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CALIFORNIA, REPRESENTING A
NEW GENUS AND SPECIES

WITH TWO PLATES

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A FOSSIL TOOTHED CETACEAN FROM CALIFORNIA,
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(WITH TWO PLATES)

BY FREDERICK W. TRUE

A portion of the mandible of a fossil cetacean belonging to the museum of the University of California, has recently been sent me by Prof. J. C. Merriam and proves on examination to represent an undescribed form. With the jaw are four detached teeth. This material, which is recorded as No. 1352 Mus. Univ. Cal., was obtained from Upper San Pablo, near Rodeo, California. Rodeo is a town about 16 miles northeast of San Francisco on San Pablo Bay. Although so small a part of the skeleton is available for study, yet as it represents a quite distinct form, it seems to require a name. It is, therefore, described below under the designation of *Hesperocetus californicus*.

The portion of the symphyseal region of the mandible preserved consists of three fragments which, when placed in line, measure 196 mm. It is probable, however, that the anterior and middle portions should be separated by an interval of about 30 mm. The posterior portion is probably from near the posterior end of the symphysis. The greatest breadth posteriorly is 41 mm. and the greatest depth, 29 mm. In section, the mandible is triangular or cordate, the sides being convex and the upper surface nearly flat. When viewed from above, the jaw appears at first to present a series of ten or eleven pairs of alveoli closely approximated, but upon careful examination it is seen that every second pair in reality consists of two shallow depressions in the surface of the jaw, while the alveoli themselves are widely separated. There are, in fact, only six pairs of alveoli represented in the fragment preserved, unless the anterior pair is to be regarded as consisting of two or three pairs of small alveoli closely approximated. Further reference will be made to this question below. Aside from this anterior pair, the alveoli are large and elliptical, the largest posterior one having a longitudinal diameter of 20 mm. and a transverse diameter of 9.5 mm. They decrease in size anteriorly, the pair immediately following the anterior ones having a length of 12.5 mm. The two alveoli

constituting the pair nearest the posterior end of the fragment are separated in the median line by a distance of 9 mm., while the two constituting the pair nearest the anterior one are separated by 4 mm. As already mentioned, the space between the different pairs of alveoli is occupied by a series of elliptical depressions of similar form, but only a few millimeters deep. These depressions are deepest at the middle of the series, the posterior ones being shallower and longer, and the anterior ones shallower and shorter.

The alveoli constituting the anterior pair, as already mentioned, differ from the others in that they are divided by one or two rudimentary transverse septa. These septa are convex backward and emarginate above, so that they do not reach the level of the upper surface of the jaw, except where they join the sides of the same and the median longitudinal ridge. The anterior one is not visible on the right half of the jaw, and on the left it is developed on the side nearest the outer margin of the jaw. It is supposable that the teeth belonging in these alveoli had a partially divided root, such as sometimes occurs in *Platanista*, *Inia* and other recent genera, but this is by no means certain. The fragment in which they are situated has been broken transversely into two pieces, and it is possible that the two parts do not belong together. As the fracture is behind the anterior pair of alveoli, however, this does not explain their conformation, though it may be that the anterior piece belongs farther forward, and that the mandible was a little expanded at the extremity.

The upper margins of the jaw are rounded, and the lateral borders of the median ridge are sinuous, owing to the fact that it expands opposite the points at which the pairs of alveoli and of elliptical depressions join. Along the center, it appears to have been as high as the outer borders of the jaw and flat above.

The sides of the jaw are convex and meet in a rounded angle in the median line below. On each side are several rather large foramina from which more or less distinct channels extend forward toward the extremity of the jaw. There is, however, no continuous longitudinal furrow such as is found in *Stenodelphis*, *Schizodelphis*, etc.

The four teeth which accompany the mandible lack the greater part of the root and the crowns are worn in a peculiar manner, as will be noted more in detail below. They seem too large for the alveoli, but when placed in them it is observed that they fit quite accurately and there is little doubt that they belong to the jaw already described.

The crowns of the teeth, which are of a very dark brown color, are short and conical, and elliptical in section at the base. They are strongly curved inward, or a little backward, from about the middle of the height. The enamel is distinctly rugose and there is a clearly defined, longitudinal postero-internal ridge, and also an antero-external ridge. The latter is bifurcated in the lower half. The cingulum is represented only by a small tubercle at the base of the internal ridge. The crown is slightly constricted below this point. The base of the crown appears oblique owing to wear or splintering of the enamel on the outer side, but was probably not so originally. The apex of the crown in two of the teeth is obliquely truncate as a result of attrition, the upper exposed surface being quite flat. In the other two teeth only the extreme tip is abraded and the exposed worn surface is nearly at right angles with the longitudinal axis of the crown. The dimensions of the teeth are as follows:

Measurements.	No. 1.		No. 2.		No. 3.		No. 4.	
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Length of crown.....	11	12	11	11	11	11	11	11
Antero-posterior diameter of crown at base.....	8	10	9	9	8.5	8.5	8.5	8.5
Transverse diameter of crown at base.....	8	8	8.5	8.5	8	8	8	8

