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West American Mollusca

Volume I.

May 1900.

Number 1.

WEST AMERICAN MOLLUSCA.

The last twelve or fifteen years have been prolific in changes in the nomenclature of our shells and in discoveries of new varieties and species. The following descriptions are in many cases compiled from the original publications cited.

PUPA CALAMITOSA Pilsbry, Phila ac pr 1889 411, t 12, f 16-17.

Shell cylindrical, very blunt at apex, chestnut colored; whorls $4\frac{1}{2}$, the first $1\frac{1}{2}$ smooth, the following regularly costulate striate, the costulae separated by spaces wider than themselves; last whorl abruptly turning forward, rounded beneath, encircled by a slight central constriction or furrow; aperture about $\frac{1}{2}$ the total length of shell, rounded, truncated above, contracted within; peristome thin, expanded, without crest or callous thickening behind; columellar margin rather dilated; parietal wall bearing 2 entering lamellae, 1 arising near the termination of the outer lip, the other more deeply seated, elevated, entering less obliquely; columella with a strong white deep-seated obliquely entering fold; outer lip with 2 short white lamellae. Altitude 1.7, diameter .8 mm. Near the mouth of the Santo Tomas river, Lower California, collected by Henry Hemphill; and near San Diego, Cal. by Orcutt.

MYOFORCEPS ARISTATUS Dillwyn.

'My friend, F. W. Kelsey, of San Diego, Cal., recently sent me a peculiar Lithophagus, taken near that city, which I at once recognized as a Myoforceps, and Dr. Dall afterwards kindly determined the species as *M. aristatus* Dillwyn. The finding of this interesting species, with its elongate, crossed ends, in shell ground which has been well worked for so many years, is worthy of note and to the credit of the enthusiastic collector named. The fact that mature specimens are found imbedded in hard rock is proof that it is not of very recent introduction.'—Fred. L. Button, *Nautilus* 13:131. March 1900.

FUSUS ROPERI Dall.

'Shell small, rather short and wide, with a short, subacute spire and almost 6 whorls; color ferruginous brown, faintly spirally zoned and lighter on the siphonal fasciole, pillar and throat whitish, outer lip between the white of the throat and the margin showing narrow spiral brown lines on a yellowish ground, whorls with a tendency to a white, narrow peripheral line most evident on

the summits of the ribs; whorls excavated behind, somewhat rounded before the periphery, the margin at the suture strongly appressed with the whorl in front of it somewhat constricted; suture distinct, hardly undulated, the spiral thread in front of it slightly minutely imbricated; axially directed sculpture of finely wrinkled silky incremental lines and (on the last whorl) 9 rounded ribs with rather wider interspaces, the ribs are obsolete near the suture, on the early whorls, and on the base; spiral sculpture of numerous flat strap-like threads with the interspaces much narrower and sharply reticulated by the incremental sculpture which rises in the interspaces nearly to the level of the tops of the threads; the nucleus (lost) is small, the first 2 or 3 whorls are more coarsely reticulate than the later ones; aperture elongated and insensibly passing into a rather wide and short canal; siphonal fasciole rather marked, though the siphon is not recurved; pillar smooth, nearly straight with little callus; the body with no subsutural callus; the outer lip slightly flaring, hardly thickened; lon. of shell 26, of aperture 15.5, lat. 13 mm. San Pedro, Cal., in rather deep water, E. W. Roper; in whose honor the shell is named. This is a singular species, recalling *Ocinebra* or *Muricidia* by its surface sculpture and the constricted and appressed sutural region of the whorls. I have not been able to find any species with similar characters in the monographs or in the national collection. It is probable that it should be separated sectionally from the group typified by *F. colus*, and it cannot be associated with *Sipho* or *Chrysodomus*, so it may be regarded as typifying a new section, *Roperia*.—Dall, *Nautilus*, 12:4-5, May 1898.

VITRINELLA WILLIAMSONI Dall.

Shell small, white, with $2\frac{1}{2}$ whorls; spire flattened; suture appressed with a shallow channel or excavation outside of the appressed margin of the whorl, outside of which the convexity of the whorl rises higher than the suture. Base slightly more rounded than the upper side, with a wide and flaring umbilicus; periphery rounded; aperture rounded, oblique; surface polished, finely striate here and there by the incremental lines which are most prominent above. Maximum diameter of shell, 5.5; minimum diameter, 4.5; altitude 1.25 mm. Beach at San Pedro, Cal.; U. S. National Museum, registered number 106,855. This species, which is rather large for a *Vitrinella*, is respectfully dedicated to

Mrs. M. Burton Williamson, to whose researches this paper is due. The name being inherently masculine, the usual genitive ending is preserved.'—Dall, U S Nt Mu, pr, 15: 202, t 21, f 2-3. 2 Ag 1892.

DORIS SANDIEGENSIS J. G. Cooper, Cal ac pr 2: 204.

Pale brownish yellow, with large annular brown spots irregularly scattered, varying from 10-20, or entirely brown. Surface slightly rough, sometimes a little tuberculate. Dorsal tentacles conical, retractile; branchiæ large, rising in 5 parts which become tripinnately divided, expanding so as to cover the posterior $\frac{1}{3}$ of the body like an umbrella. Mouth probosciform, with 2 short lateral tentacles. Length $3\frac{1}{2}$, breadth $2\frac{1}{2}$, height $\frac{1}{2}$ inch. Numerous among sea-grass on mud flats in San Diego bay, Cal., from November to May.

Among my notes I find:—'animal dirty white, $\frac{3}{4}$ inch long; mantle with 5-10 or more circles of dark brown irregularly placed along the edge of the thick mantle.'—Orcutt, number 23, from San Diego, identified by Dall as this species.

Cooper doubtfully placed in the section *Actinocyclus*, and has reported 2 specimens from Santa Barbara, with tentacles conical, acute, and states that the branchial orifice does not agree with the 'peculiar characters of *Actironotus*.' Bolinas bay.

AMPHISSA BICOLOR Dall.

Shell small, solid, pale with brownish bands and 6 convex whorls; nucleus eroded in the specimens; suture distinct, not appressed, whorls full, with 11-13 narrow rounded ribs extending nearly from suture to suture; spiral sculpture of numerous flattened strap-like cinguli separated by subequal channeled shallow interspaces; epidermis thin and yellowish; color of shell pale straw color with a brownish base and a brown band extending from the periphery half-way back to the suture; aperture about equal to the spire, the penultimate rib behind it a little swollen; pillar slender, polished white with little callus; canal wide, short, recurved; outer lip simple, slightly reflected; not lirate inside. Longitude of shell, 14; of aperture, 7.7; maximum diameter of shell, 8 mm. Habitat: Dredged by the U. S. Fish Commission at various places off the coast from Point Sur to San Diego, and in the Santa Barbara channel in depths varying from 124 fathoms at the south to 298 fathoms at the north, over a sandy or muddy bottom. The operculum is brownish and resembles that of *A. versicolor* Dall.

The brown coloration, though generally disposed in bands as described, is variable, and occasionally appears in a zigzag pattern on the pale ground, or generally suffused over the surface, or even maculated, as in *Nitidella*. The apex when perfect is probably moderately acute, but is more or less eroded on all the specimens. —Dall, U S Nat Mus pr 15: 213, t 20, f 4. 2 Ag 1892.

PUPA STERKIANA Pilsbry, Phila ac pr 1889, 412, t 12, f 2-3.

Shell rimate, perforate when young, cylindrical, blunt at both ends, chestnut-brown; surface obliquely sculptured with strong, rather irregular costulae, which often split or branch, suture very deeply impressed; whorls 7, the first one smooth, the last 5 of about equal diameter, very convex; last whorl a little ascending to the aperture, without crest or scrobiculation behind the peristome; aperture a trifle oblique, rounded, truncate above; lip expanded, continuous, thin, white, without teeth or folds; umbilicus deeply impressed, appearing very narrowly perforated. Alt. 4, diam. 1.5 mm.

On *Rocella leucophœa* both north and south of San Quintin bay, Lower California (C. R. Orcutt No. 1322), and first distributed as *P. chordata* Pfeiffer. Named in honor of Dr. V. Sterki, whose special studies of these minute species has added much to our present knowledge.

EPIPHRAGMOPHORA HARPERI Bryant.

Shell umbilicate, translucent, white; suture well defined; spire a depressed cone composed of 5 regularly increasing convex whorls, the first 3 smooth, the remainder marked by obscure, closely crowded, oblique lines of growth; base convex; aperture nearly circular, oblique; peristome thin, broadly expanded, and reflexed at lower third of baso-columellar portion, its extremities joined by an elevated ridge, bordering which is a somewhat triangular callus bounded on the inner side by a ridge extending from the middle of the base of the reflected portion of the peristome obliquely to the upper part of the basal whorl; width of umbilicus about one-fifth greater diameter of shell. Numerous dark microscopical lines extend from the peristome over the body whorl nearly perpendicular to the lines of growth. Greatest diam. 17, least diam. 14, alt. 9 mm. San Jacinto mountains, California.

—F. W. Bryant, Nautilus, 13: 143. Ap 1900.

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EPIPHRAGMOPHORA BOWERSI Bryant.

'Shell umbilicated, convex; epidermis olivaceous; spire slightly elevated; whorls between 4 and 5, convex, gradually increasing; suture well defined; aperture transverse, nearly circular; peristome whitish, thin, very slightly expanded at the basal portion, at the columella broadly reflected, yet leaving the umbilicus entirely open, showing within the whorls to the apex; base convex. A well defined, moderately broad, light-chestnut band revolves above the center of the body whorl, and is visible above the suture on the whorl preceding the last; lines of growth close and distinctly marked. Greater diameter 13, lesser 10, height 6 mm. San Jacinto mountains, Riverside county, California.'—F. W. Bryant, Nautilus, 13:143. Mr 1900.

CHRYSODOMUS ITHIUS Dall.

'Shell slender, acute with 7 rounded whorls, distinct suture, surface sculptured only with lines of growth and of a pale purple brownish tint. Aperture moderate not flaring, canal short. Length 70, of aperture 32, breadth of shell 30 mm. U. S. Steamer Albatross, station 3202, off the coast of California in 382 fathoms. Extremely perfect young specimens show a few faint spirals occasionally.'—Dall, U S Na Mu pr 14:187. 24 Jl 1891.

SIGARETUS OLDROYDII Dall.

'Shell large, thin, naticoid, with a short spire and 3-4 inflated whorls; color pale brown, livid on the spire, fading to waxen on the base; surface sculptured with extremely fine wavy spiral striae; aperture ample, oblique, the outer lip thin, a little patulous, the body covered with a thin callus, the pillar lip obliquely cut away, wide near the junction with the body, the basal part of the margin receding; umbilicus large, pervious, its walls covered with a thin, silky, brown wrinkled epidermis. Alt. 3.5, diam. 37 mm. A single specimen in deep water off Catalina Island, California, collected by Mr. and Mrs. T. S. Oldroyd. This species is easily distinguished from any other recorded, by its very thin shell, naticoid form and wide pervious umbilicus.'—Dall, Nautilus, 11: 86. D '97.

PUNCTUM CALIFORNICUM Pilsbry.

'Similar to P. conspectum in the small, deep umbilicus and color. Spire somewhat more elevated; whorls fully 4, closely revolving, the last decidedly narrower than in conspectum (viewed from above). Surface lusterless, with fine, even, hair-like stria-

tion, and in places showing faint traces of spiral striae. Umbilicus narrow and deep, its width contained $4\frac{1}{2}$ times in greatest diameter of the shell. Aperture wider than high, shaped much as in *P. conspectum*. Alt. 1.14, greatest diam. 1.85 mm. Fish Camp, Fresno county, California.—Pilsbry, *Nautilus*, 11: 134. Ap 1898.

CÆCUM ORCUTTI Dall.

'Shell small, stout, smooth but not polished, light warm brown in color and without sculpture, excepting slight lines of growth. Shell slightly curved, the anterior aperture very oblique, about at right angles to the plane of the diameter of the plug, the superior margin being the anterior; plug glandiform, smooth, rounded without mucro; operculum brown, thin, smooth. Lon. of shell 2; diameter .75 mm. San Diego, California, abundant under stones (C. R. Orcutt). 'This is the smallest and the only smooth Californian species of the genus.'—Dall, *U S na mu pr* 8: 541.

DORIS MONTEREYENSIS Cooper *Ca ac pr* 2: 204.

Pale yellowish with scattered black spots (or entirely brown?), mantle rough tuberculate, or nearly smooth, dorsal tentacles knob-shaped, branchial rays bipinnate, short, in 8 divisions, forming a crown-shaped expansion on the posterior third of the dorsum. Foot expanded into a broad, thin margin, as wide as the mantle. Length 3, breadth 1, height $\frac{7}{8}$ inch; form elongated oval. Dredged in 6-10 fathoms, in Monterey bay, California, adhering to fragments of sandstone. Dr. Frick found small specimens, apparently the same, in San Francisco bay, California.

Santa Barbara at low water, larger in size and deeper color; tentacles club-shaped, the branchial 7-8-parted, bipinnate and from one opening.

Orcutt, No. 19 (young? fide Dall), from San Diego, appears described among my notes as follows:—animal translucent white, an inch or less long, the back of mantle liberally sprinkled with irregular dots and blotches of brownish black which are most conspicuous just behind the tentacles, near the center of the back, and just forward of the branchiæ.

DORIS ALABASTRINA Cooper, *Ca ac pr* 2: 204.

§*Asteronotus*? 'Alabaster white, opaque, form depressed-oval; dorsal tentacles short, acute, branchiæ of 12 simple rays expanding in the posterior fifth of the body. Length 4-tenths, breadth 3-tenths inch. Under stones, San Diego bay, only one found.'

DORIS SANGUINEA Cooper Ca ac pr 2: 204.

§*Asteronotus*. Brilliant red, with few large black spots irregularly distributed, surface smooth; dorsal tentacles short; branchiæ composed of 8 simply pinnate rays, expanding close to the posterior end of the body. Length $\frac{1}{2}$, breadth $\frac{1}{4}$ inch, height about the same. Under stones in San Diego bay, rare.

