Notes on the diet of *Pterogymnus laniarius* (Cuvier) (Pisces: Sparidae)

J.R. Clarke and C.D. Buxton
Port Elizabeth Museum, Port Elizabeth

Stomach contents of fish taken between Mossel Bay and Algoa Bay were analysed. Prey associated with both hard and soft substrates were present in the diet although the latter were more important. The mouth structure is shown to be well adapted to feeding over soft substrates.
S. Afr. J. Zool. 1985, 20: 68 – 71

Maaginhoudanalises is gedoen van vis wat gevang is tussen Mosselbaai en Algoabaai. Prooi wat geassosieer word met riwwe sowel as sand was teenwoordig in die dieet, alhoewel laasgenoemde belangriker was. Die mondvorm is goed aangepas vir voeding oor sand.
S.-Afr. Tydskr. Dierk. 1985, 20: 68 – 71

J.R. Clarke and C.D. Buxton*
Port Elizabeth Museum, P.O. Box 13147, Humewood, 6013
Republic of South Africa

*To whom correspondence should be addressed

Received 13 August 1984; accepted 8 November 1984

Pterogymnus laniarius (panga), a sparid endemic to southern Africa, is a deep-water species found on the Agulhas Bank and further north to Madagascar (Smith 1965). A recent inshore trawling survey off the Cape south coast showed *P. laniarius* to be absent at depths less than 50 m (Wallace, Kok, Buxton & Bennet 1984), confirming their preference for deep water. The species is an important by-catch in both the hake- and sole-directed demersal fisheries in South Africa (Botha 1970; Hecht 1976; A.J. Penney unpublished data Sea Fisheries Research Institute). This has resulted in studies on its contribution to the Eastern Cape trawl fishery (Hecht 1976), age, growth and reproduction (Hecht & Baird 1977; Hatanaka, Sato, Augustyn, Payne & Leslie 1983) as well as numerous biomass surveys (Sato 1980; Hatanaka *et al.* 1983; Uozumi, Hatanaka, Sato, Augustyn, Payne & Leslie 1984). An aspect of the biology that has received little attention is feeding. A significant problem in the study of the diet of deep-water species is the problem of regurgitation (Buxton 1984), resulting in a high percentage of empty or everted stomachs (Hecht 1976; Uozumi *et al.* 1984).

Most of the guts analysed in this study ($n = 64$) were taken from ski-boats operating between Mossel Bay and Algoa Bay during the period February 1980 to November 1981, fishing at a depth of approximately 90 m. A further 17 specimens were trawled between Knysna and the Maitlands River between May and August 1980 at a depth of 50 m (Figure 1). Prey items were quantified in terms of frequency of occurrence and percentage volume, and were assigned a rank computed as the ratio of fish containing a food item to the number of fish sampled (frequency of occurrence) multiplied by the mean per cent that item represented of the diet volume (Buxton 1984). Results are presented in Table 1.

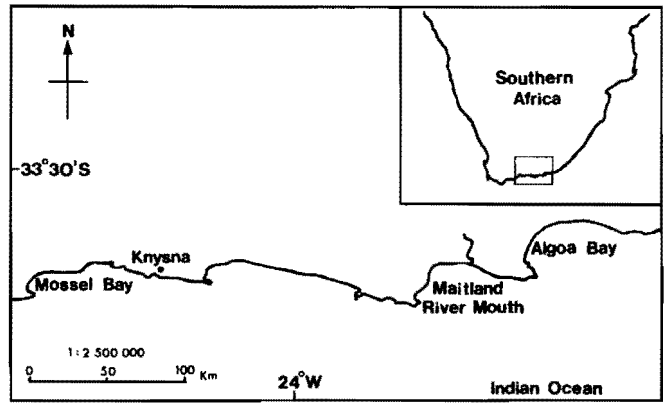

Figure 1 Map of the study area.