The four teeth, of which measurements are given above, differ somewhat in their characteristics when compared with each other. Tooth No. 1 is from the left side, if a lower tooth. It is the smallest of the four and the crown is most strongly recurved. The antero-external ridge of the crown is nearly obliterated, but appears to be widely bifurcated at the base. On this account and because of the curvature of the crown it may be a posterior tooth, and belong behind the other three. The anterior side of the crown is worn away by abrasion, leaving a large, flat, elliptical and nearly vertical surface devoid of enamel. Tooth No. 2 has the largest crown of the four and the crown is also more compressed than in the other teeth. The bifurcation of the anterior ridge extends upward only a little way from the base. This tooth is only slightly curved inward and backward. Teeth Nos. 3 and 4 are almost identical in form and size. They are perceptibly larger in diameter than No. 1, and the crown is somewhat gibbous near the base. The apex is worn away, leaving a large, oblique, elliptical surface devoid of enamel, but was originally strongly curved inward and backward. The anterior

ridge is bifurcated upward to a point about half way between the base of the crown and the apex (when complete).

The dimensions of the portion of the mandible which is preserved are as follows:

	<i>mm.</i>
Length of the three parts when in line and touching.....	196
Greatest breadth of median portion posteriorly	41
Least breadth of anterior portion anteriorly	26
Breadth at middle of median portion.....	34
Length of posterior alveolus.....	20
Breadth of the same.....	9.5
Length of alveolus next to the anterior one.....	12.5
Breadth of the same.....	9
Length of anterior alveolus	22.5
Breadth of anterior alveolus.....	12
Length of the posterior depression.....	18
Breadth of the same.....	11.5
Length of one of the middle depressions.....	16
Breadth of the same.....	10
Length of the depression next to the anterior alveolus.....	8
Breadth of the same	10
Least breadth of median ridge between alveoli posteriorly....	9
Least breadth of median ridge between alveoli anteriorly....	4
Depth of mandibular fragment posteriorly.....	29
Least depth of mandibular fragment anteriorly.....	23

From the foregoing description it will be gathered that *Hesperocetus californicus* is a toothed cetacean, or porpoise, of moderate size, with a rather long beak and teeth in both jaws. The teeth were separated by wide interspaces, those of the lower jaw fitting in between those of the upper jaw and *vice versa* when the mouth was closed, but probably the teeth of neither set touched those of the other in front or behind, except in a few instances. The tips of the upper teeth probably rested on the upper surface of the lower jaw in the depressions which intervene between the alveoli, and, similarly, the mandibular teeth probably rested against the roof of the mouth.

What the affinities of the species are is difficult to determine. The peculiar setting of the teeth just mentioned reminds one, to a certain extent, of the South American genus *Ischyrorhynchus* Ameghino. The original description of the type-mandible of *Ischyrorhynchus vanbenedeni* is as follows:

“Mandibular rami anchylosed together throughout the length of the tooth-row as in *Saurocetes* [= *Pontoplanodes*]. Mandible less compressed, with a flat and rugose space between the two tooth-rows, one or two centimeters broad in its posterior part. Perpendicular

diameter of the mandible a little greater than the largest transverse diameter. The upper part terminates in a rounded longitudinal eminence (*quilla*). Roots of the teeth less compressed than in *Saurocetes* [= *Pontoplanodes*], frequently imperfect at the termination below, with the two points, anterior and posterior, less distinct. Crowns of the teeth conical and low, with the apex turned a little backward and the enamel strongly rugose. Teeth implanted in an alternating order, each of those of the right side opposite the space which intervenes between two of the left side, and *vice versa* with each of the teeth of the left side in relation to those of the right side. Average diameter of each of the posterior molars at the level of the alveolar border: antero-posterior, 13 millimeters, transverse, 8. Diameter, antero-posterior, of the crown of a detached tooth, 9 millimeters: transverse, 9 millimeters. Height of crown, 11 millimeters. Transverse diameter of the beak at the anterior end of the part figured, 31 millimeters: vertical diameter, 38 millimeters.”¹

In *Hesperocetus* the teeth of the two sides are opposite, but this might be, and probably was, so in the anterior part of the mandible of *Ischyrorhynchus*. Displacements of the teeth similar to that occurring in the latter genus are common in various recent genera of Delphinidæ. In *Ischyrorhynchus* the teeth are close together, or even in contact, on each side at the posterior end of the series figured by Ameghino, but the anterior ones are separated by interspaces which increase in length forward. It is not improbable, therefore, that near the anterior end of the complete jaw they were quite as widely spaced as in *Hesperocetus*.

There is also some indication of depressions in the interspaces between the teeth in the fragment figured by Ameghino, but they are quite indistinct, and are somewhat external to the alveoli, rather than in line with them, as in *Hesperocetus*.

