

A RARE SPECIES OF DOLPHIN (*STENELLA ATTENUATA*)
FROM ARARI, JAPAN

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INTRODUCTION

Recently, Oceanariums have been developed in several places in Japan. Various species of dolphins and porpoises have been kept in them. Hitherto Arari Bay, a small fishing village, supplying dolphins only for human consumption locally, became a famous place of supplying live dolphins for the Oceanariums.



Fig. 1. The dolphin herd was caught by the "oikomi-drive" method into a round wall of net at ARARI.

The dolphins of the present species which had never been seen previously even by the fishermen in Arari, were caught by the "oikomi drive" method on 7th June, 1964 and were driven into a round wall of net. The number of captured dolphins alive in the herd were about fifty, but when the authors arrived, some of them had already been transported to some of the Oceanariums. The authors therefore, could not observe all individuals in the herd.

At first glance Nishiwaki thought that the shape of the body quite resembled

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Delphinus delphis. Then he touched the palate of a carcass and recognized that the dolphin belonged to the genus *Stenella*. Numerous small spots were observed on the every parts of the skin, so he thought the species name might be *Stenella frontaris*. The tips of the dolphins, however, were apparently white. On this evidence he wavered in choice. When the taxonomical studies were completed, it was clear that these dolphins belonged to the rare species *Stenella attenuata*. We would like to report it as follows.

TABLE 1. FREQUENCY OF BREATHING IN THE TRANSPORTATION

Name of places	Arari	Toi	Funabara	Shuzenji	Mishima	Hakone	Odahara	Katase
Heights from sea leved (m)	2~3	535	130	60	20	850	5~10	2~3
Transit time	07:30	08:30	09:30	10:30	11:30	12:30	13:30	14:30
Air temperature	26.0	24.0	26.5	25.0	25.0	23.0	22.0	23.0
Water temperature	23.0	16.0	15.5	19.5	20.0	20.5	21.8	21.0
		use ice						
Frequency of breathing								
Dolphin No. 1	13	13	11	9	12	6	10	6
„ 2	26	18	17	34	42	43	24	36
„ 3	43	26	21	14	16	8	7	7
„ 4	24	43	36	67	37	24	25	22

Temperatur indicates in centigrade.

Frequency of breathing counted in continued three minutes.

TABLE 2. AMOUNT OF HOOD OF THE DOLPHIN IN CAPTIVITY

Date	Amount	Kind of food
28 June	3.9 kg	Horse mackerel ×122
29 „	4.6	„ ×109
30 „	5.3	„ ×129
1 July	5.3	Horse mackerel } ×170
		Squid }
2 „	6.0	Squid ×112
3 „	7.5	„ ×55
4 „	7.1	„ ×44
5 „	7.0	„ ×53
6 „	5.8	„ ×33
Average	5.8	„ ×92

TRANSPORTATION AND KEEPING

Though *Stenella caeruleo-alba* hardly eat food due to their fright, these dolphins ate soon after having been driven alive into a wall of net. Following the first one which began to eat, they all gradually ate small mackerels. They were fed 5–6 kg of small mackerels each by the fishermen. For this reason representatives of Oceanariums came to buy them. “Enoshima Marineland” transported them on 27th June.

The dolphins were laid on a stretcher, pulled up by a hand crane and put into track. Then they were carried to Enoshima over the Hakone mountain (about 850 m highs). The dolphins were placed on thick spongeous mats and were covered with dipped blankets. Sea water was pouring continuously on the blankets

to keep them from drying. The air and the water temperatures were measured at least once in an hour. Table 1 shows them.

Herzmon-A (Outohormon) for the hart stimulant, Save-amine (Promajine hydrochloride) as the tranxilizer and Bicilin-sol (Dibenthyl ethylene diamine dipenicillin G in aqueous suspension) for antibiotic injected in their dorsal muscles.