Table 1 Stomach and hindgut content analysis of *Pterogymnus laniarius*

	Stomach ($n=51$)				Hindgut ($n=55$)			
Prey	%*n*	freq. occ.	mean % vol	rank[a]	%*n*	freq. occ.	mean % vol	rank[a]
Brachyura	20,2	58,8	41,0	24,1	42,2	60,4	37,9	22,9
Goneplax angulata	9,8	17,7	15,0	2,6	17,5	23,6	14,5	3,4
Brachyuran remains	4,3	19,6	10,7	2,1	13,4	29,1	9,2	2,7
Mursia cristimanus	4,3	15,7	8,0	1,3	2,1	10,9	2,7	0,3
Atelecyclus sp.	0,5	3,9	2,9	0,1	–	–	–	–
Dromiidae	0,8	3,9	2,2	0,1	0,9	1,8	0,8	T
Megalopas	1,0	3,9	1,9	0,1	4,5	5,5	2,8	0,2
Oxyrhyncha	0,3	2,0	0,3	T[b]	–	–	–	–
Macropodia falcifera	0,3	2,0	0,2	T	1,2	7,3	1,0	0,1
Pseudodromia sp.	–	–	–	–	0,9	3,6	1,4	0,1
Dehaanius dentatus	–	–	–	–	0,9	5,5	0,8	T
Eurynome aspera	–	–	–	–	0,3	1,8	0,9	T
Inachus guentheri	–	–	–	–	0,3	1,8	0,9	T
Achaeopsis spinulosus	–	–	–	–	0,3	1,8	0,2	T
Anomura	5,6	15,7	1,9	0,3	13,0	30,9	12,6	3,9
Anomuran remains	4,5	13,7	1,7	0,2	7,1	23,6	6,2	1,5
Paguridae	0,3	2,0	0,2	T	4,5	10,9	5,0	0,6
Galathea sp.	–	–	–	–	0,6	3,6	0,7	T
Galathea dispersa	–	–	–	–	0,9	3,6	0,7	T
Macrura	1,0	7,8	0,6	T	0,6	3,6	2,4	0,1
Macruran remains	0,8	5,9	0,3	T	0,6	3,6	2,4	0,1
Scyllarides elisabethae	0,3	2,0	0,3	T	–	–	–	–
Tanaidacea	6,5	7,8	0,6	T	0,6	1,8	0,6	T
Apseudes ?grossimanus	5,3	3,9	0,5	T	–	–	–	–
Tanaidacean remains	1,3	3,9	0,1	T	0,6	1,8	0,6	T
Isopoda	1,8	5,9	0,2	T	1,8	10,9	1,4	0,2
Isopod remains	1,8	5,9	0,2	T	1,5	9,1	1,3	0,1
Cymodocella sp.	–	–	–	–	0,3	1,8	0,6	T
Amphipoda	1,8	5,9	0,1	T	–	–	–	–
Mysidacea	0,3	2,0	0,2	T	–	–	–	–
Pelecipoda	6,3	39,2	20,0	7,8	19,6	58,2	34,6	20,2
Macoma sp.	4,0	29,4	16,1	4,7	16,6	47,3	30,9	14,6
Pelecypod remains	1,5	11,8	2,9	0,4	0,6	3,6	0,4	T
Nucula sp.	0,8	2,0	1,0	T	–	–	–	–
Nucula nucleus	–	–	–	–	0,3	1,8	1,3	T
Solemya sp.	–	–	–	–	0,3	1,8	1,1	T
Nuculana sp.	–	–	–	–	0,3	1,8	0,9	T
Chlamys tincta	–	–	–	–	1,5	3,6	0,1	T
Gastropoda	5,3	11,8	0,6	0,1	3,3	14,6	2,5	0,4
Gastropod remains	1,5	5,9	0,3	T	0,3	1,8	T	T
Shell fragments	3,0	3,9	0,1	T	2,1	9,1	2,4	0,2
Operculae	0,3	2,0	0,1	T	0,3	1,8	0,1	T
Nassarius sp.	0,3	2,0	0,1	T	0,3	1,8	T	T
Diodora parviforata	0,3	2,0	T	T	–	–	–	–
Terebra sp.	–	–	–	–	0,3	1,8	T	T
Cephalopoda								
Octopus sp.	0,3	2,0	2,0	T	–	–	–	–
Amphineura	0,5	3,9	0,1	T	–	–	–	–
Ophiuroidea	37,1	27,5	9,2	2,5	7,4	14,6	2,7	0,4
Ophiuriod remains	8,8	19,6	4,9	1,0	3,0	10,9	0,9	0,1
Dictenophiura anoidea	25,8	5,9	2,4	0,1	1,8	1,8	0,1	T
Ophiothrix fragilis	2,5	2,0	1,9	T	2,7	1,8	1,7	T
Pisces	1,8	13,7	8,6	1,2	0,3	1,8	0,4	T
Pisces remains	1,0	7,8	4,8	0,4	–	–	–	–
Syngnathidae	0,3	2,0	2,0	T	–	–	–	–

Table 1 Continued

Prey	Stomach ($n = 51$) %n	freq. occ.	mean % vol	rank[a]	Hindgut ($n = 55$) %n	freq. occ.	mean % vol	rank[a]
Sardinops ocellata	0,3	2,0	1,4	T	–	–	–	–
Engraulis capensis	0,3	2,0	0,5	T	0,3	1,8	0,4	T
Annelida	7,0	17,7	6,5	1,2	6,5	18,2	2,4	0,4
Annelid remains	2,8	7,8	1,7	0,1	1,8	1,8	0,3	T
Polychaeta	2,3	9,8	4,4	0,4	4,8	16,4	2,2	0,4
Flabelligeridae	2,0	2,0	0,4	T	–	–	–	–
Sipunculida	0,8	5,9	0,7	T	0,3	1,8	0,1	T
Sipunculid remains	0,3	2,0	0,6	T	0,3	1,8	0,1	T
Phascolosoma	0,5	3,9	0,1	T	–	–	–	–
Bryozoa	0,5	3,9	0,3	T	0,9	5,5	0,1	T
Pycnogonida								
Pallenopsis intermedia	–	–	–	–	0,3	1,8	T	T
Amorphous	2,3	17,7	4,6	0,8	2,7	16,4	5,0	0,8
Unidentified	1,3	9,8	3,1	0,3	0,6	3,6	0,1	T

[a]Rank is the frequency of occurrence multiplied by mean percentage volume.
[b]T = Trace amounts ranked < 0,1.

