

The principal synonymy and characters of *A. heloisæ* are as follows:—

ATTHIS HELOISÆ.

Ornismya heloisæ, LESS. & DELATTE, Rev. Zool. 1839, 15 (Jalapa and Quatepu, S. E. Mexico).

Mellisuga heloisæ, GRAY, Gen. B. i, 1849, 113, sp. 62.

Tryphæna heloisæ, BONAP., Rev. et Mag. Zool. 1854, 257.

Selasphorus heloisæ, GOULD, Monog. Trochilid. iii, 1852, pl. 141.

Atthis heloisæ, REICHENB., J. f. O. 1853, App., 12.—GOULD, Introd. Trochilid. 8vo ed. 1861, 89.—ELLIOT, Illustr. Am. B. i, 1869, pl. —.—COOPER, Orn. Cal. i, 1870, 361 (El Paso, Texas; Mexico).—B. B. & R., Hist. N. Am. B. ii, 1874, 465, pl. 47, fig. 6 (El Paso, Texas; Mexico).

Specific Characters.—*Adult male*:—Outer primary very narrow, the end abruptly attenuated. Gorget violet-purple, with changeable tints in varying lights. Jugulum wholly white; middle of the abdomen white; sides light rufous, slightly glossed with golden-green; crissum white, tinged with light rufous. Upper parts metallic golden-green, more bronzy than in *A. ellioti*. Tail with the basal half (approximately) clear cinnamon-rufous, the subterminal portion black, with the three outer feathers (on each side) tipped with rusty-white; middle pair of feathers glossed with golden-green on the upper surface to the extreme tip. Wings uniform dusky, the smaller coverts golden-green. Wing, 1.30–1.50; tail, 0.95–0.10; culmen, 0.48–0.50.

Of the three adult males of *A. heloisæ* now before me, the two from Jalapa are much alike; but that in my own collection, which is evidently from another part of Mexico, although, unfortunately, the precise locality is not stated on the label, differs in several very noticeable particulars. The bill is very much more slender, the wing shorter (about 1.30, instead of 1.50), and the general size decidedly less. What is most conspicuous, however, is the fact that the lateral feathers of the gorget are not elongated as in the Jalapa specimens, in which they are 0.25 to 0.30 of an inch longer than the longest feathers of the middle portion, while there is a mixture of bluish-violet in the gorget not observable in the other specimens. It is barely possible that the longer lateral plumes of the gorget have been lost from this specimen; but in any event, the differences are quite sufficient to characterize a well-marked local race.

JANUARY 29, 1878.

FOSSIL MOLLUSKS FROM LATER TERTIARIES OF CALIFORNIA.

By W. H. DALL.

The National Museum has recently received from Mr. Henry Hemplill a series of fossil shells collected by him from the later Tertiary deposits of the Californian coast. Some of them are from the vicinity of Santa Barbara, but the majority are from San Diego, part of them

(marked *w* in the list) from the material obtained in sinking a well* at a distance of from ninety to one hundred and sixty feet below the surface of the earth, and not far from the present sea-level. The matrix is usually rather soft, composed of loosely aggregated grains of sand or fine sandy mud, occasionally hardened by infiltration of lime-bearing water.

In the accompanying list, those species found living (R) at the present day in the fauna of the Californian coast, between San Francisco and San Diego, are marked L, those at present making part of the northern or Oregonian fauna N, and those belonging to the fauna of Lower California, the Gulf of California, Mexico, and Central America are marked S. The extinct species (F) form a very small proportion of the whole, as will be readily seen.