These transported individuals were two females of 190 cm body length, a female of 180 cm and a male of 181 cm. When they arrived at Enoshima Marine-land, their conditions were very bad. They were put into the big pool. Soon after that they clashed against the separating net or the pool sides, evidently having they lost their directions.

Two females, which were eating (3-7 kg/day) appeared as if they would live long, but died 2 days later. Both had fetuses 80 cm long. Another female which died 10 days later was also dissected. It had no fetus but had a functional corpus luteum in the ovary, so this female must have been caught soon after the parturition. Most of the females were either in the condition of a little before or soon after parturition. So that the shocks of capture and the transportation might have been doubled by the above mentioned conditions. That seemed the cause of death.

BODY LENGTH DISTRIBUTION

The dolphin herds of this species were found in May and August, 1961. All of a herd caught in May 1961, 194 individuals and 34 fetuses, were measured in body length. It is shown in Fig. 2.

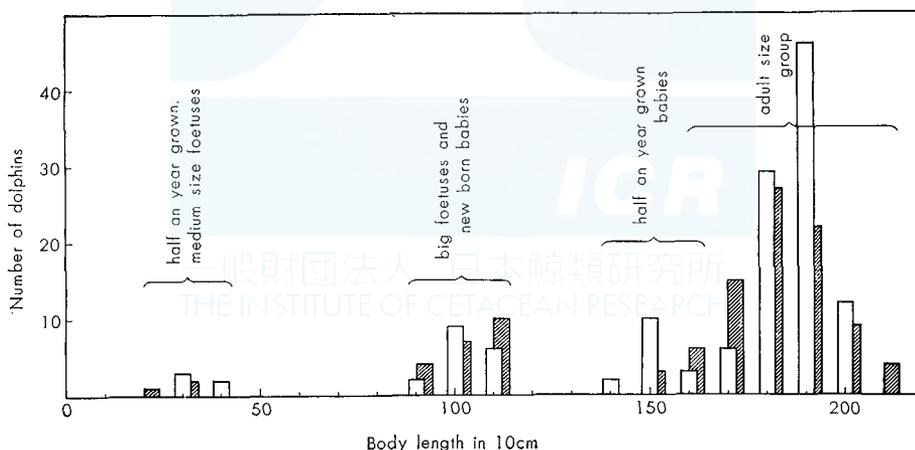


Fig. 2. Body length distribution of a herd of *Stenella attenuata*.

The largest body length of the fetuses was 106 cm and the smallest swimming individual was 104 cm. About 105 cm therefore must be the parturition body length. The largest adult was 201 cm in females and 208 cm in males, but in

Fig. 2 those body lengths were indicated in every 5 cm. In the figure several fetuses that smaller than 50 cm are seen. But we have no data of very small fetuses. One of the reason is that the ovaries and the uteruses were not dissected in detail.

The group at around 100 cm body length consist of some large fetuses and some new born pups. A little distant from this group, a peak at 150 cm, though it consisted mainly the females, can be seen. This group is considered as the half-year old grown young, delivered in the previous autumn. In the adult size groups the peak for females is 180 cm and for males is 190 cm.

From looking at the figure and assuming their period of pregnancy as twelve months, two seasons for mating and partrition can be considered in spring and

