

Article IV.—A NEW PORPOISE FROM JAPAN.

BY ROY C. ANDREWS.

On June 18, 1910, while the guest of the Oriental Whaling Company, Ltd. (Toyo Hogeï Kabushiki Kaisha), at their station at Aikawahama in the north of Japan, a porpoise was secured which is apparently new to science. This specimen, an adult male, was captured by Capt. Y. E. Andersen of the whale ship "Hogeï Maru No. 5," who recognized that it was a species unknown to him and went to considerable trouble to secure and preserve it for me. So far as could be discovered by inquiries among the whalers and fishermen no other porpoise like it had been seen or taken, and it is probable that the animal is rare.

As I was absent from the station at the time, I did not see this specimen until four days after it had been killed. The body had been opened ventrally and the viscera removed, otherwise it was intact. This porpoise in coloration, shape of the dorsal fin, number of vertebræ and skull characters is allied to *Phocæna dalli* True. Thus, so far as is known, the existing *Phocæna*-like porpoises fall into two natural groups which I believe to merit full generic rank.

On the one hand, we have *Phocæna* Cuvier, comprising species in which the coloration is entirely black, or black above shading gradually into lighter below, the dorsal fin triangular, the crowns of the teeth spade-shaped and separated from the root by a distinct neck, and the vertebræ 64 or 65. The species are *P. phocæna* (Linn.) and *P. spinipinnis* Burmeister.

On the other hand, a group in which the coloration is black above with large, sharply defined side and ventral areas of white, extremely small teeth the crowns of which are somewhat compressed and separated from the root by a slight constriction, and vertebræ numbering 95 or more. This group, to which I believe *Phocæna dalli* True should be referred, and a species here described as new, may be diagnosed as follows,—

Phocænoides gen. nov.

Type, *Phocænoides truei* sp. nov.

Rostrum of skull wide and flat; intermaxillæ elevated proximally to form two prominent bosses in front of nares. Nares large. Pterygoids small and widely separated. Temporal fossæ small. Teeth very small, the crowns compressed and separated from the root by a slight constriction. Vertebræ 95 or more. Neural spines of vertebræ very long and slender. Head without beak. Dorsal fin falcate and situated near the middle of the back.

In view of the important cetological researches of Dr. F. W. True, and the fact that he was the first to make known the other member of the genus, it is eminently fitting that this new porpoise should be described as,

***Phocænoides truei* sp. nov.**

Type, No. 31425; ad. ♂, Aikawahama, Rikuzen Province, Japan, June 18, 1910.

Color.—Entire head, throat and back black; sides, posterior breast (except median line) and belly white. On the sides the white areas are sharply defined and reach forward slightly beyond the anterior insertion of the pectoral fins; posteriorly they end on the sides of the peduncle in falcate patches the convexities upward (Plate II, Fig. 1). The black of the throat extends backward in a narrow band on

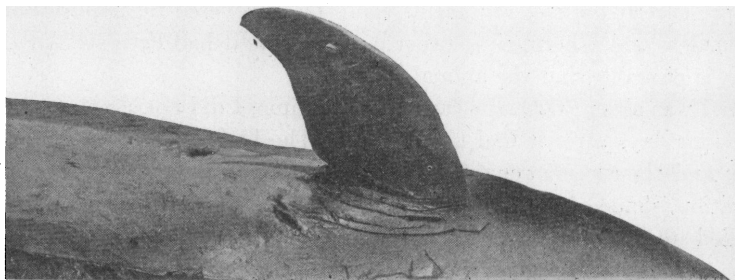


Fig. 1. *Phocænoides truei*. Pectoral fin.

the mid-ventral line of the breast ending 210 millimeters behind the posterior insertion of the pectoral fins.

On the inferior surface of the caudal peduncle, the black extends forward in a trident-shaped patch to a point shortly beyond the anus (Plate II, Fig. 2). Just

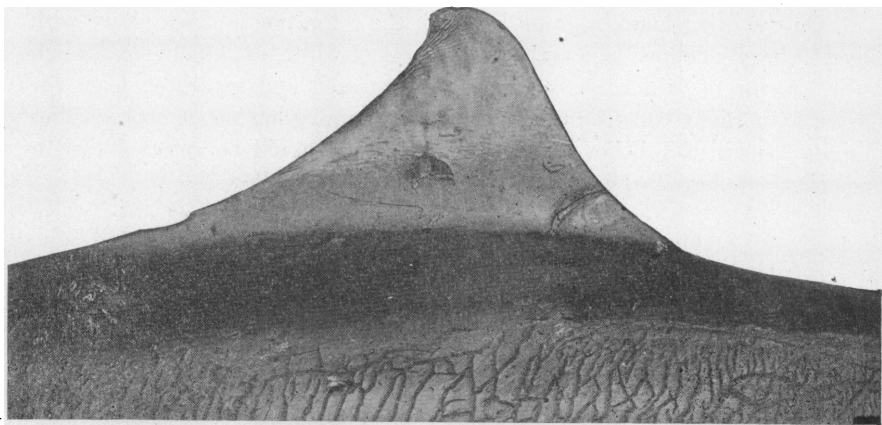


Fig. 2. *Phocænoides truei*. Dorsal fin.

anterior to the insertion of the flukes the ventral surface and lower sides of the caudal peduncle are occupied by a well-defined grayish area thickly marked with short, longitudinal black lines; ventrally this area is 200 mm. long.

Pectoral fins.— Both fins are black above and below except for a small patch of grayish, faintly marked, at the angle. The fins are falcate, and the angles rounded (see Fig. 1).