7907	<i>Laqus californicus</i> (Koch) Dall	San Diego.	R	N, L
8	<i>Pholadidea oroides</i> Gld.	"	R	N, L
9	<i>Corbula luteola</i> Cpr.	"	R	L
7910	<i>Periploma argentaria</i> Conr	"	R	L, S
1	<i>Solecurtus californianus</i> Conr	"	R	L, S
2	<i>Macoma secta</i> Conr	"	R	L
3	<i>Macoma indentata</i> Cpr	"	R	L
4	<i>Macoma nasuta</i> Conr	"	R	N, L
5	<i>Macoma</i> (like) <i>sabulosa</i> Spengler	"	R	N
6	<i>Tellina modesta</i> Cpr.	"	R	L
7	<i>Tellina Bodegensis</i> Hds	"	R	L
8	<i>Cuningia californica</i> Conr	"	R	L
9	<i>Donax sternosus</i> Gld.	"	R	L, S
7920	<i>Mactra californica</i> Conr	"	R	L
1	<i>Mactra falcata</i> Gld	"	R	N, L?
2	<i>Clementia subdiaphana</i> Cpr	"	R	N, L
3	<i>Chione simillima</i> Sby.	"	R	L, S
4	<i>Chione succincta</i> Val	"	R	L, S
5	<i>Dosinia ponderosa</i> Gray	"	R	S
6	<i>Tapes staminea</i> Conr.	"	R	N, L
7	<i>Saxidomus aratus</i> (jun.) Gld.	"	R	L
8	<i>Petricola pholadiformis?</i> Lam	"	R	.
9	<i>Cardium procerum</i> Sby	"	R	S
7930	<i>Venericardia monilicosta</i> Gabb	" w.	R	L
1	<i>Venericardia monilicosta</i> Gabb	Santa Barbara.	R	L
2	<i>Lucina Nuttallii</i> Conr	San Diego.	R	L
3	<i>Lucina acutilineata</i> Conr	"	R	N, L
4	<i>Arca microdonta</i> Conr	" w.	F	.
5	<i>Arinea profunda</i> Dall, n. s.	"	F	.
6	<i>Nucula crigua</i> Sby	"	R	S
7	<i>Leda calata</i> Hds.	" w.	R	L, S
8	<i>Pecten islandicus</i> Mull	"	R	N
9	<i>Pecten hericeus</i> Gld	"	R	N
7940	<i>Pecten ventricosus</i> Sby. (var. ?)	"	R	S
1	<i>Pecten expansus</i> Dall, n. s.	"	F	.
2	<i>Pecten Stearnsii</i> Dall, n. s.	"	F	.
3	<i>Pecten Hemphillii</i> Dall, n. s.	"	F	.
4	<i>Pecten ? aquisulcatus</i> Cpr. var	"	R	L, S
5	<i>Pecten ? paucicostatus</i> Cpr. jun.	"	R	L, S
6	<i>Janira dentata</i> Sby	" w.	R	L, S
7	<i>Ostrea lurida</i> Cpr.	"	R	N, L
8	<i>Ostrea Veatchii</i> Gabb	"	F	.
9	<i>Anomia limatula</i> Dall, n. s.	"	F	.
7350	<i>Rhectaris punctocalata</i> (Cpr.) Dall.	"	R	L
1	<i>Tornatina crealis</i> Gld.	"	R	N, L
2	<i>Tornatina eximia ?</i> Baird	"	R	N

* A list of species obtained from this well, with descriptions of new species, was published by me in the Proc. Cal. Acad. Sci., v, pp. 296-299, 1874.