A comparison of the stomachs and hindguts showed no difference in the major components of the diet and only minor differences in the relative importance of individual prey items. Of the 39 different prey items recorded the two main groups were Brachyura and Pelecypoda. While some of the prey species recorded such as *Ophiothrix fragilis, Dehaanius dentatus, Octopus* sp. and *Chlamys tincta* are associated with reefs, it is clear that the most important prey are found on soft substrates. These include *Macoma* sp., *Goneplax angulata, Mursia cristimanus* and *Dictenophiura anoidea*. In a study of the diet of *P. laniarius* taken by trawlers in the Eastern Cape, Hecht (1976) also recorded a predominance of prey species associated with sandy substrates as well as a high proportion of sand.

In spite of the relatively high diversity of prey species recorded only a few contribute significantly to the diet, including *Macoma* sp., *Goneplax angulata* and *Mursia cristimanus*. While it is difficult to infer selectivity for these prey without a knowledge of their availability, the results suggest that *P. laniarius* are specialist feeders particularly with respect to burrowing bivalves. The mouth structure of *P. laniarius*, illustrated in Figure 2, shows a number of adaptations for this purpose. The large, fleshy lips are protrusible and may be compared to those of the white steenbras, *Lithognathus lithognathus*, which feeds by sucking and blowing food items from burrows (Mehl 1973). The villose undersurfaces of the lips suggest a tactile or chemo-sensory function while the jaws have a double row of crushing molars and well-developed flared outer canines.

The results presented in Table 1 show that *P. laniarius*, although able to feed on a wide variety of prey associated with both hard and soft substrates, are particularly well suited to feeding on the latter. This specialization probably contributes to their offshore preference and their widespread distribution on the Agulhas Bank.

This research was supported by a grant from the South African National Committee for Oceanographic Research.

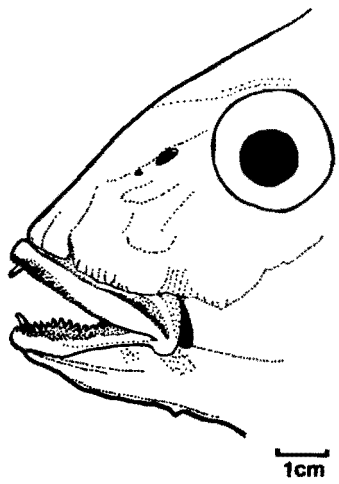

Figure 2 Medio-lateral view of the mouth of an adult *Pterogymnus laniarius*.

References

BOTHA, L. 1970. South African trawlfish landings from 1955 to 1968 with special reference to the hake. *S. Afr. Ship. News Fish. Ind. Rev.* 25: 68–77.

BUXTON, C.D. 1984. Feeding biology of the Roman *Chrysoblephus laticeps* (Pisces: Sparidae). *S. Afr. J. Mar. Sci.* 2: in press.

HATANAKA, H., SATO, T., AUGUSTYN, J., PAYNE, A. & LESLIE, R. 1983. Report on the Japan/South Africa Joint Trawling Survey on the Agulhas Bank in November/December 1980. Japan Marine Fishery Resource Research Center, Tokyo, Japan: 1–73.

HECHT, T. 1976. The general biology of six major trawl fish species of the eastern Cape coast of South Africa, with notes on the demersal fishery, 1967–1975. Ph.D. thesis, University of Port Elizabeth.

HECHT, T. & BAIRD, D. 1977. Contributions to the biology of the panga, *Pterogymnus laniarius* (Pisces : Sparidae): Age, growth and reproduction. *Zool. Afr.* 12: 363–372.

MEHL, J.A. 1973. Ecology, osmoregulation and reproductive biology of the white steenbras *Lithognathus lithognathus* (Teleostei : Sparidae). *Zool. Afr.* 8: 157–230.

SATO, T. 1980. Reassessment of the panga stock on the Agulhas Bank fishing ground in ICSEAF sub area 2. *Colln. Scient. Pap. Int. Comm. SE Atl. Fish. ICSEAF Part II*: 315–330.

SMITH, J.L.B. 1965. The sea fishes of Southern Africa. Central News Agency, Ltd., South Africa.

UOZUMI, Y., HATANAKA, H., SATO, T., AUGUSTYN, J., PAYNE, A. & LESLIE, R. 1984. Report on the Japan/South Africa joint trawling survey on the Agulhas Bank in November/December 1981. Japan Marine Fishery Resource Research Center, Tokyo, Japan: 1–91.

WALLACE, J.H., KOK, H.M., BUXTON, C.D. & BENNETT, B. 1984. Inshore small-mesh trawling survey of the Cape south coast. Part 1. Introduction, methods, stations and catches. *S. Afr. J. Zool.* 19: 154–164.