Orcutt No. 22, among sea-grass and under stones on rocky beaches. Cooper, Ca ac pr 3: 58, reports:—'4 specimens from Santa Barbara with *D. montereyensis*. Differ from original in having the black spots very small. Tentacles acute, cylindric-conic, retractile into a cavity bordered by a toothed membrane. I cannot discover the stellate valvular structure of the branchial opening which characterizes the genus *Asteronotus*, in these specimens.'

DORIS ALBOPUNCTATA Cooper Ca ac pr 3: 58 (1863).

Form ovate, pointed behind, flattened, surface shining, minutely rugose. Tentacles club-shaped, retractile, branchial plume 6-8-parted, bipinnately divided, situated near the posterior extremity. Color yellow or orange brown, dorsal surface thinly speckled with small white dots, each forming a slightly raised papilla. Beneath paler. Length about 1, breadth $\frac{1}{4}$ inch. Dredged from a rocky bottom in 20 fathoms a mile from the shore at Santa Barbara. Also found on rocks at low water mark near the N. W. end of Catalina Island. Bolinas bay.

Orcutt No. 25, San Diego.

NAVARCHUS INERMIS Cooper.

'One small specimen dredged among seaweeds in 10 fathoms, near the eastern-shore of the 'Isthmus' of Catalina Island shows no variation from San Diego specimens.'—Cp Ca ac pr 3: 58.

Under *Strategus inermis*:—'Vinous purple, ornamented with numerous rounded or oblong yellow spots: inner surface of enveloping folds, flesh-color. Edge of mantle and tail orange, with a narrow band of rich blue, forming a scalloped edging alternately blue and gold; a row of alternating spots of the same along the center of the ear-like processes. Under surface of tail deep purplish-blue. Whole surface perfectly smooth and shining. Eyes white with a black pupil. Length $3\frac{1}{2}$, breadth $\frac{3}{4}$ inch. This beautiful animal inhabits muddy parts of San Diego bay, where I found it not uncommon in spring. It creeps among the grasses slowly and looks like a large caterpillar. Though without any

apparent means of escape or defense, it seems little molested by other animals. As an object for study in an aquarium for the investigation of the metamorphoses it doubtless undergoes, from the egg to its perfect state, it would be highly interesting. It is more highly organized than any other genus of Opistho-branchiata, resembling *Aplysia* more nearly than any other, and probably carnivorous or a carrion eater.—*Cp Ca ac pr 2: 202.*

APLYSIA CALIFORNICA Cooper *Ca ac pr 3: 57.*

Form and external appearance as usual in the genus. Length 15, breadth 5 inches, height about the same. Color pale gray or greenish, becoming purplish on the side, folds of mantle with scattered white specks, from which an irregular network of brown lines extends over the rest of the body, interspersed with large brown blotches. Inner surface of mantle varied with alternating painted bars of white and dark brown interlocking together. Sole of foot black. Eyes very minute. Shell contained in the substance of the mantle cartilaginous, translucent, trapezoidal or hatchet-shaped, margins rounded, slightly convex above, the nucleus or center in the old specimens distant from the posterior end or apex. Faint radiating lines diverging from the nucleus, crossed by an irregular network of darker lines, all ending abruptly at some distance from the margin, which has thus a wide, nearly transparent border. An accessory plate arises on the inner surface from the nucleus, spathulate in form and slightly raised. The 2 younger specimens have the clear border and accessory plate less developed, and very young ones do not probably show these characters at all, but resemble the typical *Aplysia* in the form of the shell. On this account I am unwilling to constitute it a new genus, but propose to call it a sub-genus under the name of *Neaplysia*. San Pedro, Cal., July 25, 1893, on beach after a heavy blow; 3 specimens. Stomach was full of large fragments of *algæ*. Kept in water for some time, they were very slow and uninteresting in movements, showing no evidence of any means of defense, except the exudation of a beautiful purple fluid from the mantle when handled.—*Cp. Monterey, to Lower California.*

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OCINEBRA GRACILIMA.

"Shell small, solid, fusiform, slender; spire subacute; whorls 6-7; body whorl about two-thirds the whole length. Upper part of whorls subangulate, aperture about as long as the spire. Outer lip thickened internally; white, with 4 prominent denticles. Columellar lip excavated, callous, with a purplish stain showing through the enamel. Canal moderate, closed. Surface smooth, with numerous fine whitish revolving costae, dotted with brown, the interspaces near the outer lip with brown-linear markings. Upper whorls longitudinally nodosely ribbed. General color olivaceous, with patches of yellow. Lon. .5; Lat. .25 in. Habitat—San Diego, California, 10 fms.: Hemphill."—Robert E. C. Stearns, Conchological memoranda, No. 6 (May 18, 1871); "Am J Conch 7:— (1871) with f."

Under stones, San Diego.—Or U S Na mu pr 1885, 535.

"A few at Point Fermin," near San Pedro, California, fide Mrs. Williamson (U S Na mu pr 15: 215).

PHOLAS PACIFICA.

"Shell, oblong, beaks two-fifths of length of shell from anterior end; anterior end of valves triangular, pointed; anterior dorsal edge of valves reflected and folded down on the umbos; lower anterior margin curved, forming a large elliptic-oval gape; posterior end of valves squarely rounded; shell dull chalky white, sculptured in concentric lines, which anteriorly are lami-

nated and posteriorly become extinct; valves radiantly ribbed, which also become obsolete at the posterior end; at the intersection of the radiating and concentric lines the sculpture is pectinated; an area below the umbos, nearly or quite destitute of sculpture, which varies much in prominence in different specimens; accessory plate sub-lanceolate and bent down on the beaks, anteriorly prolonged over but not covering the ante-umbonal gape; interior of valves white enamelled; internal ribs short, curved and flattened. Largest specimen, two and six-tenths inches in length, and one and five-tenths inches in height. Habitat—Alameda, San Francisco bay, California, where in some places it is common in sandy mud between tide marks. Numerous specimens collected by Messrs. Harford, Hemphill, Drs. Kellogg and W. P. Gibbons.”—Robert E. C. Stearns, Conchological memoranda No. 7 (28 Ag 1871) Ca ac pr 5:—t 1. 56, 6a, 6b, 6c, (7 Ap 1873).

Mrs. Williamson (U S Na mu pr 15: 183), reports “three or four washed ashore with the tide” at San Pedro bay, California, and adds “single valves not plentiful.”

PTYCHATRACTUS OCCIDENTALIS.

“Shell elongated, fusiform, rather slender, whitish, traversed by narrow (revolving, brownish threads and much wider intervening spaces; suture distinct, spire tapering; aperture oblong oval, about half the length of the shell; within white, polished; canal short, nearly straight; columellar obliquely, not strongly plicated; length about three-fourths of an inch. Habitat—near the Island of Attou, at the west end of the Aleutian Archipelago.”—Robert E. C. Stearns, Conchological memoranda No. 7 (28 Ag 1871): Ca ac pr 5:—(7 Ap 1873):—“Habitat—near the Island of Nagai, one of the Shumagin Islands, where it was hooked up attached to a rock from a depth of 40 fathoms, by Captain Prime of the California Fishing Fleet; through the kind-

ness of Mr. Harford to whom it was given, it is now in my cabinet."

OCINEBRA CIRCUMTEXTA.

"Shell ovate, solid, sub-turreted, of 5 convex whorls. Upper whorls cancellated; body whorl traversed by about 14 roughly-rounded revolving costae, more or less tuberculated at the intersection of the longitudinal ribs, and marked with fine incremental striae. Last whorl $\frac{3}{4}$ the length of the shell; outer lip thickened internally denticulate, external edge crenulated. Columella excavated, light purple or purplish brown; canal short, open or closed in specimens of equal size. Umbilicus obsolete; surface of whorls with faint irregular longitudinal costae. Color dingy white, with 2 interrupted black or dark brown bands. Lon. .85; Lat. .5 in. Habitat—Monterey, California; Hemphill, Harford, Gordon, and Stearns, 16 specimens, mostly immature."—Robert E. C. Stearns, Conchological memoranda No. 6 (May 18.1871); "Am J Conch 7:—(1871), with f."

"Not rare under stones at Portuguese Bend," near San Pedro, California, fide Mrs. Williamson, (U S Na mu pr 15: 215).

EPIPHRAGMOPHORA CIRCUMCARINATA.

"Helix, variety circumcarinata. Shell widely umbilicated, discoidal, flattened, angulated, with a peripheral keel; whorls 6-6 $\frac{1}{2}$, slightly tabulated near the sutures, which latter are deeply impressed; surface finely granulated, varying in different specimens; and otherwise sculptured by conspicuous sub-acute ribs parallel with the lines of growth both above and below, which meet, and sometimes cross, the peripheral keel; these ribs are more or less irregular and uneven, of varying prominence, and are also unequally spaced, being closely crowded in some places and farther apart in others. Aperture obliquely subangulate, semilunate; peristome moderately thickened, re-

flected somewhat, covering the open umbilicus, and made continuous by a connecting thin deposit of callus on the labium. Color, in some specimens, dingy white to white, in others a dingy reddish white, ornamented with a double revolving band,—the upper stripe being whitish, the lower reddish or light chestnut just above, and contiguous to the peripheral keel; the pinch or fold of the keel taking up what in *Helix Mormonum* is the third or lower stripe of white. Number of specimens 4, 2 adult and 2 immature, but nearly full grown. Dimensions—Greater diameter .92-1.01; lesser diameter .75-.86; height .36-.37 inch. Animal not observed. Habitat, Stanislaus county, near Turloch, California. For the specimens from which the above is written, I am indebted to Mr. A. W. Crawford, of Oakland, who has examples in his collection; specimens are also contained in the typical collection of my friends Binney and Bland, and in my own museum. Most authors would regard the above as a distinct and well marked species; I regard it (as well as *H. Hillebrandi*, of Newcomb) as a varietal form of *Helix Mormonum*, to which it is a near neighbor, inhabiting the same region.”—Robert E. C. Stearns, *Annals N Y ac* 1:—(N 1879), 3 f.

ABBREVIATIONS.

The editor has adopted the following abbreviations for use in his publications. In citations the number of volume precedes the paging and is separated therefrom by a colon (:); periods are used only at the end of a citation, which is usually composed of a series of abbreviations:

A—America; ac—academy; aes—agricultural experiment station; Am—American; Ap—April; b—bulletin; Ca—California; D—December; F—February; f—figure; J—journal; Ja—January; Je—June; Jl—July; L—Carl von Linnæus; Mr—March; My—May; mu—museum; N—November; na—national; O—October; Or—Charles Russell Orcutt; pr—proceedings; r—report; S—September; sr—series; tr—transactions; t—plate; Un—university; W—West American Scientist; Z—Zoe.

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AUTHOR'S CATALOG.

COCKERELL, THEODORE DRU ALISON: Mesilla Park, N. M.

—et Henry A. Pilsbry: *Ashmunella*, a new genus of *Helices*.
Phila ac pr 1899. 188-194, f. 25c

STEARNS, ROBERT EDWARDS CARTER:

—Verification of the habitat of Conrad's *Mytilus bifurcatus*,
Phila ac pr 1882. 241-2. 10c.

—Description of a new species or variety of land snail from California. *N Y ac annals* 1:—3 f (N 1879). 30c.

—On *Helix aspersa* in California and the geographical distribution of certain West American land-snails, &c. *N Y ac annals* 2: 129-139. 40c.

MONOCEROS PAUCILIRATA.

“Shell moderately elevated, whorls 4-6; body whorl four-fifths the total length, angulated above and excavated between the angle and the suture; a sharp groove behind the tooth. Upper whorls cancellated, nucleus smooth. Aperture elongate, purple brown in the throat; outer lip sharp, yellowish, internally denticulated, with a prominent tooth at its outer edge. Columella purple, canal short, umbilicus nearly covered by the columellar callus. Siphonal fasciole strong. Externally painted with longitudinal broad black and narrow whitish streaks, interrupted by the white dental groove and 3 or 4 narrow yellowish revolving carinae, which, except the keel, are inconspicuously

elevated. Lon. .55; Lat. .33 in. Habitat—Coronado Islands, off San Diego, California. Hemphill, 3 specimens.”—Robert E. C. Stearns, Conchological memoranda No. 6 (May 18, 1871); *Am J Conch* 7: —(1871), with f.

PLEUROTOMA HEMPHILLII.

“(Drillia) Shell small, smooth, slender, polished; spire long, subacute, rounded at apex; longitudinally marked with inconspicuous, oblique ribs, which are nearly obsolete on the body whorl; number of whorls 7, with well defined sutural line, and just below it a parallel impressed thread-like line; shell of an opaque dingy horn color; incremental lines fine, marked in some specimens with dingy white; mouth obliquely ovate, about one-third the length of the shell; labrum produced, anteriorly somewhat thickened; sinus sutural, deep, calloused; columella thickened at base; canal very short, somewhat produced and twisted; one specimen shows obscure, revolving, impressed lines below the swell of the body whorl; size quite uniform. Lon. .26; Lat. .09 in. Habitat—Los Todos Santos bay, Lower California, where several specimens were obtained by Mr. Hemphill, for whom I have named this well marked species.”—Robert E. C. Stearns, Conchological memoranda No. 7 (28 Ag 1871); *Caac pr* 5:—11, f3 (7 Ap 1873).

MURICIDEA SUBANGULATA.

“Shell small, abbreviated fusiform, dingy white and marked spirally by an inconspicuous band formed of 3 reddish-brown lines more or less interrupted on the basal and the preceding volution; whorls 5, angulated above and on the basal whorl rounded below the angle, with a shallow sulcation beneath; surface covered with rounded and irregular costae, which are inconspicuous or obsolete on the upper whorls; longitudinally marked with from 7-9 irregular rounded ribs, which at the edge of the angle, (which is somewhat carinated) are broken into angular or pointed knobs or blunt spines; aperture ovate, angu-

lated above and white within; the outer lip with 5 or 6 tubercles internally; canal moderately prolonged, slightly curved and open in the two specimens before me. Dimensions of largest: Long. .89; lat. .41 inch. Habitat—San Miguel Island, off the southern coast of California, where the specimens from which this description is made were obtained by Mr. W. G. W. Harford."—Robert E. C. Stearns, *Ca ac pr* 5:—t1, f 4 (7 Ap 1873).