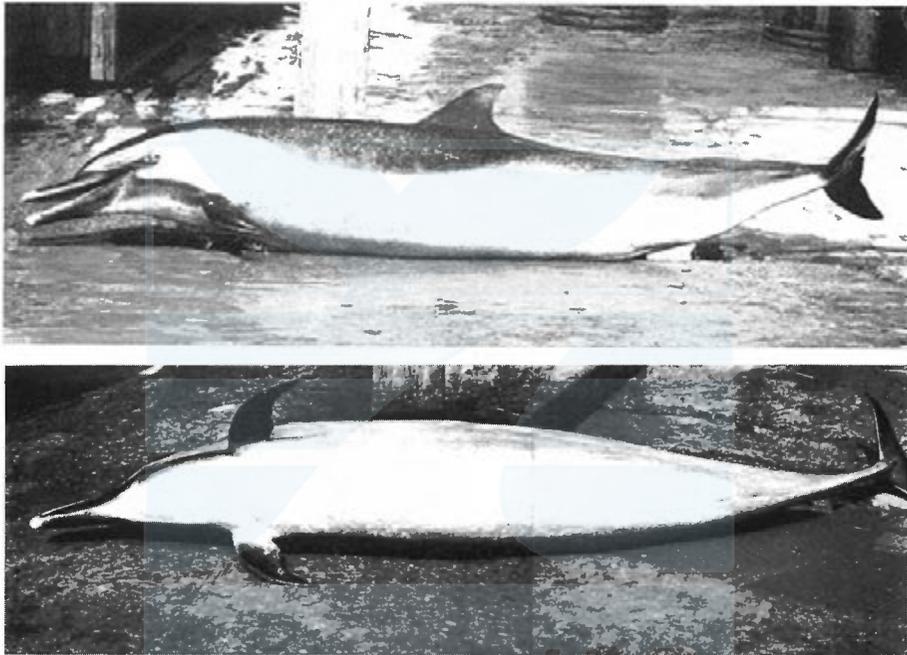


Fig. 3. Lateral and ventral views of the ARARI specimen No. 4.

autumn. The smaller group of the adult size are considered to consist of the one year old individuals. Of cause they were probably not sexually mature. The ovaries and the testes were not observed, so the body length at reaching sexual maturity and the rate of maturity on both sexes could not estimate.

Within the adult size group males are fewer than females. Males might be reduced by fighting.

Since the dolphin herd was captured in 1959, the same species of dolphin has been caught several times around Izu Peninsula until spring of 1964, but after this present observation no special examination could be made. According to the catch reports of the Fishermen's Association, it is estimated that a herd of this dolphin species usually consist about 100~300 individuals.

Tip of the beak in this dolphin species, is white and very easy to distinguish

from other dolphin species, when they are swimming or in the market. They are recognized by fishermen easily.

EXTERNAL CHARACTERS

The outer body proportions of this species are shown in Table 3 and 4 comparing the data with that of other species of genus *Stenella* the authors would say that the body form is very similar to *Delphinus delphis* rather than *Stenella caeruleo-alba*, but the shape of the flippers is different.



Fig. 3. Dorsal view of the ARARI specimen No. 4.

Body coloration: the dorsal half of the body is blueish purple black with numerous gray and white spots and the ventral half of the body is gray with numerous tiny white spots. There are no spots on the head, the dorsal fin, the flippers and the tail flukes. Those parts were observed as black. No colored zone was seen on the center of the belly as a white line. The dorsal black coloration was doubled just beneath the dorsal fin. One black colored zone began from the beak and waved to posteriorly, ending just behind the dorsal fin. Another zone, though this area was lighter than the former, began from the anterior end of the

dorsal fin and waved to the tailflukes. They crossed just beneath the dorsal fin and made a triangular shaped dark area. This resembles the coloration of the dolphins belong the genus *Delphinus*.

A black band extends from the eyes and ends at the root of the forehead on the beak. Another wide black band proceed from the anterior insertion of the

