

New Records of the Pygmy Right Whale (*Caperea marginata*) from South Africa, with Comments on Distribution, Migration, Appearance, and Behavior¹

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Nine South African records of *Caperea marginata* are strongly seasonal, all occurring in the period December–February. The world distribution is summarized, based on a total of 71 individuals. Migration may include dispersal of juveniles into inshore waters in spring and summer. The first underwater photographs of this species are presented, and from them and other records, the body shape and external pigmentation are described. Behavior in the wild is unspectacular, probably making the species relatively inconspicuous at sea.

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Neuf signalements de *Caperea marginata* sont fortement saisonniers, tous se produisant dans la période de décembre à février. Nous donnons un résumé, fondé sur 71 individus, de la répartition mondiale de l'espèce. La migration peut inclure une dispersion des jeunes vers le littoral au printemps et en été. Nous présentons les premières photographies sous-marines de l'espèce et, à partir de celles-ci ainsi que d'autres mentions, décrivons la forme du corps et la pigmentation externe. Le comportement de cette baleine à l'état sauvage n'est pas spectaculaire, ce qui probablement la met relativement peu en évidence en mer.

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SINCE Dr J. E. Gray's description of the pygmy right whale (*Caperea marginata*) in 1846, data on some 40 specimens have been reported in the literature, from animals captured or stranded in widely separated localities in the Southern Hemisphere. In most cases, however, the information available from these records is scanty, so that while the osteology (Beddard 1901; Oliver 1922; Hale 1964) and the external appearance (Davies and Guiler 1957; Ivashin et al. 1972) are relatively well documented, almost nothing is known

of the biology and behavior of this species. In their review of the records of pygmy right whales, Davies and Guiler (1957) included the three South African specimens known at that time. Subsequently these whales have been recorded on this coast on at least six occasions, four of which involved sightings of live animals; this paper reviews the South African records and discusses them in relation to our present knowledge of the distribution, appearance, and behavior of this species.

South African Records

There have now been a total of nine, possibly 10 occasions on which *Caperea* has been recorded from South Africa (Table 1). Although four of these records involved sightings, the identification of the species could be determined

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TABLE 1. South African records of the pygmy right whale, *Caperea marginata*.

Date	Locality	Remarks
Jan. 12, 1917	Simonstown, False Bay	3.39-m ^a male, harpooned by G. Cotton. Skeleton in South African Museum (cat. no. 14407).
Jan. 23, 1937	Gordons Bay, False Bay	Animal stranded then burned by local council (Barnard 1954).
Jan. 15, 1957	Fish Hoek, False Bay	Animal caught by net from the beach and killed by fishermen (Fig. 6). Skull collected (SAM 19944), CBL 790 mm.
Feb. 26–27, 1963	Fish Hoek, False Bay	2.90-m animal (sex unknown) caught by net fishermen from the beach — examined and released by C. K. Tayler.
Feb. 1–23, 1965	Fish Hoek, False Bay	Two live individuals observed frequently (by P.B.B.) during this period. One caught by net from the beach — examined (not by P.B.B.) and released.
Dec. 18, 1965	Port Elizabeth, Algoa Bay	2.98-m animal (sex unknown) found dead in harbor by Mr Lubbe (Fig. 7). Skeleton in Port Elizabeth Museum (cat. no. 1514/10).
Dec. 1967	Plettenberg Bay	Live animal photographed and filmed underwater by T. Dicks (Fig. 1–5).
Dec. 1967	Mossel Bay	Baleen plate from stranded animal in possession of Mr. Cairncross, Victoria Bay, George.
Jan. 28, 1968– Feb. 3, 1968	Fish Hoek, False Bay	Live animal seen frequently during this period (Fig. 8).
(An animal corresponding in description to <i>Caperea</i> was taken during the 1969 whaling season off Durban in error, while running with a minke whale. No further data are available other than the probable month of capture, July or August — Mr D. Miles, Union Whaling Co., personal communication.)		

^aNot 3.35 m as recorded by Davies and Guiler (1957).

in two instances from examination of a temporarily restrained animal by a reliable observer, and in the other two instances from photographs taken above or below water.

The known range of the species around the South African coast has now been extended from False Bay east as far as Algoa Bay, with intermediate records from Mossel Bay and Plettenberg Bay. The unconfirmed record from Durban would extend the range even farther up the east coast.

The seasonality of the South African records is most marked, only the animal reported from Durban occurring outside the period December to February.

Distribution

The pygmy right whale is restricted to the Southern Hemisphere, and is circumpolar in dis-

tribution. The regional distribution of records is as follows: South Australia, 7 (Hale 1964; Aitken 1971); Victoria, 1 (Wakefield 1967); Western Australia, 1 (Davies and Guiler 1957); Tasmania, 14 (Davies and Guiler 1957; Guiler 1961; Davies undated); New Zealand, 13 (Davies and Guiler 1957; Gaskin 1968); South Africa, 9 (present paper); South Atlantic, 3 (Budylenko et al. 1973; Ivashin et al. 1972); Falkland Islands, 1 (Hamilton 1952); Crozet Islands area of the Antarctic, 1 (Ivashin et al. 1972). These involve a total of about 71 individuals. Cabrera and Yepes (1940) record a specimen from the province of Buenos Aires in Argentina and state that pygmy right whales are occasionally recorded on the Chilean coast. Aguayo (1974) has been unable to trace any authentic Chilean records.

