

REPORTS

OF

EXPLORATIONS AND SURVEYS,

TO

ASCERTAIN THE MOST PRACTICABLE AND ECONOMICAL ROUTE FOR A RAILROAD

FROM THE

MISSISSIPPI RIVER TO THE PACIFIC OCEAN

MADE UNDER THE DIRECTION OF THE SECRETARY OF WAR, IN

1853-4,

ACCORDING TO ACTS OF CONGRESS OF MARCH 3, 1853, MAY 31, 1854, AND AUGUST 5, 1854.

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ARTICLE II.

DESCRIPTIONS OF THE FOSSIL SHELLS.¹

BY T. A. CONRAD.

PHILADELPHIA, PA., *January*, 1855.

SIR: I have examined the very interesting organic remains which you collected in California, and the drawings of such species as were too fragile to preserve, and I herein submit a few remarks upon their geological relations. There appear to be several distinct groups; but I cannot pretend, from such scanty materials, to designate what particular formation every group represents. There is no obscurity resting on the deposits of Santa Barbara and San Pedro, which represent a recent formation, in which you inform me the remains of the mammoth occur. The shells are generally those which live in the adjacent waters, and indicate little, if any, change of temperature since their deposition. The littoral character of this formation is very evident. Water-worn shells and fragments show the action of the surf, whilst entire specimens of bivalves, and Pholadidæ, and Saxicavæ, remaining undisturbed in their self-excavated domicils, exhibit the same disposition of marine shells that is familiar to the observer on all sandy and argillaceous shores. They burrow in clay, mud, or sand, beyond the ordinary action of the surf; whilst some are scooped out by the tempest-driven surge, and others preyed upon by fishes and marine animals of various kinds, and are thus broken up and deposited among the living species.

Of the Eocene, and the recent formation alluded to, I can speak with confidence; but the intermediate beds are of uncertain age. The *Ostrea vespertina*, *Anomia subcostata*, and *Pecten deserti*, occurring in the bank of Carrizo creek, are unlike any recent forms that I am acquainted with from the Pacific coast, but analagous to Miocene species of Virginia. This formation may, therefore, be regarded as of Miocene origin—an opinion in which I am confirmed by some fossils collected in California by Dr. Heermann, consisting of decidedly Miocene forms; a *Mercenaria*, (*M. perlaminosa*,) Con., scarcely differing from a species of Cumberland county, N. J., (*M. Ducateli*, Con.) a *Cemoria*, *Pandora*, and *Cardita* of extinct species, closely analogous to Miocene forms. I am inclined, also, to refer to this period a very different group from Ocoya creek, the forms of which you sketched in California, as the specimens were too friable to be preserved. I do not recognise any recent species among them, nor any contained in an Eocene deposit.

The rock at San Diego is replete with shells, generally of a small size, and appears to have a certain palæontological relation to those of Monterey, Carmello, and those in boulder specimens of Oregon, collected by Townsend and Dana, which I have referred to the Miocene period. Two species of San Diego, if not identical, approach Oregon shells; *Nucula decisa* is similar to *N.*

¹ These descriptions were published in 1855. See the Appendix to the Preliminary Geological Report, 8vo; Washington, 1855.

divaricata, and both, in their markings, resemble *N. cobboldii* of the English Miocene. *Maetra Diegoana* is nearly related to the Oregon *M. albaria*.

The Eocene period is unequivocally represented by the beautifully perfect shells from the Cañada de las Uvas, which, though not found in situ, are evidently derived from strata occurring on the Pacific slope of the Sierra Nevada. This is very remarkable, inasmuch as three species correspond with forms of Claiborne, Alabama, and seem to indicate a connexion of the Atlantic and Pacific oceans during the Eocene period. The vast distance between the two localities will account for the general distinction of species, and it was, indeed, an unexpected result to find any identical. If I had imagined any eastern species to occur in California, it would have been the very one which does occur, and, apparently, in abundance, that "finger-post" of the Eocene, *Cardita planicosta*, a fossil of the Paris basin, and also abundant in Maryland, Virginia, and Alabama. This species originated and perished in the Eocene period, and is so widely distributed that it may be regarded as the most characteristic fossil of its era. As the boulder from which these shells were derived was quite small, and yet furnished thirteen species, when it shall be investigated in situ, doubtless a great many other forms will be obtained, and very likely some with which we are already familiar in eastern localities. Although the rock is a very hard sandstone, the shells may be exposed in great perfection by careful management, and we look forward with great interest to their further development, and to the discovery of the rock in situ.