7953	<i>Cylichna alba</i> Brown	San Diego. w.	R	N, L?
4	<i>Volvula cylindrica</i> Cpr	"	R	L
5	<i>Melampus olivaceus</i> Cpr	"	R	L
6	<i>Dentalium hexagonum</i> Sby	"	R	S, L?
7	<i>Cadulus fusiformis</i> ? Phil.	"	?	.
8	<i>Acmava mitra</i> Esch.	"	R	N, L
9	<i>Acmava insessa</i> Hds	"	R	N, L
7960	<i>Fissurella volcano</i> ? Reeve	"	R	L
1	<i>Fissurellidea callomarginata</i> Cpr	"	R	L
2	<i>Chlorostoma Pfeifferi</i> Phil	"	R	L
3	? <i>Vitrinella</i> sp. ind.	"	?	S
4	<i>Crucibulum spinosum</i> Sby	"	R	L, S
5	<i>Crepidula princeps</i> Conr	" w.	R?	N
6	<i>Crepidula adunca</i> Sby	"	R	L
7	<i>Serpentorbis squamigerus</i> Cpr	"	R	L, S
8	<i>Turritella Cooperi</i> Cpr. var	" w.	R	L
9	<i>Ceritheda sacrata</i> Gld	"	R	L
7970	<i>Bittium quadrifidatum</i> Cpr	Santa Barbara.	R	L
1	<i>Bittium asperum</i> Cpr	"	R	L
2	<i>Litorina scutulata</i> Gld.	San Diego.	R	N, L
3	<i>Lacuna rincta</i> Mont.	Santa Barbara.	R	N
4	<i>Lacuna solidula</i> Lovén	San Diego.	R	N
5	<i>Rissoina</i> (like) <i>Woodwardi</i> Cpr	"	R	S
6	<i>Myurella simplex</i> Cpr	"	R	L, S
7	<i>Drillia penicillata</i> Cpr	"	R	L, S
8	<i>Drillia Hemphillii</i> Stearns.	"	R	S
9	<i>Surcula Carpenteriana</i> Gabb	"	R	L
7980	<i>Mangelia angulata</i> Cpr.	"	R	L
1	<i>Conus californicus</i> Hds	"	R	L
2	<i>Odostomia gravida</i> Cpr	"	R	L
3	<i>Turbonilla styliana</i> ? Cpr.	" w.	R	L
4	<i>Turbonilla chocolata</i> Cpr.	"	R	L, N?
5	<i>Turbonilla virgo</i> ? Cpr	"	R	L
6	<i>Turbonilla torquata</i> ? Cpr.	"	R	L
7	<i>Eulima micans</i> Cpr	"	R	L
8	<i>Scalaria indianorum</i> Cpr	"	R	L
9	<i>Scalaria indianorum</i> var.	"	R	L
7990	<i>Scalaria tincta</i> Cpr	"	R	L
1	<i>Scalaria Hemphillii</i> Dall, n. s.	"	F	.
2	<i>Opulia anomala</i> Stearns.	"	F	.
3	<i>Opalia varicostata</i> Stearns.	"	F	.
4	<i>Cerithiopsis assimilata</i> Cpr.	"	R	L
5	<i>Cancellaria</i>	" w.	.	.
6	<i>Cancellaria</i>	" w.	.	.
7	<i>Neverita Recluziana</i> Petit	"	.	L, S
8	<i>Neverita Recluziana</i> var. <i>alta</i> Dall	"	R	L
9	<i>Mamma nana</i> Möller (Fos. Japan Tert.)	"	R	N
8000	<i>Rauella muriciformis</i> Brod. var.	"	R	S
1	<i>Mitra maura</i> Swains	"	R	L, S
2	<i>Olivella biplicata</i> Sby	"	R	L
3	<i>Olivella boetica</i> Cpr	"	R	N, L
4	<i>Nassa fossata</i> Gld	"	R	L
5	<i>Nassa fossata</i> var	"	R	L
6	<i>Nassa perpinguis</i> Hds	"	R	L, S
7	<i>Nassa tegula</i> Rvo	"	R	L, S
8	<i>Nassa mendica</i> Gld.	" w.	R	N, L
9	<i>Astyris gonsapata</i> Gld. vars	Santa Barbara.	R	L
8010	<i>Nitidella Gouldii</i> Cpr	San Diego.	R	N, L
1	<i>Amphissa versicolor</i> Dall	"	R	L
2	<i>Amphissa versicolor</i> Dall	Santa Barbara.	R	L
3	<i>Monoceros cugonatum</i> Conr	San Diego.	R	L
4	<i>Cerostoma Nuttallii</i> Conr	"	R	L
5	<i>Pteronotus festinus</i> Hinds	"	R	L
6	<i>Trophon</i> (<i>orpheus</i> jun. ?)	Santa Barbara.	R	N, L
7	<i>Porpura crispata</i> Chemn	San Diego.	R	N, L
8	<i>Fusus Harfordi</i> Stearns	"	R	N, L?
9	<i>Serpula</i> sp. indet	"	?	.
8020	Fish-teeth, one species, indet	"	?	.

This, it will be observed, contains one hundred and seven well determined species, omitting several doubtful ones, of which ten are extinct and ninety-seven still found recent. Of these recent or still existing forms, twenty are found in the Californian fauna and northward at the present time. Eighteen more are found in the Californian fauna and southward, while forty-four are strictly Californian. Besides these, there are eight species belonging to the Oregonian or Arctic fauna, and no longer found living in the Californian region. Seven more are found on the west coast of Mexico, the Gulf of California, or Western Middle America, and, so far as known, no longer in the Californian region. One or two species are still found living in Atlantic seas, but not on the western shores of America. How far these peculiarities of distribution may be explained by a restriction of their geographical range in modern times by some species, or by the association of fossils in one collection from beds of differing age, and consequently exhibiting the fluctuation of the northern and southern faunæ based on varying temperatures of the sea, will be determined only by a most critical stratigraphical study of the localities.

But in either case the problem is well worthy of solution. The very modern character of the beds is determined by the great majority of the species being still found living, and by the fact that some of them retain very evident traces of their original coloration. They are mostly in excellent preservation. The well fossils taken with those mentioned on p. 3 would give a vertical range of some six hundred feet for the Pliocene Tertiary beds of California.

The species which appear to be new are as follows:—

Axinea profunda, n. s. (7935).