PLEUROTOMA MONTEREYENSIS.

"(Drillia) Shell small, rather solid, elongate, slender; spire elevated, subacute; whorls, 7-8 moderately rounded; upper portion of larger volutions somewhat concavely angulated; suture distinct; color, dark purplish brown or black, surface covered with rather coarse, inconspicuous, revolving costae, interrupted on the body whorl by rude incremental lines; middle of upper whorls and upper part of body whorl displaying 14-15 equidistant, longitudinal, nodose, slightly oblique ribs, which are whitish in the specimen before me (being somewhat rubbed on the larger whorls); on the smaller volutions of the spire a puckering at and following the suture suggests a second indistinct series of nodules; aperture less than half the length of the shell; canal short; terminal portion of columella whitish, slightly twisted; posterior sinus, rather broad rounded, and of moderate depth. Mean divergence about 26 degrees, Long. .67 in.; Lat. .24 in. Habitat—Monterey, California, where the single specimen in my cabinet was collected by Mr. Harford and myself in March, 1868. This shell, in its general aspect, resembles the sombre colored specimens of the Gulf of California and Panama."—Robert E. C. Stearns, *Conchological memoranda No. 7* (28 Ag 1871); *Ca ac pr* 5:—t 1 f 2 (7 Ap 1873).

ANCYLUS —————?

Many things in this world are unseen because unsought. While recently camped, one April day, beside the banks of the

San Luis Rey river, remembrances of earlier days beside the waters of a New England river caused the editor to look, rather without hope it is true, for some of his former acquaintances—*Ancylus*—and lo!—a solitary specimen of an apparently undescribed species was the reward. It was a healthy individual attached to a piece of dead wood lodged in the stream and an interesting addition to the fauna of San Diego county and to Southern California. Further search was in vain—possibly it had drifted down from its natural environment nearer the source of the stream. *Succinea oregonensis*, *Pupa Hemphilli* and *Helix tudiculata* were observed near by.

FUSUS HARFORDII.

“(Chrysodomus?) Shell solid, elongate, regularly fusiform; spire elevated, whorls 6 or 7, moderately convex, slightly flattened (in outline) above, with a groove or channel following the suture; color, chocolate brown; surface marked by numerous narrow revolving costae, which alternate in prominence on the body whorl, and longitudinally by fine incremental striae, and on the upper whorls by obtusely rounded ribs of more or less prominence; aperture ovate, about one-half the length of the shell, polished, white and finely ribbed within; (the outer lip in perfect specimens is probably finely crenulated); canal short, nearly straight. Lon. 2.1; Lat. .94 in. Number of specimens, 3; 2 mature, dead, 1 junior, fresh. Habitat—coast of Mendocino county, near Big Spanish Flat, California, where it was detected by Mr. Harford.”—Robert E. C. Stearns, *Conchological memoranda* No. 7 (28 Ag 1871); *Ca ac pr* 5: 79 (7, Ap 1873). Dall, “*extr Ca ac pr* 19 Mr 1877;” *U S Na mu pr* 14: 178, t 6,

Dall cites the Farallones Islands (Watkins), and says he has “little doubt that this is the shell called by Middendorf *Tritonium Sabini*, from Kenai; at least, there is no other shell of the coast resembling Gray's *Fusus Sabini*.”

pp. 17-18 reprinted from *Le Proc. Sci U (5) [92]: 48-49 (June 1902)*
pp. 19-20 " " " " *12 (5) [98]: 30-31 (Nov 1902)*

West American Mollusca

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CHLAMYDOCONCHA ORCUTTI.

Dall, Science. 4: 50 (18 J1 1884). U S na mu pr 1885, 549.
Or U S na mu pr 1885, 549:—False bay, near San Diego, California, under stones.

Animal somewhat of the shape of a small globose *Cypraea*, of inflated, ovoid form, translucent, jelly-like, dotted above with small, rounded papillae, which appear of an opaque white on the general translucent ground. Over an inch in length when living, contracting in alcohol to less than half. Mantle covering the dome of the body tough and thick; sides smooth, nearly free of the papillae, superior median line a little depressed; basal-part of the anterior line in life prolonged beyond the general mass in a trough with the convexity upward, and somewhat expanded at its anterior extremity; about one-third from anterior end the mantle is perforated by an orifice, which pierces it in the vicinity of the mouth. The edges of this orifice project from the general surface, lined with close-set small papillae. At about the same distance from the posterior end is another tubular perforation, holding a similar relation to the anus; which has, however, plain edges, and is not internally papillose. Beneath the anterior surface, lined with close-set small papillae. At about the same distance from the posterior end is another tubular perforation, holding a similar relation to the anus; which has, however, plain edges, and is not internally papillose. Beneath the anterior trough of the mantle prolonged backward, like a slit with plain edges, to about the posterior third; from this projects a narrow, hatchet-shaped foot, with a strongly marked byssus-gland at its posterior angle; from this a bunch of white byssus extends to the

stone or object to which this mollusk attaches itself. The cavity of the mantle extends some distance behind the commissure of the pedal opening. The anterior point of the foot is roofed by the trough-like expansion above mentioned. The mouth is provided with 2 pairs of small palpi. Two gills very finely microscopically laminate, extend backward from near the mouth, on each side, to the posterior end of the body, the wider one being the inner; between their posterior ends a thin reticularly perforate veil connects the two pairs, and shuts off the anal area from the rest of the mantle cavity. The intestine contains a hyaline stylet, and is considerably convoluted; but the viscera offer no marked peculiarities when compared with ordinary pelecypods. The shells are enclosed in two little sacs in the substance of the mantle. The umbones are near together, apparently connected by a brown gristle resembling an abortive ligament, and are nearly over the heart. The valves are about 10 mm long, 1 wide, destitute of epidermis, prismatic, or pearly layers. There are no muscular or pallial impressions, no adductors, hinge, or teeth. They resemble in form the exterior of *Gervillia*, as figured by Woodward, and are pure white. As they lie in the body, they diverge at a rather wide angle from the beaks forward. The embryonic valves are retained like 2 tiny bubbles on the umbones. The animal forms the type of a new family, *Chlamydoconchae*, and under the classification in the new edition of the *Encyclopaedia Britannica*, would form a new order, *Amyaria*, *vide* Dall, from whom the above is mainly compiled.

The following is reprinted from the West American Scientist 10: 30-31 (Mr 1900).

Haliotis Cracherodii, Leach, is one of the most beautiful shells, and is the common trade species so well known on the Pacific coast as the abalone. Its more poetic name is the California pearl shell, from its clear white color, delicately tinged with rose purple, more rarely showing lustrous green or blue colors. The epidermis is smooth dark olive, hence this variety is commonly called the black abalone in distinction from its larger congener, *H. splendens*, known as the blue abalone. Monterey, Cal., was the original locality of the type. The shell may be described as 110-125 mm. long, 90-100 wide, about 40 high; usually 5-7 holes 5-12 mm. apart and 3-5 in diameter; interior pearly white with rose iridescence; scars of the closed holes showing, nearly to the apex of the shell in perfect specimens, and especially plain in polished specimens.

Tons of these shells, along with *H. splendens*, are annually collected by Chinese and other fishermen, especially on the rocks at low tide off the west coast of Lower (or Baja) California. The shells are mostly shipped to Germany and there manufactured into buttons and toilet articles. The snail is taken from the shells and dried, the meat usually shipped to China for food, where it is esteemed a great delicacy. The meat when fresh and properly cooked is certainly delicious, and is best when pounded to a pulpy mass and fried in butter.

Some consider that there is great danger of these shells becoming practically extinct in the California waters, and legislation for their protection (so far ineffective) has been passed in several of the coast counties. This species sometimes yields very beautiful pearls, but very rarely symmetrical in form, usually irregular, at times assuming a triangular or tusk-like shape that is very remarkable. These pearls are valuable as specimens, and the writer has often paid \$1 to \$5 apiece for unusually beautiful specimens, and even as high as \$20 for a very perfect specimen half an inch in diameter. But very pretty ones can be purchased

in our stores for 25 cents to 50 cents each, that will be valued in any collection.

Var. *splendidula*, Williamson, is a form of *H. Cracherodii*, with some of the coloring of *H. splendens*.

H. Californiensis, Swainson, is a very rare form, usually small, shorter and deeper than the type, with 9-16 smaller nearly round holes; a specimen 109 mm. long, 75 wide and 33 deep, is probably typical. This is generally from more southern waters, being described from Guadalupe island and southward. A specimen—collected by the writer at San Diego, Cal., is 165 mm. long, 126 broad, 60 high, with 10 holes 3-5 mm. in diameter, and showing 23 closed holes—the smallest 1 mm. in diameter. This is commonly considered as a variety only of *H. Cracherodii*, but is as well worthy of specific rank as many of the new species being described.

H. Bonita, Orcutt, is a new form recently discovered by the writer, from "near Santa Barbara, Cal.," 105 mm. long, 85 wide, 35 deep, with 13 long narrow holes close together, without showing scars of any of the closed holes and characterized further by the very large, rough muscular impression (50 mm. in greatest diameter), forming a most beautiful "pearl" and showing equally well from the inside or outside in the polished type specimen before me. It is evidently rare, and may be from Mexican waters.

They are not exclusively peculiar to Californian waters, some species being found in far remote seas, and several handsome species occurring in Japanese and Chinese waters. They are often called ear shells in other lands because of their shape resembling a human ear. Though they are abundant on the west coast of Lower California, strangely enough they seem to be absent from the waters of the Gulf of California, where thrives the pearl oyster shell.

H. Rosea, Orcutt, is another rare form apparently unnoticed by conchological writers, the specimen before me, 125 mm. long, 90 wide and 40 deep; 7 holes and another half enclosed, showing scars of 23 closed holes; not as heavy as the typical *H. Cracherodii*, it is further distinguish-

ed by the rich and extremely beautiful reddish epidermis.

H. splendens, Reeve (now called *H. fuigens* by most conchologists, as being the older name), is the famous blue abalone, flatter grooves, brilliant with lustrous blue and green iridescence Holes 4-7. Not rare on rocks below tide from Catalina island to Cedros island, and probably further south. One a foot in length is reported.

H. rufescens, Swains, is the famous red abalone of Monterey, Cal., large flatter, waved, 3-5 holes, with rich orange-red epidermis. It adds brilliancy of color to any collection. One specimen has been reported from San Diego and I have found a few between Todos Santos and San Quintin bay, Lower California, but apparently rare outside of Monterey bay. A specimen $7\frac{1}{2}$ by 10 inches is one of the largest specimens I have seen.

H. corrugata, Gray, is a large arched very rough shell, with 3-5 holes around which the shell forms prominent tubercles with acute edges. Occurs from Santa Barbara to Cedros island. Margin of shell crenulated. Not common.

Var. *diegoensis*, Orcutt, is a pecu-

liar form of this shell, margin not crenulated, and shell comparatively smooth and not elevated around the holes as in the type, or less prominently so. A specimen before me is 150 mm. long 130 wide, 65 deep, greatest diameter of the interior muscular impression or "pearl," 100 mm., rough; interior dull mottled greenish brown and bluish iridescence. This was taken near La Jolla and evidently enjoyed a long but stormy life. This variety I believe has never before been described.

H. assimilis, Dall, is a small species found only in deep water off San Diego near the Mexican boundary. It is the smallest of our species, more elevated than *H. splendens* and thin but otherwise resembling that shell.

H. kamtchatkana, Jones, is slightly larger than *H. assimilis*, thin, arched waved, 4-5 holes, found in Japan and from Straits of Fuca to Monterey.

H. aquatilis, Reeve, is yet another species occurring at Sitka and in Japan, but not reaching southern waters.

The trade in these shells is very considerable, but only the two species, *H. cracherodii* and *H. splendens*, are sufficiently abundant to be of great economic value.

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Number 6.

The first part of the proceedings of the academy of natural sciences of Philadelphia for 1900 contains the following articles pertaining to our subject:—

Dall, William Healey: Additions to the insular land-shell faunas of the Pacific coast, especially of the Galapagos and Cocos Islands. 88-106, t 8.

Pilsbry, Henry A.: Addendum to Dr. Dall's paper: note on the anatomy of *Guppya hopkinsi* Dall. 105.

—Note on the anatomy of the helicoid genus *Ashmunella*. 107-109, 3f.

—Mollusca of the Great Smoky mountains. 110-150.

The following descriptions are of new species, taken from Dr. Dall's paper:—

EPIPHRAGMOPHORA LEUCANTHEA.

"Shell with $5\frac{1}{2}$ rather convex whorls; pale lavender, nearly white below, with an obsolete white peripheral band, above which the whorl is more or less tinged with pale bluish gray, a translucent band above the peripheral one through which the dark brown with which the interior of the whorls is lined may show through more or less distinctly; nuclear whorls with wavy radial striæ, visible under a lens, for a whorl and a half, translucent; succeeding whorls opaque, except as stated, polished, with rather distinct incremental lines and obsolete vermiculations or malleations; base rounded, perforate, with the umbilicus nearly closed by the columellar reflection; aperture rounded, the outer lip slightly reflected, white, with the throat brown internally; body without callus, pillar short, arcuate, with no thickening or denticle upon it. Major diam. 28, minor 23.5, alt. of shell 20, of aperture 15 mm.

"Eastern side of Cerros Island, Anthony, 1896.

"This is evidently a derivative from *E. Veatchii*, from which it differs in the absence of the numerous interrupted brown bands, in the usually blunter and lower spire and more distinct and deeper sutures."—Dall, 99, t 8, f 18, 20.

E. CRASSULA.

"Shell small, solid and heavy, smooth, with 5 whorls; spire rather pointed, suture distinct, not deep, last whorl evenly round-

ed at the periphery; color opaque white with more or less numerous very pale brown subtranslucent spiral bands, all or part of which may be absent; usually there is a peripheral white band and between it and the suture one or two translucent bands of which the anterior is most constant; from 2-4 narrower translucent bands may exist in front of the periphery; the base is rounded, at first minutely perforate, later imperforate and sealed by a reflection of the pillar lip; aperture rounded, slightly oblique, with a solid white, slightly reflected peristome, but no callus on the body; pillar broad, short with a conspicuous callosity. Alt. of shell 15, of aperture 6, lat. of shell 15.5, of aperture 7.5 mm.