TABLE 3. EXTERNAL MEASUREMENTS OF THE ARARI SPECIMENS

Serial number	1	2	3	4	5	6	7	8	9
Sex	M	F	M	F	F	F	F	F	M
Number of teeth	45 44 43 43	43 42 42 43	44 44 42 41	44 44 43 43	41 40 40 39	40 42 41 40	39 38 36 37	34+ 33+ 35+ 35+	40 40 39 37
Skull length in mm	428	411	381	397	412	408	414		
Body length in cm	208.0 100	201.0 100	165.0 100	180.0 100	192.0 100	190.0 100	184.0 100	190.0 100	181.0 100
Tip of rostrum to anterior margin of forehead	11.0 5.3	12.0 6.0	— —	— —	10.5 5.5	10.6 5.6	13.5 7.7	12.0 6.3	11.5 6.4
Tip of rostrum to angle of gape	23.0 11.0	26.0 13.0	22.0 13.4	22.0 12.2	22.5 11.7	26.5 14.0	26.5 14.4	27.5 14.5	26.0 14.4
Tip of rostrum to center of blow hole	29.5 14.2	28.0 14.0	25.5 15.4	25.5 14.2	29.0 15.1	29.5 15.5	32.5 17.7	30.6 16.1	31.0 17.1
Tip of rostrum to center of eye	28.0 13.5	30.5 15.2	26.5 16.1	27.0 15.0	27.0 14.0	31.0 16.3	32.5 17.7	30.3 16.0	29.5 16.3
Center of eye to ear hole	6.0 2.9	6.5 3.2	— —	— —	5.5 2.9	5.0 2.6	5.5 3.0	5.4 2.9	5.5 3.0
Notch of tailflukes to posterior end of dorsal fin	— —	86.0 42.8	67.0 40.5	75.0 41.8	78.0 40.5	78.0 41.0	73.0 39.6	81.0 42.6	71.0 39.2
Notch of tailflukes to anus	55.0 26.5	52.0 26.0	41.5 25.2	49.0 27.2	50.0 26.0	48.0 25.2	50.0 27.2	49.3 26.0	46.0 25.5
Notch of tailflukes to center of umbilicus	114.0 54.8	104.0 51.8	85.0 51.6	96.0 53.2	102.0 53.0	100.0 52.6	95.0 51.6	105.0 55.2	96.0 53.0
Anus to center of genital opening	22.0 10.6	6.0 3.0	14.0 8.5	— —	6.0 3.1	6.5 3.4	7.0 3.8	7.5 4.0	15.0 8.3
Base length of dorsal fin	30.0 14.0	25.0 12.4	20.0 12.1	23.0 12.8	26.0 13.5	27.0 14.2	25.5 13.8	25.0 13.2	26.0 14.4
Height of dorsal fin	17.0 8.2	17.0 8.5	— —	— —	18.0 9.4	15.0 7.8	15.0 8.2	15.0 7.9	17.5 9.7
Total spread of tailflukes	47.0 22.5	43.0 21.4	— —	— —	45.0 23.5	43.0 22.6	43.0 23.3	40.5 21.3	39.0 21.6
Flipper : anterior insertion to tip	30.0 14.4	24.0 12.0	— —	— —	25.5 13.3	25.6 13.5	26.0 14.2	29.0 15.2	27.3 15.1
— : axilla to tip	21.0 10.1	17.0 8.5	— —	— —	18.5 9.6	16.7 8.8	19.0 10.4	20.5 10.4	19.3 10.7
— : greatest breadth	10.5 5.0	8.5 4.2	— —	— —	9.0 4.7	8.6 4.5	9.0 4.9	10.0 5.3	9.5 5.3
Remarks		Number of corpora in ovaries							
		pregnant							
		1 0							
		3 0							
						pregnant		pregnant	
						1 0		1 0	
						1 0		1 0	

flippers toward the angle of gape or a little more anterior part of the lower jaw. In *Stenella caeruleo-alba* it goes toward the eye. However the dolphins belonging to the genus *Delphinus* show the same character of this band. On the tip of their snout, a white patch was clearly seen. This is one of the important colorations.

On the body of the fetuses and the new born pups there were no white tips, although tiny white spots were barely perceptible.