Dorsal fin.— The upper half (except the posterior edge) is whitish marked with a few short, scattered, black lines. The remainder is black. The fin is situated on a long base; the posterior edge is concave and the tip slightly recurved. Fourteen

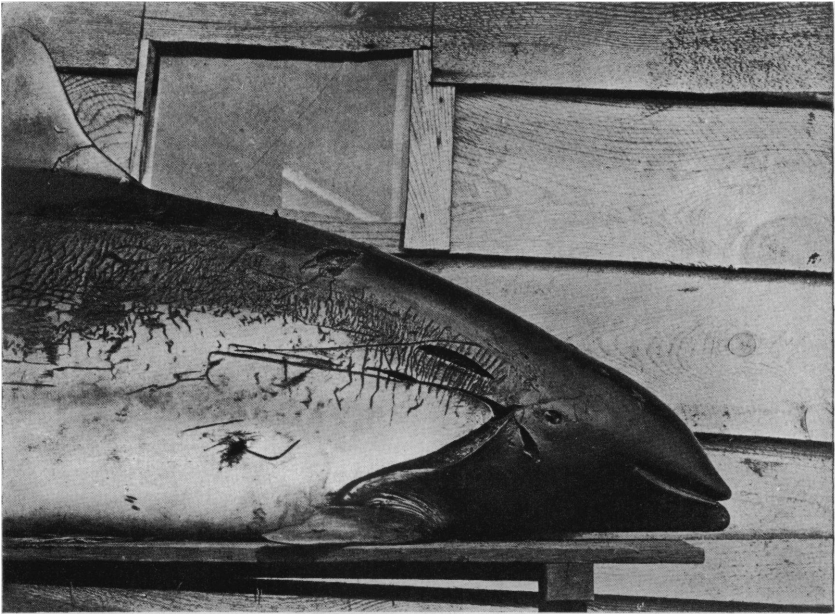


Fig. 3. *Phocaenoides truei*. Head and anterior portion of body.

small, spinous tubercles similar to those found in *Phocaena* are present upon the anterior edge near the distal extremity. The anterior base of the dorsal fin is 25 millimeters behind the junction of the first and second thirds of the total length of the body measured along the side (Fig. 2).

Flukes.— Similar above and below. Black, except for a whitish band on each lobe running from the notch along the posterior border for a short distance and obliquely across, meeting the anterior edge 50 millimeters from the tip (Plate II, Fig. 2).

Head.— The head is short and narrows rapidly from the eyes to the snout. The lower jaw projects slightly beyond the upper.

Caudal peduncle.— The caudal portion of this specimen presents a most extraordinary shape which is approximated by no other known member of the Delphinidae. From the dorsal fin to a point 300 millimeters anterior to the insertion of the

flukes the upper edge is nearly parallel with the body axis; at that point it slants abruptly down to the flukes. On the ventral surface, at a point midway between the anus and the insertion of the flukes, is a prominent concavity (Plates I and II, Fig. 1).

This form of the peduncle is so remarkable that the question has been raised as to whether it might not be a malformation due to injury or similar causes. This hypothesis, however, cannot have great weight since there is no indication of a pathological condition of the vertebræ or any other part of the skeleton. The extreme height of the neural spines of the caudal vertebræ and their peculiar shape will be discussed later. A very careful examination of the entire body before it was dissected revealed no suggestion of injury, and I cannot but conclude that the shape of the peduncle is not abnormal for the species.

It is interesting in this connection to note that both edges of the caudal region of *P. dalli* are raised into prominent flange-like extensions, being quite a departure from the usual shape of the peduncle among other members of the Delphinidæ. Thus are suggested most interesting possibilities as to what may be learned of the limits of variation when other specimens of the genus become known.

The most important external differences between *P. dalli* and *P. truei* are as follows:

1. The white areas on the sides of *P. dalli* extend forward only as far as a point opposite the anterior base of the dorsal fin; in *P. truei* the white areas are continued slightly beyond the anterior insertions of the *pectoral* fins.

2. On the lower surface of the peduncle, just anterior to the flukes, *P. truei* has a patch of gray marked with short, black lines. *P. dalli* presents no such coloration.

3. In *P. truei* the trident-shaped ventral extension of black, in the center of which the anus is situated, is of a quite different pattern from the disposition of the colors in the corresponding region of *P. dalli*.

4. The shape of the body of *P. truei* posterior to the dorsal fin is totally unlike that of *P. dalli*.

5. In *P. dalli* the flukes are apparently black on both surfaces while those of *P. truei* show distinct whitish markings.

External measurements.—Two series of measurements were taken; one for direct comparison with *P. dalli*; the other containing additional measurements of value in further designation of the species.

External Measurements.

	<i>P. truei</i> mm.	<i>P. dalli</i> mm.
Total length (straight from snout to notch of flukes)	1915	1829
Tip of lower jaw to corner of mouth	134	89 ¹
“ “ “ “ center of eye	233	177
“ “ “ “ anterior base of pectoral	305	279
“ “ “ “ anterior edge of blowhole	260	228
“ “ “ “ anterior boundary of white area	310	692
“ “ “ “ genital slit	765	1093
Eye to blowhole (vertical)	168	102
Blowhole to anterior base of dorsal fin	505	470
Length of eye opening	22	19
Anterior base of pectoral to tip	233	203
Posterior “ “ “ “	163	146
Breadth of pectoral at base	103	95 ²
Height of dorsal (vertical)	165	152
Length of base of dorsal	360	267
Notch of flukes to anus	620	578
Flukes, tip to tip	469	470
Breadth of flukes (antero-posterior)	180	133
Height of body at insertion of flukes	106	89
Length of white area along belly	735	457
Depth of body 24" anterior to flukes	535	254
“ “ “ 8" “ “ “	270	190

	<i>P. truei</i> mm.
Total length over curve of back from snout to notch	2115
Snout to eye	233
“ “ “ corner of mouth	125
“ “ blowhole (center)	250
“ “ posterior insertion of pectoral fin (axilla)	415
“ “ posterior insertion of dorsal fin	1110
Notch of flukes to penis	765
Pectoral fin, tip to head of humerus	220
“ “ “ “ posterior insertion	163
“ “ “ “ anterior insertion	233
“ “ greatest breadth (at angle)	105
Depth of notches of flukes	30
Length of right lobe of flukes axially	251
“ “ left “ “ “ “	245

¹ It will be seen that there is a great difference between the two specimens in this measurement. Since the skulls do not bear this out, however, I believe that it is possible that one may have been from the interior and the other from the exterior corner of the mouth and that the apparent discrepancy could thus be accounted for.

