

STENELLA CLYMENE, A REDISCOVERED TROPICAL
DOLPHIN OF THE ATLANTIC

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ABSTRACT.—*Stenella clymene* has not been recognized as a valid species in recent lists of cetaceans. Examination of new material allows the redescription of this valid species. Externally, it closely resembles *S. longirostris*; cranially, it resembles *S. coeruleoalba* in shape, but is smaller. *S. clymene* shares many features with these two species and is probably closely related to both of them. *S. clymene* is now known from New Jersey, Florida (both coasts), Texas, the Caribbean, the mid-Atlantic and West Africa. New records of *S. longirostris* extend its known range in the western Atlantic north to Cape Hatteras and south to Rio de Janeiro.

Gray (1846) described *Stenella clymene* (as *Delphinus metis*) from a single skull from an unknown locality. This nominal species was subsequently placed in the synonymies of other species or considered separately, and its habitat and external appearance have remained unknown. On the basis of examination of new material, we have determined that the species is valid, that it inhabits the tropical Atlantic and that it is closely related to *S. longirostris*, the spinner dolphin.

We first suspected that *S. clymene* is a valid species in 1975, when one of us (WFP) noted resemblance of the skulls of two dolphins from the Texas Gulf Coast to the holotype of *S. clymene* in the British Museum. Photographs of the Texas dolphins showed them to have coloration similar to that of the spinner dolphin, *S. longirostris*. In shape, the skull of *S. clymene* closely resembles that of the striped dolphin, *S. coeruleoalba*. This discordant resemblance of the skull of *S. clymene* to that of one species and the external appearance to that of another perhaps accounts for the long-standing uncertainty concerning the existence of the species. The new material has made possible for the first time examination of adequate suites of external and skeletal data from the same specimens.

MATERIALS AND METHODS

Varying combinations of skeletal, external, and photographic data were available for 71 specimens of spinner dolphins or spinner dolphin-like specimens from the Atlantic. The holotypes of *S. clymene* and *S. longirostris*, from unknown localities, and an additional skull from an unknown locality but labeled *S. clymene* were examined. Of the total of 74, 19 were judged to be *S. clymene* and 55 were assigned to *S. longirostris*. In addition, 21 skulls of *S. coeruleoalba* from the Atlantic and two holotypes of species in the synonymy of *S. coeruleoalba* but from unknown localities were measured, and additional measurements of skulls of that species were extracted from the literature (True, 1889; Busnel et al., 1968; van Bree et al., 1969; Robineau, 1972) and, for some of the specimens listed below, from unpublished notes by F. C. Fraser.

Measurements of skeletal characters were made as described by Perrin (1975). External measurements follow the Committee on Marine Mammals (American Society of Mammalogists, 1961). Distal fusion of premaxillaries and maxillaries was used as the criterion of adulthood for inclusion of skulls in adult series. Specimens were adjudged physically mature (for inclusion in adult series of postcranial skeletons) if all vertebral epiphyses were fused to the centra.

We examined 17 of the 31 specimens of *S. coeruleoalba* for distal fusion of the premaxillaries and maxillaries. Only 6 (with condylobasal lengths of 435, 436, 442, 460, 465, and 491 mm) exhibited fusion. To increase the sample size we included an additional 12 skulls \geq 435 mm long (CB = 435–466), of which 6 (CB = 436–457) were known juveniles and 6 were of undetermined age. The holotype of *S. coeruleoalba* (ZMB 51226) was destroyed during World War II. The holotype, although possessing the color pattern definitive of this species, was a juvenile (CB = 403, no distal fusion evident in figure published by True, 1889).

Specimens included.—Specimens of *S. clymene* are listed in the redescription of that species. Full names of institutions are included in Acknowledgments.

Stenella longirostris.—U.S. ATLANTIC COAST: Cape Hatteras, North Carolina, 2 (USNM 291352, 504524; 291352 may have been collected in the former fishery for bottlenose dolphins, *Tursiops truncatus*, at Cape Hatteras—Mead, 1975); Bulls Island, South Carolina, 1 (USNM 500859); Mayport, Florida, 2 (R-3-SLS, R-4-SLS: in possession of DKC); Miami, Florida, 1 (University of Miami, Department of Zoology, unnumbered). GULF OF MEXICO: Casey Key, Florida, 25 (USNM 504433–504456, 504460); Dog Island, Florida, 3 (USNM 504223, 504224; UF 7861); Fort Walton, Florida, 1 (LSUMZ 17017); Sabine Pass, Texas, 1 (TCWC 28286); Padre Island, Texas, 3 (TCWC 29035 and 2 unnumbered for which skeletal specimens were not saved). CARIBBEAN: Cuba, 1 (STV #1, only photo seen); St. Vincent, Lesser Antilles, 6 (SV-1-SL, SV-2-SL, SV-3-SL, SV-4-SL, SV-5-SL, SV-6-SL; in possession of DKC); Venezuela, 1 (ZMA 15.138). WEST AFRICA: Vridi, Ivory Coast, 1 (USNM 470557); Liberia, 1 (RMNH 21.720); Senegal, 5 (ZMA 12.263, 13.146; 13.147, IFAN no. 2; EDM 784). UNKNOWN LOCALITY: 1 (RMNH 8676: the holotype of *S. longirostris*).

Stenella coeruleoalba.—MEDITERRANEAN: France, 1 (MNHN A3021: the holotype of *Delphinus tethyos* Gervais 1853). EASTERN NORTH ATLANTIC: Cornwall, England, 2 (BMNH SW19341, 1940.3.2.1); N. Devon, England, 1 (BMNH 1938.2.5.1); 44°00'N latitude, 28°24'W longitude, 1 (EDM 758). WESTERN NORTH ATLANTIC: Massachusetts, 2 (USNM 20877, MCZ 51763); New York, 2 (USNM 504086, 504261); 37°42'N latitude, 73°34'W longitude, 1 (MCZ 50406); 37°10'N latitude, 74°00'W longitude, 1 (MCZ 51708); Virginia, 1 (USNM 504859); North Carolina, 4 (USNM 504134, 504761, 504880, and 504885); 37°28'N latitude, 72°09'W longitude, 1 (EDM 798). CARIBBEAN: St. Vincent, Lesser Antilles, 1 (SV-78-1-SC, in possession of DKC). WESTERN SOUTH ATLANTIC: Rio de la Plata, 1 (ZMB 51226: the holotype of *Delphinus coeruleoalbus* Meyen 1833). UNKNOWN LOCALITIES IN ATLANTIC: 2 (UZMC no. 18 and UZMC no. 1). UNKNOWN LOCALITIES: 2 (BMNH 1861.4.2.7: the holotype of *Tursio dorcides* Gray 1866; BMNH 1920.5.13.1: the holotype of *Delphinus euphrosyne* Gray 1846).