TABLE 4. EXTERNAL MEASUREMENTS OF THE ARARI SPECIMENS COMPARED WITH THOSE OF *STENELLA* SPECIES

Measurements (Data expressed as percentage of body length)	Range of the male Arari Specimens	Range of the female Arari Specimens	"Atlantide" Specimen (male)	<i>Stenella plagiodon</i> (=p. dovis of True 1884 p. 319)	Type of <i>Stenella</i> <i>graffinani</i> (Lönnerberg)	<i>Prodolpinus</i> <i>foenatus</i> (female) (Ogawa specimen)	Range of <i>Stenella</i> <i>caeruleo-alba</i> from Izu, Japan
Body length (cm)	165.0-208.0	180.0-201.0	200.0	215.7	224.5	189.0	197.0-229.0
Tip of rostrum to anterior margin of forehead (snout length)	5.3- 6.4	5.5- 7.7	4.5	5.9	5.0	—	5.3- 5.9
Tip of rostrum to angle of gape	11.0- 14.4	11.7- 14.5	12.0	12.9	12.9	13.0	14.2- 14.8
Tip of rostrum to center of blow hole	14.2- 17.1	14.2- 17.7	14.8	16.1	14.5	15.6	16.0- 16.8
Tip of rostrum to center of eye	13.5- 16.3	14.0- 17.7	14.3	15.6	14.6	15.0	14.5- 16.8
Center of eye to ear hole	2.9- 3.0	2.6- 3.2	2.7	—	—	—	—
Notch of tailflukes to posterior end of dorsal fin	39.2- 40.5	39.6- 42.8	47.5	—	—	47.6	41.5- 43.8
Notch of tailflukes to anus	25.2- 26.5	25.2- 27.2	30.0	28.8	30.7	28.5	27.8
Notch of tailflukes to center of umbilicus	51.6- 54.8	51.6- 55.2	56.5	—	—	—	52.0- 55.0
Anus to center of genital opening	8.3- 10.6	3.0- 4.0	9.0	—	—	2.9	6.8- 7.2
Dorsal fin : basal length	12.1- 14.4	—	16.5	17.0	—	—	9.2- 14.4
: vertical height	8.2- 9.7	7.8- 9.4	8.0	11.2	6.7	7.9	8.3- 8.9
Tailflukes : total spread	21.6- 22.5	21.3- 23.5	22.0	24.4	20.9	21.3	22.3- 25.3
Flipper : anterior insertion to tip	14.4- 15.1	12.0- 15.2	12.0	14.1	10.5	11.0	—
— : axilla to tip	—	—	8.5	—	—	—	9.2- 10.6
— : greatest breadth	5.0- 5.3	4.2- 5.3	4.5	5.8	4.8	—	4.6- 5.2

OSTEOLOGY

The dimensions of the skull are shown in Table 3 with the comparable data of the certain other species.

The data of the present specimen quite resembled the "Atlantide" dolphin which was describe by Dr. F. C. Fraser, the snout of which is also white. It was presented as a near relative of *Stenella frontrai* and *S. doris*. The Authors feel however, although most resembling *Stenella attenuata*, it would be a independent species. The dental formula is $\frac{38 \sim 45}{36 \sim 43}$ in both sides.

The vertebral formula is as follows.

$$C7 + D15 \sim 16 + L19 \sim 18 + Ca37 = 78$$

The most anterior two in the seven cervical vertebrae are fused. The ribs are 15 or 16 pairs, there are 1 or 2 pairs of free ribs included. The individuals which have 16 pairs of ribs are observed more often than those having 15 pairs. The number of the caudal vertebrae is 37, the added number of the dorsal and the lumbar vertebrae is 34, so the total number is 78. In other words the first

