

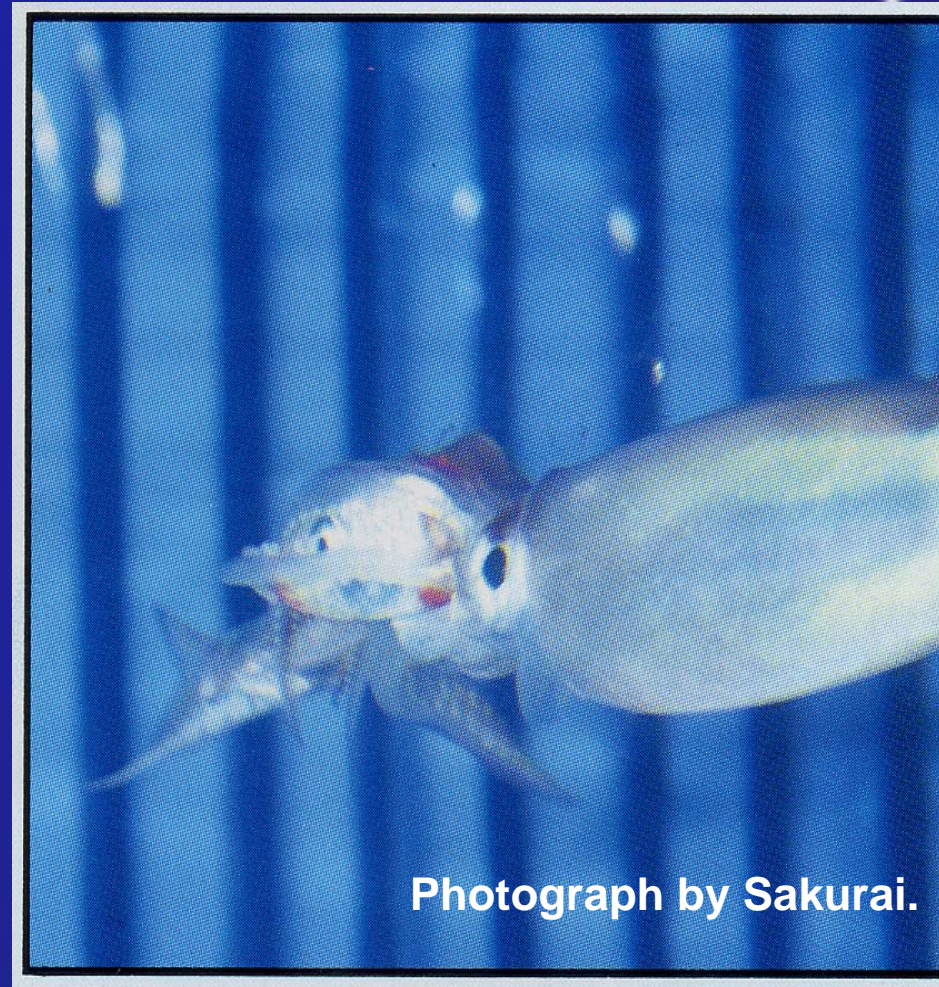
Feeding habit of the common squid *Todarodes pacificus* (Cephalopoda: Ommastrephidae) off Busan, Korea

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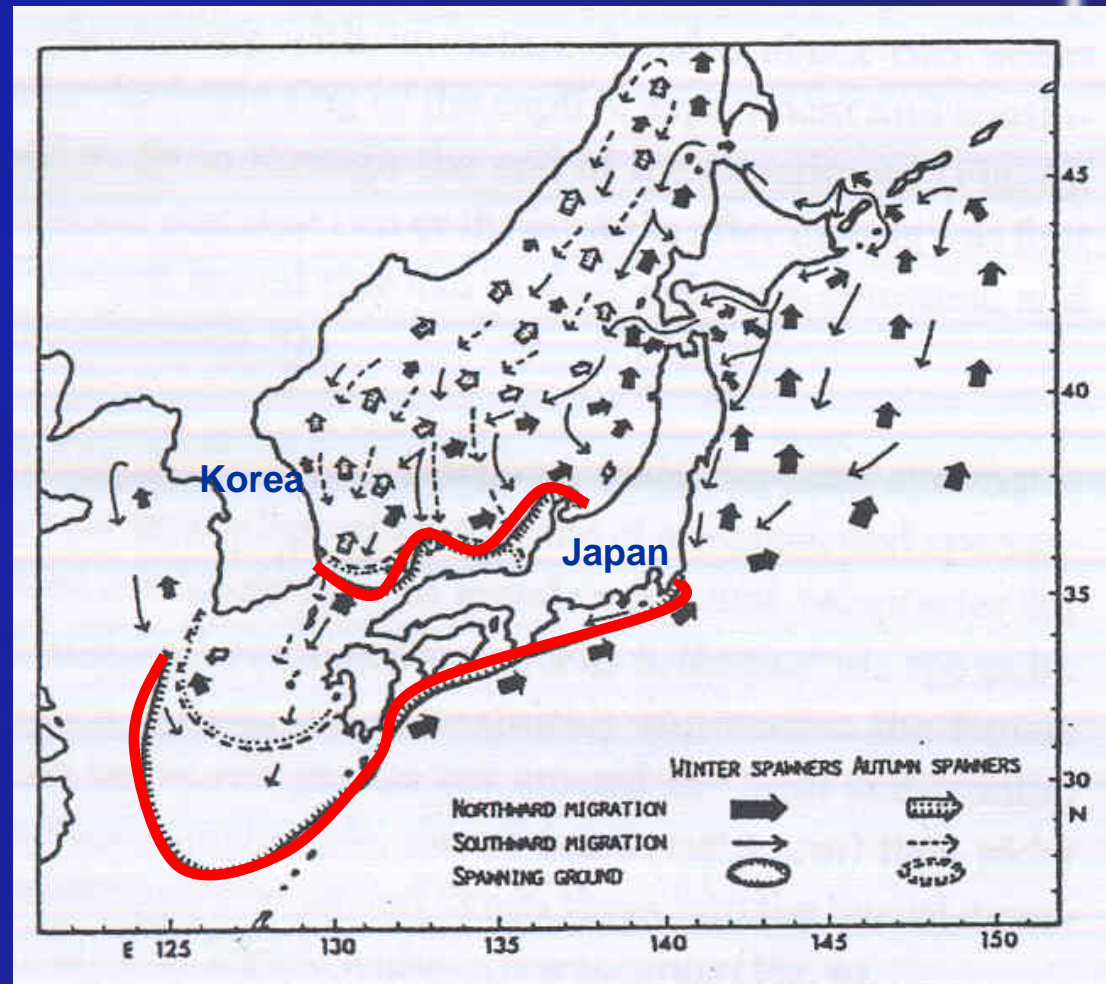
Introduction