² Through a misinterpretation of Dr. Dall's mss. notes, Dr. True gave the breadth of the fin of *P. dalli* across the base as 5.5 inches. After a further examination of the notes he writes me that the "5.5 inches" is probably the distance between the pectorals across the breast and that the actual basal breadth of the fin is 3.75 inches (95 mil.).

	<i>P. truei</i> mm.
Depth of body midway between insertion of flukes and anus, which is the point where the upper margin begins to descend to flukes	304
Distance apart of anterior bases of pectoral fins (below)	157
“ “ “ posterior bases of pectoral fins (below)	203
Lower jaw extends beyond upper	7
Distance from corner to corner of mouth over head	275
Girth of head at eyes	685
“ “ body directly in front of pectoral fins	835
“ “ body at posterior insertion of dorsal fin	1285
“ “ body at anus	817
Length of anal opening	13
Corner of mouth to anterior insertion of pectoral fin	210
Distance of eye above line of mouth	20
Length of white area on sides	1175
Width of blowhole across tips	49

OSTEOLOGY.

Skull.—There is a very close resemblance between the skull of this specimen and that of the type of *P. dalli*, the two being directly comparable as to age. In the latter species the maxillæ are bent more sharply upward on either side of the superior nares than in the former. The rostrum is proportionately a little shorter and broader, and at the middle of the beak the intermaxillæ are slightly wider than in *P. dalli*; the mandible of our specimen is also somewhat longer and heavier proportionately. All of these differences, however, could easily fall within the range of individual variation and I do not consider them to be of specific importance.

This close resemblance between the skulls of the two species is most interesting when one considers the strong external differences. Measurements of the skull of *P. truei* and of the type of *P. dalli* are appended in the table following:

Measurements of skull of P. truei and of the type of P. dalli.

	<i>P. truei</i>	<i>P. dalli</i>
Total length	339	333
Length of beak	140	140
Breadth of beak at base of notches	98	95
“ “ “ its middle	62	57
“ “ intermaxillæ at same point	41	35
Greatest breadth between outer margins of intermaxillæ proximally	54	51
Length of alveolar margin	97	—
Tip of beak to anterior margin of superior nares	185	178
“ “ “ end of crest of pterygoid	212	213
Breadth between orbital processes of frontal	169	165
“ “ hinder margins of temporal fossæ	171	162



Fig. 4. *Phocaenoides truei*. Dorsal view of skull.

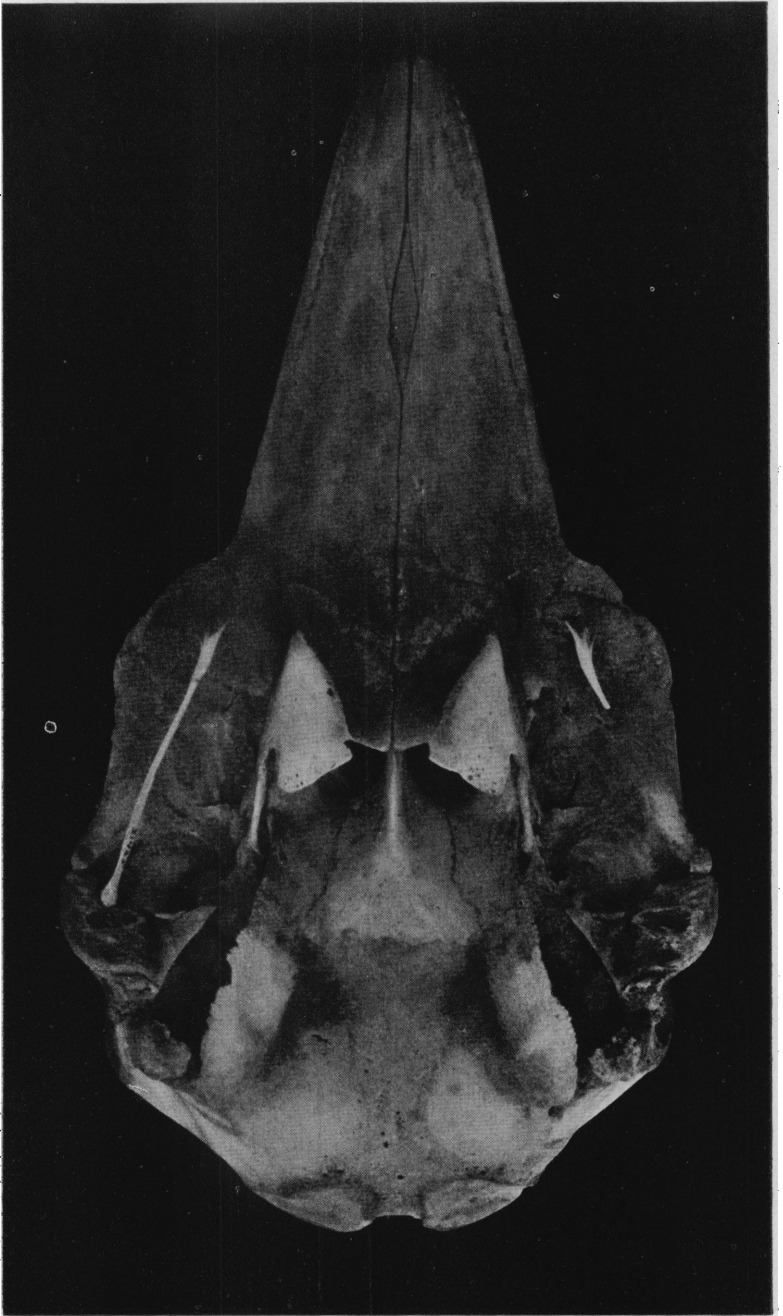


Fig. 5. *Phocaenoides truei*. Ventral view of skull.