Wilson (1907) reported numerous sightings of pygmy right whales in the Ross Sea, but Lillie

TABLE 2. Records of pygmy right whales in relation to latitude and month.

Latitude	VI	VII	VIII	IX	X	XI	XII	I	II	III	IV	V
South Atlantic (32–35°S)						2	1					
South Africa (34–35°S)							3	3	3			
South Australia (35–36°S)				1	1	2		1				
Tasmania (40–43°S)	4	1		1	1	1	1	1	1			
Crozet Is. (46–47°S)									1			
New Zealand (47°S) ^a						1		1	5	5	1	1
Total	4	1	1	2	4	3	6					

^aThe three records for which the month of occurrence is known are all from Stewart Island.

(1915) has refuted these records on the grounds that they were probably minke whales. Ivashin et al. (1972) have recorded a sighting of three pygmy right whales at a latitude of apparently 46–47°S, but the most southerly specimen recorded is from the Falkland Islands (Hamilton 1952), which though lying in 52°S are still north of the Antarctic Convergence. There is therefore no confirmed record of pygmy right whales in strictly antarctic waters, and as yet little evidence to suggest that they occur there at times.

The northern limit of distribution is not as conveniently delineated by a recognizable zoogeographical boundary as is the southern limit. Latitudinally, the most northern records lie at 31°S (western Australia) and 32–56°S (South Atlantic), unless one considers the Durban "record," which would be at a latitude of about 30°S. Davies and Guiler (1957) noted that the summer isotherm for 20°C conveniently marked the northern limit of distribution for almost all the records of pygmy right whales, though they did not claim that temperature acted directly as a limiting factor. Subsequent records have also occurred near or south of this isotherm.

Too little is known of factors influencing the distribution of cetaceans to make more than tentative suggestions concerning them. The availability of suitable food is almost certainly one of the most important factors. In the case of pygmy right whales of which the food, as far as is known, consists of copepods (Ivashin et al. 1972), it could be expected that the distribution pattern would be similar to that of the plankton where it occurs in exploitable quantities. The distribution of pygmy right whales south of 40°S, in fact, resembles that of southern right whales and sei whales in that the bulk of the population appears to stay north of the Antarctic Convergence in

summer. Both right and sei whales are considered primarily copepod-eaters, so that this distribution may reflect the relative abundance of suitable food. North of the Antarctic Convergence the productivity of the open ocean drops markedly towards the tropics, possibly to the level where the quantity of plankton is insufficient or too patchy to support even the smallest baleen whale.

Very little is known of the migrations of the pygmy right whale. Davies and Guiler (1957) maintained that a seasonal north-south migration as observed in other baleen whales does not occur in this species, on the grounds that strandings occurred in the spring and early summer in the northern part of the species' range. They suggested that pygmy right whales are present off southern Australia and New Zealand throughout the year, but move inshore during the spring and early summer, possibly associated with some phase of the reproductive cycle such as mating. The addition of several new records since their paper prompted a review of the problem, and each record for which the month of occurrence is known is presented in Table 2. The New Zealand records occurred in spring and summer, but few of the records (three out of 13) have monthly data, and the spread of occurrence is possibly much wider than suggested by these three records. The Tasmanian animals were recorded in nearly all months of the year, suggesting that whales are present in these latitudes throughout the year. In South Australian and South African waters their occurrence is seasonal in the months of August–December and December–February, respectively. Overall, however, there is a great preponderance (71.9%) of spring and summer records, suggesting a greater susceptibility to stranding or being seen from the shore at this time of year.

A large proportion of the records presented in

TABLE 3. External measurements of *Caperea marginata*. Total length is given in centimeters. Other measurements are expressed as percentage of total length.

Source Sex	Ivashin et al. (1972) ♀	Davies and Guiler (1957) ♀	Guiler (1961) ♀	Hale (1931) ♂	Hale (1964) ♂	Hale (1931) ♂	Present paper (Simonstown 1917) ♂	Ivashin et al. (1972) ♂	Present paper (Port Elizabeth 1965) ?
Total length	621	640 ^a	637	277	305	330	339	547	298
Tip of snout to eye	21.4	—	15.1	—	22.5	21.5	—	21.0	23.0
Length of gape	23.2	—	—	—	20.0	20.0	—	23.8	—
Tip of snout to blowholes	13.9	13.1	11.9	—	—	—	—	14.4	14.5
Tip of snout to anterior insertion of flipper	31.9	—	—	—	35.1	—	—	33.1	34.1
Tip of snout to anterior insertion of dorsal fin	67.0	—	—	—	73.1	66.9	—	66.7	67.0
Length of flipper, anterior insertion to tip	13.7	10.3	13.5	—	10.0	10.8	11.2	13.2	11.3
Length of flipper, axilla to tip	10.5	8.8	6.3	—	—	6.9	—	7.9	—
Width of flipper	3.2	—	—	—	—	—	—	3.5	—
Height, dorsal fin	5.0	3.9	4.7	—	5.1	3.8	—	4.8	—
Length, dorsal fin base	6.0	—	—	—	5.1	—	—	8.6	—
Width of flukes	—	28.3	—	19.7	20.0	—	—	31.4	—
Width of single fluke	16.1	—	14.3	—	—	—	10.1	16.5	11.9
Length, fluke notch to dorsal fin	32.4	35.8	26.2	—	—	—	30.0	26.5	—

^aMeasured along the curve of the back.