"Natividad Island, 10 miles south of Cerros Island, Anthony, 1896

"This species is an offshoot of *E. levis* Pfr., from which it differs by its smaller, and much heavier shell, fewer whorls, conspicuous peristome and narrower, fewer and less interrupted banding of a paler tint."—Dall, 100, t 8, f 3.

E. (MICRARIONTA) GUADELUPIANA.

"Shell small, thin, depressed, of a dark-brownish color with a narrow reddish band, bordered on each side by a pale streak, just above the periphery; spire little elevated, suture distinct; epidermis strong, in well-developed specimens slightly microscopically hirsute; sculpture of well-marked incremental lines, stronger on the spire, with occasional microscopic punctations; base more or less flattened, the last whorl with the periphery somewhat above the middle of the whorl, umbilicus narrow and deep; aperture sub-circular, very oblique with a strong whitish reflection of the peristome, the ends of the lip on the body approximated, throat with the bands showing through. Alt. of shell 6, diam. 10.5, aperture diam. 4.5 mm.

"Gundelupe Island, off Lower California, in N. Lat. about 29 degrees, Anthony, 1896; Snodgrass and Heller, 1899.

"This very well-marked little species is nearest to *E. Catalinae*, but is well depressed, with a larger umbilicus and differently shaped aperture. It seems to be tolerably abundant, though most of the specimens received were defective."—Dall 101, t 8, f 14, 15.

E. CATALINÆ.

"*Helix tenuistriata* W. G. Binney (as mutation of *H. Gabbi*), Land and fresh-water shells of North America, part 1, page 175, f 305, 1869; not of A. Binney, 1842.

"*Arionta Gabbi*, W. G. Binney, U S Na mu b No. 28, 148, f 130, 1885.

"This form was collected on Catalina Island by H. Hemphill, and, while obviously a member of the *Gabbi-facta* group, seems perfectly distinguishable from the other members of that group. There is a very large series of *Gabbi* and *facta* in the collection of the National Museum, and, notwithstanding their variability I do not find any specimens which are not readily referred to one or the other, and none intermediate between these and *catalinæ*. The name *tenuistriata* had previously been used specifically by A. Binney, and was repudiated for this shell by his son. As the original *tenuistriata* A. Binney has never been identified, and in the case of the present species the name would have to rest anonymous, it seems better to apply a local name to it which is free from any uncertainty. It has a small deep umbilicus partly shaded by the reflected pillar lip and a broadly reflected peristome, the ends of which upon the body are not approximated. It measures as follows: Alt. of shell 7, diam. 12, diam. aperture 4.5 mm. There are $5\frac{1}{2}$ rounded whorls and the entire shell is finely spirally striate. It is also found fossil on Santa Barbara Island, but the fossil specimens are often considerably larger than the largest living specimens now known; one measures 15 mm. in major diameter and nearly 10 mm. in height."—Dall, 103.

E. ORCUTTI.

"Shell globose, moderately elevated, polished, with nearly 6 moderately convex whorls forming a dome-like spire; color, purplish brown, lighter toward the umbilicus; a narrow pale band on the last whorl bordered behind by a darker brown, poorly defined, similar band, both being above the periphery and the suture in the earlier whorls being laid on the anterior edge of the darker line; nucleus flexuously radiantly wrinkled, pale colored; subsequent whorls with fine incremental wrinkles the ridges of which are cut by revolving, partly obsolete incised lines; as a rule these lines are not deep or continuous, cutting merely the tops of the wrinkles and not the furrows between them; suture distinct, last whole rounded, plump, toward the aperture descending below the pale band; base plumply rounded, the umbilicus covered by a reflection of the pillar-lip with a minute chink behind it; aperture very oblique, thickened, whitish, reflected, especially near the pillar;

throat livid brownish with the bands well indicated. Major diam. of large and small specimens, respectively, 24 and 22.5, minor diam. 20 and 18.5, alt. 19 and 16 mm.

"Habitat: Rosario mesas, in Northern Lower California, in May, 1886, by C. R. Orcutt.

"This form much resembles in shape the typical *E. Kellettii*, from which it differs in the absence of the yellow flecking and the different surface sculpture. *E. Kellettii* is also a more globose shell. The same stock, doubtless, was the origin of both species, as well as several others."—Dall, 104-105, t 8, f 19.

Under living and dead Maguey plants (*Agave shawii*), with *levis* and *Stearnsiana*, exceeding rare in comparison. Major diam. of largest specimen obtained 27, minor 22, alt. 19 mm. This is from the type locality of *Stearnsiana*, which was much more abundant and differing not at all from San Diego specimens. Orcutt No. 1321. It has more the aspect of the *tudiculata* than the *Kelletti* group. One specimen was quite elevated, 24 mm alt.

E. STEARNSIANA.

Under *Helix*.—"Shell narrowly umbilicated; sub-globose, solid, of a dirty white color, irregularly mottled with crowded ashy blotches, grouped into revolving series below, with a decided wide, brownish revolving band above; with delicate oblique incremental striae, unequally cut by revolving lines; spire elevated; whorls 5, rather convex; aperture oblique, semi-circular; peristome simple, acute, its columellar termination white, expanded, reflected over the half concealed umbilicus. Greater diam. 22, lesser 17; height 12 mill.

"*Helix stearnsiana* Gabb, Am J Conch 3: 235, t 16, f 1 (1867).

"Lower California, from Sta. Tomas to Rosario, under stumps of Maguey. (Gabb.) The shell figured and described was received from Dr. Newcomb. It may not be entirely mature."—B-B, 177, f 310.

"San Martin Island, in N. Lat. 30 degrees, 30 minutes, Anthony, 1896."—Dall Phila ac pr 1900, 101.

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PHYLLAPLYSIA TAYLORI

"The Rev. Dr. Geo. W. Taylor, of Wellington, British Columbia, has recently forwarded to me some marine slugs which were found on floating sea-grass near Nanaimo, Vancouver Island. An examination shows that these animals represent a genus, *Phyllaplysia*, not hitherto known except in Southwestern Europe, and an undescribed species.

The animal in most respects differs very little from *P. lafonti* Fischer, the type of the genus. It is subtranslucent, smooth, of a uniform pale lemon-yellow color, very much flattened, resembling some of the Planarian worms. The specimens sent by Dr. Taylor are presumably somewhat contracted by alcohol, which may account for the form of the rhinophores and tentacles, which are short, conical, and strongly transversely wrinkled, but without tuberculation or color pattern, being of the same pale yellow as the rest of the body.

The 'rainure' extending from the right tentacle to the branchial opening is a plain line barely perceptible; the branchial pit with 2 minute lobes is short and in about the same relative position as in *P. lafonti*. The body is much depressed and the margins thin, sharp and even. The eyes appear as conspicuous small black spots in front of the bases of the posterior tentacles.

The general form is elongate oval, the ends of the rhinophores, unlike the tentacles, are blunt, and these organs are sulcate inferiorly as usual. The length of

the largest specimen, as contracted in alcohol, is about 20 mm., and the breadth about 9 mm.

I propose for it the name of *P. taylori* in honor of its discoverer.

Of the 3 other species known, *P. lafonti* is pale green, with darker bands and numerous violet spots; *P. depressa* is green-buff, variegated with black; and *P. limacina* is of a dusky green.

All of these are from western and southern Europe."—Dall *Nautilus* 14:91-92 (D 1900).

PLEUROBRANCHUS CALIFORNICUS.

"Some time since Mrs. Oldroyd sent me 2 specimens of *Pleurobranchus*, from San Pedro, Cal., which I could not spare time to examine microscopically at the moment. I can now specify their chief diagnostic characters as follows: Animal when fresh of a waxy white, with a surface apparently smooth, or rather like the skin of an orange, not tuberculate, but, under a glass, showing obsolete distant pustules hardly raised above the general surface; body elongate-oval, the foot longer than the mantle behind. The gill short; its stem finely granular, not tuberculate, with 10 or 11 alternate short vanes, the whole adnate nearly to the tip, medially situated, with the contiguous genital orifices just in front of its anterior insertion and the anus just over the posterior insertion between the gill and the mantle. Eyes, rhinophores, muzzle, jaws and teeth, as described by Fischer (*Man. Conch.* xvi, pp. 301-2). Shell rather long and narrow, subrectangular, longitudinally obsoletely striate on the left side, obscurely obsoletely punctate near the anterior edge, and covered with a very thin periostracum which reflects nacreous tinges of color. The shell itself is white and thin, with a small spiral nucleus; the left margin somewhat recurved, the central part moderately convex; the whole extends more than half the length of the body and measures 12 by 6.5 mm. This species differs from *P. digueti* Rochebrune in color, in the proportional size and number of pinnules of the gill, in having a larger and differently shaped shell, and in the position of the anal orifice. These remarks apply to the form described by Pilsbry anatomically; Rochebrune states that his species was scarlet above and whitish below, but gives no anatomical data."—*Dall Nautilus* 14:92-93.

SUBEMARGINULA YATESII.

"Shell large, coarse, strong, whitish gray, or pale olive green on the fresher portions, especially a very narrow margin about the base; sculptured with strong, not dichotomous, radial ribs, of which about 20 are primary, between each 2 of which lie from 1 to 4 secondary riblets, most numerous at the sides of the shell: besides these there is a very strong anal fasciole, higher and stronger externally than any of the ribs, extending from the apex, and ending in front at a notch about 3.5 mm. deep and rounded above and behind; the radiating sculpture is sharply and irregularly imbricated by the rude and profuse incremental sculpture, which is too

close and irregular to form reticulation; apex small, pointed, not much elevated, situated 3-fifths of the way from the front to the posterior margin; the fasciole descending from it swerves a little to the right of the median line of the shell; interior white, the extreme margin pale olive green but almost linear; anal furrow deep, extending nearly to the apex, where it is lost in a very pale olive deposit of shelly matter; margins crenulated by the sculpture; muscular impressions strong, the 2 recurved scars unequal, the right one larger. Lon. of shell 51, lat. 36, alt. 13 mm. This shell was received from Dr. L. G. Yates, of Santa Barbara, who obtained it from a dealer at Monterey, Cal., who asserted it to have been obtained alive from the bay of Monterey. Two specimens were obtained, which the possessor would neither lend nor sell; but finally Dr. Yates succeeded in obtaining one of them, which he courteously forwarded to the National Museum for examination. It can only be compared with *S. gigas* von Martens, of Japan, in which the furrow is obsolete, and there are no secondary ribs, and the primary ribs are feeble, low, wide, and obsolete on the anterior part of the shell. If the locality is confirmed, the species is a notable addition to the Californian fauna."—Dall l. c. 125-126.

ACANTHOCHITES EXQUISITUS.

"Visible portions of the valves extremely narrow, generally less than $\frac{1}{4}$ the entire width of the dried animal. Valves dark olive, interior blue; the girdle light green, tufts very large, either green, pink or bronze; fleshy covered with a green pubescence. Length 30, breadth 18 mm. La Paz (Lockington). The valves are more covered than in any other form, the tegmentum being far less in area than one of the sutural laminae."—Pilsbry *Nautilus* 7: 32.

FLABELLINA OPALESCENS

"*Æolis* (*Flabellina opalescens*):—Bluish white, pellucid, somewhat quadrangular, posteriorly wedge-shaped ending in a sharp point. Foot anteriorly with 2 short spreading appendages, laterally thin and flattened. Head short; tentacles 2, long, acute (the lower pair replaced by the appendages of the foot). Two erect, club-shaped appendages (dorsal tentacles) on the anterior part of the back, of an opaline color, with an orange stripe between them. Branchiæ in 5 pairs of fasciculi along the upper edges of back, each bundle of about 4 rows, longest above their color yellowish,

with a purple or blood-red spot near the end. A rosy tint often visible from the string of ova shining through the abdominal walls. This elegant species is numerous in San Diego bay, California, in the winter, living among the grass, and depositing its ova on any fixed object it meets with. Length, $1\frac{1}{2}$; breadth, $\frac{1}{4}$ inch."—Cooper Cal ac pr 3: 205.

Flabellina opalescens Cooper Cal ac pr :—"Dredged at Santa Barbara on a rocky bottom in a depth of 16 fathoms. A few also from the rocky shore of Santa Barbara Island, differing only in having the branchiæ olive, tipped with white."

ÆOLIS BARBARENSIS

Cooper Cal ac pr 3: 59.

Rose-red, longer tentacles tipped with yellow, branchial ciliæ simple in 6 longitudinal rows, all short, the middle rows longest and tipped with blue, anterior tentacles 2, above the mouth, dorsal tentacles club-shaped, a white streak extending from the median line between them to the mouth. Length nearly an inch. Santa Barbara, Cal., 16 fathoms on a rocky bottom.—Cooper.

PHIDIANA IODINEA.

Cooper Cal ac pr 3:60.—"One from Santa Barbara beach, agreeing with those from San Diego.

"*Æolis* (*Phidiana*?) *iodinea*: rich violet purple, narrow wedge-shaped, high in front, tapering to an acute point behind, slightly constricted in 5 parts of the body corresponding to divisions of the branchiæ. Foot very narrow, slightly expanded. Head obtuse, with 4 tentacles, the upper longer and turned upward, the lower deflexed. Two club-shaped, orange-colored appendages a little behind the upper tentacles. Branchiæ short in a double row, close together near the median line, their color, orange red. Length $2\frac{1}{2}$; breadth one-fifth, inches. On rocks, among algæ outside of San Diego bay—rare inside."—Cooper Cal ac pr 2: 205.

ACMÆA MORCHII.

"Shell conical, much elevated, with a sub-central recurved apex resembling that of *Helcion pectinatus* covered with close-set, rough, imbricated ribs and riblets, the coarse, imbricated, sharp lines of growth forming with the other sculpture a close reticulation in some specimens. Interior with a brown-mottled spectrum and margin, otherwise white; exterior dull grayish or greenish speckled. The imbrications on the principle ribs very strong, in some specimens forming small spines concave beneath. Lat. 16, lon. 20, alt. 10 m n. Tomales bay, Cal. (Henry Hemphill). Mus. Cat. 31268."—Dall U S Na mu pr 1: 47 (1878).

c. (p. 190)?