Fig. 6. *Phocænoides truei*. Lateral view of skull.

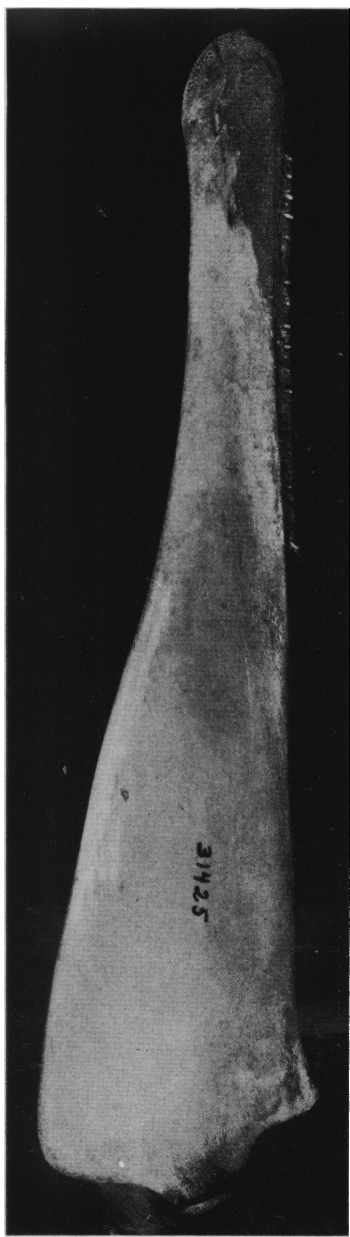


Fig. 7. *Phocænoides truci*. Lateral view of mandible.

	<i>P. truei</i>	<i>P. dalli</i>
Greatest breadth of skull (squamosal)	190	—
Length of temporal fossæ	44	56
Depth " " "	32	26
Total length of mandible	265	255
Length of symphysis of mandible	35	38
" " alveolar margin of mandible	120	—
Depth between angle and coronoid	65	57

Teeth.—The teeth of this specimen are exceedingly small and in life project but slightly above the surrounding membrane. Those of the lower jaw are cylindrical and show a slight swelling at the head; they have apparently been considerably worn. The teeth of the upper jaw, under a

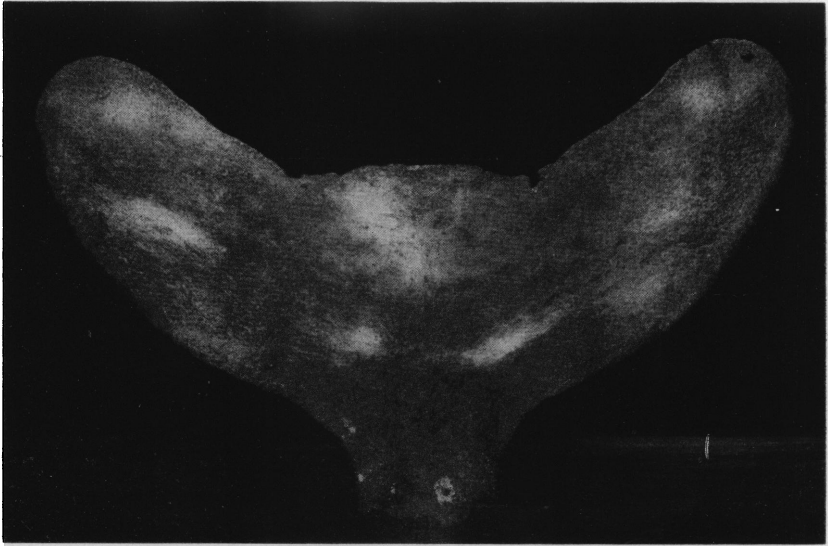


Fig. 8. *Phocaenoides truei*. Basihyal and thyrohyals.

low-power magnification, show a compressed, somewhat spade-shaped crown and a slightly constricted neck. The teeth are smaller than those of *P. dalli* and have the crowns and neck less well developed.

The dental formula is $\frac{19-19}{22-22}$. The teeth were counted while the animal was in the flesh and the formula as given represents the number that were found upon inspection with the aid of a low-power glass. I was led to believe, however, upon macerating the specimen, that in both jaws several teeth were present which did not show above the surface and were lost.

Vertebrae.—The specimen was dissected with extreme care and the dif-

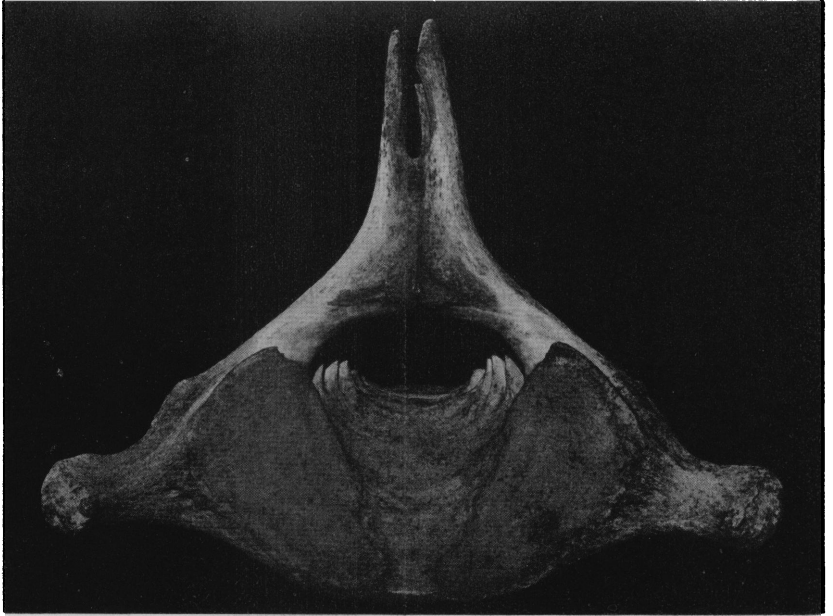


Fig. 9. *Phocaenoides truei*. Atlas and cervical vertebræ.