Respectfully, yours, &c.,

T. A. CONRAD.

WM. P. BLAKE, *Geologist of the United States*
Pacific Railroad Survey in California.

CATALOGUE.

I. EOCENE.

No.	Name.	Locality.
1	<i>Cardium linteum</i> , (nova species.) Con.....	Cañada de las Uvas
2	<i>Dosinia alta</i> , (nov. sp.) Con.....	do.....
3	<i>Meretrix Uvasana</i> , (nov. sp.) Con.....	do.....
4	————— <i>Californiana</i> , (nov. sp.) Con.....	do.....
5	<i>Crassatella Uvasana</i> , (nov. sp.) Con.....	do.....
6	————— <i>alta</i> , Con.....	do.....
7	<i>Mytilus humerus</i> , (nov. sp.) Con.....	do.....
8	<i>Cardita planicosta</i>	do.....
9	<i>Natica ætites</i> . Con.....	do.....
10	————— <i>gibbosa</i> . Lea.....	do.....
11	————— <i>alveata</i>	do.....
12	<i>Turritella Uvasana</i> , (nov. sp.) Con.....	do.....
13	<i>Volutatithes Californiana</i> , (nov. sp.) Con.....	do.....
14	<i>Busycon</i> ? <i>Blakei</i> . (nov. sp.) Con.....	do.....
15	<i>Clavatula Californica</i> , (nov. sp.) Con.....	do.....

CATALOGUE—Continued.

II. MIOCENE AND RECENT FORMATIONS.

No.	Name.	Locality.
16	<i>Cardium modestum</i> , (nov. sp.) Con.....	San Diego
17	<i>Nucula decisa</i> , (nov. sp.) Con.....	.....do.....
18	<i>Corbula Diegoana</i> , (nov. sp.) Con.....	.....do.....
19	<i>Meretrix uniomeris</i> , (nov. sp.) Con.....	Monterey county
20	——— <i>decisa</i> , (nov. sp.) Con.....	Ocoya creek
21	——— <i>Tularena</i> , (nov. sp.) Con.....	Tulare valley
22	<i>Tellina Diegoana</i> , (nov. sp.) Con.....	San Diego
23	——— <i>congesta</i> , (nov. sp.) Con.....	Monterey, Carmello, and San Diego..
24	——— <i>Pedroana</i> , (nov. sp.) Con.....	San Pedro
25	<i>Arca microdonta</i> , (nov. sp.) Con.....	Tulare valley?
26	<i>Tapes diversum</i>	San Pedro
27	<i>Saxicava abrupta</i> , (nov. sp.) Con.....	.....do.....
28	<i>Petricola Pedroana</i> , (nov. sp.) Con.....	.....do.....
29	<i>Schizothorus Nutalli</i> , (nov. sp.) Con.....	.....do.....
30	<i>Lutraria Traskei</i> , (nov. sp.) Con.....	Carmello
31	<i>Mactra Diegoana</i> , (nov. sp.) Con.....	San Diego
32	<i>Modiola contracta</i> , (nov. sp.) Con.....	Monterey county
33	<i>Mytilus Pedroanus</i> , (nov. sp.) Con.....	San Pedro
34	<i>Pecten Deserti</i> , (nov. sp.) Con.....	Colorado desert.....
35	<i>Anomia subcostata</i> , (nov. sp.) Con.....	.....do.....
36	<i>Ostrea vespertina</i> , (nov. sp.) Con.....	.....do.....
37	——— <i>Heermanni</i> , (nov. sp.) Con.....	.....do.....
38	<i>Penitella spelæa</i> , (nov. sp.) Con.....	San Pedro, (recent.).....
39	<i>Fissurella crenulata</i> . Sow.....	.....do.....
40	<i>Crepidula princeps</i> , (nov. sp.) Con.....	Santa Barbara.....
41	<i>Narica Diegoana</i> , (nov. sp.) Con.....	San Diego
42	<i>Trochita Diegoana</i> , (nov. sp.) Con.....	.....do.....
43	<i>Crucibulum spinosum</i> , (nov. sp.) Con.....	.....do.....
44	<i>Nassa interstriata</i> , (nov. sp.) Con.....	San Pedro.....
45	——— <i>Pedroana</i> , (nov. sp.) Con.....	.....do.....
46	<i>Strephona Pedroana</i> , (nov. sp.) Con.....	.....do.....
47	<i>Littorina Pedroana</i> , (nov. sp.) Con.....	.....do.....
48	<i>Stramonita petrosa</i> , (nov. sp.) Con.....	Tulare valley
49	<i>Gratelupia mactropsis</i> , (nov. sp.) Con.....	Isthmus of Darien
50	<i>Meretrix Dariena</i> , (nov. sp.) Con.....	.....do.....
51	<i>Tellina Dariena</i> , (nov. sp.) Con.....	.....do.....
52	<i>Natica Ocoyana</i> , (nov. sp.) Con.....	Ocoya or Posè creek.....
53	——— <i>geniculata</i> , (nov. sp.) Con.....	.....do.....
54	<i>Bulla jugularis</i> , (nov. sp.) Con.....	.....do.....
55	<i>Pleurotoma transmontana</i> , (nov. sp.) Con.....	.....do.....
56	——— <i>Ocoyana</i> , (nov. sp.) Con.....	.....do.....
57	<i>Syctopus Ocoyanus</i> , (nov. sp.) Con.....	.....do.....
58	<i>Turritella Ocoyana</i> , (nov. sp.) Con.....	.....do.....
59	<i>Colus arctatus</i> , (nov. sp.) Con.....	.....do.....
60	<i>Tellina Ocoyana</i> , (nov. sp.) Con.....	.....do.....
61	<i>Pecten Nevadaanus</i> , (nov. sp.) Con.....	.....do.....