WEST AMERICAN MOLLUSCA.

STEARNS, ROBT. EDWARDS CARTER
—Exotic mollusca in California. Science, 27 Apr 1900.

Notes the occurrence of the following species:

AMALIA HEWSTONI Cooper.
Seattle, Washington, to San Diego, California.

BULIMUS VENTROSUS Fer.
Oakland, California (Henry Hemphill).

COCHLICOPA LUBRICA Muell.
Ferrussacia subcylindrica L.

Grizzly Peak, Berkeley, Cal. (H. Hemphill); Oregon; Alaska.

CREPIDULA CONVEXA Say.
Variety GLANCA Say.

This form of the Atlantic slipper-shell was found on the Alameda flats, Cal. by Henry Hemphill.

HELICODISCUS LINEATUS Say.
Oakland, California (Henry Hemphill).

HELIX ASPERSA Muell.

MODIOLA PLICATULA Lam.
Nova Scotia to Georgia. Found in 1894

three miles north of Stanford University, Cal., by N. F. Drake.

MYA ARENARIA Linn.
Mya Hemphilli Newcomb.

San Francisco bay, Cal. (Henry Hemphill, N 1874). Washington. Accidentally introduced on the Pacific coast, from the Atlantic seaboard, and variously known as the "soft-shelled," "squirrel," "long-necked" clam, and "mananose." An important food species.

OSTREA VIRGINICA Gmelin.

Importations of seed oysters from the Atlantic side to San Francisco bay, California, for the nine years ending with 1896, amounted to 15,271,000 pounds, costing \$350,000.00, according to the U. S. Fish Comm. report for 1896.

UROSALPINK CINEREUS Say.

The oyster-drill of the Atlantic coast, discovered on the oyster beds in San Francisco bay, California, by C. H. Townsend, in 1889.

ZONITES CELLARIA Muell.

ZONITES DRAPARNALDI Beck.
Greenhouses, Seattle, Washington; Oakland, California.

STEARNS, R. E. C.

—The edible clams of the Pacific coast and a proposed method of transplanting them to the Atlantic coast. U. S. Fish Com 'b 3:353-362.

Mentions the following:
CARDIUM CORBIS Mart.
Cockle.

GLYCYMERIS GENEROSA Gould.
Puget Sound to San Diego, California.

"Goeduck," attaining a weight of 16 pounds (fide Capt. J. S. Lawson)!

MYTILUS EDULIS Linn.

SAXIDOMUS NUTTALLII Conr.
Saxidomus aratus Gould.

Saxidomus squalidus Desh.
Saxidomus brevisiphonatus Cpr.

Alaska to San Diego, California. Fully equal, if not superior, as many persons think, to the Atlantic quahaug

SCHIZOTHAERUS NUTTALLII Conrad
Tresus maximus Midd.

Lutraría capax Gould.
Puget Sound to San Diego, California.

Closely approaching the best oysters in tenderness and delicacy.

TAPES STAMINEA Conr.
"Little round clam," or "hard shelled."

ACTÆON TRASKII Stearns.

Shell small, conical above, cylindrical, rather solid, opaque, somewhat glossy; sculpture consisting of fine spiral impressed lines or grooves, which become wider toward the base of the body whorl, making the sculpture of the lower portion of the shell lirate; part of the lirae are slightly grooved and in some cases show a tendency to run in pairs; the grooved lines are not quite regular in their relative distances, and some are deeper than others; the surface is otherwise sculptured by sharp, close-set, incremental lines; these latter are subordinate to the spiral sculpture and are more conspicuous on the lower part of the body whorl. Color dull-cream white, with (in the example before me) 2 obscure, broad, pale rufous bands on the body whorl. Spire short, obtusely conical. Whorls 6 (probably, apex in example somewhat eroded); suture distinct, narrowly channeled. Aperture about two-thirds the length of the shell (not quite 9 mm), acutely angular above, rounded and effuse below, finely lirate and glossy within, with a thin glazing on the body whorl. Outer lip thin, simple. Columella short and flexuous, with a conspicuous fold, curving around the same and thickening the edge of the lip, which is moderately produced in the umbilical region. Length of shell (type), 24, of body whorl 19, breadth 12 mm.—Stearns, U S Na Mu pr 21: 297-298, f (1899).

Quaternary marl: San Diego, California (Stearns, Homer Hamlin).

ACTÆON PUNCTOÆLATUS, Cpr.
Stearns, U S Na Mu pr 21: 297, 299 (1899).—quaternary, San Diego, Calif.

Va. CORONADOENSIS Stearns.
Stearns, U S Na Mu pr 21: 299 (1899).

Slender, more attenuated and delicate than the recent specimens, without the dark bands. Quaternary marl, Spanish Bight, San Diego, California (Stearns).

SUCCINEA CINGULATA Forbes.

Oblong-ovate, slightly oblique, striate, shining; spine well developed, suture impressed; whorls 4; aperture large, oval, columella at the base receding to the left. Brownish-yellow, with obsolete spiral white lines. Length 12, diameter 6 mm. Mazatlan, Mexico?

Tryon, Monog T M 28, t 2 f 35.

SUCCINEA CHRYSIS Westol.
Living: Andreafski, Yukon river, Alaska.

SUCCINEA GABBII Tryon.

Tryon, Monog T M 22, t 2 f 14.
Keep, West Coast shells, 129.
Elongate ovate, thin, subpellucid, coarsely undulately striate; spire long, acute, suture deeply impressed; whorls nearly 4, but slightly oblique, very convex, the last 3-4 of the total length; aperture small, roundly oval, columella well incurved. Light yellowish. Length 9, diameter 5 mm. Binney, considers this a variety of *S. oregonensis*.

Living: Southeastern Oregon; north-eastern California (W. M. Gabb).

SUCCINEA HAWKINSII Baird.

Tryon, Mong T M 23, t 2 f 31.
Very narrow, sub-cylindrical, thin, rugosely striate; spire very short, apex mamillary; whorls $2\frac{1}{2}$, suture not impressed; body very long and narrow, the sides flattened, sub-parallel; aperture narrow ovate, two-thirds the total length, viewed from the base exhibiting the interior of the whorl to the apex, columella slightly folded above, with a callous deposit. Covered with a rather oblique dark yellow or orange epidermis. Length 1', diameter 5 mm.

Living: Washington; British Columbia.

SUCCINEA HAYDENI W. G. Binney.

Tryon, Monog T M 24, t 2 f 20.
Keep, West Coast shells, 128 f 118.
Elongate-oval, thin, shining; spire short, acute; whorls 3, convex, the last marked with wrinkles of growth, and irregular; heavy, spirals furrows; aperture oblique, oval, five-sevenths the total length, the lower margin considerably expanded. Amber color. Length 21, diameter 9 mm.

Living: Nebraska and north. Utah.

SUCCINEA LINEATA W. G. Binney.

Tryon, Monog T M 23, t 2 f 16.
Oblong ovate, irregularly wrinkled, between which are coarse, remote, revolving lines; spire acute; whorls 3, very convex; aperture $\frac{1}{2}$ the length of the shell, oval; columella folded. Length 12, diameter 6 mm.

Living: Nebraska; British Columbia; northeastern California; Utah.

SUCCINEA NUTTALLIANA Lea.

Tryon, Mong T M 26, t 2 f 26.
Keep, West Coast shells, 129.
Ovate conic, very thin, pellucid, shining, striate; spire acute, attenuate; whorls revolving very obliquely; aperture two-thirds the total length, ovate, broadly rounded below, angled above; columella without fold. Light horn color or greyish. Length 15, diameter 8 mm.

Living: Snake river, Oregon; to Clear Lake, California.

SUCCINEA OREGONENSIS Lea.

Tryon, Monog T M 23, t 2 f 13.
Keep, West Coast shells, 129.
Elongated oval, thin, diaphanous, shining, striate; spire acute, suture well impressed; whorls 3, well rounded; body seven-eighths and aperture two-thirds the total length; aperture ovate, one-third longer than broad, columella arcuate. Color deep orange or golden. Length 3, diameter 6 mm.

Living: Vancouver Island to Baja California.

ifornia.

SUCCINEA RUSTICANA Gould.

Tryon, Monog T M 24, t 2 f 19.
Elongate ovate, thin fragile, diaphanous, irregularly striate; spire elevated, acute, suture moderately impressed; whorls 3, not very convex; body long, oval, not inflated; aperture narrowly oval, three-fifths the entire length. Pale greenish or yellowish. Length 14, diameter 7 mm.

Living: Nevada; Vancouver Island, to Baja California.

SUCCINEA AVARA Say.

Keep, West Coast shells, 129 f 119.
Orcutt 1319: Near San Quintin bay, Baja California.

SUCCINEA SILLIMANI Bland.

Tryon, Monog T M 24-25, t 2 f 21.
Keep, West Coast shells, 129.
Oblong-ovate; thin, coarsely striate, shining; spire short, acute, suture impressed; whorls 3, convex, much flattened superiorly; aperture oblique, elongate oval, angular above, effuse at base, columella slightly arcuate, with a thread-like thickening above. White? Length 20, diameter 8.5 mm.

Living: Humboldt Sink, Nevada, to San Joaquin valley, California; Washington.

TRUNCATELLA CALIFORNICA Pfr.

Cylindrical imperforate, thin, translucent, slightly striate; whorls 6-10, quite convex, last not carinate below; aperture vertical suboval, lip simple, continuous, slightly expanded. Amber colored. Length 4.6, diameter 1.6 mm.

Living: San Diego, California.

TURTONIA MINUTA Fabricius.

"Bering Sea to the Shumagins. Precisely similar to European and New England specimens."—Dall U S Na Mu pr 21: 881 (1899).

TURTONIA OCCIDENTALIS Dall.

"Plover bay, Bering Strait, and northward, in 20 to 40 fathoms."—Dall U S Na Mu pr 21: 881 (1899).

Larger, stouter, and shorter than *T. minuta*.

Genus **VERTIGO** Muell.

VERTIGO CALIFORNIA P.-V.

Pilsbry & Vanatta, Phila ac pr 1900:610.
Pupa Californica Rowell ex Newcomb, N Y Lyc Ann 7:287.

Bland, N Y Lyc Ann 8:166, f 12 (1865).

Shell rimately subperforate, elongate ovate, thin, dark horn-color; with oblique rib-like striae; apex obtuse; suture deep; with 5-6 convex whorls, the last a little compressed at the aperture; aperture oblique, suborbicular, armed with 4 white denticles; one lamelliform, strongly developed, slightly twisted, on the parietal wall, one on the columella, and two deeply seated within or near the base of the aperture; peristome slightly expanded, columellar margin somewhat reflected. Long. $2\frac{1}{2}$, diam. 1 mm.

Keep, West Coast shells, 130, f 120:—Near Lone Mountain, in San Francisco, Calif.

SERRIDENS OBLONGA Cpr.

Dall U S Na Mu pr 21: 880 (1899).
San Pedro, California.

BINNEYA NOTABILIS J. G. Cooper.

Tryon, Monog T M 32, t 3 f 4.
Depressed, smooth and shining, epidermis extending beyond margin of aperture, translucent when young, but opaquely thickened when old. Nuclear whorl with about 30 delicate transverse ribs. Pale brown. Diameter 12, height 3 mm.
Santa Barbara Island, California; Guadalupe Island, Baja California (G. W. Dunn).

On the mainland near San Quintin, Baja California (Orcutt).

BORNIA PULCHRA Philippi.

Dall, U S Na Mu pr 21: 880, 889.
Kellia pulchra Philippi, Zeitschr für Mol 5: 145 (1848). "Probably a Pythina, but unfigured."—Dall. "West America."

BORNIA RETIFERA Dall.

"Shell thin, white, moderately convex, rounded, trigonal, nearly equilateral; beaks distinct, not high; surface polished, with faint incremental lines and minute close punctations whose interspaces give the effect of a fine netting; hinge normal, delicate; adductor scars rounded, high up; posterior basal margin very slightly crenulate. Lon. 12, alt. 9, diam. 4 mm. One left valve dredged by the U. S. Fish Commission at station 2900, in 13 fathoms, off Santa Rosa Island, California."
—Dall, U S Na Mu pr 21: 889, 880, t 87 f 2 (1899).

CYLADELLA POPYRACEA Cpr.

Mazatlan, Mexico. "Possibly the nepionic young of Cooperella or Clementia."—Dall, U S Na Mu pr 21: 882 (1899).

ERYCINA COMPRESSA Dall.

"Shell large, subquadrate, thin, moderately compressed, white, covered with a conspicuous, thin, wrinkled, partly glossy periostracum; nearly equilateral, the posterior end slightly broader, both ends rounded, the basal margin nearly straight; beaks inconspicuous, surface with strong, irregular incremental lines, but no radial sculpture; pallial scar rather wide and irregular, merging into the subequal, rather narrow adductor scars; resilium large, wide, and long, more or less calcareous ventrally, left valve with one obscure cardinal tooth, right valve with the tooth better developed; the right dorsal valve margins overlap those of the left valve a little, but there are no distinct lamellae. Lon. 14, alt. 13, diam. 6 mm. Dredged on muddy bottom in from 4 to 23 fathoms in the eastern part of Bering sea, south of Nunivak Island, the eastern Aleutians, and southward to Sitka, Alaska, by W. H. Dall."—Dall, U S Na Mu pr 21: 888, 887, t 87, f 1, 8 (1899).

ERYCINA RUGIFERA Cpr.

Dall U S Na Mu pr 21: 887, 880, t 87 f 4 (1899).

Pythina rugifera Cpr Supple R Brit Assoc 1863: 602, 643 (1864). Phila ac pr 1865;

Lepton rude (Dall ms) Whiteaves R Progr Geol Surv Canada 1878-79: 198 B, f 2 (1880).

Lives attached to the abdomen of Gebia pugetensis Dane, a burrowing crustacean. Puget Sound.

KELLIA LAPEROUSSII Desh.

Behring Island, and the Aleutians to Panama.

Carpenter's var. Chironii and K. rotundata are synonyms.

