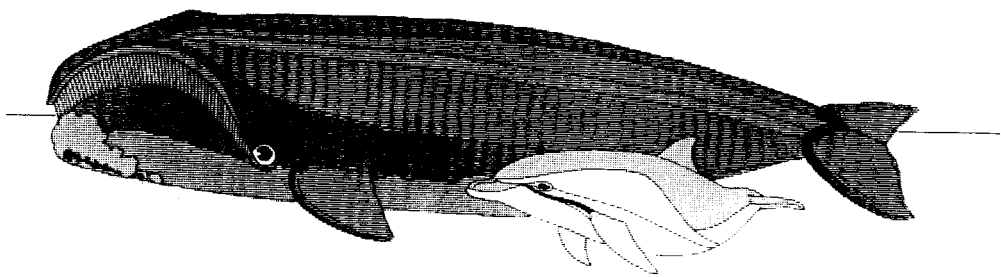


EUROPEAN RESEARCH ON
CETACEANS - 7

PROCEEDINGS OF THE SEVENTH ANNUAL CONFERENCE
OF THE EUROPEAN CETACEAN SOCIETY,
INVERNESS, SCOTLAND
18-21 FEBRUARY 1993



EDITOR : P.G.H. EVANS

THE STOMACH CONTENT OF SOME COMMON DOLPHINS (*Delphinus delphis* L.) FROM THE LIGURIAN SEA

Lidia Orsi Relini and Marco Relini

Istituto di Zoologia, Università di Genova, Via Balbi 5, 16126 Genova, Italy

INTRODUCTION Since the common dolphin (*Delphinus delphis* L.) is a cosmopolitan species, notes about its feeding habits are available from various sources (Norris and Prescott, 1961; Fitch and Brownell, 1968; Watson, 1985). Such studies, so far as we know, have not included the Western Mediterranean, where, however, competition with striped dolphin (*Stenella coeruleoalba* Meyen) is suggested by the inverse relationship in abundance of the two species (Viale, 1985). At the beginning of this century, common dolphins appear to have been common in the Gulf of Genoa (Poggi, 1986), while in the 1970's it was only occasionally found. There have been no more records of common dolphins in the area in the last ten years, while striped dolphins remain common.

The specimens of common dolphin whose stomach content are analysed here were killed for the preparation of "musciame", a preserved food item consisting of salted and dried fillets of meat. In the context of fishing for dolphins (which ceased in 1980 with the introduction of a Mammal Protection Act), during the 1977 and 1978 seasons, several stomach contents of small cetaceans were collected at Camogli, by M.R. Costa and M. Pessina, whose work is gratefully acknowledged. Only three common dolphins were to be found among these, a fact which probably reflected the progressive decline of this species. In order to make a comparison of feeding habits, two stomach contents of striped dolphins of the same origin and another more recent one derived from a specimen killed in a swordfish drift net, were analysed. All the dolphins were healthy animals of the same approximate size (90-100 kg), killed in the same season (July and August) in the Portofino area (Eastern Ligurian Riviera).

MATERIALS AND METHODS Three common dolphin specimens (male 215 cm, c. 100 kg; male 210 cm, 100 kg; female 200 cm, 90 kg) and three striped dolphins (female 90 kg; male 95 kg; male 206 cm) were dissected a short time after death and the gastric content was preserved by formalin fixation. Prey was identified at a taxonomic level in as detailed a manner possible, with the aid of collections of surface and mesopelagic organisms from the same area. Prey of common dolphins were counted and the biomass measured as actual weight when soft tissues were present; when only hard parts were available, an estimated weight was given. For the time being, only prey composition was studied in the case of striped dolphin.

RESULTS In the stomach of three common dolphins, identified prey totalled more than 328 individuals belonging to four species of fish, two species of decapod crustaceans and seven species of cephalopods (Table 1). The stomach content of the female was the most abundant and suggests, with its recently ingested prey, a complete meal. It was about two litres in volume, with a part consisting of a very dense suspension, which it was difficult to separate by filtration. The solid remains had the following approximate wet weights: 200 g crustaceans, 500 g fish, and 500 g cephalopods. The last two groups consisted of both recently ingested prey (450 g fish, 490 g cephalopods) and highly digested items like bones and beaks. Crustaceans, even when broken up into pieces had a "fresh appearance" and could be easily counted on the basis of pairs of eyes.