CATALOGUE—Continued.

No.	Name.	Locality.
62	—— catilliformis, (nov. sp.) Con.....	Ocoya or Posé creek
63	Cardium —— ?	do
64	Arca —— ?	do
65	Solen —— ?	do
66	Dosinia —— ?	do
67	Venus —— ?	do
68	Cytherea decisa ? Con.....	do
69	Ostrea —— ?	San Fernando.....
70	Pecten —— ?	do
71	Turritella biseriata, (nov. sp. ?) Con.....	do
72	Trochus —— ?	Benicia
73	Turritella —— ?	do
74	Buccinum interstriatum ?	San Pedro
75	Anodonta Californiensis. Lea.....	Colorado desert

DESCRIPTIONS OF FOSSIL SHELLS FROM THE EOCENE AND MIOCENE FORMATIONS OF CALIFORNIA.

I. EOCENE.

CARDIUM, *Lin.*

1. *C. LINTEUM*, Conrad, Pl. II, fig. 1.—Cordate, ventricose subequilateral, with closely arranged radiating lines, umbonal slope subcarinated; posterior submargin with closely arranged smooth striæ, fine, but much larger than those of the disk.

Locality.—Cañada de las Uvas. Allied to *C. Nicolleti*, Con., but very distinct.

DOSINIA, *Scopoli.*

2. *D. ALTA*, Con., Pl. II, fig. 2.—Elevated equilateral? posterior side short; disk with fine closely arranged concentric lines, becoming large towards the base; posterior extremity obtuse, direct.

Locality.—Cañada de las Uvas, with the preceding.

MEBETRIX, *Lam.* CYTHEREA, *Lam.*

3. *M. UVASANA*, Con. Pl. II, fig. 3.—Suboval convex, inequilateral, margins rounded; beaks distant from anterior margin; disk with concentric, rather distant ribs, which were probably laminiform when perfect.

Locality.—Cañada de las Uvas.

There is but one broken valve of this species, in hard sandstone and with the ribs broken off.

4. *M. CALIFORNIANA*, Con., Pl. II, fig. 4.—Subcordate, ventricose, inequilateral; posterior extremity truncated somewhat obliquely inwards; basil margin nearly straight in the middle; lunule lanceolate; anterior extremity acutely rounded.

Locality.—Occurs at the Cañada de las Uvas, with the preceding species. Allied to *M. Poulsoni*, Con.

CRASSATELLA, *Lam.*

5. *C. UVASANA*, Con., Pl. II, fig. 5.—Subtriangular, compressed, concentrically sulcated above,

Locality.—Occurs with the preceding, in Cañada de las Uvas.

This species is allied to *T. obruta*, Conrad, (*T. lineata*, Lea.) but that Claiborne shell differs in having fewer revolving lines, and in being indented at the suture.