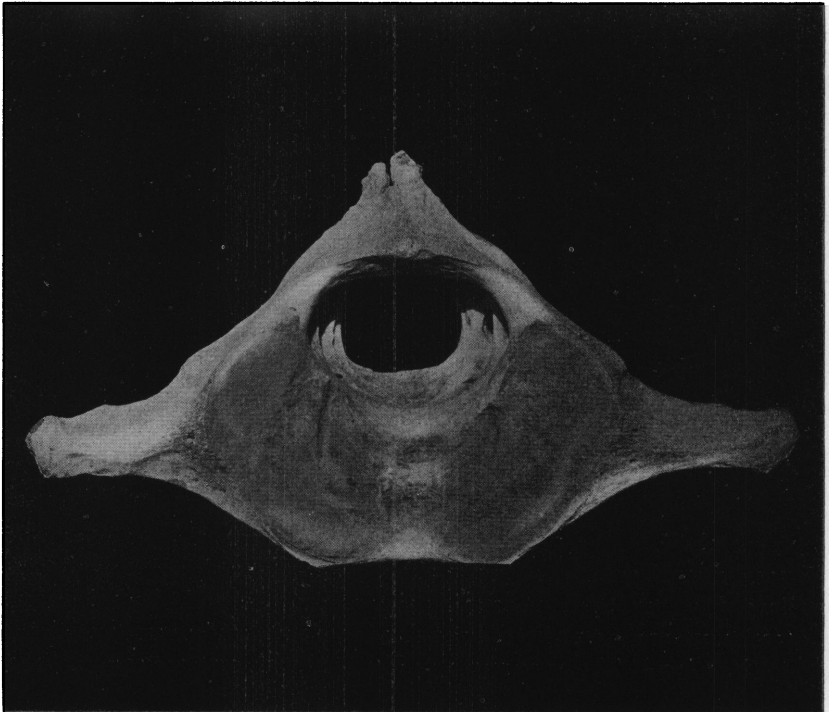


Fig. 10. *Phocæna phocæna*. Atlas and cervical vertebræ.

ferent segments of the vertebral column accurately determined. The formula is as follows — C. 7, D. 16 (or 17), L. 26, Ca, 46 = 95.¹ The seven cervical vertebræ are solidly ankylosed both by their centra and neural spines. The atlas bears short, thick transverse processes which arise below the middle of the centrum and are directed slightly downward and forward. Its neural spine is erect, very high and deeply bifurcated. The atlas is unlike either that of *Phocæna* or *Lagenorhynchus*.

Of the dorsal vertebræ the transverse processes are shorter and less massive, the neural spines are much higher and the centra of the vertebræ



Fig. 11. *Phocænoides trucei*. First dorsal vertebra. Nat. size.

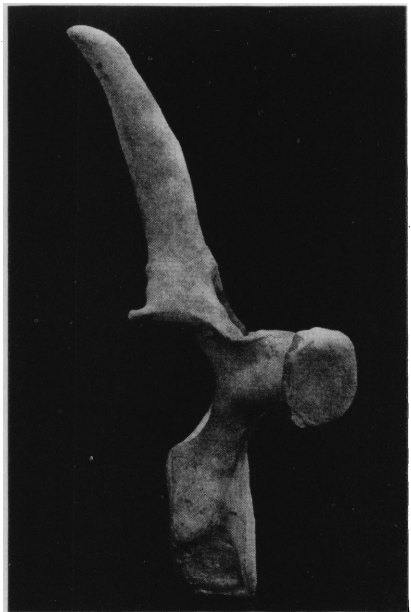


Fig. 12. *Phocæna phocæna*. First dorsal vertebra. Nat. size.

are more compressed antero-posteriorly than in either *Lagenorhynchus* or *Phocæna*; the centrum of the last dorsal is but little more than half as thick as that of the corresponding vertebra in the other two genera. The transition from the rib-bearing to the lumbar series is abrupt.

¹ The vertebral formula of *P. trucei* is C. 7, D. 14 (or 15), L. 27, Ca. 49 = 97 (or 98).



Fig. 13. *Phocaenoides truei*. First lumbar vertebra. Lateral view.

The extremely long, slender, rod-like neural spines and transverse processes, and the greatly [compressed centra which make the vertebræ of this specimen remarkable are present throughout] the lumbar and caudal series. The lumbar vertebræ resemble those of *Lagenorhynchus*, except that the spines in that genus are much lower and both the spines and transverse processes are more compressed laterally and consequently less rod-like.

The second lumbar is the last vertebra to bear

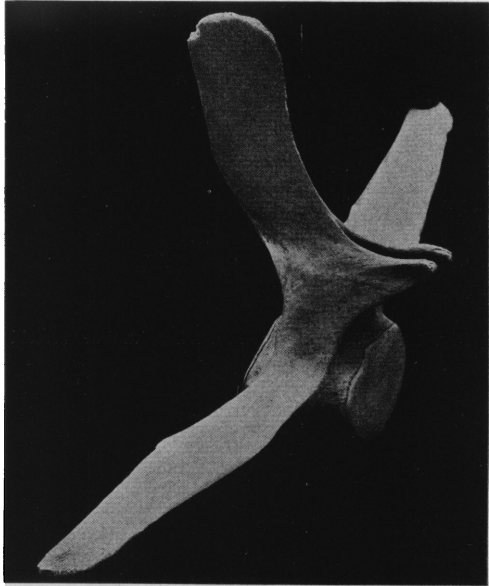


Fig. 14. *Phocæna phocæna*. First lumbar vertebra. Lateral view.



Fig. 15. *Phocænoides truei*. First lumbar vertebra. Dorsal view. $\frac{1}{3}$ nat. size.

