizothaerus Conrad,1853. 44:22,23,24.

Schizothaerus nuttallii (Conrad),1837. Bolinas, Calif. to Scammon's Lagoon, Lower Calif. 44:22,23,24

Schizothaerus nuttallii capax (Gould),1850. Kodiak Island to Monterey. 44:22

Family MESODESMATIDAE

Genus Ervilia Turton,1822. 44:25

Ervilia californica Dall,1916. San Pedro to Magdalena Bay. 44:25

Family MYACIDAE

Genus Mya Linnaeus,1758. 44:25 .

Mya truncata Linnaeus,1758. Circumboreal. Arctic Ocean to Bering Island on the west and to Puget Sound on the east. 44:25

Mya truncata uddevallensis Forbes,1846. Afognak Id. and Raspberry Id. 44:25

Mya japonica Jay,1857. (Mya intermedia Dall,1898). 44:25

Mya arenaria Linnaeus,1758. Britain,Scandanavia,Greenland,Atlantic Coast of North America to Carolina, Alaska south to Japan and to Vancouver Island, B.C. San Francisco Bay (Introduced).

Genus Cryptomya Conrad,1849. 44:26

Cryptomya californica (Conrad),1837. Chicagoff Island,Alaska south to Topolobampo, Mexico. 44:26

Genus Sphenia Turton,1822. 44:27

Sphenia fragilis Carpenter,1857. Oregon to Mazatlan. 44:27

Sphenia ovoidea Carpenter,1864. Aleutian Islands to Puget Sound and San Diego. 44:27

Sphenia trunculus Dall,1916. San Diego, Calif. to Panama. 44:27

Sphenia pholadidea Dall,1916. Bolinas Bay to Imperial Beach, Calif. 44:27

(Sphenia globula Dall,1919) (Sphenia nana (Oldroyd) 44:27

Genus Platyodon Conrad,1837. 44:27

Platyodon cancellatus (Conrad),1837. Queen Charlotte Island to San Diego. 44:27

Family ALOIDIDAE (CORBULIDAE).

Genus Aloidis Megerle von Muhlfeldt,1811. 44:28 (Corbula Lamarck)

Subgenus Lentidium Cristofori and Jan.,1832. 44:28

Aloidis obesa (Hinds),1843. Catalina Island to Panama. 44:28

Aloidis fragilis (Hinds),1843. Monterey,Calif. to Salina Cruz,Mex. 44:28

Aloidis luteola (Carpenter),1864. Monterey, Calif. to Acapulco,Mexico.44:28

Aloidis porcella (Dall),1916. Santa Rosa Island to Panama. 44:29

Aloidis kelseyi (Dall),1916. Esteros Bay to Catalina Island. 44:29

Genus Grippina Dall,1912. 44:29

Grippina californica Dall,1912. San Diego, Calif. to Guadelope Id. 44:29

Family SAXICAVIDAE

Genus Panope Menard,1807. 44:29

Panope generosa Gould,1850. Forrester Island, Alaska to Scammons Lagoon, Lower Calif. Gulf of Calif. and Japan. 44:29

Genus Panomya Gray,1857. 44:30

Panomya turgida Dall,1916. Unalaska to the Schumagin Islands,Alaska. 44:30

Panomya beringiana Dall,1916. Eastern Bering Sea 44:31

Panomya ampla Dall,1898. Arctic Ocean,Aleutian Islands, to Puget Sound ?

Genus Saxicavella Martens,1885. 44:31

Saxicavella pacifica Dall,1916. Redondo Beach, Calif. to Todos Santos Bay, Lower Calif. 44:31

Genus Cyrtodaria Reuss,1809. 44:31

Cyrtodaria kurriana Dunker,1862. Arctic Ocean and south to Norton Sound, Alaska. Also on the west coast of Greenland. 44:31

Genus Saxicava Fleuriau de Bellevue,1802. 44:31

Saxicava arctica (Linnaeus),1767. Arctic Ocean to Panama. Also Atlantic. 44:32

Saxicava pholadis (Linnaeus),1771. Arctic Ocean to Panama. Also Atlantic.

Family PHOLADIDAE

Genus Barnea (Leach) Risso,1826. 44:32,33

Barnea pacifica Stearns,1871. San Francisco Bay to Scammons Lagoon. 44:32,33

Genus Zirfaea Gray,1842. 44:33

Zirfaea pilsbryi Lowe,1931. Bering Sea to Scammons Lagoon, Lower Calif.

Genus Parapholas Conrad,1849. 44:33

Parapholas californica (Conrad),1837. Coos Bay, Ore. to San Diego. 44:33

Genus Pholadidea Goodall in Turton,1819. 44:33,34

Pholadidea penita (Conrad),1837. Chirikoff Islands, Alaska to San Diego.44:33

Pholadidea penita sagitta Dall,1916. Puget Sound to Socorro Id. 44:34

Pholadidea ovoidea(Gould),1851. Bering Sea to Gulf of Calif. 44:34

Pholadidea parva Tryon,1865. San Francisco to Scammons Lagoon. 44:35

Subgenus Nettastomella Carpenter,1865. 44:35

Pholadidea rostrata Valenciennes,1846. Puget Sound to San Diego. 44:35

Genus Martesia (Leach) Blainville,1824. 44:35

Martesia xylophaga Valenciennes ,1846. San Francisco to Panama. 44:35

Martesia intercalata Carpenter,1855. Farralone Islands to Mazatlan. 44:35

Genus Navea Gray,1851. 44:35

Navea subglobosa Gray,1851. Lobitas, Calif. to San Pedro,Calif. 44:35

Genus Xylophaga Turton,1822. 44:36

Xylophaga mexicana Dall,1908.Monterey, Calif. to Acapulco,Mex. 44:36

Xylophaga californica Bartsch,1921. Pt. Pinos Light to Catalina Id. 44:36

Xylophaga washingtona Bartsch,1921. Puget Sound, Departure Bay, B.C. and off Oregon and Washington. 44:36