Shell subtriangular, ventral margin rounded, umbos erect, rather small. Area narrow, deep; marked by five or six lines meeting at an angle in the vertical of the umbo, one above another; anterior lines somewhat the shortest; exterior marked by twenty-five or thirty flattened ribs, separated by deep channels one-fourth as wide as the ribs, and by which the interior margin is crenulated. The ribs are crossed by thread-like close lines of growth, which may be elevated or obsolete on the ribs, but are sharply defined in the channels, which they partially fill up in some specimens. Toward the anterior and posterior margins, the sculpture is nearly obsolete. In eroded examples, this sculpture may be entirely altered, and such are hardly recognizable as the same thing. Interior smooth or lightly radiately striate, with a tendency to an elevated narrow ridge behind the anterior scar; hinge with teeth placed as if radiating from the centre of the valve, six to nine anteriorly, and ten to fourteen posteriorly, with some ten or twelve small, crowded teeth between the two radiating sets, and placed perpendicularly and parallel with one another. Height, 32^{mm}; length, 30^{mm}; thickness, 20^{mm}; the last proportionally greater in the young.

This species differs in its sculpture from any of the recent species ascribed to the coast, and from *A. barbarensis* Conr. (Pliocene foss.) by its shorter, more elevated, and deeper form, as well as by details of sculpture.

Pecten expansus, n. s. (7941).

Shell large, thin, with the upper valve flatter than the lower one, both with very slight convexity; outer surface of upper valves marked by sixteen to twenty sharp, radiating ridges, but slightly elevated, and whose sides shade off inseparably into the broad interspaces, which are but slightly depressed; faint indications of ridges appear between the principal ones. The entire surface is covered with fine, slightly raised, sharp lamellæ, which are waved in some places so regularly as to produce the appearance of a delicate reticulation, which, however, does not really exist; angle of the umbo about 120° ; ears finely sculptured, like the rest of the surface, but with only faint indications of ridges, sharply differentiated from the rest of the shell, very short, broad; supra-foraminal ear with a sigmoid curve to the lateral margin; margin of the other ear nearly straight; hinge-line straight; interior of the valve smooth, except for faint depressions corresponding to the ridges; peripheral margins not crenulated, even or nearly smooth.

Lower valve with twenty-five or thirty dichotomous ribs, flattened above, but not sharply differentiated from the interspaces, sculptured with fine lines of growth or nearly smooth, with faint appearances of radiating striæ. Peripheral margin somewhat crenulated by the ends of the ribs; interior marked by shallow channels corresponding to the ribs; ears rather small and distinctly but not strongly marked off from the rest of the valve; byssal notch rounded, moderately deep. Height of shell, 135^{mm} ; breadth of shell, 140^{mm} ; breadth of hinge-line, 65^{mm} ; thickness, 32^{mm} ; some specimens one-half larger.

This shell is nearest *P. propatulus* Conr. (*caurinus*? of Gould) from the Miocene of Oregon, but differs in all its details when compared. The Miocene shell has a sharper umbonal angle, larger ears with straight lateral margins, and strong and different sculpture; the ribs are not dichotomous, and are much more sharply defined, while the margins are strongly crenulated. It is possible that some of the indeterminate nominal species of Conrad may have been based on this species, but the wretched figures given by him seem to differ strongly so far as they show any characters, while his descriptions are quite worthless, as usual.

Pecten Stearnsii, n. s. (7942).

Shell moderately large, thin, regular; elegantly radiately ribbed. Upper valve flattened or even a little concave, with about twenty four regularly rounded, vaulted, even ribs, separated by slightly wider channelled interspaces; the whole surface covered with fine, sharp, concentric, regular lamellæ, a little looped backward over the top of the ribs, but showing no appearance of reticulation anywhere; ears small, nearly

symmetrical, covered with more elevated, crowded, concentric lamellæ, especially near the margins; hinge-margin straight, or even a little concave toward the umbo; peripheral margins of the valves strongly and regularly crenulated and interlocking; interior regularly deeply grooved, to correspond with the external ribs; lower valve slightly convex, with about twenty-six regular even ribs, separated by channelled interspaces somewhat narrower than the ribs; the top surface of each rib is flattened with a broad, shallow groove in the middle, with one or two faint riblets on each side of the groove; the whole surface is covered with concentric lamellæ, like those of the upper valve, but less sharp, and about twice as crowded. Ears subequal, arched, covered with crowded, elevated lamellæ; byssal notch very small. Height of shell, 90^{mm}; breadth, 100^{mm}; breadth of hinge-line, 34^{mm}; thickness, 15^{mm}.