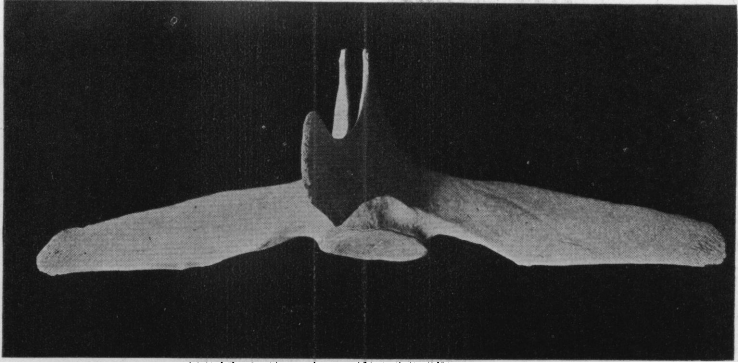


Fig. 16. *Phocaena phocaena*. First lumbar vertebra. Dorsal view. $\frac{1}{2}$ nat. size.

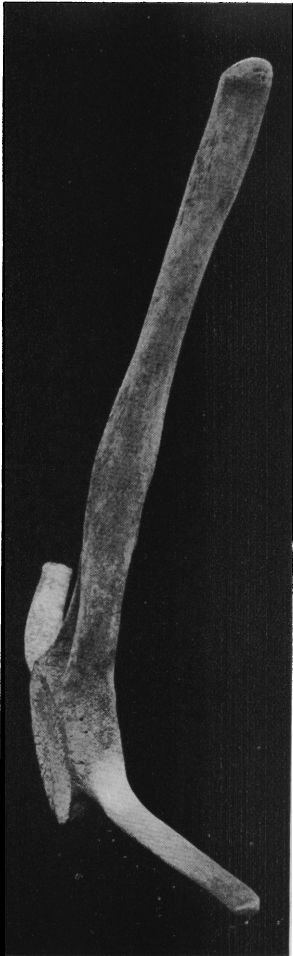


Fig. 17. *Phocaenoides trueli*. First caudal vertebra. Lateral view.

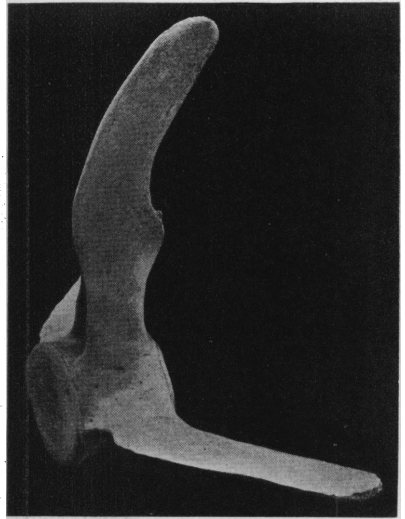


Fig. 18.

Fig. 18. *Phocaena phocaena*. First caudal vertebra. Lateral view.

a distinct zygapophysis, while in *Phocæna phocæna* these persist far back into the caudal series; in *Lagenorhynchus obliquidens* the zygapophyses are lost on the fifth lumbar but appear again high up on the spines of the second or third caudal.

The disappearance of the transverse processes is very gradual, and on the twenty-second caudal, where the process shows as merely a tubercle, the spine is still 57 mm. long and the centrum, including the epiphyses, only 18 mm. thick.

The terminal caudal is very small and seems to be composed of two ankylosed portions; all the remaining vertebræ, except the cervicals, are free.

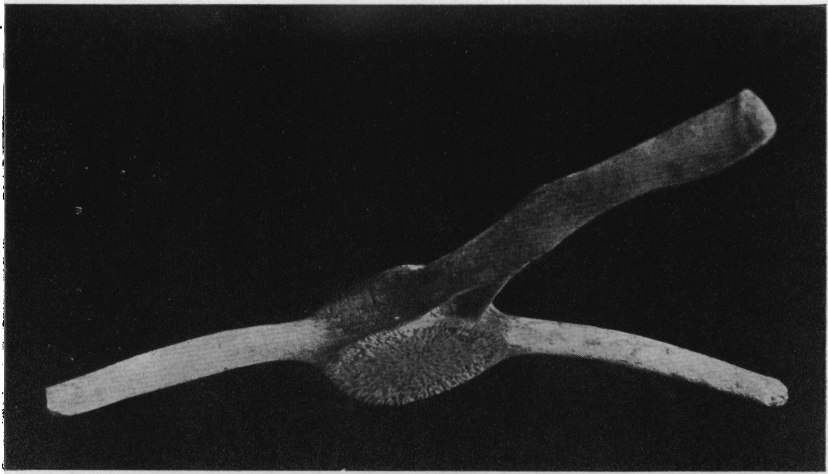


Fig. 19. *Phocænoides truei*. First caudal vertebra. Dorsal view.

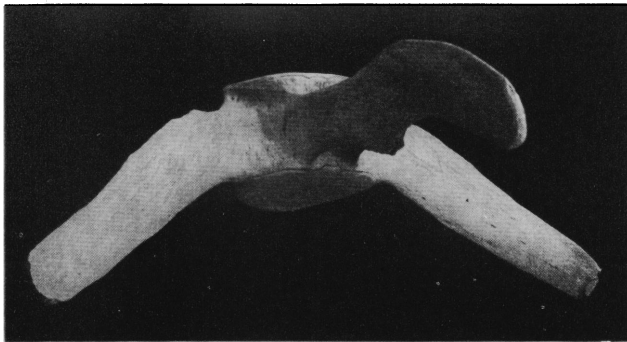


Fig. 20. *Phocæna phocæna*. First caudal vertebra. Dorsal view.

Measurements of Vertebrae.

	Atlas.	1st dorsal.	1st lumbar.	1st caudal.
Greatest depth from tip of spine to ventral edge of centrum	117	122	182	175
Greatest breadth between distal ends of transverse processes	139	79	209	178
Distance from tip of spine to superior edge of centrum	—	94	151	145
Length of transverse processes	27	23	88	69

Chevrons.—There are thirty-five in the entire series. The two or three pairs of small chevrons so commonly present in porpoises at the beginning of the series are absent in this specimen and the first is long but free distally. The laminae of the second are very broad and the spine is pointed; it is

slightly longer than the first. The third is of about the same width as the first but is longer than the second. The fourth and fifth chevrons are very narrow and are somewhat longer than the third. The sixth is slightly wider and longer than the fifth, the seventh longer and broader than the sixth, and the eighth is the longest of the series. From this point backward they decrease very gradually in length and increase in breadth. The second and fifteenth chevrons are about equal in height as they stand in position. The last is exceedingly minute but shows definite ossification. These observations were taken while the chevrons were *in situ*.