VOLUTATITHEE, *Sucina*.

13. v. CALIFORNIANA, Con., Pl. II, fig. 9.—Resembles *V. Sayana*, Con., but smaller, having numerous rounded tubercles instead of the comparatively few spiniform ones of the latter. The tubercles are somewhat oblique; base with rather distant impressed lines.

Locality.—Cañada de las Uvas, with the preceding.

BUSYCON?

14. B.? BLAKEI, Con., Pl. II, fig. 13.—Fusiform, body whorl bicarinated; shoulder profoundly tuberculated; tubercles acute, transversely compressed; lower angle distant, entire. Surface covered with rather fine unequal or alternated wrinkled lines; upper side of the whorls flattened and sloping; whorls of the spire angulated and tuberculated in the middle.

Locality.—Cañada de las Uvas, with the preceding.

The beak of this shell being broken, its form and length are uncertain, and the aperture being concealed in the rock, the generic character can only be inferred from the contour of the shell. This corresponds with *Busycon*, except in the biangular form of the body whorl, in which respect it differs from any undoubted species that I have seen.

CLAVATULA? *Sucina*.

15. c.? CALIFORNICA, Con., Pl. II, fig. 11.—Fusiform; spire conical, volutions rounded, somewhat flattened above; body whorl ventricose; beak short and narrow.

Locality.—Cañada de las Uvas, with the preceding. Allied to *C. proruta*, Con., of the Claiborne Eocene, but proportionably narrower.

II. FOSSILS OF THE MIOCENE AND RECENT FORMATIONS OF CALIFORNIA.

CARDIUM, *Lin.*

16. c. MODESTUM, Con., Pl. III, fig. 15.—Very small; ribs about 22, narrow; concentric wrinkled lines on the disk; posterior margin direct, truncated; umbonal slope angular; ligament margin parallel with the basal, and forming nearly a right angle with the posterior margin.

Locality.—San Diego Mission.

NUCULA, *Lam.*

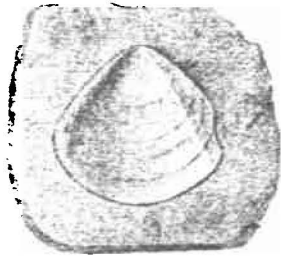
17. n. DECISA, Con., Pl. III, fig. 19.—Suboval or sub-rhomboidal, posterior margin obliquely truncated; disk with devaricating striæ.

Locality.—San Diego, with the preceding.

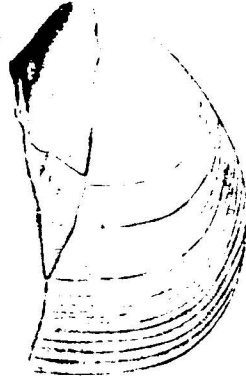
This species resembles, in its divaricating striæ, *N. divaricata*, of the Oregon Miocene; but the lines are proportionally larger, and the shell is smaller and different in outline.

CORBULA.

18. c. DIEGOANA, Con., Pl. III, fig. 16.—Triangular, ventricose, inequilateral, extremities subangulated; anterior margin very oblique, rectilinear; posterior margin forming with the



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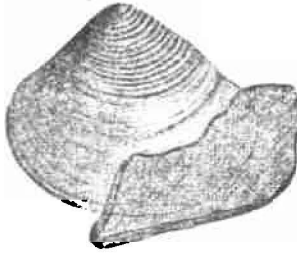
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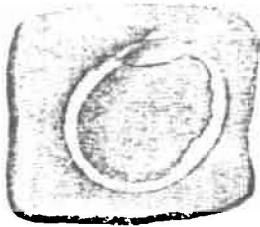
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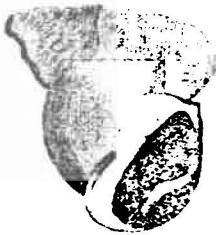
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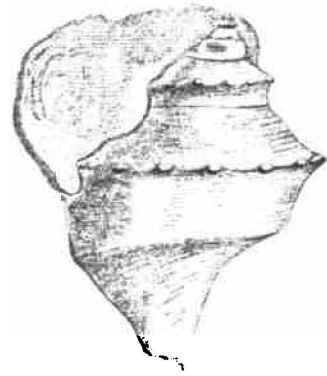
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