Table 2 for South Australia and South Africa for which total lengths are known, or have been estimated from skull length, is of juvenile animals. Three of the five South Australian animals had lengths of 2.77 m (September), 3.30 m (October), and 3.05 m (December) (Davies and Guiler 1957). All three South African animals of known length were juveniles with lengths of 2.98 m (December), 3.39 m (January), and 2.90 m (February), while a fourth animal was considered to be a subadult (December). The only other juvenile for which the month of occurrence is known was a Tasmanian record of 3.35 m in length (December). There is little information on the breeding biology of pygmy right whales. Two pregnant females have been examined with fetuses of 42 cm and 24 cm, caught in November and December, respectively (Budylenko et al. 1973; Ivashin et al. 1972), and a fetus 60 cm in length was taken from a female stranded in June (Guiler 1961). These fetal lengths suggest an extended mating and calving season of several months (Ivashin et al. 1972). The lengths at birth and at weaning are unknown for this species, but by analogy with other baleen whales it is possible to give estimates of these figures. From values tabled by Bryden (1972) of lengths at birth and weaning for eight species of baleen whales, including birth lengths of two balaenids, the lengths at birth and weaning can be calculated as 26–33% and 52–60%, respectively, of the physically mature female. The recorded lengths of the four largest female pygmy right whales are 6.4 m (Davies and Guiler 1957), 6.37 m (Guiler 1961), and 6.21 m and 6.35 m (Budylenko et al. 1973; Ivashin et al. 1972), with an average length of 6.32 m. The theoretical lengths of pygmy right whales at birth and weaning would then be 1.6–2.2 m and 3.2–3.8 m with averages of 1.9 and 3.5 m.

A comparison of these lengths with those of recorded juveniles clearly shows that the latter are not newborn animals and that the larger juveniles are probably close to if not already weaned. Such juveniles have been recorded in October, December, and January. Assuming a lactation period of some 5 or 6 mo these animals would have been born in the preceding autumn or winter. Hence, the postulated inshore movement in spring and summer does not seem to be linked to the season of birth, or (if pregnancy should last about a year as in most other cetaceans) to the breeding season, although Hale (1964) recorded a pygmy right whale with calf in July in Port Lincoln Bay, South Australia, a few weeks prior to the August stranding of an adult female in the bay, and mentioned that it was not uncommon for pygmy right whales to be reported in this bay in winter.

In fact, nearly all of the specimens seen or caught close inshore (as opposed to those that have stranded) have apparently been juveniles or subadults, and the seven presumptive juveniles for which accurate sizes are known (see above) were all recorded in the months from September to February. The appearance of *Caperea* in inshore waters in spring and summer might therefore represent an influx of juveniles, possibly as part of a more general dispersal of animals after weaning.

As such, it could be largely unrelated to seasonal migrations of adults, although considerably more data will be required before the timing and pattern of movements in this species become clear.