Although the dimensions of the teeth in the two forms are nearly identical, the proportions of the jaw do not agree. The fragment on which *Ischyrorhynchus* is based, if it were from the same species as that on which *Hesperocetus* is based, should be from nearer the posterior end of the symphysis, on account of the close approximation of the teeth in the former. It should, therefore, be broader. The type-fragment of *Ischyrorhynchus* is, however, narrower at the posterior end than the Californian specimen. From this circumstance, it seems reasonable to suppose that the latter, when complete,

¹ Revista Argent. Hist. Nat., Buenos Aires, vol. 1, 1891, pp. 163-165.

had the teeth widely spaced throughout. This idea is strengthened by the fact that the interspaces in the fragment preserved increase in length toward the posterior end of the jaw, or maintain a constant length, the length of each from in front backward being as follows: 13, (hiatus), 20, 23, 23, 23 mm. In the type of *Ischyrorhynchus* the same intervals are about 10, 8, 4.5, 1, 0, 0 mm. The mandible in the latter form is deeper than wide, while in *Hesperocetus*, it is wider than deep, but this difference is rather specific than generic.

On account of the differences mentioned above, the assignment of the Californian specimen to the genus *Ischyrorhynchus* does not seem warranted.

It is possible that *Hesperocetus* is related to the South American genus *Sauroidelphis* Burmeister, which belongs to the family Iniidæ, but as the mandible of the latter genus is not known this cannot be determined at present.

The genus *Pontoplanodes* Ameghino, which has already been alluded to, presents some of the characteristics of *Hesperocetus*. The mandibular teeth have conical, recurved crowns, with rugose enamel, and in the anterior ones the root is more or less distinctly divided into two or three branches at the extremity. The upper borders of the jaw are sinuous in outline, and there are depressions between the teeth. These depressions, however, are of small size and are situated outside of the alveoli instead of in line with them, as they are in *Hesperocetus*. The teeth are quite close together, especially at the posterior end of the series. The mandible has a distinct channel or sulcus, along the outer side of the symphyseal portion, as in *Platanista*, etc.

While *Pontoplanodes* presents some resemblances to *Hesperocetus* they are not sufficient, in my opinion, to warrant a close association of the two genera.

Hesperocetus may be provisionally assigned to the family Iniidæ, but it should be remarked that the teeth, though much larger, resemble those of *Delphinodon* which I have recently proposed to transfer to the Delphinidæ. No known genus of that family, however, presents mandibular characteristics similar to those of *Hesperocetus*.

EXPLANATION OF PLATES

Hesperocetus californicus, new genus and species. Type.

PLATE 1

FIG. 1. Mandible. Superior aspect.

2. Mandible. Inferior aspect.

Both figures natural size.

PLATE 2

FIG. 1. Mandible. Lateral aspect. Left side. Natural size. (The inferior margin is complete below the posterior foramen.)

2. Tooth No. 1. Postero-internal surface.

3. The same. Anterior surface.

4. Tooth No. 2. Internal surface.

5. The same. Anterior surface.

6. Tooth No. 3. Postero-internal surface.

7. The same. Antero-external surface.

All the figures of teeth twice natural size.



FIG. 2



FIG. 1

MANDIBLE OF *HESPEROCETUS CALIFORNICUS*, NEW GENUS AND SPECIES. TYPE

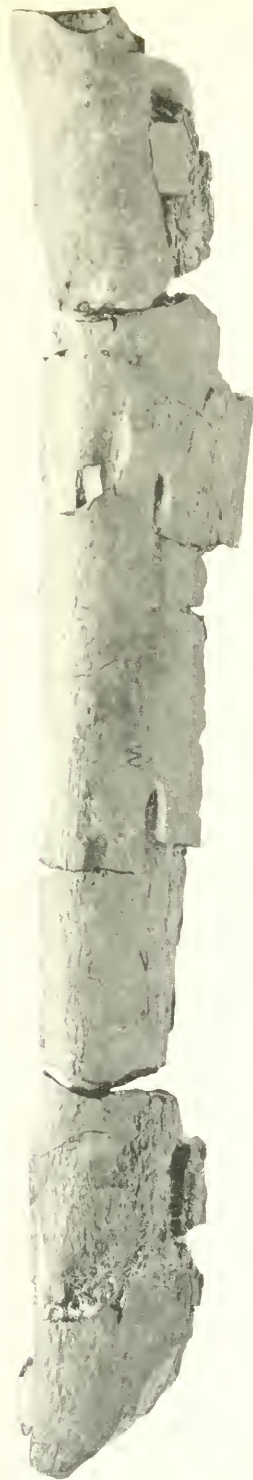


FIG. 1

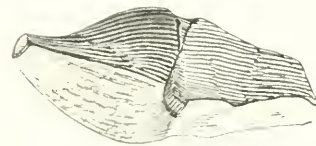


FIG. 2



FIG. 3



FIG. 4



FIG. 5

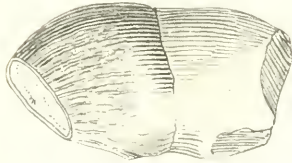


FIG. 6

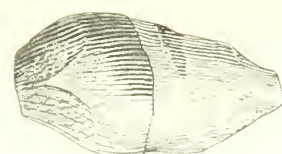


FIG. 7

MANDIBLE AND TEETH OF *HESPEROCETUS CALIFORNICUS*, NEW GENUS AND SPECIES. TYPE