In the two males, the stomach content was less abundant with a lower number of species. Surface pelagic fish, anchovies and Belonidae, represented the total content in the first dolphin, while in the second dolphin, cephalopods of the families Onychoteuthidae and Ommastrephidae were dominant.

The gastric contents of the three striped dolphins will be described in detail elsewhere. Eight prey species were in common with common dolphin (Table 1), the largest ingested biomass resulting from *Pasiphaea multidentata* (two cases), and mesopelagic fish (one case).

DISCUSSION The stomach contents of common and striped dolphins reflect an offshore foraging method, which is only likely to affect fishing resources to a small extent. These two dolphin species are euryphagous predators which prey on fish, cephalopods and decapod crustaceans. This last prey is generally under-estimated in the analysis of stranded individuals; here, it forms the biggest portion in two of the four striped dolphins examined and also forms a major part of the stomach contents of the common dolphin. It is interesting to note that fishermen are not able to exploit the shrimps concerned.

Some common dolphin prey (*Belone* sp., *Chauliodus sloani*, *Sergia robusta*, *Onychoteuthis banksi*) have not been found in the present sample of striped dolphins; however, they were present in the stomach content of a specimen from the Ionian Sea (Bello, 1992) and, in stranded specimens from the Ligurian Sea (Wurtz and Marrale, 1991). Among "other prey" of striped dolphins examined here, crustacean decapods and cephalopods besides those listed in Table 2, are negligible. A larger share is formed by "other fish", mainly mesopelagic species (see also Miyazaki *et al.*, 1973) which, however, may be exploited also by common dolphin (Fitch & Brownell, 1968). Thus, the overall picture is of the two species feeding on the same prey and their trophic niches overlapping.

The distribution of prey can yield some useful information about the predatory habits of these dolphins. Besides surface pelagic fish such as *Engraulis encrasicolus* and Belonidae, all other prey consists of eurybathic species. The muscular squids *Ancistroteuthis lichtensteini*, *Onychoteuthis banksi*, and *Todarodes sagittatus* frequent surface waters during the night, as has been proved by direct observation and strandings (Torchio, 1966, Orsi Relini, 1990). Other squids - *Abralia veranyi*, *Histioteuthis bonnellii*, *Histioteuthis reversa* - which have ventral photophores, are true mesopelagic species. *A. veranyi*, however, can be found "at the bottom in bathyal and in midwater above slopes, sometimes at the surface" (Nesis, 1982). The same may be said for *Heteroteuthis dispar* (Orsi Relini, 1992). Large *Histioteuthidae* can also move to the surface (Torchio, 1966). So it is difficult to draw any conclusions about the diving range of dolphins from cephalopod prey type. Decapod crustaceans seem to be more useful indicators. In fact, both *Pasiphaea multidentata* and *Sergia robusta* are "deepwater species", generally found below a depth of 700 m during daylight hours. Considering their nocturnal ascent, *P. multidentata* can reach surface waters (Franqueville, 1971), but *S. robusta* is fished at a minimum depth of 200 m, and abundant catches are made at 450-500 m (Foxton, 1970). Taking into account the large size of the ingested specimens and their number, a deep, even if nocturnal, "search for shrimps" on the part of the common dolphin is quite probable.

CONCLUSIONS The stomach content of three adult common dolphins killed in the 1970's in the Gulf of Genoa included 328 food items belonging to the following categories of fish, decapod crustaceans and cephalopods: *Belone* sp., *Chauliodus sloani*, *Engraulis encrasicolus*, *Sygnathus phlegon*, *Pasiphaea multidentata*, *Sergia robusta*, *Abralia veranyi*, *Ancistroteuthis lichtensteini*, *Heteroteuthis dispar*, *Histioteuthis bonnellii*, *Histioteuthis reversa*, *Onychoteuthis banksi*, and *Todarodes sagittatus*. A comparison with the stomach content of some striped dolphins of the same size and caught in the same area shows that these dolphins use common prey. Commercially unexploited decapod crustaceans make up a considerable part of the diet.