Family TEREDIDAE

Genus Bankia Gray,1840. 44:36

Bankia setacea (Tryon),1863. Bering Sea to Gulf of California. 44:36

Genus Teredo Linnaeus,1758. 44:36

Teredo beachi Bartsch,1920. San Pablo Bay, Calif. 44:36

Subgenus Teredops Bartsch,1921. 44:36

Teredo diegensis Bartsch,1916. San Francisco Bay to San Diego. 44:37

Subgenus Lyrodus Gould,1870. 44:37

Teredo townsendi Bartsch,1922. South San Francisco, Calif.

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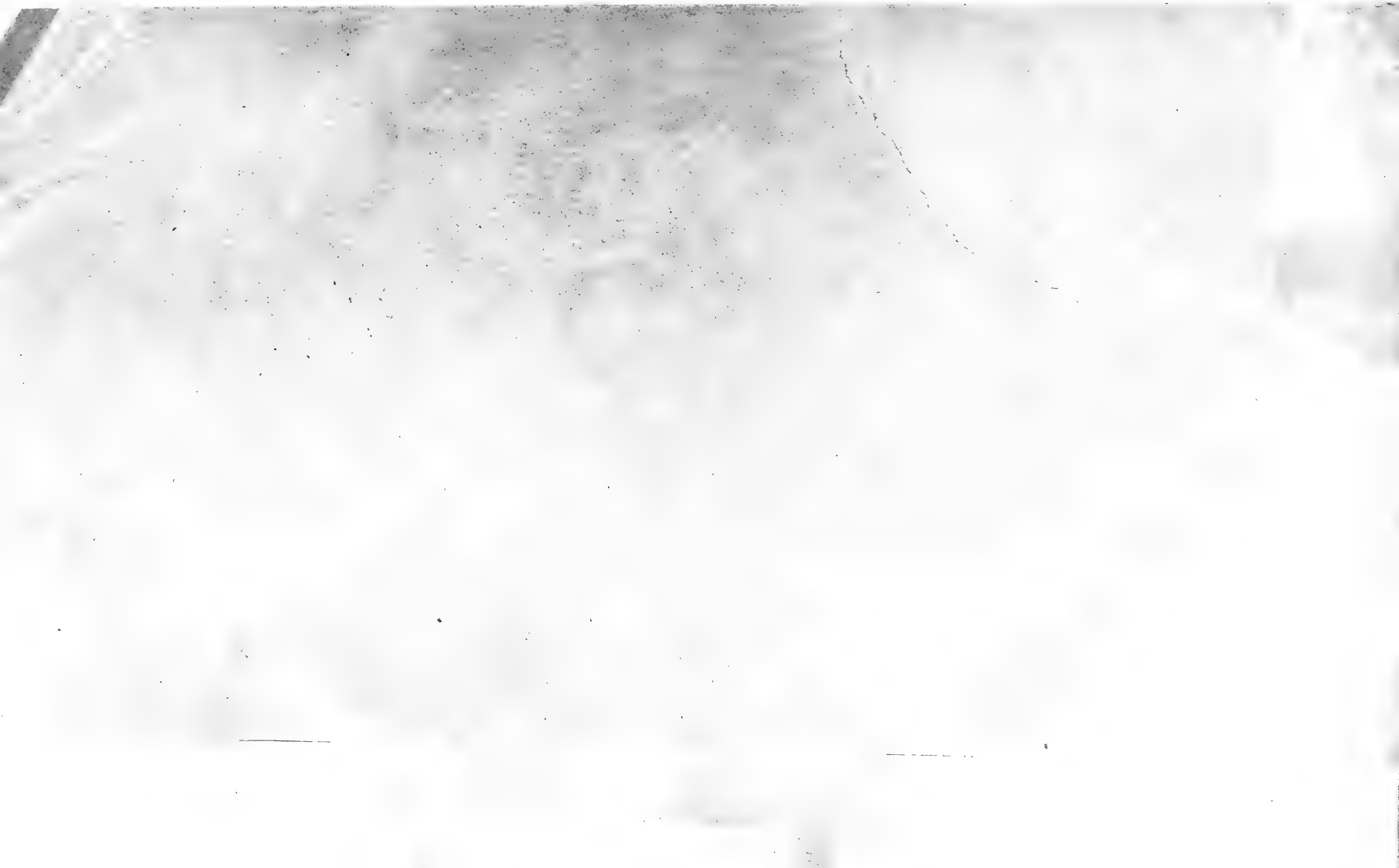


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