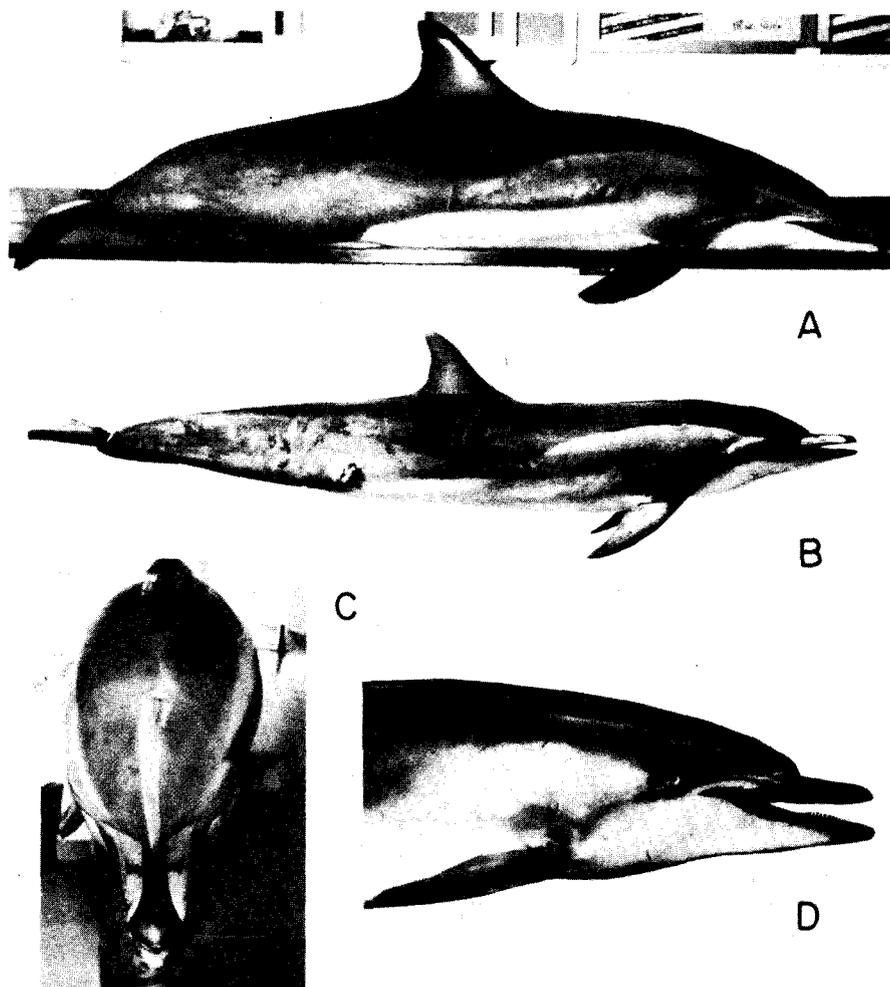
Redescription of *Stenella clymene*

1846. *Delphinus metis* Gray [no. 2], Zoology of the voyage of H.M.S. *Erebus* and *Terror*, 1 (Mammalia): 39 (not pl. 18; not *Delphinus metis* Gray, 1846:38 = *Tursiops truncatus*).
1850. *Delphinus clymene* Gray, Cat. Mamm. British Mus., Cetacea, p. 115 (replacement name for *D. metis* Gray 1846:39, preoccupied by *D. metis* Gray 1846:38).
1866. *Clymene normalis* Gray, Proc. Zool. Soc. London, 1866 (a):214.
1868. *Clymenia normalis*, Gray, Synopsis whales and dolphins, British Mus., p. 6.
1884. *Delphinus clymene*, Flower, Proc. Zool. Soc. London, 1883:498.
1898. [*Prodelphinus*] *clymene*, Trouessart, Cat. Mamm., p. 1036.
[*Prodelphinus*] *normalis*, Trouessart, Cat. Mamm., p. 1036.
1966. *Stenella clymene*, Hershkovitz, Bull. U.S. Natl. Mus., 246:26.

Holotype and type locality.—Adult skull, British Museum of Natural History (BMNH) no. 350a, no accompanying data.

Distribution.—Tropical and subtropical Atlantic. Not known to occur in Indian or Pacific oceans. This is unusual for a tropical cetacean. Perrin et al. (1978) noted the possible existence of endemic tropical dolphins in the Atlantic and speculated that they may represent forms that arose during Pleistocene isolation of the warm Atlantic from the Indopacific.

Diagnosis.—The color pattern of *S. clymene* (Figs. 1 and 2) differs from the very similar pattern of *S. longirostris* as follows: the ventral margin of the cape below the dorsal fin dips toward the ventral margin of the lateral field (terminology of Perrin, 1969, 1972), whereas in *S. longirostris* the two margins are parallel for most of the length of the animal; the upper and lower margins of the flipper stripe converge markedly as they approach the eye, whereas in *S. longirostris* they are all but parallel; and the black tip of the beak is bordered dorsally with a distinctive pale-gray-to-white



(USNM 504408); (B) lateral view of Curacao specimen (AMNH 239115—suspended vertically from rope around flukes), and (D) lateral view of anterior portion of Florida specimen (R-1-SLS).

blaze, instead of with the pale-to-dark-gray field that is adjacent to the black tip in *S. longirostris*. The blaze interrupts the black gape border distally, just behind the black beak tip, heightening the visual impact of the blaze. The eye stripe in most delphinids, including most specimens of *S. longirostris*, extends forward to the apex of the melon. At about one-third of the distance from melon apex to beak tip, the line zig-zags several times before merging with the black dorso-mesial mark that includes the beak tip, yielding a variable "moustache mark" in dorsal view. The blowhole stripe (from blowhole to apex of melon) is approximately the width of the blowhole and is composed of pale bordering lines enclosing a slightly darker-gray area and a faint pale-gray mesial line, yielding an overall impression of a pale stripe shading abruptly into the black mesial mark of the beak.