KELLIA SUBORBICULARIS Mont.

Straits of Fuca to Mazatlan; Panama; north Atlantic; Europe.

MELAMPUS OLIVACEUS Cpr.

Obconic; spire short, suture indistinct; whorls 7-9, obtusely angulated on the body below the suture; aperture long and narrow, lip covered with sharp laminae within, parietal wall with from 1 to 3 small revolving laminae; there is also a stout fold on the columella. Epidermis olivaceous, below which the color is white with patches or revolving lines of red. Length 13, diameter 8 mm.

Living: San Diego, California to Mazatlan.

MYSELLA ALEUTICA Dall.

"Shell small, solid, ovate, white, smooth, covered with a polished straw-colored epidermis with usually 3 or 4 concentric darker colored zones; beaks distinct, often eroded, ends and base rounded, valves moderately convex, teeth strong in the right valve, anterior adductor scar narrow and rather irregular, elongated, posterior rounded, pallial scar linear. Lon. 4.3, alt. 3.2, diam. 2 mm. Bering sea, the Aleutians, and east to Sitka bay, Alaska."—Dall, U S Na Mu pr 21: 892-3, 881, t 87 f 6 (1899).

MYSELLA PEDROANA Dall.

"Shell large, thin, rounded, rather compressed, white, with a concentric rugose; pale-brownish epidermis (to which, in the type, adheres a good deal of blackish oxide of iron); beaks inconspicuous; surface with coarse, concentric, incremental lines; inequilateral; the posterior side short, dorsal margins merging roundly into the distal and they into the basal margin, which last is nearly straight; hinge feeble, the right anterior lamella elongated and very slender, the posterior one shorter and stouter, the resilium subumbonal and very small; adductor scars small, the pallial scar linear. Lon. 9, alt. 7.3, diam. 3 mm. A single shell found on the beach at San Pedro, California."—Dall U S Na Mu pr 21: 891, 881, t 88 f 4 (1899).

MYSELLA PLANATA Dall.

Dall, U S Na Mu pr 881, 892 t 88 f 12 (1899).

Tellmyra planata Dall, in Krause; Beitr Moll fauna des Beringsmeers, Arch f Naturg 51 pt 1: 34, t 3 f 6 a-d (1885).

Bering Strait, south to the Aleutians and east to the Shumagin Islands, Alaska.

MYSELLA TUMIDA Cpr.

Dall, U S Na Mu pr 21: 881, 892, t 87 f 7 (1899).

Tellmyra tumida Cpr, Suppl R Brit Assoc 1863: 88, 97, 129 (1864). Phila ac pr 1865: 58.

Alaska peninsula, south to San Diego, California.

ANCYLUS NUTTALLII Hald.

Living: Oregon.

PEDIPES LIRATA, W. G. Binney.

Shell globose conical, solid, with regular spiral lines; spire short, with obtuse apex; whorls 3, the upper ones small, the last equalling five-sixths of the total length; aperture semicircular; parietal wall with strong transverse lamina, columella with 2 acute approximate teeth. White or yellowish. Length 3.3, diameter 2.5 mm.

Living: San Diego, California (Orcutt). Cape San Lucas, Baja California.

SCALA STEARNSII Dall.

Pliocene: Pacific Beach, San Diego, Calif. (Stearns, 1887).

Stearns, Wagner Free Inst tr III, pt 2: 54, t 21 f 4 (1892).

SELENITES CAELATA Mazyck.

Shell small, depressed, brownish horn-color, with very coarse, rough, crowded, subequidistant, irregular ribs, which are obsolete at the apex; whorls 4, rounded, somewhat inflated below, gradually increasing, the last not descending at the aperture; suture impressed; umbilicus wide, clearly exhibiting all the volutions; aperture almost circular, slightly oblique; peristome simple, its ends approaching and joined by a very thin, transparent, whitish callus, through which the ribs are distinctly seen. Greater diameter 4, height 1.75 mm. Santa Barbara (Dr. L. G. Yates); Hayward's, Alameda county, California (W. H. Dall).

Mazyck, U S Na Mu pr 9:460-461, f 1886.

SELENITES DURANTI.

Mazyck, U S Na Mu pr 9:460-1 f (1886).
Pelix duranti Newcomb, Ca ac pr 3:118 (1861).

Patula duranti Tyron, Am J Conch 2: 22, t 1 f 53 (1865). Mong. T. M. 51, t 4 f 2.

Hyalina duranti Binney and Bland L-F S 1:37, f 49 (1869).

Macrocyclus duranti W G Binn T M 5:94, 189. Man Am L S 85 f 49 (1885).

"Shell depressed, discoidal, pale corneous, under the lens minutely striated, opaque, broadly and perspective umbilicated; whorls 4, the last shelving but not descending (at the aperture); suture linear; aperture rounded, lunate, lip simple, the external and internal approaching. Santa Barbara Island."—Newcomb.

Tyron says: "spire not at all elevated, perfectly plane above."

Binney says: "with very coarse rough striae."

Diameter 5, height 1.75 mm.
Pilsbry, Phila ac pr 1889, p 196, treats Selenites caelata Mazyck as a variety of this.

SELENITES HEMPHILLI W. G. Binn.

Eastern Oregon; Washington.

SELENITES SPORTELLA Gould.

Tyron, Mong T M 33, t 3 f 7.
Macrocyclus sportella Gould.

Whorl 5, the superior part of the last one flattened upon approaching the aperture, rounded below; very light apple green, dull, very closely and sharply striate, reticulated by slight revolving lines; suture moderate, umbilicus mod-

erate and deep. Diameter 18 mm. Puget Sound to San Diego, California (Orcutt).

SELENITES VANCOUVERENSIS Lea.

Large, whorls 5, the superior part of the last one flattened upon approaching the aperture, rounded beneath; bright yellowish-green, shining, roughly striate, with very slight revolving lines, suture moderate, umbilicus of moderate width and deep. Diameter 30 mm. Oregon; Washington; Alaska; western Idaho.

Macrocyclus vancouverensis Lea.
Tryon, Mong T M 32, t 3 f 6.

SELENITES VOYANA Newc.

Depressed; whorls 5, convex, the last declining towards the aperture and somewhat flattened or concave above, striate; aperture sinuate above, the lip slightly expanded, its extremities joined by a callus on the body whorl; below broadly umbilicate. Pale horn color. Diameter 12.5 mm. San Diego to Trinity county, California.

Macrocyclus voyana Newcomb.
Tryon, Mong T M 34, t 3 f 9.

SPORTELLA CALIFORNICA Dall.

"Shell small, compressed, rude, with a yellowish epidermis; slightly arcuate, dorsal margin evenly arched, base concavely arcuate; inequilateral, the anterior part longer, rounded, the posterior end more blunt; teeth normal, the larger right cardinal nearly parallel with the dorsal margin, the ligamentary nymph obscure, the attachment for the resilium thickened and projecting; scar of the mantle wide and somewhat irregular, the anterior adductor scar not well distinguished from it. Lon. 6, alt. 4.2, diam. 1.5 mm. A single rather worn right valve was collected on the beach at Monterey, California, by Dall in 1866."—Dall, U S Na Mu pr 21: 885, 879 (1899), t 88 f 5.

SPORTELLA STEARNSII Dall.

"Shell of moderate size for the genus, inequilateral, not very convex, white, with an almost imperceptible yellowish epidermis; anterior dorsal margin nearly straight, the base parallel with it, the ends bluntly rounded; surface nearly smooth, with faint incremental lines and microscopic sagination; teeth normal, strong, the posterior cardinal prominent, vertical; ligament strong, external, on a nymph; resilium well developed, its area of attachment thickened; posterior adductor scar rounded, unusually large. Lon. 13.5, alt. 10, diam. 5 mm. One well-preserved specimen from the Gulf of California, exact locality unknown, is contained in the Stearns collection."—Dall, U S Na Mu pr 21: 885, 879, t 87, f 8, 12 (1899).

SUCCINEA STRETCHIANA Bland.

Keep, West Coast shells, 129.
Tryon, Monog T M 19, t 2 f 5.

Globose-conic, thin, pellucid, shining, striatulate; spire short, obtuse, suture well impressed; whorls 3, convex, last inflated; aperture roundly oval, columella arcuate, slightly thickened. Greenish horn color. Length 6.25, diameter 5 mm.

Sub-alpine Sierra Nevada, California and Nevada, 4,000 to 6,500 feet altitude.

Axiurus bisectus c

Barbatia gradata y—Arca g.

Or in da 8:549.

Lafeeia haliotiphila cr n d j on

Haliotis fulgens.

Or in da 8:541.

BARLEEA SUBTENUIS Cpr.

Or in da 8:541. bo d p m

varinata cr d Or in da 8:541.

Bela brachistomoides d

excurvata cr u

fidicula g u kt

Bolemites macritatis C. A. White,

Gs b Or 1:47

BINNEYA NOTABILIS J. G. Cooper.

Cp Ca ac pr 3:62 f 15.

Cp Zo e 3:14

Tryon Am J conch 2:244 t 3 f 4.

Tryon, Monog T M 32, t 3 f 4.

P-V, Philad ac pr 1898, 231 t 14 f 63-65, t 16 f 87, 88.

W. G. Binney, W 2:61.

Or W 2:62.

Depressed, smooth and shining, epiderm's extending beyond margin of aperture, translucent when young, but opaquely thickened when old. Nuclear whorl with about 30 delicate transverse ribs. Pale brown. Diameter 12, height 3 mm.

Color buff-gray, with rather large black dots mainly scattered along the radial grooves of the foot and in a line above the pedal grooves, the mantle maculated with black. Surface with rather coarse radial grooves and sparse reticulation; a fine groove median on tail above, not extending to the end; foot margin narrow, closely and evenly crenate; sole unicolor grayish, rugose and distinctly tripartite. Alcoholic specimens measure 10-20 mm long.

Santa Barbara Island, California; Guadalupe Island, Baja California (G. W. Dunn).

On the mainland near San Quintin, Baja California (Orcutt).

BITHINELLA BINNEYI Tryon.

Or in da 8:541; W 1:6.

See *Bythinella* b.

BITHINELLA INTERMEDIA Tryon.

Or in da 8:541; W 1:6.

See *Bythinella* i.

BITTIUM ARMILLATUM Cpr.

Or in da 8:540. fa d

asperum cr b n pr

attenuatum cr u mo

B. (*Elachista*) *CALIFORNICUM*.

"Shell white, broadly elongate-conic; whorls rounded, falling off more abruptly toward the suture than the summit. The earlier whorls increase less rapidly in diameter, and are more evenly rounded. Base short, well rounded; aperture suboval, effuse and subchannelled anteriorly, with the posterior angle rounded; columella somewhat twisted and slightly revolute. The ornamentation consists of about 14-16 broad and low axial folds, which gradually become obsolete on the periphery and base, and on the whorls 3 or 4 impressed spiral lines, which are equally apparent on the ribs and intercostal spaces. This species occurs both recent and fossil in California. Recent shells appear more slender with fewer ribs, 12-14. The type is a fossil specimen from Dead Man's Island, off San Pedro, California, and has eight whorls which measure: long 5.3, diam. 2.2 mm. A recent shell of 10 whorls measured 6, diam. 2.1 mm."—Dall & Bartsch, *Nautilus* 15:58-59 (S 1901).

esuriens cr mo u pr

fastigiatum cr b

flosum g u mo

vesuriens cr—*esuriens*

quadrifilatum cr mo d

Or in da 8:540

Rivonia compacta cr w pr

BORNIA PULCHRA Philippi.

Dez. U S Na Mu pr 21: 880, 889.

Kellia pulchra Philippi, *Zeitschr fur Mol* 5: 149 (1848). "Probably a *Pythina*, but unfigured."—Dall. "West America."

BORNIA RETIFERA Dall.

"Shell thin, white, moderately convex, rounded, trigonal, nearly equilateral; beaks distinct, not high; surface polished, with faint incremental lines and minute close punctations whose interspaces give the effect of a fine netting; hinge normal, delicate; adductor scars rounded, high up; posterior basal margin very slightly crenulate. Lon. 12, alt. 9, diam. 4 mm. One left valve dredged by the U. S. Fish Commission at station 2900, in 13 fathoms, off Santa Rosa Island, California."

—Dall. U S Na Mu pr 21: 889, 880, t 87 f 2 (1889).

Bryophila setosa cr n

BUCCINUM ALEUTICUM Dall.

"Shell thin, 6 whorled, covered by a thin sparsely pilose, dehiscient epidermis; of a livid pinkish color with a white pillar and margin to the outer lip and a dark chestnut nucleus; sculpture of extremely fine, regular, close-set grooves with equal or wider interspaces, regularly spaced on the last, but tending to pair on the earlier whorls; spire short rather pointed; whorls full; suture deep but not channelled; aperture moderate; pillar with a white callous ridge incurved upon it; siphonal fasciole distinct, bounded by a groove behind; outer lip slightly thickened, hardly reflected; throat livid brown; operculum small, subcircular with a subcentral nucleus and fan-shaped scar of attachment. Length of shell, 35; maximum diameter, 21 mm."—Dall, U S Na Mu pr 17:706, t 27 f 7 (1894). South of Unimak Island, Aleutians, in 59 fathoms, sand.

B. OVULUM Dall.

"Shell small, thin, of about $4\frac{1}{2}$ or five whorls; surface smooth, or with faint irregular spiral threads mostly obsolete; covered with a vernicose adherent olive-green epidermis; substance of the shell livid pinkish purple, with a white margin to the pillar and aperture; last whorl much the largest; suture deep but not channelled; nucleus eroded in all the sp.; pillar nearly straight, thin, with a deep, very short, hardly recurved canal; body sometimes with a thin wash of yellowish callus; operculum small, nearly circular, the nucleus subcentral, surface of attachment fan-shaped, reflected by a depression in the concave outer surface. Length of shell, 25; maximum diameter, 20 mm."—Dall l. c. 707 t 30 f 6.