Fig. 21. *Phocænoides truei*. External surface of sternum.

Ribs.—There are sixteen pairs of ribs articulating with the vertebral column; an additional pair, very short and unattached to vertebrae or sternum, were present and would have been overlooked except by careful dissection. In giving the vertebral formula I have considered the dorsal series as sixteen.

Sternum.—The sternum is smaller, more slender, and its expanded anterior end is of different shape than in *Phocæna*.

Scapula.— The scapula of this specimen is decidedly interesting. It is totally unlike that of *Phocæna phocæna* and *Lagenorhynchus obliquidens* with which I compared it, but somewhat resembles the figured scapula of *Lagenorhynchus leucopleurus* Rasch (= *L. acutus* Gray) in the 'Ostéographie' of Van Beneden and Gervais.¹

The most striking feature of the scapula is its extreme height in proportion to its width, the vertical length being but little more than the

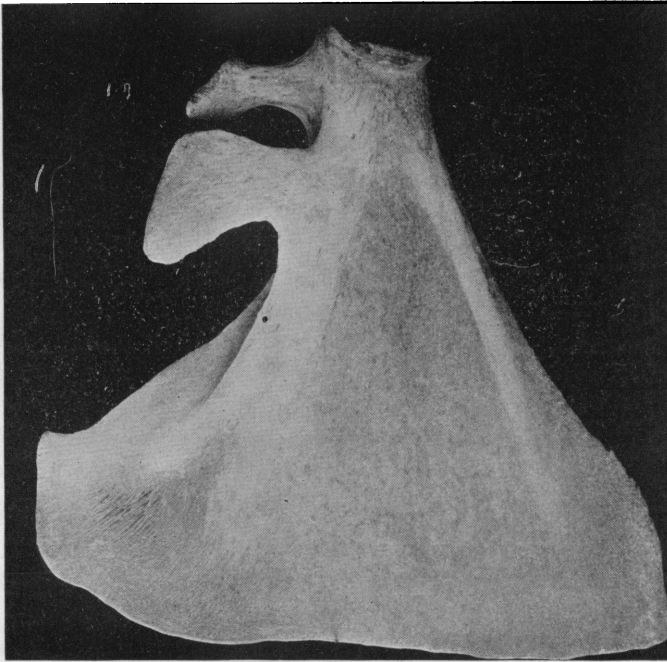


Fig. 22. *Phocænoides truei*. Right scapula.

greatest breadth. The superscapular edge is nearly straight and dips abruptly downward anteriorly to meet the corocoid border. The prescapular fossa is narrow and not strongly marked. Measurements of the scapula of this specimen and of an adult *Phocæna phocæna* and *Lagenorhynchus obliquidens* are appended.

	<i>P. truei</i> . mm.	<i>P. phocæna</i> . mm.	<i>L. obliquidens</i> . mm.
Length	150	101	116
Greatest breadth	166	149	181
Length of the acromion	33	37	43
“ “ “ corocoid	29	28	38

¹ Ostéographie des Cétacés, plate xxxv, fig. 23.

Manus.—The humerus is shorter proportionately, more massive, and the condyle decidedly more lateral in position than in *Phocæna*. The radius is flat, has the anterior margin convex and the distal end widened and rounded. The ulna is short and remarkable for the deeply concave outer edge; the olecranon process is well developed. In shape and arrangement the carpal bones are essentially as in *Phocæna*. The formula for the phalanges is — I₁, II₆, III₅, IV₁.¹

CONCLUSIONS.—In addition to the peculiar external appearance, the skeleton shows that in several respects *Phocænoides truei* stands unique among the entire family, for the extremely long, slender spines and transverse processes of the vertebræ and the high, narrow scapulæ are unlike all the other known members of the Delphinidæ. Although many external characters and the skull and teeth show a decided relationship to *Phocæna*, the remainder of the skeleton is totally unlike that genus. In the high vertebral formula, the shape of the scapula, and of the lumbar and caudal vertebræ, there are apparently affinities to *Lagenorhynchus*. It will be extremely interesting to see how far *P. dalli* participates in these aberrant characters, when the skeleton of that species becomes known.²

I wish to express my indebtedness to the Oriental Whaling Company, Ltd., for the many privileges which were generously extended to me during my stay at their stations, and to Captain Y. E. Anderson who captured the porpoise here described. Acknowledgments are due Dr. F. W. True for the privilege of examining the type of *P. dalli* and the loan of other specimens. Dr. True also rendered valuable assistance in my study of the material here described.