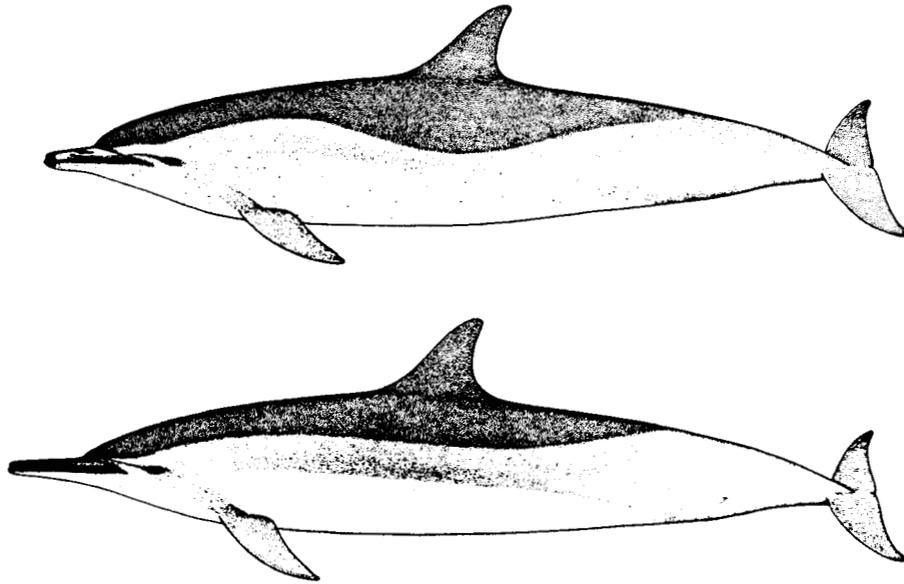


FIG. 2.—Color patterns of *Stenella clymene* (top, drawn from photographs of USNM 504408, R-1-SLS, and AMNH 239115) and *S. longirostris* (bottom, drawn from photographs of several specimens).

External measurements for 10 specimens are in Table 1. Six adult specimens ranged from 183 to 196 cm long. Two of these were physically mature and were 184 and 186 cm long. The beak is relatively short, 9–11 cm long in the 8 adult specimens for which this measurement was taken.

Adult skulls of *S. clymene* can be separated from the skulls of the closely related *S. longirostris* and *S. coeruleoalba* by their relative length and breadth (Figs. 3 and 4).

Comparisons.—The color pattern (Figs. 1 and 2) resembles that described by Perrin (1972) for *S. longirostris* in Hawaiian waters, a pattern also typical for that species in the Atlantic (Leatherwood et al., 1976). Points of close correspondence are a three-part pattern consisting of dark-gray cape, pale-gray lateral field, and white ventral field; a dip in the ventral margin of the cape over the eye; flipper stripe from flipper to eye and bordered above by a pale stripe; pale gular region; and a system of black markings that border the gape, cover the tip of the beak, and extend posteriorly along the midline of the beak to the apex of the melon, whence it continues as a pale stripe posteriorly to the blowhole. These features separate *S. clymene* and *S. longirostris* from the other beaked dolphins, including *S. attenuatafrontalis* (nomenclature unsettled—IWC, 1975), *S. plagiodon*, *S. coeruleoalba*, *Delphinus delphis*, *Tursiops truncatus*, *Lagenodelphis hosei*, *Lagenorhynchus* spp., and *Steno bredanensis*. The white ventral field in *S. clymene*, as in some specimens of *S. longirostris*, is flecked with very small irregular dark spots. The spots are most numerous near the border of the lateral gray field.

The beak is shorter than in adult specimens of *S. longirostris* (Table 2). *S. clymene* also has relatively small flippers, on the average about 2 cm shorter and 1 cm narrower than in *S. longirostris*. Although the sample sizes are small, *S. clymene* also may have a smaller dorsal fin and greater axillary girth than does *S. longirostris*.

TABLE 1.—Selected external measurements of 10 specimens of *Stenella clymene*. Estimates are in parentheses.

	UZMC Lütken #7	UZMC Lütken #9	UZMC Lütken #13	IFAN (no no.)	AMNH 239115	Caldwell R-3-SLS	USNM 504308	UF14186	UF14187	UF14188
Sex	F	M?	M		F	M	M	M	M	M
Adult?	(No)	(Yes)	(Yes)		Yes	Yes	Yes	(Yes)	(Yes)	(Yes)
Total length (cm)	168	177	185	183	188	184	186	196	187	184
Tip of upper jaw (c):										
apex of melon		9		10	11	10	10	11	11	11
center of blowhole	31	29	32	31	27	29	29	28	32	32
center of eye	29		33	30	30	28	28	(~32)		
end of gape				26	26	24	24	26	28	27
ant. insertion of flipper	43		48		45	40	42	44	43	44
umbilical scar					92	87	89			
center of genital slit					134	118	121	123	116	118
center of anus					139	133	137	142	131	133
Girth at axilla					85	95	93			
Girth at anus	56		62		56	66	68			
Ant. length of flipper		22*		29	28	28	28	28	29	22*
Width of flipper		8		8	9	8	9	9	9	8
Width of flukes		43			47	48	46	(~43)	(~46)	(~45)
Height of dorsal fin				29*	16	20	16	18	18	
Weight (kg)				58	68.2		85.8			
Measurements by:	From Lütken (1889); long measurements may not have been taken parallel to body axis.			From Cadenat and Doutre (1958)	EDM	DKC	JGM	R. S. Wells	R. S. Wells	R. S. Wells

* Apparently anomalous due to measuring technique.