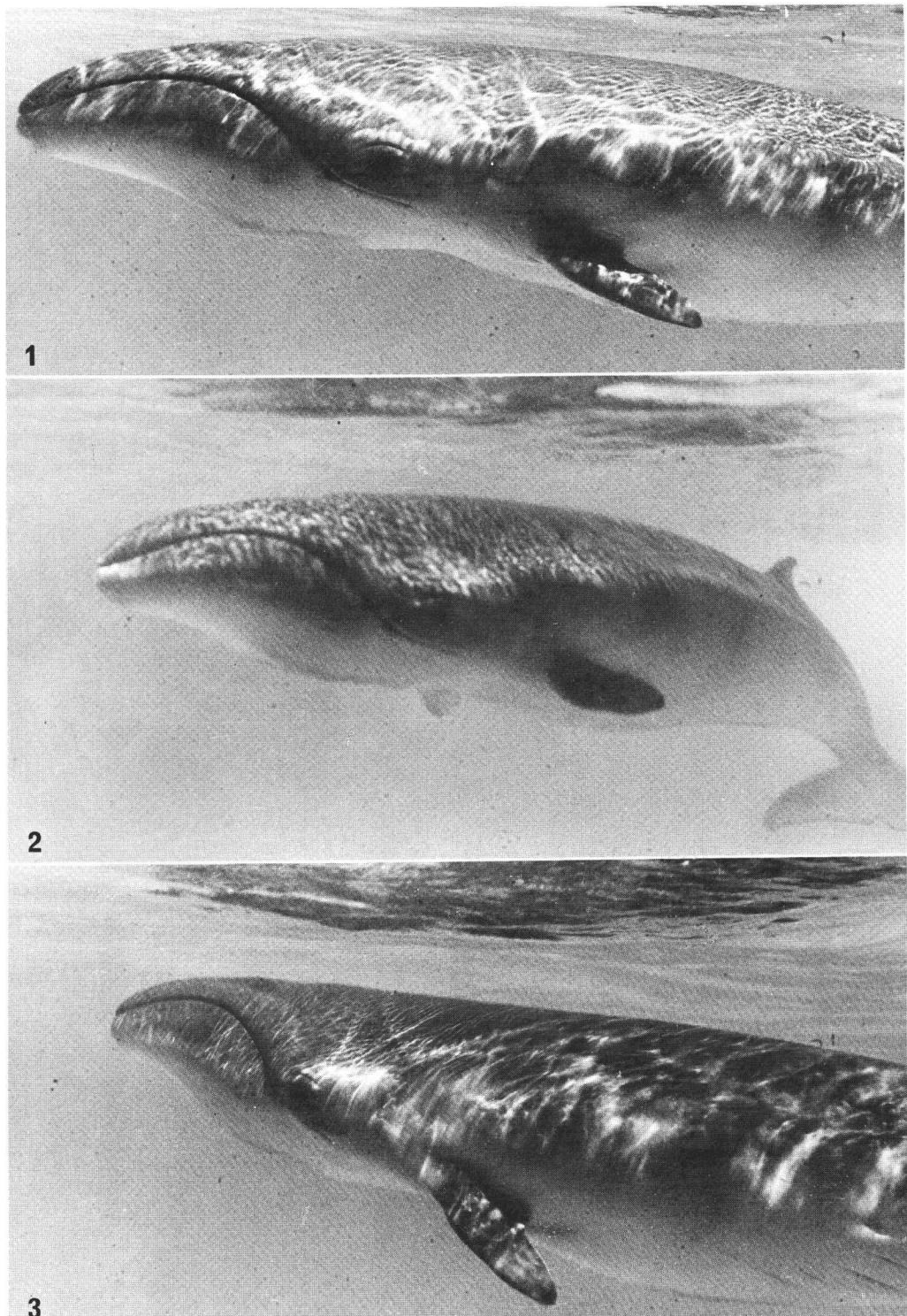
External Appearance

Descriptions of the external form of *Caperea* have been given by Hale (1931) and Davies and Guiler (1957), and Ivashin et al. (1972) have described the external characters of two captured adults in detail. These descriptions have been based on dead, and sometimes decomposing specimens in which some postmortem changes are highly probable but unknown in extent.

It is now possible to illustrate the living, submerged animal in a unique series of underwater photographs (Fig. 1–5) as well as a clip of 16 mm movie film taken by the late Mr T. Dicks at Plettenberg Bay. In addition, notes on the appearance of the live, restrained animal were taken by Mr C. K. Tayler in 1963, and the original notes on the 1917 animal made by Mr J. Drury of the South African Museum have become available. Photographs of the freshly killed animal at Fish Hoek in 1957 (Fig. 6) and of the stranded Port Elizabeth specimen (Fig. 7) have also enabled features of the species' external appearance to be studied.

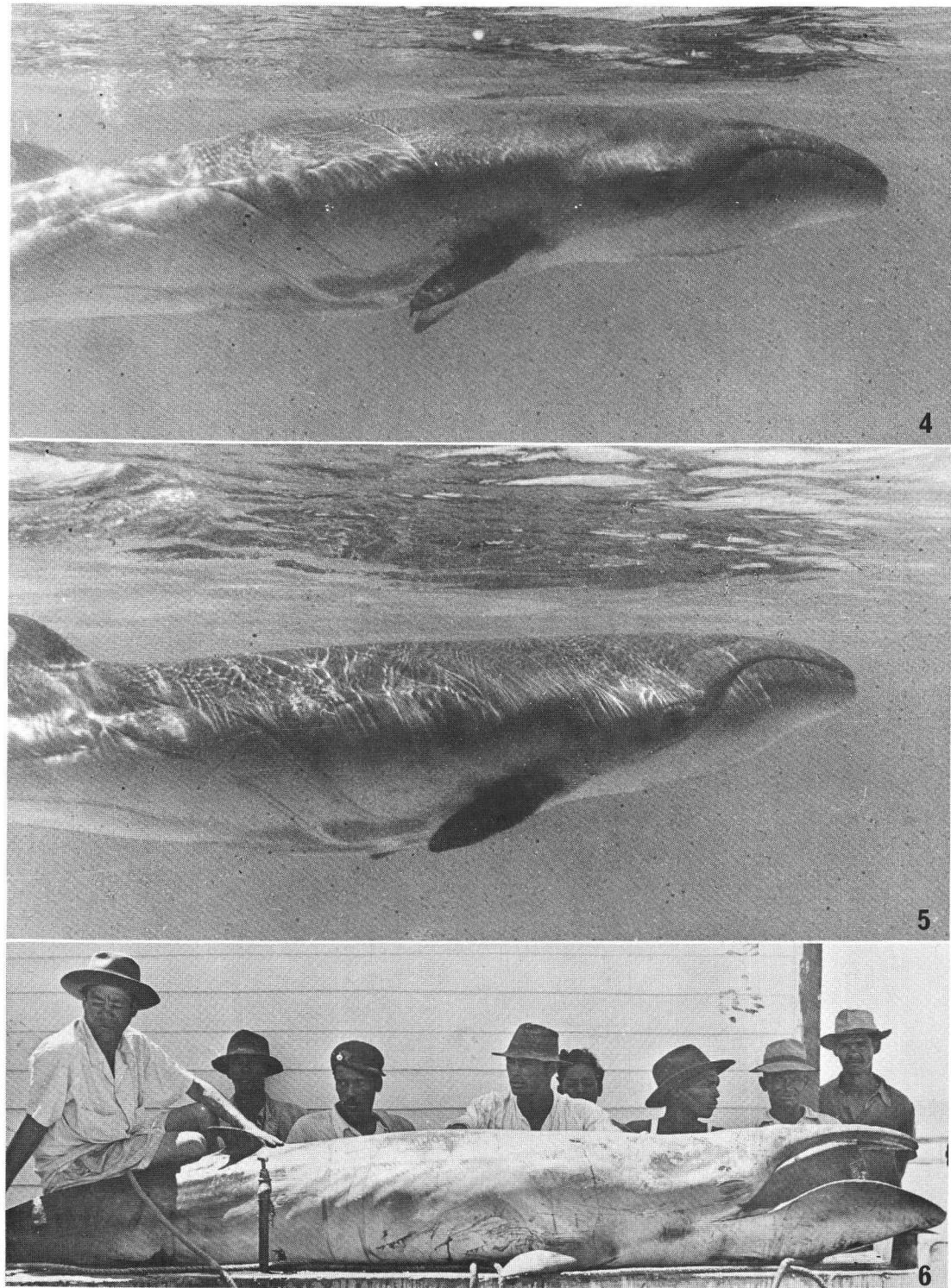
Body shape — The distinguishing characters of the species as described by previous authors are clearly shown in the photographs, namely, bowed lower jaws, and an arched, tapered upper jaw with the line of the mouth extending posteriorly below the eye, narrow flippers slightly rounded at the tip, a small triangular dorsal fin with a falciform posterior margin more than two thirds of the body length from the snout, and broad, full tail flukes with a well-formed median notch.