This very elegant species, while also showing some general resemblance to *P. caurinus* Gld., forms a passage toward the section *Janira*, and differs in many details from any described west-coast species, recent or fossil, so far as figures and descriptions serve to indicate.

Pecten Hemphillii, n. s. (7943).

This species has a strong general resemblance to the last, and is best described by comparison with it. *P. Hemphillii* is smaller, with sixteen ribs, as against twenty-six in a *P. Stearnsi* of the same size, with which throughout it will be compared; the lateral margins of the ears are perpendicular and straight, instead of outwardly rounded; the hinge-line is perfectly straight, not slightly concave; the ribs on the lower valve are flattened above, with symptoms of a groove on the top surface, instead of beautifully roundly vaulted; the interspaces are of course wider; the raised concentric lamellæ toward the periphery become long, coarse, and very crowded; on the lower valve, the shell is more vaulted, with hardly any traces of the raised lamellæ, and with larger, rude, hardly flattened, radiating ribs, which show no trace of grooving or riblets; the ears and byssal notch are smaller and more coarsely sculptured. Height, 56^{mm}; breadth, 63^{mm}; breadth of hinge-line, 28^{mm}; thickness, 15^{mm}.

This species seems to approach *Janira* even more closely than the last, but the value of these sections of *Pectinidæ* is very questionable.

Anomia limatula, n. s. (7949).

Shell large, thin, irregular, with a rather thickened hinge-line; external surface rough (when not worn), like the fresh fractured surface of a piece of china-ware; a few faint radiating lines with the lines of growth comprise the sculpture; shell originally yellowish, and still retaining some of its color and lustre. Normal form apparently that of a *Pecten* without ears. Breadth, 75^{mm}; height, 70^{mm}; arch of valve, 10-15^{mm}.

No lower valves were obtained. This large species is neither *A. lampe* Gray nor *A. (Plac.) macroschisma* Desh., which are the only recent spe-

cies known to inhabit these coasts, while the only fossil one, *A. subcostata* Conrad, a species from the Colorado Desert, appears to be different, as the name would imply. For this reason, I have attached a name to the rather imperfect material received from Mr. Hemphill.

Scalaria Hemphillii, n. s. (7991).

Shell in general resembling a robust specimen of *S. indianorum*, having from nine to twelve varices on the last whorl, coronated behind near the suture, wholly pure white; surface of the whorls beneath the varices longitudinally delicately sculptured, with alternate riblets and grooves. Length about an inch; apical angle about 30°.

This species has the sculpture of *S. bellastrata*, but the shape of *S. indianorum*, and is the only grooved species, except the former, which has yet been reported from this region. All the specimens are decoliate. The specimens were sent by Mr. Hemphill with the suggestion that they might prove to be new, and an examination has confirmed the suggestion. I take much pleasure in dedicating it to its discoverer.

The two species of *Cancellaria* mentioned were obtained from the San Diego well some years since, but having been mislaid cannot at this moment be identified. *Mamma nana* Möller is now found living in Arctic seas and fossil in the Tertiary of Japan.

WASHINGTON, February 3, 1878.

THE MANUFACTURE OF PORPOISE-OIL.

By Capt. CALEB COOK, of Provincetown, Mass.

About the year 1816, sailors and fishermen having caught a porpoise on their voyage, would sometimes extract the oil from the jaw-bone and give it to carpenters and those who used oil-stones for sharpening their tools. Finding in this way that it did not gum nor glue, suggested the idea that it was just what was wanted for a nice lubricator. It was noticed that the weather at zero would not congeal it, neither would it corrode on brass.

Watchmakers were then using olive-oil as the only fitting oil for watches; but by experimenting with the porpoise-jaw oil they found it superior to the olive or any other oil, consequently the sailors and fishermen found a ready market for all they were able to obtain.

This state of things continued until the year 1829, when a shoal of blackfish, about forty in number, was taken at Provincetown, Mass., being the first for many years. Solomon Cook, of that town, took from the jaws of those blackfish a few gallons of oil, and sent it to Ezra Kelley, of New Bedford, Mass., a skillful watchmaker, to be tested for watch-oil. Mr. Kelley soon found that this oil was superior to the porpoise-oil, as it had more substance and less chill. He contracted with Solomon Cook to supply him from year to year until 1840, when Solomon Cook died, and his oldest son supplied Mr. Kelley until the