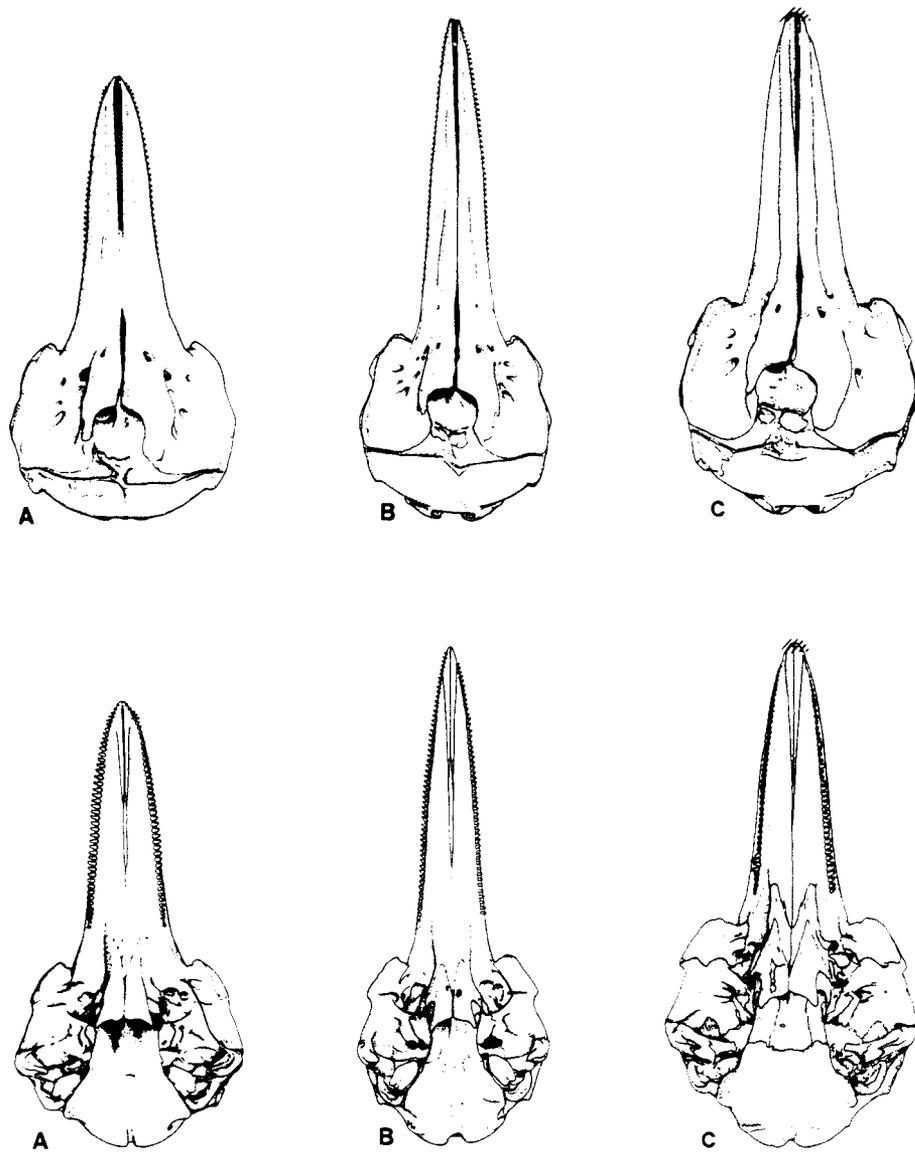


FIG. 3.—Comparison of skulls of *Stenella clymene* (A, drawn from R-1-SLS, physically mature male, CB length = 392—broken teeth have been restored in the drawing), *S. longirostris* (B, drawn from R-3-SLS, sexually mature female, CB length = 437 mm), and *S. coeruleoalba* (C, drawn from USNM 504885, male, CB length = 436 mm, ≈ 5 mm missing rostrum tip restored and cross hatched).

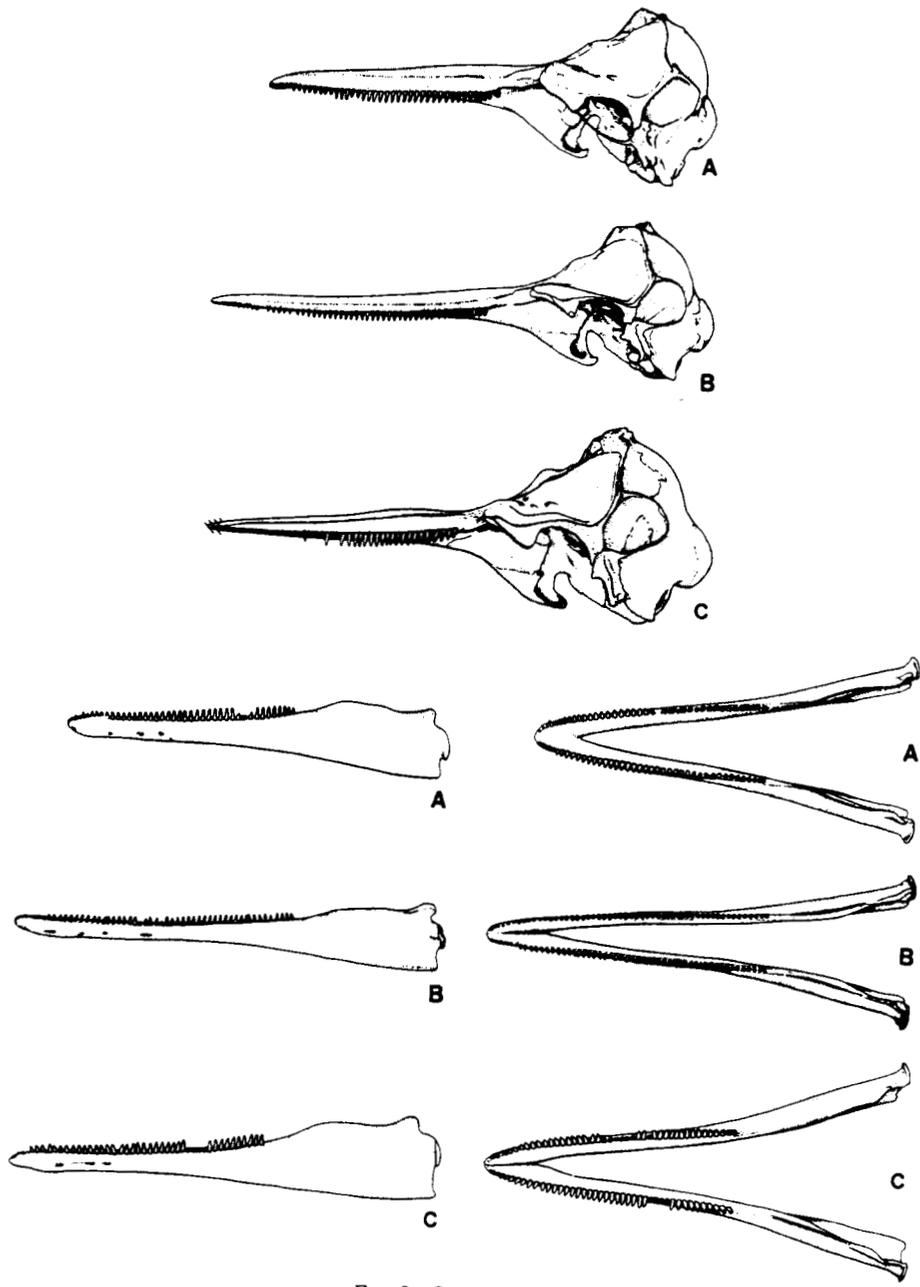


FIG. 3—Continued.