Several other features described by Ivashin et al. (1972) are clear in these photographs. The lower jaw projects slightly beyond the upper jaw, there are no callosities on the upper or lower jaws as in *Eubalaena*, and the upper margins of the lower jaw are not scalloped. A concavity on



FIGURES 1-3.

FIGS. 1-3. Pygmy right whale, *Caperea marginata*, at Plettenberg Bay in December 1967.



FIGURES 4-6.

Figs. 4-5. Pygmy right whale at Plettenberg Bay, South Africa, December 1967. FIG. 6. Pygmy right whale caught at Fish Hoek by net from beach and killed by fishermen on Jan. 15, 1967.

either side of the midrostral ridge continues posteriorly into a broad depression above the eye. The upper and lower eye folds are shown clearly. Though the neck is not demarcated dorsally, this feature is apparent in the lateral and ventral constriction of the body between the eye and the flipper. In dorsal view the head narrows abruptly anterior to the eyes, and the rostrum tapers gradually to a rounded point (Fig. 7b: the blow-holes converge from 7.5 cm apart posteriorly to 2 cm anteriorly). A shallow groove is present on the ventrolateral margin of the rostrum (Fig. 7d and c) which is presumed to correspond with the dorsal margin of the lower jaw. Other features of interest are the strongly ridged palate and the tongue which is fimbriated at the tip (Fig. 7c).

In the photographs shown by Hale (1964), Ivashin et al. (1972), and Davies and Guiler (1957) and the last authors' outline drawing, the ventral outline of the anterior half of the body is distorted, giving a rounded, deep-bodied appearance to the animal. This distortion may be due in part to the effects of decomposition, and in the case of the Russian-caught specimens, the effect of inflation with an air hose; much of it though is the effect of postmortem relaxation and distension of the throat region, similar to that described in balaenopterids (Williamson 1972). The true shape of this region in the living animal is more streamlined (Fig. 1-5), and shows a feature previously undescribed in this species. In profile, the ventral outline of the throat is concave anteriorly becoming convex posteriorly. This convexity appears to be formed by a distinct ridge on each lower jaw extending from the midlength of the gape to the level of the eye, and corresponding in position with the ventral margin of the posterior half of each mandible. The appearance of these ridges is clearer in Fig. 7d which shows the throat region of the Port Elizabeth juvenile. In this animal there are two clearly defined grooves bounded laterally by these mandibular ridges and medially by a third, median ridge. Though the two mandibular ridges are clearly visible in parts of the movie film of the Plettenberg Bay animal, the median ridge and the two grooves cannot be seen, and their exact nature in the living animal is uncertain. If their presence should be confirmed, the interesting possibility arises that these grooves might represent a simple form of the throat grooves found in balaenopterids and the gray whale.

The extensive rib cage characteristic of this species can be seen in the Fish Hoek specimen (Fig. 6). The last rib is apparent as a bulge in the body wall below the dorsal fin.

Three long, rake-like scars are visible on the right flank and belly of the Plettenberg Bay animal (Fig. 4 and 5), while Fig. 1 and 3 show

a series of six radiating scars on the left lower flank. The origin of these scars is unknown; though the position and similarity of those on the right side suggest they were made simultaneously, it is difficult to envisage an animate or inanimate object capable of causing such divergent wounds.

The length of the latter animal is not known with any certainty. Attempts to find proportional measurements which might have been of value in distinguishing young animals from adults were not successful (Table 3), excepting the apparent increase in fluke width with age, which is unfortunately inapplicable in this case. Davies and Guiler (1957) noted that the arching of the jaws appears to increase with age. The appearance of the young animal illustrated by Hale (1964) and the adults shown by Ivashin et al. (1972) support this observation. A comparison of the Plettenberg Bay animal with the animals figured by these authors, by Hale (1931), and with those of known length in the present paper suggests that its jaws are intermediate in curvature between an immature 3-3.5 m in length and an adult. It is probably, therefore, a subadult animal.