TABLE 5. SKULL DIMENSIONS OF THE ARARI SPECIMENS

Serial number	1	2	3	4	5	6	7
Sex (M=male, F=female)	M	F	M	F	F	F	F
Body length in cm	208	201	165	180	192	190	184
Measurements (Data expressed as mm and percentages of skull length)							
Skull length (condylo-basal length in)	428	411	381	397	412	414	408
Rostrum length	258 60.28	252 61.31	227 59.58	244 61.45	241 58.49	250 60.39	236 57.8
Rostrum width at base	94 21.96	89 21.65	82 21.52	90 22.67	96 23.30	95 22.95	92 22.5
Rostrum width at middle	47 10.98	45 10.95	41 10.76	48 12.09	48 11.65	46 11.11	47 11.5
Rostrum width 60 mm in front of ant. orb. notches	63 14.72	62 15.09	54 14.17	61 15.37	63 15.29	61 14.73	61 15.0
Rostrum width 3/4 length	33 7.71	31 7.54	29 7.61	30 7.56	33 8.01	31 7.49	33 8.1
Width across preorbitalis	166 38.78	163 42.78	150 39.37	160 40.30	168 40.78	162 39.13	158 38.7
Width across postorbitalis	183 42.76	175 45.93	161 42.26	173 43.58	186 45.14	182 43.96	172 42.2
Width across zygomatics	161 37.62	159 39.66	160 41.99	169 42.57	165 40.05	160 38.65	152 37.3
Width between parietals	152 35.51	145 35.28	137 35.96	150 37.78	161 39.08	149 35.99	155 38.0
Maximum width of pmx. proximally	74 17.29	68 16.55	70 18.37	69 17.38	74 17.96	73 17.63	73 17.9
Tip of rostrum—ant. margin of superior nares	295 68.93	282 68.61	259 67.98	280 70.53	286 69.42	289 69.81	286 70.1
Tip of rostrum—end of pterygoid	307 71.73	294 71.53	271 71.13	286 72.04	289 70.14	302 72.95	286 70.1
Temporal fossa—length	60 14.02	60 14.60	52 13.65	53 13.35	60 14.56	58 14.01	60 14.7
Temporal fossa—height	38 8.88	42 10.22	36 9.45	34 8.56	37 8.98	35 8.45	33 8.1
Hinder end tooth row to tip of pmx. R.	218 50.93	216 52.55	196 51.44	206 51.89	206 50.00	213 51.49	199 48.7
Hinder end tooth row to tip of pmx. L.	219 51.17	215 52.31	195 51.18	206 51.89	207 50.24	212 51.21	196 48.0
Mandible length R.	362 84.58	371 90.27	322 84.51	340 85.64	350 84.95	358 86.47	342 83.8
Mandible length L.	362 84.58	369 89.78	322 84.51	341 85.89	350 84.95	359 86.71	343 84.1
Coronoid height R.	61 14.3	61 14.8	58 15.2	58 14.6	62 15.0	60 14.5	63 15.4
Coronoid height L.	60 14.0	60 14.6	58 15.2	58 14.6	61 14.8	61 14.7	61 15.0
Hinder end tooth row to tip of mandible R.	216 50.47	211 51.34	188 49.34	205 51.64	206 50.00	212 51.21	201 49.3
Hinder end tooth row to tip of mandible L.	216 50.47	210 51.09	189 49.61	206 51.89	206 50.00	211 50.97	202 49.5
Length of symphysis	73 17.06	72 17.52	66 17.32	68 17.13	66 16.02	78 18.84	69 16.9
Teeth	45 44 43 43	43 42 42 43	44 44 42 41	44 44 43 43	41 40 40 39	39 38 36 37	40 42 41 40

chevron bone appears on the 42nd bone in the vertebral column. The chevron bones are usually 28, the most anterior and the most posterior three bones are usually separated in two parts. The most anterior two chevron bones segments are fused on each side. The individual variations in the vertebral formula are very scarce. The phalangeal formula is as follows. I: 2, II: 9, III: 7, IV: 3, V: 2.