TABLE 2.—Means, standard deviations (for sample sizes >30), sample sizes (in parentheses), and extremes for selected external measurements (in cm) of adult specimens of *Stenella clymene* and *S. longirostris*. Males and females considered separately for measurements found by Perrin (1975) to vary by sex in *S. longirostris*.

	<i>Stenella clymene</i>		<i>S. longirostris</i>	
	Males	Females	Males	Females
Total length	185.6 (7) 177-196*	188 (1)	192.5 (17) 173-208**	188.9 (17) 177-204***
Tip of upper jaw to:				
apex of melon	10.3 (6) 9-11	11 (1)	17.0 (16) 13-19	17.9 (16) 16-20
center of blowhole (M&F)	29.8 (8) 28-32		33.3 ± 2.11 (35) 30-39	
center of eye (M&F)	29.8 (4) 28-33		33.4 ± 1.54 (34) 30-36	
end of gape (M&F)	25.8 (6) 24-28		29.5 ± 1.93 (35) 25-33	
anterior insertion of flipper (M&F)	43.7 (7) 40-45		47.1 ± 2.42 (35) 41-53	
umbilical scar (M&F)	89.3 (3) 87-92		93.9 (23) 85-101	
center of genital slit	119.2 (5) 116-123	134 (1)	24.6 (13) 112-135	133.0 (14) 125-149
center of anus	135.2 (5) 131-142	139 (1)	142.0 (13) 128-151	135.3 (3) 130-142
Girth at axilla	94.0 (2) 93-95	85 (1)	85.9 (13) 78-94	85.2 (14) 80-98
Girth at anus	65.3 (3) 62-68	56 (1)	65.2 (12) 52-95	57.3 (14) 48-98
Anterior length of flipper (M&F)	26.8 (8) 22-29		28.9 ± 2.38 (34) 25-38	
Width of flipper (M&F)	8.5 (8) 8-9		9.6 ± 0.77 (34) 8-11	
Width of flukes	45.7 (3) 43-48	47 (1)	45.4 (16) 40-53	41.3 (17) 36-48
Height of dorsal fin	18.0 (4) 16-20	16 (1)	19.3 (17) 15-25	18.0 (17) 16-20

* Two physically mature were 184 and 186 cm long.

** Four physically mature were 192-208 cm long.

*** Two physically mature were 196 and 201 cm long.

The skull of *S. clymene* (Fig. 3, Table 3) shares a complex of features with several other small pelagic delphinids with dorsal fin and externally well-defined beak (*S. longirostris*, *S. coeruleoalba*, *Delphinus delphis*, and *Lagenodelphis hosei*): 1) a relatively small temporal fossa (reflecting a small temporal muscle); 2) a relatively large number (typically more than 40 in each row) of small, slender teeth; 3) poorly developed alveoli in the distal 1 cm or so of upper and lower jaws in most specimens; 4) proximal halves of upper and lower toothrows parallel or nearly so; 5) a relatively short mandibular symphysis; 6) distal half of the rostrum markedly flattened dorso-ventrally; and 7) a grooved palate (grooves nearly absent in some specimens of *S. longirostris* and *S. coeruleoalba*). In all of these features *S. clymene* is unlike the other small pelagic (or partially pelagic) delphinids with dorsal fin and externally well-defined beak (*S. attenuata/frontalis* complex, *S. plagiodon*, and *Tursiops truncatus*).

In comparison with *S. longirostris*, the skull of *S. clymene* is relatively short and broad. The present series of specimens of the two species do not overlap in length of the rostrum, preorbital width, postorbital width, and length of the upper toothrow (Table 3). In some measurements, however, particularly those of the internal nares,

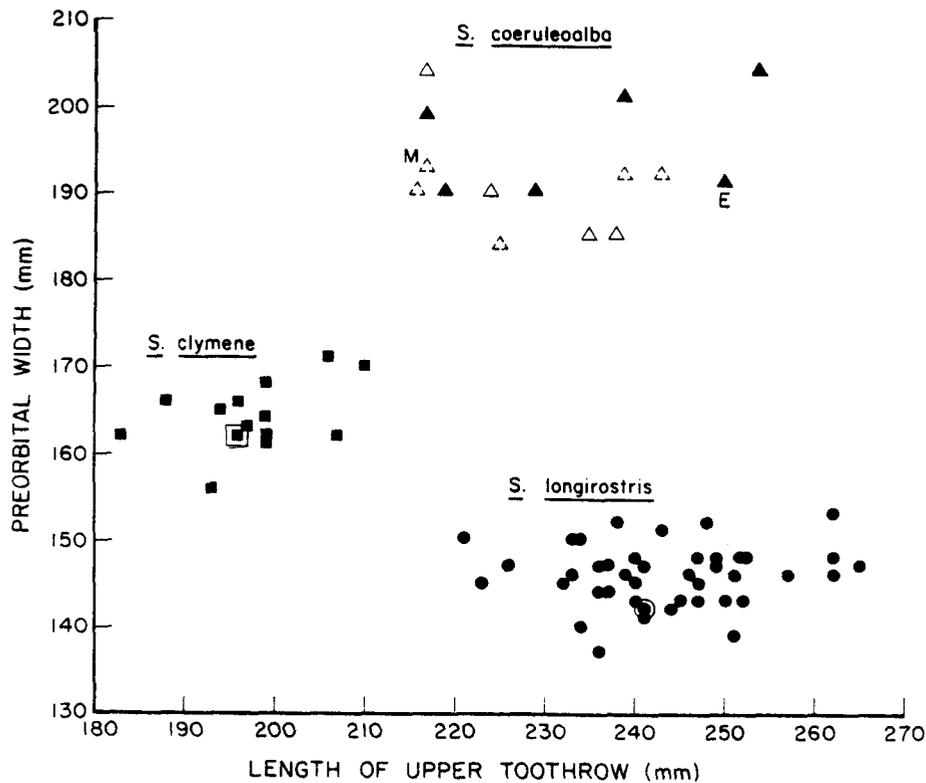


FIG. 4.—Scatterplot of preorbital width of the skull against length of the upper tooththrow for 17 specimens of *Stenella clymene*, 12 of *S. coeruleoalba*, and 40 of *S. longirostris*. For *S. coeruleoalba*, solid triangles are known adults (see text), line triangles are near-adult, and dashed triangles are of unknown status. E is the holotype of *Delphinus euphrosyne* Gray, 1846, and M is the holotype of *D. marginatus* Pucheran 1868. Enclosed symbols are holotype of *S. clymene* and *S. longirostris*.

the orbit, the temporal fossa, and the brain case, there is little or no difference between the two species.