Color pattern — Prior to the adult specimens examined by Ivashin et al. (1972), descriptions of color pattern in *Caperea* had been based on dead, and probably decomposing animals, for which the times between death and examination are not known. As cetaceans darken rapidly in color after death, particularly when exposed to the sun, it is uncertain whether the general description of "black above, paler below or black all over" by several authors (see Davies and Guiler 1957) are correct or due to postmortem effects.

The description of the juvenile harpooned at Simonstown in 1917, for which Barnard (1954) described the color pattern as "black above, dirty white below; baleen yellowish-white, outer edges black," is clearly based on notes on the specimen in the South African Museum files taken by Mr J. Drury, who added further that the inside of the mouth was creamy white, but dark on the outside edges. Davies and Guiler (1957) described the white color of the mouth cavity and tongue of *Caperea*, together with a white band "along the upper jaw above the baleen." This seems to represent the color of the baleen gum, which is usually much darker in other baleen whale species and in balaenopterids is usually covered externally by the upper lip. This feature has been noted subsequently by Hale (1964), Ivashin et al. (1972), and in the present paper (Fig. 6), and exposure of the baleen gum to this extent is possibly characteristic of the species.

The South African records include two animals

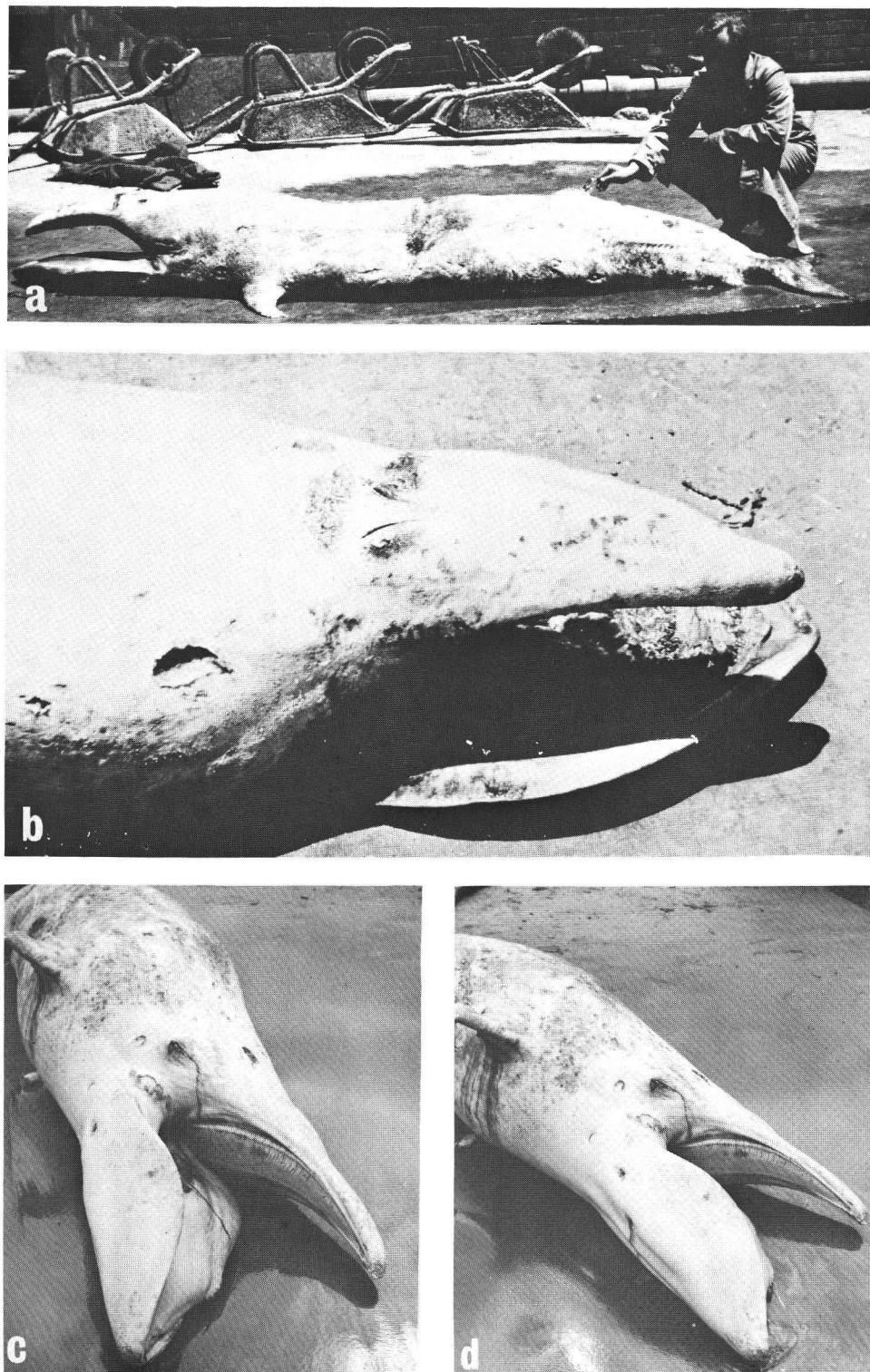


FIG. 7. Pygmy right whale 2.98 m long, stranded specimen found dead in harbor at Port Elizabeth, Algoa Bay.

observed or photographed alive, and a third photographed prior to dismemberment by the fishermen who caught it; collectively, they provide information on the true color pattern, at least in young pygmy right whales.