B. STRIGILLATUM Dall.

"Shell with 7 fully rounded whorls,

deep suture, and hirsute epidermis sculpture of numerous narrow flattened primary ridges with subequal channelled interspaces; aperture not expanded but with a wide deep sinus near the houlder. Color white; length 42, breadth 27 mm. U.S. Steamer Albatross, station 3170, off Guadelupe Island, Lower California, in 167 fathoms."—Dall l. c. 14:186 (1891); 17:706 t 27 f 9. Off Tahwit Head, Washington, in 178 fathoms; and off Bodega Head, Cal. 167 fm., muddy bottom.

Subgenus **SULCOSINUS** Dall.

"Shell thin, with a deeply channelled suture, strongly reflected lip, and thick parietal callous deposit. Type *Buccinum taphrium*."—Dall l.c. 17:707 (1894).

B. TAPHRIUM Dall.

"Shell thin, slender, with polished brown epidermis, with fine spiral striae and conspicuous zigzag or spiral malleations; 6-whorled, acute; suture deeply channelled; aperture white, with thick reflected lip and continuous thick callus on the concave pillar. Length of shell

40, breadth 18, length of aperture 15 mm. U. S. Steamer Albatross, station 3330, off Akutan Island, Bering Sea, Alaska, in 351 fathoms."—Dall l.c. t 29 f 6.

Bulimulus artemisia W. G. B. n. j

Cp Zoe 3:14; Ca ac pr sr 2, 3:100.

californicus r j? Cp Zoe 3:14

excelsus g j Cp Zoe 3:14; Ca ac pr sr 2, 3:101.

inscendens W. G. B. l Cp Zoe 3:15

v bryanti Cp Ca ac pr sr 2, 3:101

Cp Zoe 3:15

pallidior y l sa d? Cp Zoe 3:15; ca ac pr sr 2, 3:101.

proteus Brod. j Cp Zoe 3:15; Ca ac pr sr 2, 3:100, 101.

pilula W. G. Binn. j

Cp Zoe 3:15, 16; Ca ac pr sr 2, 3:102.

proteus Brod Cp Zoe 3:15 j

sufflatus g l Cp Zoe 3:15

BULIMUS VENTROSUS Fer.Oakland, California (Henry Hemphill).
BULLA NEBULOSA Gld.**BYTHINELLA BINNEYI** Tryon.

Shell elongated, 4-5 whorls, apex somewhat obtuse; aperture ovate or nearly suborbicular, both margins rounded; umbilicus very small. Color light horn, translucent. Height 3, diameter 1.6 mm.

Living: Bolinas; Martinez; San'a Cruz; Campo, San Diego county (Orcutt), California.

BYTHINELLA HEMPHILLI Pilsbry.Shell very slender, about the shape of *Carychium ex guum*. Apex obtuse, whorls 5, convex, the last imperforate. Aperture ovate, about one-third the length of the shell; peristome continuous, its plane oblique to the axis of the shell, the base of the lip being advanced. Color corneous, often encrusted with a black ferruginous deposit. Height 2.4, diameter 1 mm.

Living: Snake river, Washington (Henry Hemphill).

Pilsbry, *Nautilus* 4: 62-64.**BYTHINELLA INTERMEDIA** Tryon.

Shell elongately turbinated, of over 4 very convex whorls; spire elevated, suture profound, apex obtuse; body whorl well rounded; aperture small, nearly round; umbilicus narrow. Color dark green. Height 5, diameter 3.3 mm.

Living: Owyhee river, southeastern Oregon. Springs, Cuyamaca mountains east of San Diego, California (Orcutt).

Cæcum californicum da d n 8-10 fm

Or in da 8:541; W 1:80; 2:78

cooperi cr—californicum

crebricostatum cr mo d

effusum cr j

firmatum cr j

CAECUM ORCUTTI Dall.

Da 8:541; Or 2:79

Callostoma annulatum Mart u d

Or in da 8:542

canaliculatum Mart u d.

Or in da 8:542

costatum Mart u d

Or l. c.

gemmulatum cr pr d Or l.c.

gloriosum da mo pr

splendens cp mo n

supragranosum cr z mo pr

tricolor Gabb d New Years Point

variegatum cr u

versicolor Menke an

Callista callosa c b s

newcombiana Gabb n

Callistochiton crassicostatus Pilsbry

Pils Phila ac pr 1898, 288

decoratus cr Or in da 8:544

palmulatus cr da 1:297

v mirabilis Pils Ph'a ac pr '98, 288

Callochiton fimbriatus cr u

Or in da 8:544

Cancellaria bullata y

'Near Cerros ls., off j'—da 14:183

cassidiformis y

'Near Cerros l. off j'—da l. c.

Miocene—Santa Barbara county.

C. tritonidea & vetusta Gabb, are based on a young and a very aged specimen, respectively, of this sp.

C. cooperi Gabb mo d

crawfordiana da 14:182-3 t 6 1

Drake's bay, near f-d 20-30 fm

modesta cr ne

obesa h near Cerros I, j da 14:183

Cantharidæ pupides da mo pr 20 fm

CARDITA SUBQUADRATA Crp.

Carditamera subquadrata cr

Or in da 8:549 is Cardita s.

Cardium biangulatum Say u

blandum g u k d

centiflosum cr n mo 20-40 fm

CARDIUM CORBIS Mart.

Cockle.

HH Zoe 2:136 u k b

elatum y HH l.c.—Liocardium e.

quadragenarium c mo d

Or in da 8:548

CARINIFEX NEWBERRYI Lea.

Keen, West Coast shells, 115, f 104.

Shell: light horn color, turreted, very minutely striated, above and below acutely carinated, broadly and deeply umbilicated, whorls 5, flat above, sloping convex below; aperture large, subtriangular.

Living: Klamath lakes, Oregon, to Owen's river and Clear lake, California, Nevada, Utah.

Carolina telernus L Pelagic n u

tridentata Forsk an

Cerithidea californica Held bo m

mazatlanica d m

pullata g—californica

CERITHIDEA SACRATA Gld.

Or in da 8:540—californica

Cerithiopsis assimilata CBAd mo p

Or in da 8:540

colymna cr u d

fortior cr b pr

munita cr pr ne

purpurea cr pr

PLANORBIS AMMON Gould.

Shell large, discoid, subconic, delicately striate; left side broadly and deeply concave, showing 4 obtusely carinated whorls; right side concave, showing 2½ rounded whorls; aperture ovate triangular, sometimes quite expanded on each side; axis, five-eighths to one; diameter ¾ to 1 inch.

Living: Klarath lake, Oregon. Honey lake, Lassen county, Calif. Nevada, Colorado river.

Quaternary: Clenega Grande, Colorado Desert.—T. H. Webb; W. P. Blake. Lachontan basin, Lassen county, California.

PLANORBIS ANITENSIS Cp.

"Shell (when held mouth downward) with the right side concavo-convex, the left flat (or slightly concave), the left margin forming a sharp carina expanded beyond the edge of shell, which is marked by a compressed line. Whorls 5, visible on both sides, uniformly flat on the left side forming a concave umbilicus on the right, where their surface is rounded. Mouth triangular, the right lip arched, the left nearly flat, the extremities joined to outer angle and to obtuse margin of umbilical cavity. Umbilicus half as wide as the shell; flat side of mouth one-fourth of diameter; greatest breadth (at mouth) over one-fifth of same; greater diameter .6, least .3 inch."—Cooper, Cal. ac pr 2d ser. 3: 341.

Type locality: Laguna at Santa Anita, Baja California, at an elevation of 100 feet, and 10 miles from San Jose del Cabo.

PLANORBIS EINNEYI Tryon.

Living: Oregon, Washington.

PLANORBIS HORNII Tryon.

Shell of three convex volutions; aperture almost orbicular, not oblique, not extending above or below the plane of the whorls; labrum slightly reflected, thickened within, its ends converging so as nearly to connect on the parietal wall; lines of growth fine and close. Color light horn. Diameter 21, height 7 mm.

Living: Fort Simpson, British America (George H. Horn). Grant's lake, California (W. M. Gabb).

PLANORBIS OPERCULARIS Gould.

Shell dextral, much depressed, lenticular; with a prominent blunted keel at compressed line; tip sunken; beneath the periphery defined by a marginal, compressed line; tip sunken; beneath umbilicated for about one-third the breadth of the base, showing 3 volutions, convex surface rather rude and indented, marked with irregular, coarse, much arcuated lines of growth, and here and there a few obscure, raised revolving lines; color dark chestnut brown, a little clouded; whorls above 4, slightly convex; suture well defined, impressed; aperture transversely subrhombic, lip above slightly declining, at periphery acute angled, beneath arched, lip embracing ¾ of that part of the whorl

which is beneath the carina. Diameter 6, height 1.5 mm.

Living: Common in the waters of California. Vancouver island.

PLANORBIS PARVUS Say.

Living: All British America and United States. Manitoba to New Mexico. Cantillas canyon, Baja California (Orcutt).

PLANORBIS PENINSULARIS Cp.

"Shell with both sides concave, the right with whorls rounded, their edge forming an obtuse margin, and the outer one partly enclosing the others so that it forms two-thirds the greater diameter of shell. Whorls 5, visible on both sides, the rounded (or right) surface showing less of them than the other. Left (or umbilical?) surface nearly flat, deeply concave near middle, the umbilicus being over one-third of diameter. Mouth trapezoidal, very oblique, its lips curved, the right extremity attached near the concave spire, the left to the obtuse periphery of shell. Mouth one-third longer than wide; its breadth over one-third that of shell. Greater diameter 0.16, least 0.05 inch. Color brown, surface smooth."—Cooper, Cal. ac pr 2d ser. 3: 342.

Type locality: "With *P. antensis*, in same laguna."

PLANORBIS SUBCRENATUS Cpr.

Shell tumid, very thin, horn-colored; whorls 6, rounded, sutures impressed; with sharp radiating, somewhat crowded and occasionally minutely crenulated ridges; aperture rounded, parietal wall small, scarcely touching the renultima whorl; labrum slightly deflected, fuscous within; umbilicus deep. Diameter 23, height 9 mm.

Living: Oregon (Nuttall). British Columbia to Baja California.

PLANORBIS TUMENS Cpr.

Shell rapidly swelling, horn or reddish smoke-colored; whorls 4 or 5, with light waving striae; sutures deeply impressed; on one side subangulate or subcarinate near the suture, on the other rounded; umbilicus very deep; aperture with a sinuous edge, one side standing out above, flattened below, the other flattened above, produced below, capacious and rounded; labrum very thin. Diameter, 15, height 6.5 mm.

Living: Mazatlan; Baja California; San Francisco, Petaluma, and southern California.

PLANORBIS TUMIDUS Pfeiffer.

Shell opaque, pale horn colored or smoky, densely and finely striated, umbilicated above, slightly concave below; whorls 5, convex, subcarinated on each side, rapidly increasing, separated by a deep suture; aperture oblique, lunate rounded, somewhat kidney-shaped. Diameter 19, height 6 mm.

Living: Texas. Los Angeles, California. Nicaragua (T. Brydges). Guatemala.

CHAMA EXOGYRA Conr.

Conrad Phila ac J 1837, 256.

Living: Bodega bay, Calif. to Baja California. Mazatlan?

Quaternary: Santa Barbara to San Diego, Calif. Borrego springs, Colorado Desert (Orcutt). San Nicholas Island (S. Bowers).

CHLAMYDOCONCHA ORCUTTI Dall.**CHLOROSTOMA FUNEBRALE** A. Ad.**CHLOROSTOMA GALLINA** Fbs.**COCHLIOPA ROWELLII** Tryon.Shell depressed, wider than high, whorls $3\frac{1}{2}$, regularly convex, rapidly enlarging; spire small, slightly elevated, apex acute, sutures well marked; base convex, except that region around umbilicus is flattened and inclined toward the axis, its outer boundary marked thus by an angle; umbilicus small, very distinct; aperture half ovate, labrum well rounded, thin, labium slightly rounded, thickened, elevated from body whorl forming an acute angle with the labrum above, and not impinging on the umbilicus. Color yellowish-green. Operculum paucispiral. Height $2\frac{1}{2}$, larger diameter 4, smaller 3 mm.

Living: Clear lake, California? Panama?

COLUMBELLA CARINATA Hinds.**COLUMBELLA FUSCATA** Sby.**CONUS CALIFORNICUS** Hinds.**CORBULA LUTEOLA** Cpr.**CREPIDULA ADUNCA** Sby.**CREPIDULA NAVICELLOIDES** Nutt.**CREPIDULA RUGOSA** Nutt.**CRUCIBULUM SPINOSUM** Sby.**CRYPTOMYA CALIFORNICA** Conr.**CUMINGIA CALIFORNICA** Conr.**CYPRAEA SPADICEA** Gray.**DIPLODONTA ORBELLA** Gld.**DONAX CALIFORNICUS** Conr.**DONAX FLEXUOSUS** Gld.**DRILLA INERMIS** Cpr.**DRILLA MOESTA** Cpr.**FISSURELLA VOLCANO** Rve.**FLUMINICOLA FUSCA** Haldeman.

Globose, smooth, whorls 5, rapidly increasing, sutures very deeply impressed; aperture large, broadly ovate, columella thickened. Color horn to light greenish. Height 10, diameter 8.6 mm.

Living: Sacramento river, California. Green river, Utah. Oregon. Wyoming. Dakotas.

FLUMINICOLA HINDSI Baird.

Keop, West Coast shells, 63.

Living: Kootenai river, Montana.

FLUMINICOLA NUTTALLIANA Lea.

Keop, West Coast shells, 63, f 50.

Shell globosely turinate, thick, whorls 4 (apex generally eroded), convex, sutures well impressed; aperture large, widely ovate. Greenish, aperture blue within. Height 10, diameter 8.3 mm.

Living: British Columbia; Sacramento river, California.

FLUMINICOLA VIRENS Lea.

Keop, West Coast shells, 63.

Shell oval, thick, apex eroded, whorls 4 $\frac{1}{2}$ -5, moderately convex; aperture nar-

row-ovate. Bright green, bluish within. Height 10, diameter 6 mm.

Living: Oregon and northern California.

GADINIA RETICULATA Sby.**GNATHODON MENDICUS** Gould.

Living: Colorado estuary to Mazatlan, Mexico.

Quaternary: North of Carrizo creek, Colorado Desert.—Le Conte.

GUNDLACHIA CALIFORNICA Rowell.