F. C. Fraser of the British Museum was the first to note the similarity of the skull of *S. clymene* to that of *S. coeruleoalba* (unpublished notes given to WFP in June 1973). He also recognized that the skull of *S. clymene* is smaller than that of *S. coeruleoalba* and tentatively referred to *S. clymene* three small skulls referred by Lütken (1889) to nominal species now in the synonymy of *S. coeruleoalba* (*Prodelphinus euphrosyne* and *P. euphrosynoides*). *S. clymene* is more like *S. coeruleoalba* than like *S. longirostris* in all measurements of the skull taken as percentages of condylobasal length (Table 4). In the measurements taken as percentages of parietal width (Table 4), however, *S. clymene* is closer to *S. coeruleoalba* except for measurements of the premaxillaries, the temporal fossa, orbit, preorbital process, and internal nares. Differences among the three species in these characters are slight.

A scatterplot of preorbital width against length of the upper tooththrow (Fig. 4) separates the present series of specimens of the three species and summarizes the differences between them in shape; *S. clymene* and *S. coeruleoalba* are similar in shape but different in size, whereas *S. longirostris* differs from the other two in being longer

TABLE 3.—Means, standard deviations (for sample sizes >30), sample sizes (in parentheses), and extremes for selected skull measurements (in mm) and skull and postcranial meristics for adult specimens of *Stenella clymene*, *S. longirostris*, and *S. coeruleoalba*,¹ and skull measurements and tooth counts for the holotype of *S. longirostris*.

	<i>Stenella clymene</i>	<i>S. longirostris</i> from Atlantic	Holotype of <i>S.</i> <i>longi-</i> <i>rostris</i>	<i>S. coeruleoalba</i>
Condylobasal length	390.0 (14) 376-409	427.0 ± 13.10 (41) 395-458	426	452.4 (18) 441-491
Length of rostrum	233.0 (14) 218-250	276.8 ± 11.00 (41) 251-304	277	264.4 (18) 246-289
Width of rostr. at base	89.4 (14) 80-90	75.6 ± 3.41 (42) 68-83	76	105.5 (18) 93-115
Width of rostr. at ½ length	52.4 (14) 49-58	44.4 ± 2.30 (41) 41-50	48	56.6 (18) 51-66
Width of pmx's at ½ length	25.3 (14) 21-29	21.0 ± 2.32 (37) 17-32		27.7 (17) 23-32
Width of rostr. at ¾ length	39.7 (14) 36-44	31.9 ± 2.63 (39) 25-39	36	42.8 (11) 36-52
Greatest preorb. width	164.1 (14) 156-171	145.6 ± 3.86 (42) 137-153	142	192.0 (16) 184-204
Greatest postorb. width	181.6 (14) 171-190	161.1 ± 4.03 (41) 152-169	159	211.3 (17) 189-225
Greatest width of ext. nares	43.6 (14) 40-48	41.8 ± 1.63 (38) 38-45		48.7 (16) 45-52
Zygomatic width	179.1 (14) 167-189	159.2 ± 3.92 (40) 150-167	156	209.3 (17) 193-225
Greatest width of pmx's	69.3 (14) 62-74	64.8 ± 2.38 (42) 60-71	58	83.8 (18) 77-93
Parietal width	140.6 (14) 135-146	130.5 ± 4.25 (41) 121-140	125	162.4 (17) 152-169
Height of braincase	94.2 (14) 88-102	93.1 ± 3.94 (38) 85-107		107.7 (11) 98-119
Int. length of braincase	106.8 (14) 99-114	106.4 ± 3.77 (37) 99-114		127.1 (11) 124-136
Length of temporal fossa	51.3 (14) 45-56	48.1 ± 3.30 (42) 42-56	50	64.6 (18) 53-72
Height of temporal fossa	39.2 (14) 32-44	38.3 ± 3.52 (42) 30-49	43	48.9 (18) 37-61
Length of orbit	46.2 (13) 44-48	41.8 ± 2.10 (39) 39-50		51.6 (11) 38-58
Length of preorb. process	46.9 (14) 43-50	43.4 ± 2.23 (39) 38-48		57.3 (11) 47-64
Width of int. nares	50.4 (14) 47-55	46.5 ± 2.26 (37) 42-53		60.3 (11) 55-69
Length of upper toothrow	198.1 (14) 183-210	243.5 ± 10.30 (41) 221-265	241	230.8 (15) 216-254
Teeth: u. (avg.)	43.6 (10) 39-49	55.4 ± 3.01 (41) 48-64	54 & 53	45.2 (26) 39-51
l. (avg.)	42.6 (10) 38-47	53.9 ± 3.32 (43) 47-62	52 & 54	44.8 (27) 39-55
Length of ramus	330.9 (13) 316-347	368.4 ± 11.68 (40) 343-399	368	386.3 (16) 367-419

TABLE 3.—Continued.

	<i>Stenella clymene</i>	<i>S. longirostris</i> from Atlantic	Holotype of <i>S.</i> <i>longi-</i> <i>rostris</i>	<i>S. coeruleoalba</i>
Height of ramus	58.3 (13) 56–62	56.4 ± 2.28 (41) 51–61	57	68.4 (16) 64–74
Diameter of tooth (at midlength of lower row, transverse at alveolus)	2.87 (11) 2.4–3.4	2.47 (29) 2.1–3.0		3.56 (9) 3.0–4.1
Depth of palatal groove (at midlength of rostrum)	1.4 (11) 1–2	1.0 ± 0.17 (34) 1–2		0.8 (11) 0–1
Total no. of vertebrae	73.8 (6) 73–75	71.7 (27) 69–75		76.2 (9) 71–79
No. of thoracic vertebrae	14.5 (6) 14–15	14.6 (26) 13–16		14.4 (10) 13–15
No. of lumbar vertebrae	18.6 (5) 17–21	17.7 (23) 16–21		22.5 (4) 22–23
No. of caudal vertebrae	33.0 (5) 31–35	32.3 (22) 31–34		33.3 (3) 32–35

¹ Includes 29 Atlantic and Mediterranean specimens (including holotypes of *D. tethyos* Gervais 1853 and *D. marginatus* Purcheran 1856) and holotypes of *Tursio dorcides* Gray 1866 and *D. euphrosyne* Gray 1846, both from unknown localities.

and narrower. No small juvenile skulls of *S. clymene* were available for study; they may prove difficult to separate from juvenile skulls of *S. coeruleoalba*.