The actual color tones of the Plettenberg Bay animal are uncertain owing to the effects of light on color when viewed under water, though the pattern of pigmentation is shown quite clearly. The entire dorsal surface appears dark grey or black in the black and white photographs of this animal, but in the color movie film it is grey. The dark dorsal region merges midlaterally into the paler ventral surface. The upper half and tip of the lower jaws are dark grey and a dark band is present between the eye and the point of insertion of the flipper, where it is quite sharply demarcated from the very dark outer surface of the flipper. The ventral surface of the animal is pale whitish in color except for two dark grey streaks on the underside of the lower jaws in positions corresponding to the posterior half of each mandible, and a midventral greyish streak between and posterior to the flippers. These streaks are not very clear in Fig. 1-5, but show fairly clearly in the movie film. The inner surface of the flipper is unfortunately not shown in the black and white photographs and is indistinct in the movie film. The ventral surface of the tail flukes is pale grey with a darker margin (Fig. 2).

Mr C. K. Tayler noted that the color of the live animal examined at Fish Hoek in 1963 was "grey over the dorsal and lateral surfaces of the whole body, including the upper side of the flippers, merging to silvery white ventrally. The baleen was ivory in colour." The apparent absence of the dark outer margin of the baleen may be due to an oversight on the part of the observer.

The color pattern of the 1957 Fish Hoek juvenile as shown in Fig. 6 is somewhat obscured by highlighting. However, in the shadow cast on the caudal region, the dorsal surface appears darker than the ventral surface. The upper half of the lower jaw is darker than the lower half, and the outer surface of the flipper is dark and distinctly demarcated from the body color at its base.

The pattern of coloration of the adult male and female described by Ivashin et al. (1972) was similar to that observed in South African animals. These authors noted that the upper half of the jaw was darker than the lower portion, and that the outer surfaces of the flippers were black and demarcated from the lighter-colored body at their insertion. However, the color of both adults was given as entirely black dorsally, merging laterally into a light grey ventrally in the female and a darker grey in the male. As the time elapsed

between capture and examination on board the factory ship is unknown, it is possible that some postmortem darkening had occurred, though such changes were probably minimal if the animals were examined shortly after being hauled from the water. If the adult pygmy right whale is as darkly pigmented as described, the evidence from the more lightly colored, young animals from South Africa suggests that these whales become progressively darker with age.

The skin of the juvenile stranded at Port Elizabeth was too abraded over most of the body to show more than an overall impression of extreme paleness (Fig. 7). On the head the skin was more intact, however, and was uniformly creamy white. In view of the possibility of ontogenetic darkening of animals, this animal might be merely an extremely pale example of a juvenile. However, the uniformity of coloration on dorsal and ventral surfaces suggests that it was albinistic.

Behavior

It is apparent from the capture, sighting, and stranding records that pygmy right whales are frequently found in sheltered, shallow bays when they are encountered inshore. All the known South Australian records have occurred in bays with shoaling waters with exposed areas at low tide (Aitken 1971), while Hamilton (1952) refers to Byron Sound, the locality of the Falkland Island specimen, as a "sort of trap" of narrow and shoaling waters. Ralph Bay, Tasmania, where Davies and Guiler (1957) examined their adult female, is a very shallow bay. All nine South African records are from large bays along the south and southeastern coast. Further, several of these records refer to animals captured or sighted in bays, suggesting that their occurrence in such localities is normal rather than the actions of sick or dying animals seeking shelter prior to stranding. In view of its occurrence at times in sheltered waters, it is surprising that there are so few sight records inshore, and it is only recently that the species has been encountered in the open ocean (Ivashin et al. 1972). Davies and Guiler (1957) have suggested that this whale spends long periods underwater, though not necessarily diving to great depths. Ivashin et al. (1972), however, reported that the animals they observed did not dive to depths of more than 2-3 m, staying underwater for 3-4 min. In addition, the blow on surfacing was small and often inconspicuous, while the time spent on the surface was not longer than 4-5 s. These authors found that the heart and lungs of their specimens were relatively small, suggesting

that it was improbable that the species was a prolonged diver.

Observations made on live animals in False Bay by one of us (P.B.B.) in 1965 and by Mr Tayler in 1963 agree generally with those of Ivashin et al. (1972). On no occasion did any of these animals display the conspicuous behavior typical of southern right whales when seen inshore, namely lifting the tail flukes clear of the water, rolling onto their back or side, or leaping clear of the water. The respiratory rhythm appeared to be fairly regular, the intervals between five successive blows being recorded (by P.B.B.) as from 40 to 55 s with an average of 49 s; Tayler recorded the average as 60 s. The blow is small and hardly distinguishable. When at the surface the animals often failed to expose the dorsal fin, but sometimes on first breaking the surface they appeared to "throw" the snout out of the water, exposing the end of the chin (Fig. 8). At such times a flash of white was often seen, as described by Ivashin et al. (1972), possibly denoting the tongue or the lining of the mouth which must have been slightly open. Generally the whales swam very slowly, estimated at 4 knots by Tayler.