- Common squid
(*Todarodes pacificus*)
: Family Ommastrephidae
- Distribution
In the coastal waters off Korea,
Japan and China
- Longevity
Around one year (Nakamura and
Sakurai, 1991 and 1993)



Distribution and spawning areas of common squid (Murata, 1990)

- Spawning area
East China Sea
- Spawning season
Summer
(June-August)
Autumn
(September-November)
Winter
(December-February)



Previous studies on feeding habit of common squid

Korea

Lim (1967)

Kim and Kang (1998)

Japan

Araya and Nakamichi (1962)

Okutani (1962)

Okiyama (1965)

Hamabe and Shimizi (1966)

Tanaka (1993)

Objectives

- Find the ontogenetic and seasonal changes in feeding habit of common squid ;
- ✓ Main prey items
- ✓ Stomach Contents Index
- ✓ Gonad Index
- ✓ Vacancy Index

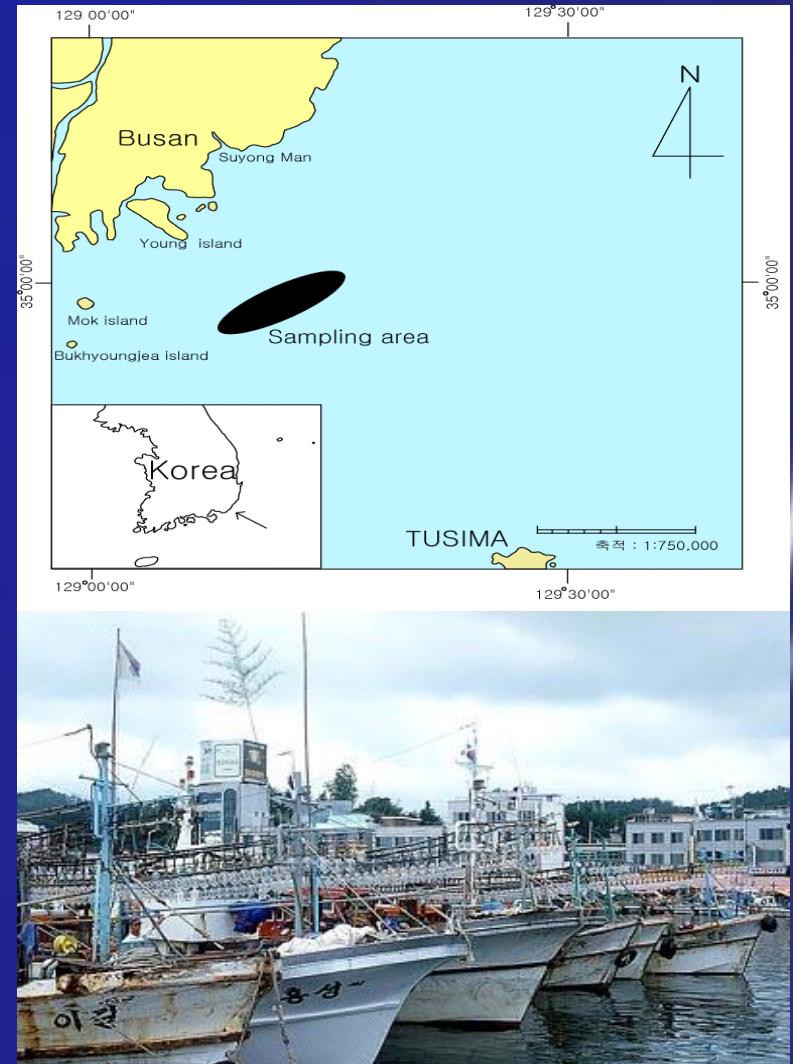
Materials and Methods

■ Sampling

Use squid jigging vessels in the coastal waters off Busan, Korea

Collect live squids monthly from September, 2004 to August, 2005

Bring live squids to the lab for stomach extraction



Materials and Methods

In Laboratory

..Measurement of mantle length (0.1 cm), body weight (0.1 g) and weight of stomach and gonad (0.01 g)