Tooth counts overlap in the three species (Table 3), but *S. clymene* has about as many teeth per row (38–49) as does *S. coeruleoalba* (39–55), about 10 fewer than in *S. longirostris* (47–64). The range of within-species variation in vertebral count in the present series is smaller than that in tooth count (3–8 versus 11–16). The range for *S. clymene* (73–75, $n = 6$) is similar to that for *S. longirostris* (69–75, $n = 27$), whereas *S. coeruleoalba* may have more vertebrae (71–79, $n = 9$). The difference is mainly in the lumbar series (17–21 in *S. clymene*, 16–21 in *S. longirostris*, and 22–23 in *S. coeruleoalba*).

The palatal grooves that are markedly developed in *Delphinus delphis* and *Lagenodelphis hosei* are present in *S. clymene*, albeit only 1 to 2 mm deep (at half-length of the rostrum). The grooves are also present in *S. longirostris* and *S. coeruleoalba*, although in some specimens of both species they may be so weakly expressed as to all but disappear beyond about the proximal one-third of the osseous palate.

Relationships.—Of three major functional complexes definable in the delphinid skull and assessed in the present series of specimens (braincase, feeding apparatus, and breathing and sound-making apparatus), the braincase appears to be the least plastic (Perrin, 1975), the feeding apparatus the most plastic. Based on the close similarity of *S. clymene* to *S. longirostris* in some cranial dimensions and in color pattern, we suspect that *S. clymene* is more closely related to *S. longirostris* than to *S. coeruleoalba*. This implies that the similarity in skull shape to that of the externally dissimilar *S. coeruleoalba* reflects a convergence affecting mainly the feeding apparatus and the breathing and sound-making complex (the beak and the "face"), perhaps reflecting a convergence in species, size, or depth-distribution of prey and in foraging tactics.

Arnason (1980) described the C- and G-banded karyotypes of *S. clymene* and found them to be strikingly similar to those of the white-beaked dolphin, *Lagenorhynchus albirostris*, and the harbor porpoise, *Phocoena phocoena*, with chromosome number

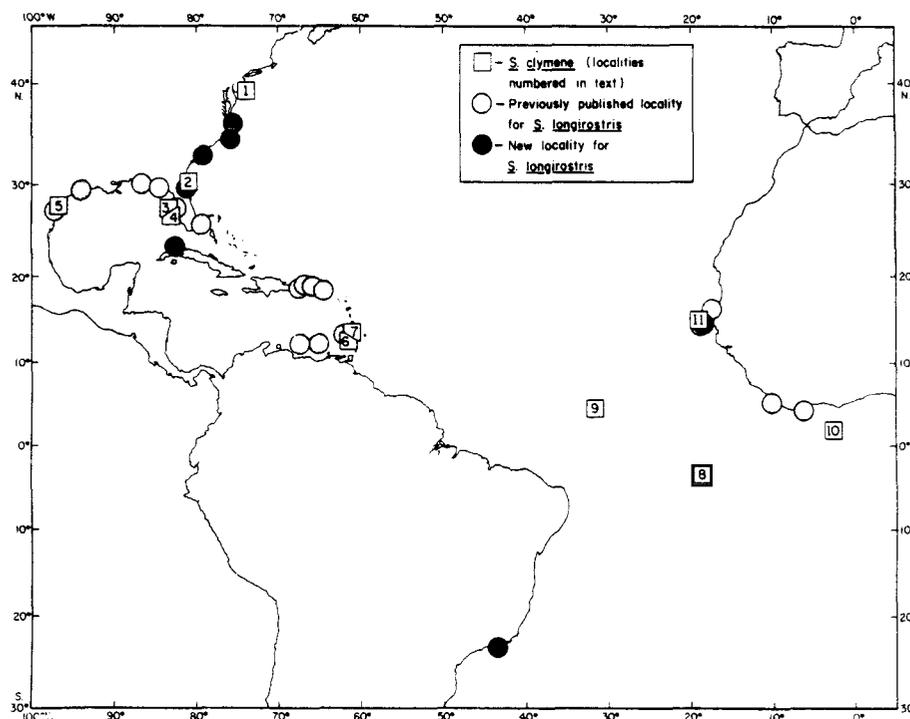


FIG. 5.—Distribution of *S. clymene* and *S. longirostris* in the Atlantic.

of $2n = 44$. He found no differences between G-banded karyotypes of *S. clymene*, *S. plagiodon*, and *Tursiops truncatus*, and only a few minor differences between their C-banded karyotypes, indicating a high degree of karyotypic conservatism in the Delphinidae.

Ecology.—*Stenella clymene* has been observed at sea only in deep water (250 to 5,000 m or deeper). It appears that it may be a midwater or night feeder on small fishes and squids. The stomach of the specimen stranded in New Jersey contained one pair of squid beaks (unidentified) and over 800 very small otoliths. The otoliths were badly eroded and could be identified only to genus or family. Myctophids predominated; there were 780 otoliths of *Ceratoscopelus* sp., seven of *Lampanyctus* spp. (at least 2 species), and seven of *Symbolophorus* sp. In addition to the myctophid remains, there were five otoliths tentatively identified as of an argentinid, one of *Bregmaceros* sp., and three unidentified otoliths. All the myctophids, except *Lampanyctus* spp. and *Bregmaceros* sp., are mesopelagic but are known to reach the surface at night during the course of vertical migrations (Perrin et al., 1973). *Lampanyctus* usually does not occur in surface waters even at night. The diet of this specimen was similar to that of *S. longirostris* in the eastern Pacific (Fitch and Brownell, 1968; Perrin et al., 1973) and *S. coeruleoalba* in the western Pacific (Miyazaki et al., 1973).

The Caribbean specimen (AMNH 239115) exhibited several well-healed circular or oval scars representing wounds that may have been made by the "cookie-cutter shark," *Isistius brasiliensis* (Jones, 1971). One animal photographed at sea had a fresh oval wound, on its back, of the type inflicted by this small pelagic shark.