REFERENCES

- Bello, G. 1992. Stomach content of a specimen of *Stenella coeruleoalba* (Cetacea: Delphinidae) from the Ionian Sea. Atti Soc. It. Sc. Nat. (in press).
- Fitch, J.E and Brownell, R.L. 1968. Fish otoliths in cetacean stomachs and their importance in interpreting feeding habits. J. Fish. Res. Bd. Canada, 25(12): 2561-2574.
- Foxton, P. 1970. The vertical distribution of pelagic decapods (Crustacea: Natantia) collected on the second cruise 1965. II. The Penaeidea and general discussion. J. mar. biol. Ass. U.K., 50: 961-1000.
- Franqueville, C. 1971. Macroplancton profond (invertebres) de la Mediterranee Nord-Occidentale. Tethys, 3 (1): 11-56.
- Miyazaki, N., Kasuya, T. and Nishiwaki M. 1973. Food of *Stenella coeruleoalba*. Sci. Rep. Whales Res. Inst., 25: 265-275.
- Nesis, K.N. 1982. *Cephalopods of the world*. [Engl. translation by B.S. Levitov 1987] T.F.H.
- Norris, K.S. and Prescott, J.H. 1961. Observations on Pacific cetaceans of Californian and Mexican waters. University of California publication in Zoology, 63, 4: 291-402, pl. 27-41, 12 figs.
- Orsi Relini, L. 1990. Field observation of young *Ommastrephes bartrami* in offshore waters in the Ligurian Sea. Rapp. Comm. int. Mer. Medit., 32(1), 243.
- Orsi Relini, L. 1992. Notes on a pelagic sample of *Heteroteuthis dispar* (Cephalopoda, Sepiolidae) from the Ligurian Sea. Bull. Inst. Oceanogr. Monaco (in press).
- Poggi, R. 1986. I Delphinidae fatti pervenire al Museo di Genova tra il 1914 ed il 1917 dal sindacato peschereccio ligure-sardo. Ann. Mus. Civ. Storia Naturale, 84: 1-11.
- Torchio, M. 1966. Euribatia di Teutacei, spiaggiamenti ed apporto di acque di origine continentale. Atti Soc. It. Sc. Nat., 105 (4): 317-342.
- Viale, D. 1985. Ecologie des cetaces en Mediterranee nord- occidentale: leur place dans l'ecosysteme. Oceanogr. Mar. Biol. Ann. Rev., 23: 491-571.
- Watson, L. 1989. *Whales of the world*. Hutchinson. 302 pp.
- Wurtz, M. and Marrale, D. 1991. On the stomach contents of striped dolphins (*Stenella coeruleoalba*, Meyen 1933) from the Ligurian coast, central Mediterranean Sea. Pp. 62-64. In . *European Research on Cetaceans - 5*. (Ed. P.G.H.Evans). Proc. 5th Conf. ECS, Sandefjord, 21-23 February 1991. European Cetacean Society, Cambridge.

Table 1: Stomach content of three adult *D. delphis* and comparison with stomach contents of *Stenella coeruleoalba*.

	D. delphis female		D. delphis Male		D. delphis male		Stenella coeruleoalba		
	prey N.	Weight	N.	W.	N.	W.	female	male	male
OSTEICHTHYES									
Belone sp.			3	800				*	
Engraulis encrasicolus	40	450	60	660					
Sygnathus phlegon					1	10			
Chauliodus sloani	13	150					*		**
mesopelagic fish n.e.i.									
CRUSTACEA									
Pasiphaea multidentata	3	35					**	**	
Sergia robusta	99	160							*
Decapoda n.e.i.									
CEPHALOPODA									
Heteroteuthis dispar	58	195			1	4	*	*	*
Ancistroteuthis lichtensteini	30	1570			2	100		*	
Onychoteuthis banksi	5	95							*
Histioteuthis bonnellii	1	5						*	*
Histioteuthis reversa	7	45						*	
T. sagittatus - O. bartrami	9	3230			14	2842	*	*	
Abralia veranyi	2	5					*	*	
cephalopods n.e.i.									
	267	5940	63	1460	18	2956			

* presence and ** dominance of a given prey; n.e.i.= not elsewhere identified.