SUMMARY

1. The dolphins which had never been reported scientifically in Japan were caught on 6th July, 1959.
2. After that until spring of 1964, several herds of this species have been caught. A herd of them was measured for the body length distribution. The body length at parturition is about 105 cm, the largest one was 208 cm in males and 201 cm in females.
3. The dolphins ate small mackerel easily from the human hand.
4. The breeding seasons are inferred to be in both spring and autumn, gestation period is about 12 months, growth period to attain the adult length is about a year.
5. External body characters are as follows; white area was observed on the tips of the snout in the adults, numerous tiny spots existed on the skin, the characteristic of the black band from the eyes and the flippers resembled rather *Delphinus delphis* than *Stenella caeruleo-alba*.
6. The vertebral formula is $C7 + D15 \sim 16 + L19 \sim 18 + Ca37 = 78$. The phalangeal formula is I: 2, II: 9, III: 7, IV: 3, V: 2. The dental formula is $\frac{38 \sim 45}{36 \sim 43}$
7. The dimensions of the skull quite resembled that of the "Atlantide dolphin."
8. The authors considered the species of this dolphins as *Stenella attenuata*. The authors would like to call this species in Japanese as "ARARI-iruka".

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TABLE 6. SKULL MEASUREMENTS COMPARED

Measurement (Data expressed as percentages of skull length)	Range of the present specimen	"Atlantide" Specimen	Range of <i>Prodelphinus</i> <i>attenuata</i>	Type of <i>Prodelphinus</i> <i>attenuata</i>
Skull length (condylo-basal length)	381-428 mm	372 mm	373-423 mm	385 mm
Rostrum length	58.5-61.5%	56.2%	59.5-61.9%	59.5%
Rostrum width at base	21.5-23.3	23.4	19.9-22.3	21.8
Rostrum width at middle	10.8-12.1	12.1	9.0-10.9	9.6
Rostrum width 60 mm in front of ant. orb. notches	14.2-15.4	15.6	13.0-15.8	13.0
Rostrum width 3/4 length	7.5-8.0	8.9	6.1-7.1	6.2
Width across preorbitalis	39.1-42.8	41.1	35.5-38.2	38.2
Width across postorbitalis	42.3-45.1	46.2	39.5-42.9	42.1
Width across zygomatics	37.6-42.6	46.2	39.4-42.1	42.1
Width between parietals	35.3-39.1	39.5	32.1-36.2	35.6
Maximum width of pmx. proximally	16.6-18.4	18.5	15.5-16.6	15.8
Tip of rostrum—ant. margin of superior nares	68.0-70.5	67.2	68.9-72.4	69.3
Tip of rostrum—end of pterygoid	70.1-73.0	69.9	69.7-73.2	—
Temporal fossa—length	13.4-14.6	17.6	14.6-18.2	15.8
Temporal fossa—height	8.6-10.2	15.3	10.2-13.7	11.4
Hinder end tooth row to tip of pmx. R.	50.0-52.6	47.3	51.3-53.4	51.7
Hinder end tooth row to tip of pmx. L.	50.2-52.3	47.3	51.2-53.4	51.4
Mandible length R.	84.5-90.2	84.4	84.0-85.5	85.5
Mandible length L.	84.5-89.8	84.1	84.2-85.1	84.7
Coronoid height	14.3-15.2	16.4	13.5-14.6	13.8
Hinder end tooth row—tip of mandible R.	49.3-51.6	48.7	49.1-52.0	50.4
Hinder end tooth row—tip of mandible L.	49.6-51.9	48.9	49.1-51.7	49.8
Teeth	39 38 45 44	42 41	35 36 44 43	43 43
	36 37 43 43	39 39	38 38 43 43	43 42

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WITH VARIOUS DATA OF *STENELLA* SPECIES