TABLE 4.—Skull proportions in *Stenella clymene*, *S. longirostris*, and *S. coeruleoalba* calculated as percentages of condylobasal length and of parietal width, from mean values in Table 3.

	Percentage of condylobasal length			Percentage of parietal width		
	<i>S. clymene</i>	<i>S. longirostris</i>	<i>S. coeruleoalba</i>	<i>S. clymene</i>	<i>S. longirostris</i>	<i>S. coeruleoalba</i>
Condylobasal length	—	—	—	227.4	327.2	278.6
Length of rostrum	59.7	64.8	*58.4	165.7	212.1	162.8
Width of rostrum at base	22.9	17.7	*23.3	63.8	57.9	65.0
Width of rostrum at ½ length	13.4	10.4	*12.5	37.3	34.0	34.9
Width of pmx's at ½ length	6.5	4.9	*6.1	18.0	16.1	17.1
Width of rostrum at ¾ length	10.2	7.5	*9.5	28.2	24.4	26.4
Greatest preorbital width	42.1	34.1	*42.4	116.7	111.6	118.2
Greatest postorbital width	46.6	37.7	*46.7	129.2	123.5	130.1
Greatest width of external nares	11.2	9.8	*10.8	31.0	32.0	30.0
Zygomatic width	45.9	37.3	*46.3	127.4	122.0	128.9
Greatest width of premaxillaries	17.8	15.2	*18.5	49.3	50.0	51.6
Parietal width	36.1	30.6	*35.9			
Height of braincase	24.2	21.8	*23.8	67.0	71.3	66.3
Internal length of braincase	27.4	24.9	*28.1	76.0	81.5	78.4
Length of temporal fossa	13.2	11.3	*14.3	36.5	**36.9	39.8
Height of temporal fossa	10.1	9.0	*10.8	27.9	**29.4	30.1
Length of orbit	11.9	9.8	*11.4	32.9	**32.0	31.8
Length of preorbital process	12.0	10.2	*12.7	33.4	**33.3	35.3
Width of internal nares	12.9	10.9	*13.3	35.9	**35.6	37.1
Length of upper toothrow	50.8	57.0	*51.0	140.9	186.7	142.1
Length of ramus	84.9	86.3	*85.4	235.4	282.3	237.9
Height of ramus	15.0	13.2	*15.1	41.5	43.2	42.1

* *S. clymene* closer to *S. coeruleoalba* than to *S. longirostris*.** *S. clymene* closer to *S. longirostris* than to *S. coeruleoalba*.

Behavior.—In the Caribbean, this dolphin has been observed to “spin” (R. V. Walker, pers. comm.). The spinning leaps observed, however, were not as high or complex as those exhibited by the spinner dolphin, *S. longirostris* (Hester et al., 1963). Several individuals seen in the Gulf of Guinea rode the bow wave, and the animals have approached vessels sufficiently closely on several occasions to make them vulnerable to harpooning from the bow. A school of this species was seen in the company of a large school of common dolphins, *Delphinus delphis*, off the coast of West Africa (Cadenat and Doutre, 1958).

Common name.—This dolphin has not had a vernacular name in the literature, aside from Gray's (1846) “the Clymene.” We propose that it be called “the clymene dolphin.”

Specimens examined and records of occurrence (numbered in Fig. 5).—U.S. ATLANTIC COAST: near Ocean City, New Jersey (Locality 1), 1 (USNM 504408); St. Augustine, Florida (Loc. 2), 3 (R-1-SLS and R-2-SLS, in possession of DKC; R-3-SLS, photograph only, in possession of DKC). GULF OF MEXICO: Sarasota Bay, Florida (Loc. 3), 3 (UF 14186–8); St. Petersburg, Florida (Loc. 4), 2 (R-G-1-SLS—photos only, in possession of DKC); Yarbrough Pass, Texas (Loc. 5), 3 (TCWC 25576, unnumbered “Hildebran's specimen,” LSUMZ 18519). CARIBBEAN: near Curacao, 12°25'N latitude, 61°36'W longitude (Loc. 6), 1 (AMNH 239115); St. Vincent (Loc. 7), taken in local fisheries (R. V. Walker, pers. comm.). MID ATLANTIC: 3°40'S latitude, 18°5'W longitude (Loc. 8), 2 (UZMC Lütken no. 7 and no. 13); 4°18'N latitude, 31°20'W longitude (Loc. 9), 1 (UZMC Lütken no. 9). WEST AFRICA: Senegal (Loc. 11), 1 (IFAN, no number; photo and external measurements only, in Cadenat and Doutre, 1958); Gulf of Guinea, 2°10' N latitude, 2°30'W longitude (Loc. 10; photos only, one in Leatherwood et al., 1976, under *S. longirostris*).

ATLANTIC: 1 (UZMC Lütken, no. 12). UNKNOWN LOCALITIES: 2 (BMNH 350a, the holotype of *S. clymene*, and BMNH 1947.7.2.2).

The St. Augustine and St. Petersburg specimens were referred by Caldwell and Caldwell (1975) to "*Stenella longirostris sensu lato*." Schmidly et al. (1972) identified the Texas specimens as *Stenella frontalis*, and Schmidly and Melcher (1974a and 1974b) repeated that identification. Based on Perrin et al. (1977), Schmidly and Shane (1978) later applied the name *S. clymene*.

Distribution of *S. longirostris*

Perrin (1975) summarized published records through 1972. Additional published records since then include those in Erdman et al. (1973), Lowery (1974), Dupuy and Maigret (1976), Taruski and Winn (1976), Shane (1977), Schmidly and Shane (1978), and Mead et al. (1980). The limits of the known range of the species in the western Atlantic have been extended over 600 km north (from Miami, Florida, to Cape Hatteras, North Carolina) and some 2,100 km south (from Venezuela to southern Brazil; Fig. 5). In addition to the previously unpublished records included in the list of specimens examined, we have two more sighting records. (1) On several occasions in November 1979, G. N. di Sciara (pers. comm.) observed and photographed large groups (150–400) of spinner dolphins near Isla Margarita, Venezuela. (2) Motion-picture footage taken off Rio de Janeiro, Brazil, by researchers at Instituto de Pesca, Sao Paulo, and seen by one of us (WFP), shows several spinner dolphins riding the bow wave of a vessel. This is the southernmost record of the species for the Atlantic. As noted by Brownell and Praderi (1976), although this tropical dolphin could be expected to occur throughout the tropical Atlantic, previous "records" from the South Atlantic have been unsubstantiated.

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