Aperture suboval, obliquely expanded towards the left posteriorly rounded, and wider anteriorly. In the shell reaching forward about one-fifth the length of the shell, its margin slightly concave and oblique. Dorsal surface convex, becoming somewhat keel-shaped towards the apex, which is strongly and obliquely deflected so as to make the right border nearly a straight line, while the expansion on the left projects nearly as far back as the apex at an obtuse angle. Structure corneous, with strong concentric lines of growth and faint radiating striae. Color dark brown, opaque; inner surface shining and purplish, the plate white towards the edge, and in some specimens showing a thickened, white semicircular continuous with its margin across the arch of the shell. Length 4, width 2, altitude 1.5 mm.

Living: On stems of plants growing in stagnant ponds, California, often two or more on the back of another.

HALIOTIS CRACHERODII Leach.**HALIOTIS SPLENDENS** Rve.**HAMINEA VESICULA** Gld.**HAMINEA VIRESCENS** Sby.**HELIX LAEVIS** Pr.**HELIX NEWBERRYANA** Binn.**HELIX STEARNSIANA** Gabb.**HELIX TRASKII** Newc.**HELIX TUDICULATA** Binn.**HINNITES GIGANTEUS** Gray.**HIPPONYX ANTIQUATUS** Linn.**HIPPONYX TUMENS** Cpr.**IANTHINA BIFIDA** Totten.**LACUNA VARIEGATA** Cpr.**LAMELLARIA DIEGOENSIS** Dall.**LASEA OBLONGA** Cpr.

Mazatlan, Mexico.

LASEA RUBRA Mont.**LASEA TRIGONALIS** Cpr.

Mazatlan, Mexico.

LEPTON MEROEUM Cpr.

San Diego, California.

LEPTON UMBONATUM Cpr.

Mazatlan, Mexico.

LEPTOTHYRA BACULA Cpr.**LIMNAEA ADELINAE** Tryon.

Shell thin, semi-transparent, body whorl large, wide, convex; spire small, consisting of 5 convex volutions, attenuating rapidly to an acute apex, sutures impressed; inner lip thin, reflected, but not covering the umbilical fissure, which is narrow; columella twisted; color light horn, polished within the aperture, outer lip tinged with red within. Length 14, diameter 8.5 mm.

Living: San Francisco; San Diego (Orcutt), California. Tijuana, Baja California (Orcutt).

LIMNAEA BULMOIDES Lea.

Living: Upper Missouri river to Columbia river. San Diego, California.

LIMNAEA CAEPATA Say.

Living: New York; Massachusetts; Michigan; to Hudson bay, and northern California.

LIMNAEA EMARGINATA Say.

Shell ovate-convex, thin, translucent, smooth; lines of growth very fine; whorls 5, very convex, suture deep; apex acute when present; aperture wide, more than $\frac{1}{2}$ the length of shell; labium turned over, so as to form an umbilic; fold on columella obsolete; columellar depression deeply emarginate. Color light ochraceous.

Living: Maine; Lake Winnipeg; Washington?

LIMNAEA HUMILIS Say.

Living: Throughout the United States. Baja California (Orcutt).. Vancouver Island.

LIMNAEA LEPIDA Gould.

Living: Columbia river, to Antioch, California.

LIMNAEA PALUSTRIS Mueller.

Living: Circumboreal; Mountain lake, California; New Mexico.

LIMNAEA STAGNALIS L.

Living: Europe; Siberia; Ohio to Oregon; California.

LIODIUM ELATUM Sby.

LIODIUM SUBSTRATUM Conr.

LITORINA PLANAXIS Phil.

LITORINA SCUTULATA Gld.

LUCAPINA CRENULATA Sby.

LUCINA NUTTALLII Conr.

LUCINA CALIFORNICA Conr.

LUTRICOLA ALTA Conr.

LYONIA CALIFORNICA Conr.

MACOMA INDENTATA Cpr.

MACOMA INQUINATA Desh.

MACOMA SECTA Conr.

MACRON LIVIDUS A. Ad.

MANGILIA ANGULATA Cpr.

MARGINELLA REGULARIS Cpr.

MILNERIA MINIMA Dall.

MITRA MAURA Swains.

MITRAMORPHA FILOSA Cpr.

MODIOLA CAPAX Conr.

MONOCEROS ENGONATUM Conr.

MONOCEROS LUGUBRE Sby.

MONOCEROS PAVICILIRATUM Stearns.

MUREX TRIALATUS Sby.

MYTILUS BIFURCATUS Stearns.

MYTILUS CALIFORNIANUS Conr.

MYURELLA SIMPLEX Cpr.

NASSA FOSSATA Gld.

NASSA PERPINGUIS Hinds.

NASSA TEGULA Reeve.

NERITINA PICTA Sby.

Cooper, Cal ac pr 2d ser, 3:103.

Living: Guaymas (Orcutt). Todos Santos creek, Baja California (L. Belding).

NEVERITA RECLUZIANA Pett.

OCINEBRA GRACILLIMA Stearns.

OCINEBRA INTERFOSSA Cpr.

OCINEBRA POULSONII Nutt.

OCTOPUS PUNCTATUS Gabb.

ODOSTOMIA AEQUISCULPTA Cpr.

ODOSTOMIA INFLATA Cpr.

ODOSTOMIA NUCIFORMIS Cpr.

OLIVELLA BIPPLICATA Sby.

OLIVELLA BOETICA Cpr.

OMPHALIUS AUREOTINCTUS Fbs.

OMPHALIUS FUSCESCENS Phil.

OPALIA CRENATOIDES Cpr.

OSTREA HEERMANNI Conrad.

Miocene: Carrizo creek, Calif.

OSTREA LURIDA Cpr.

OSTREA TITAN Conrad.

Miocene: Carrizo creek, Calif.

OSTREA VESPERTINA Conrad.

Ovate-subfalcate; lower valve plaited or ribbed; hinge long and wide, sharp and somewhat pointed; ligament cavity wide, profound, minutely wrinkled; margins abrupt; cavity not very deep; muscular impressions large, impressed; upper valve flat, irregular; pallial impression crenulated.

Miocene: Carrizo creek, and near San Diego, California.

PECTEN AEQUISCULCATUS Cpr.

Living: Monterey, Calif. to Santo Domingo, Baja California (Orcutt).

Quaternary: San Diego, Calif. Borrego springs, Colorado Desert (Orcutt).

PECTEN DESERTI Conrad.

Miocene: Carrizo creek, Calif.

PECTEN MONOTIMERIS Conr.

PEDIPES UNISULCATUS Cpr.

PHASIANELLA COMPTA Gld.

PHYSA AMPULLACEA Gould.

Shell ovate-ventricose, shining, horn-colored; spire elevated, acute; whorls 6, last one inflated; suture decidedly impressed; aperture broadly ovate, five-sixths the length of the shell; lip thin, submargined with red; columella quite flexuous, covered with callus. Length 25, diameter 13 mm.

Living: Lake Oyosa, Washington; Oregon.

PHYSA DIAPHANA Tryon.

Cooper, Cal ac pr 2d ser, 3:103. Zoe 1:196.

PHYSA DISTINGUENDA Tryon.

Shell variable in outline, sometimes cylindrical, sometimes more inflated, lengthened; spire some longer than in *P. malleata*; whorls convex, suture well impressed; surface malleated, crowded with growth lines; aperture long, narrow, rather wider below; columella long, narrow, white, almost without fold, turned a little to the right below. Length 13 diameter 7 mm.

Living: Marysville, Stockton, San Diego, California. Tijuana, Baja California (Orcutt).

PHYSA GABBII Tryon.

Shell thin, closely striated by the lines of growth; body whorl inflated, its upper half flattened, so that the lip appears angulated in the middle; spire moderate, apex acute, whorls 6, convex, with distinct sutures. Color light corneous, very much polished within; lip margined with red. Length 25, diameter 13 mm.

Keep, West Coast shells, 119.

Living: Mountain lake; Santa Ana river, California. Baja California.

PHYSA HUMEROSA Gld.

Shell subrhomboidal, solid, smooth and white; spire acute; whorls 5, tabulated; aperture one-half to two-thirds length of shell, rounded posteriorly; labrum expanded; columella scarcely plicate, callus hardly perforate. Length 15, diameter 9 mm.

Living: Colorado river; Pyramid lake, Nevada; Pecos river, Texas.

Quaternary: Near Carson, Nevada. Very abundant on the Colorado Desert in a "semi-silicified" condition.

Virtually only a distorted form of *P. heterostropha*; evidently the same form occurs living in the Dos Palmas springs, Colorado Desert.

PHYSA LORDI Baird.

Shell thin, corneous, tumid, gibbous, aperture large, outer lip acute; external surface very minutely decussated; whorls 6 first 2 minute, tinged with black, the last swollen, 4 times the size of the others. Length 19-25, diameter 12-18 mm.

Living: Lake Osoyoos, British Columbia. Washington. Humboldt lake Nevada.

PHYSA TRASKII Lea.

Shell very much inflated, somewhat oblique striate, semi-transparent, very thin, pale chestnut color; spire somewhat produced, pointed at the apex; sutures impressed; whorls 6, the last one very large and very much inflated; aperture broadly expanded; outer lip acute, and within the margin brown-banded; columella with a large fold. Length 9, diameter 13 mm. Los Angeles river, California.

PHYSA VIRGATA Gould.

Shell moderate, solid, smooth, ovate-ovate, ash-colored with longitudinal olivaceous stripes; spire elevated, acute; whorls 4-5, well separated; aperture lunata, two-thirds the length of shell; columella moderately folded, with a heavy callus within yellowish red. Length 10, diameter 6 mm.

Living: Gila river, Arizona (T. H. Webb). Los Angeles and San Diego, California.

PISIDIUM OCCIDENTALE Newc.

Serra Laguna, Baja California. Cooper, Cal ac pr 2d ser, 3:217. Zoe 1:197.

PLANORBIS VERMICULARIS Gould.

Shell dome-shaped, minutely striated by growth, whorls 4, the last one detected near the aperture, rounded at periphery, tip depressed, suture very deep, the whorls sloping towards it; base cup-shaped, exhibiting all the whorls. Aperture exhibiting a very oblique section of a cylinder; lip embracing about 1/2 the height of the last whorl and joined by callus. Height 1.6, diameter 5 mm.

Living: Oregon; California; Baja California (Orcutt).

PLATYDON CANCELLATA Conr.

POMAULEX UNDOSUS Wood.

Living: Santa Barbara, Calif. to Cape San Lucas.

Quaternary: Santa Barbara, Calif. to San Quintin, Baja California. Borrego springs, Colorado Desert (Orcutt).

POMPHOLYX EFFUSA Lea.

Shell roundly gibbous, rather thin, effuse, reddish horn-colored or greenish, whorls 5, flattened above, concave below; aperture subrotund, dilated, white within. Length 6, diameter 8 mm.

Keep, West Coast shells, 116, f 103.

Living: Pitt river, Modoc county, to Lake Tahoe, California. Pyramid lake, White Pine, Nevada (Henry Hemphill).

POMPHOLYX SOLIDA Dall.

Living: Fish Springs, Owens river valley, California.

PTERONOTUS FESTIVUS Hinds.

PUPA ORCUTTII Pils.

PUPA STERKIANA Pils.

PURPURA SAXICOLA Val.

RANELLA CALIFORNICA Hinds.

Hinds. Ann Nat Hist 11:255 (1843); Zool. Survur 12, t 2, f 4, 5.

Keep, West coast shells, 44, f 24.

Living: Monterey, Calif. to Santo Domingo, Baja California (Orcutt).

Quaternary: Dead Man's Island, San Pedro, Calif. (S. Bowers). Borrego springs, Colorado Desert (Orcutt).

SCALARIA BELLASTRIATA Cpr.

SCALARIA HINDSII Cpr.

ella impressed in the middle and fur-

SCALARIA INDIANORUM Cpr.

SEPTIFER BIFURCATUS Rve.

SIPHONALIA KELLETTII Fbs.

SOLECARDIA EBURNEA Conrad.

Conrad Phila ac pr 4: 155 (1849). Phila ac J 21: 273 t 39 f 1 (1850).

Dall, U S Na Mu pr 21: 879, 884.

Scintille, cumingi Deshayes, 1853.

Cape San Lucas to Panama.

SOLECURTUS CALIFORNIANUS Conr.

SOLEN ROSACEUS Gld.

TELLINA BIMACULATA Linn.

TELLINA GOULDII Hani.

TELLINA VARIEGATA Cpr.

TIVELA CRASSATELLOIDES Conr.

Living: Santa Cruz, Calif. to Santa Domingo, Baja California (Orcutt).

Quaternary: Santa Barbara, Calif. to San Quintin, Baja California (Orcutt). Borrego springs, Colorado Desert (Orcutt).

TRIVIA CALIFORNICA Gray.

TRIVIA SOLANDRI Gray.

TRUNCATELLA STIMPSONII Stearns

TRYONIA CLATHRATA Stimpson.

Shell elongated, narrow; apex of spire acute; sutures deeply impressed; whorls 3, with generally about 12 longitudinal ribs crossing them, sometimes crossed by revolving striae or ridges, and angulated in the middle; aperture rounded oval, very small; diameter, 1.5; altitude 5 mm.

Quaternary: Dry lake, Colorado Desert.

TURBONILLA AURANTIA Cpr.
TURBONILLA TORQUATA Gld.
VALVATA VIRENS Tryon.
 Shell turritiform, of 4 well-rounded whorls; spire elevated, apex acute, sutures deeply indented, periphery almost angulated; umbilicus very wide; aperture oval or nearly round, the peristome merely toiling the body above. Surface closely striate. Color brilliant to dark green. Height 5, diameter 5 mm.
 Living: Clear lake, California. Utah lake.

VENUS FLUCTIFRAGA Sby.
VENUS SIMILLIMA Sby.
 Living: Monterey, Calif. to Santo Domingo, Baja California (Orcutt).
 Quaternary: Santa Barbara, Calif. to San Quintin, Baja California (Orcutt). Borrego springs, Colorado Desert (Orcutt).
VENUS SUCCINCTA Val.
VOLVARINA VARIA Sby.
CEROSTOMA NUTTALLII Conr.

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