This unspectacular behavior tends to make the species relatively inconspicuous at sea, and this probably accounts for the rarity of sightings, rather than the prolonged submergences proposed by Davies and Guiler (1957). In addition, many sightings at sea have probably been listed as minke whales, for as Ivashin et al. (1972) have pointed out, the two species are similar in silhouette when seen from a distance of only 100 m. The possible association between pygmy right whales and minke whales, as is suggested by the unconfirmed record off Durban in 1969, could also lead to sightings of pygmy right whales being misreported. These whales have been encountered previously with dolphins, sei whales, and pilot whales on separate occasions (Davies and Guiler 1957; Ivashin et al. 1972).

The 16 mm movie film taken of the Plettenberg Bay animal provides a unique opportunity to observe some aspects of the swimming behavior

in this species. The film was taken in water about 6 m in depth over a sandy bottom, with the visibility range estimated at approximately 15 m. It contains a number of sequences of the whale, including fast, moderate, and slow swimming, rapid starts and turns and breaking the surface, possibly for air. The most striking feature of the swimming behavior was the extensive flexing of the animal's entire body. A single complete cycle of the flukes is shown in Fig. 9, traced from successive frames in a sequence where the whale had leveled out after surfacing and was swimming at a moderate speed.

This series of outlines shows that waves of motion pass from the head to the flukes, apparently increasing in amplitude as they do so. This observation is interesting in the light of Wu's (1961, in Lang 1966) theory that swimming is most efficient when wave amplitude increases towards the tail, based on his observations of a moving flexible plate. The undulatory motion is seen in fast and slow swimming as well. This whale appeared capable of extremely rapid acceleration. In a number of sequences in the first part of the film, the whale seems to have been scared, possibly by the close approach of the divers, and suddenly erupted into fast swimming. In one such sequence, the first quarter of the cycle, from a level stationary position to the end of the downstroke, occupied four frames, or 0.25 s, while the entire first cycle occupied 12 frames, or 0.75 s, by which time the animal was already moving with some speed. The degree of flexing of the body appeared to be similar in fast and moderate swimming, but was less extensive in slow swimming.

The flippers were held close to the body during fast and moderate swimming, but were extended ventrally and laterally during slow swimming, turning, and while breaking the surface. They were held out such that they subtended an angle of about 120° between them. After breaking the surface they were folded back only when the animal had leveled out some 2 m below the surface. The sequence shown in Fig. 9 shows the moment and manner of flipper retraction.

The only estimates of the swimming speed of pygmy right whales are those of Tayler mentioned earlier and of Ivashin et al. (1972), ranging from 3 to 5 knots. In the final sequence of this film, the whale turned away from the camera and swam directly away at moderate speed until it disappeared. From the turn to the time of disappearance took about 100 frames or approximately 6 s, and in this time the whale moved about 15 m (the estimated limit to visibility) less the distance between the whale and the camera,

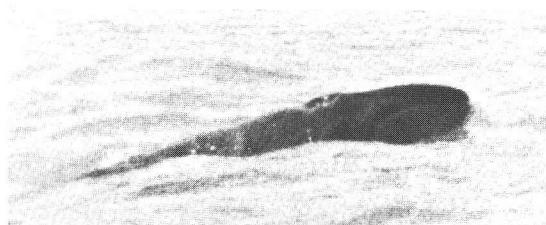


FIG. 8. Pygmy right whale observed in Fish Hoek Bay, January–February 1968.

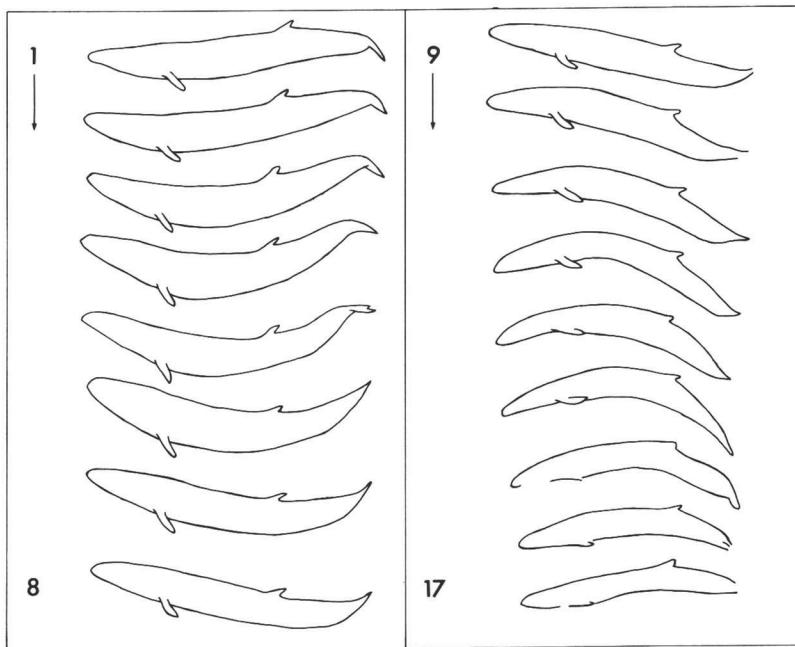


FIG. 9. Pygmy right whale showing a single complete cycle of the flukes, from the 16 mm movie film at Plettenberg Bay, December 1967.

possibly 5 m. These figures give an estimated speed of 1.7 m/s, or 3.2 knots, which is comparable to previous estimates.

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