Type of <i>Prodelphinus capensis</i>	Type of <i>Clymenia doris</i>	Range of <i>Clymenia doris</i> and <i>Prodelphinus doris</i>	Type of <i>Prodelphinus froenatus</i>	Type of <i>Prodelphinus frontalis</i>	Range of <i>S. frontalis</i>	<i>Prodelphinus froenatus</i>	<i>Prodelphinus longirostris</i>
413 mm	399 mm	363-408 mm	377 mm	392 mm	—	380	419
60.5%	59.4%	56.7-60.0%	57.8%	57.6%	56.2-60.0%	56.1	63.5
22.3	22.3	20.3-24.0	23.1	22.7	21.4-24.0	22.4	18.6
9.9	12.5	11.1-13.7	13.8	11.2	11.1-13.8	11.3	11.5
14.6	16.0	14.2-17.0	17.2	14.8	14.2-17.2	—	—
7.0	9.0	7.9-9.5	10.1	8.4	—	—	—
38.2	40.1	38.4-42.7	42.2	40.0	38.4-42.7	—	35.1
42.9	44.9	43.7-47.7	47.7	44.1	43.7-47.7	41.3	—
42.1	44.6	43.4-47.7	47.2	44.1	—	—	—
32.9	36.8	34.1-39.5	36.6	36.2	36.2-39.5	35.3	31.5
16.0	18.5	17.4-21.0	19.1	19.1	17.4-21.0	18.4	15.3
70.5	67.9	65.8-69.6	68.4	67.6	65.8-69.6	66.1	73.3
70.5	70.7	69.1-70.7	69.8	71.2	67.6-71.2	72.1	76.1
16.5	16.8	15.8-19.3	18.8	17.6	—	18.2	12.9
12.1	14.0	11.6-14.5	13.0	12.0	—	15.8	10.7
51.3	50.1	48.5-52.5	49.9	50.0	}46.3-52.5	}48.4	}55.4
51.8	50.9	48.8-52.0	49.1	50.5			
84.0	83.9	81.1-85.5	—	84.7	}81.3-86.3	}82.2	}86.4
84.3	84.2	81.3-86.3	—	85.2			
14.0	15.3	14.8-16.3	—	15.3	14.7-16.4	16.8	14.3
49.1	48.1	46.7-52.0	—	49.0	}46.9-52.0	}45.8	}55.8
49.1	48.1	46.9-51.2	—	48.7			
39 39	37 34	33 34 41 40	L38 R37	38 37		34 31+	59 60
38 38	34 34	33 33 40 40		37 38		30+ 29+	61 60

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EXPLANATION OF PLATES

(The figure number in the plate is given from top to bottom)

PLATE I

- Fig. 1. Left lateral view of skull of the Arari specimen (No. 1).
 Fig. 2. Dorsal views of skulls of the Arari specimen. 2, 1 and 4 from the left.
 Fig. 3. Ventral views of skulls of the Arari specimens No. 2, 1 and 4 from the left.

PLATE II

- Fig. 1. Inner lateral view of the No. 2, dorsal view of the No. 1 and outer lateral of the No. 4 of mandibles of the Arari specimens.
 Fig. 2. Dorsal view of skull of the Arari specimen, the mandible is occluded.

PLATE III

- Fig. 1. Lateral view of cervical, dorsal and lumbar vertebrae of the Arari specimen (No. 1).
 Vertebral formula is $C7+D16+L18+Ca37=78$
 Fig. 2. Lateral view of caudal vertebrae of the Arari specimen (No. 1).
 Fig. 3. Lateral view of chevron bones of the Arari specimen (No. 1).

PLATE IV

- Fig. 1. (left figure in the PLATE) Lateral view of cervical vertebrae of the Arari specimen (No. 3), showing only anterior two vertebrae fused.
 Fig. 2. Cranial views of cervicals of the Arari specimen (No. 3).
 Fig. 3. Caudal views of cervicals of the Arari specimen (No. 3).

PLATE V

- Fig. 1. Dorsal views of sternum, sternal ribs, vertebral ribs, hyoid bones and pelvic bones of the Arari specimen (No. 1).
 Fig. 2. (lower left) Detailed figure of pelvic bones of the Arari specimen (No. 1).
 Fig. 3. (lower right) Detailed figure of hyoid bones of the Arari specimen (No. 1).

PLATE VI

- Fig. 1. Dorsal views of the bones of flipper with scapula of the Arari specimen (No. 1).
 Phalangeal formula is I : 2, II : 9, III : 7, IV : 3, V : 2.
 Fig. 2. Tympanic bulla of the Arari specimen (No. 4).