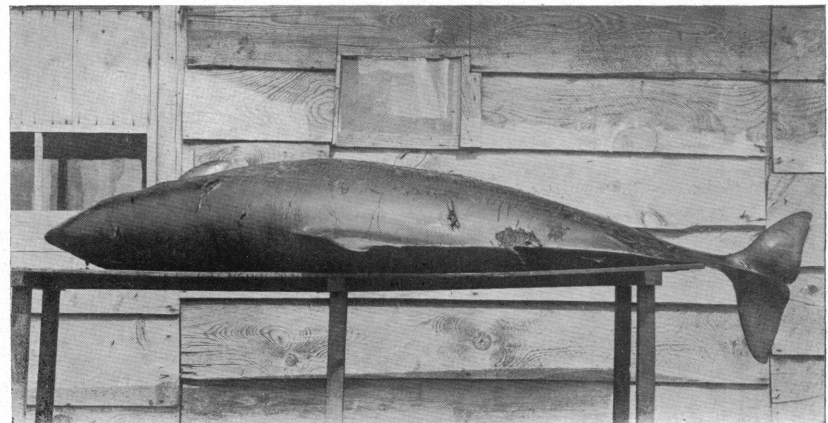
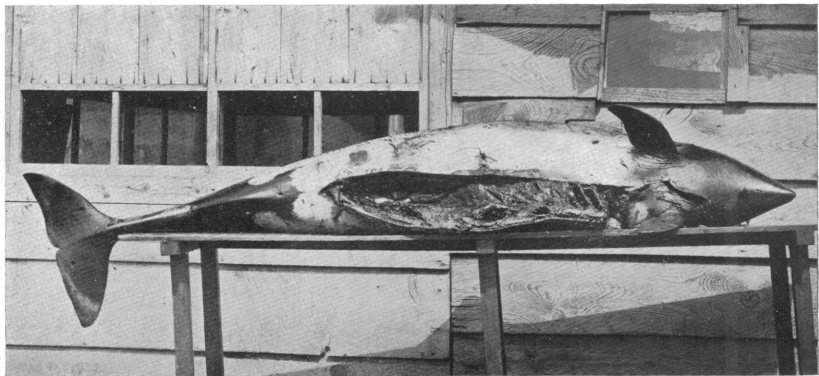
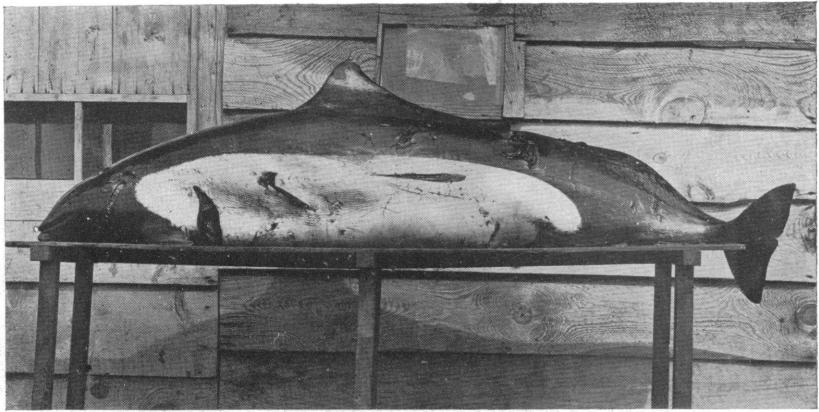
¹ The formula for the phalanges of *P. dalli* is I₁, II₆, III₄, IV₂.

² Dr. W. H. Dall, after inspecting the caudal vertebræ of this specimen, informed me that to the best of his remembrance *P. dalli* did not possess neural spines of such a height.



Fig. 23. *Phocaenoides trusi*. Pectoral fin





Phocœnoides truei sp. nov.

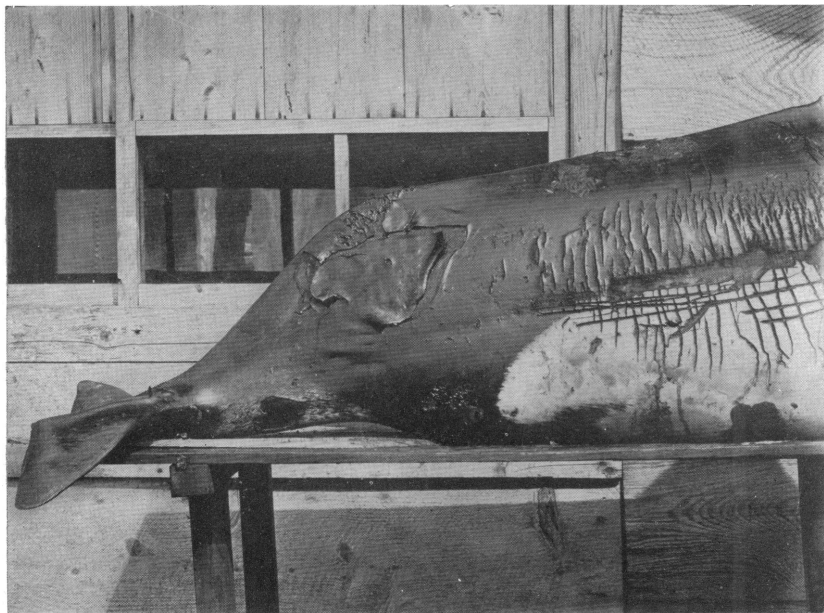


Fig. 1. *Phocænoides truei* sp. nov. Lateral view of peduncle.

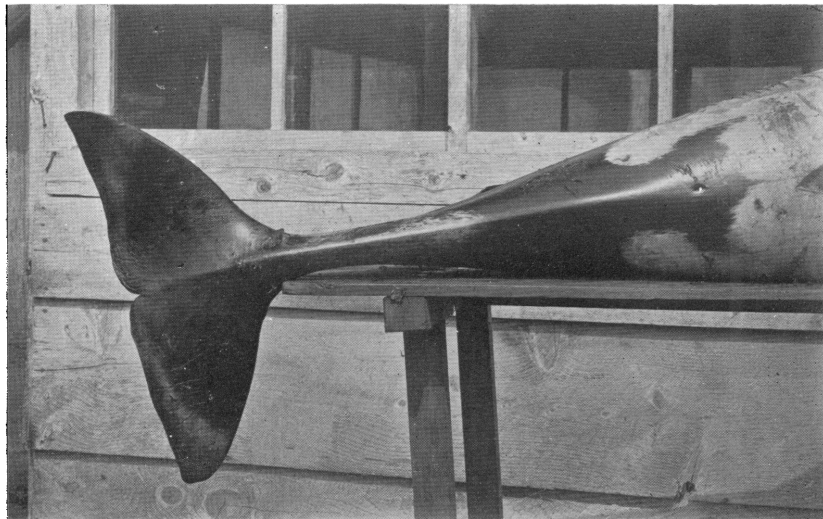


Fig. 2. *Phocænoides truei* sp. nov. Ventral view of peduncle.