..Analysis of stomach contents using dissecting microscope

..drying for 24 hr in stove (80 °C)

Measurement of dry weight

Definition of index

Gonad Index (GI, %)

$$= (\text{gonad weight} / \text{total body weight}) \times 100$$

Stomach Contents Index (SCI, %)

$$= (\text{wet weight of stomach contents} / \text{body wet weight excluding stomach contents}) \times 100$$

Ranking Index (RI)

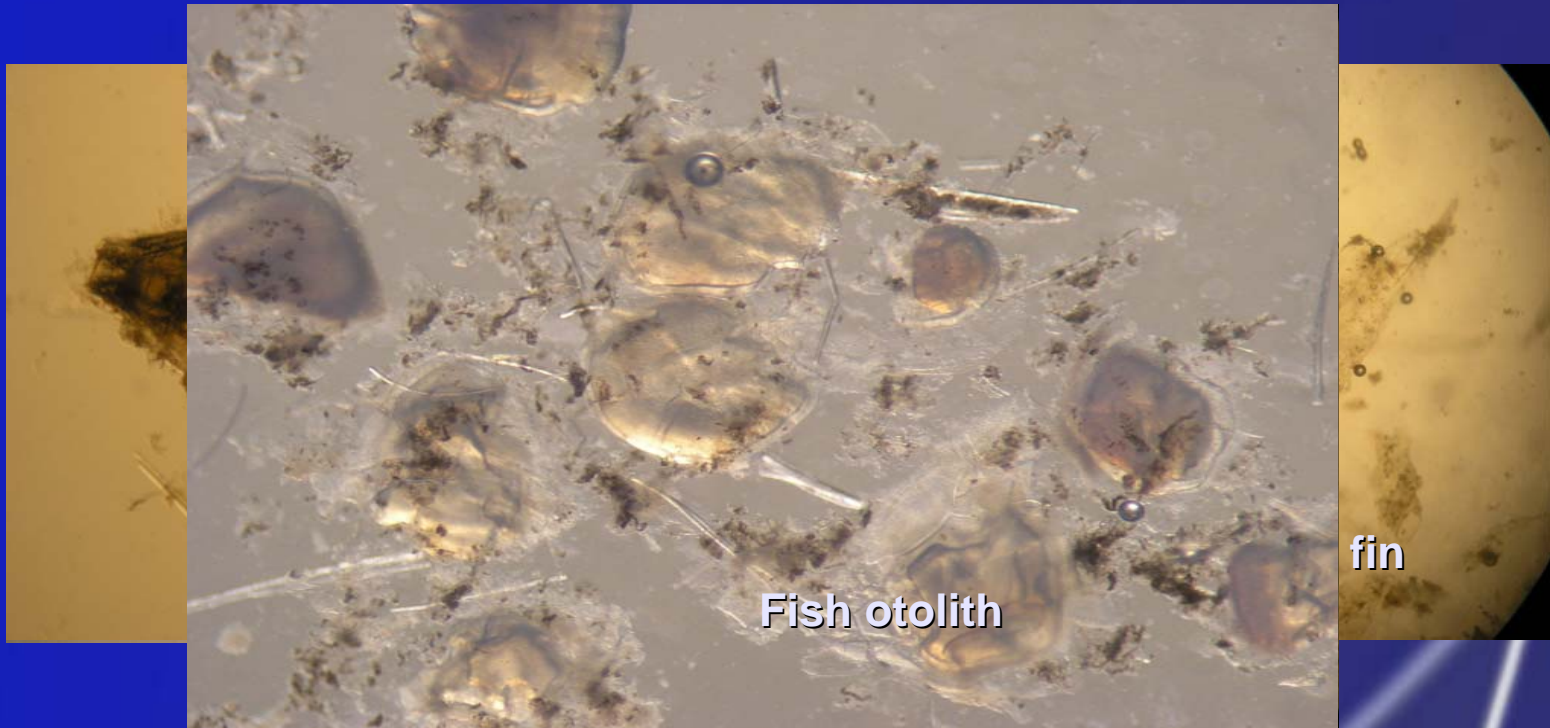
$$= (\text{occurrence \%} \times \text{dry weight \%})$$

Vacancy Index (VI, %)

$$= (\text{no. of empty stomachs} / \text{total no. of stomachs}) \times 100$$

The pictures of stomach contents

Fish



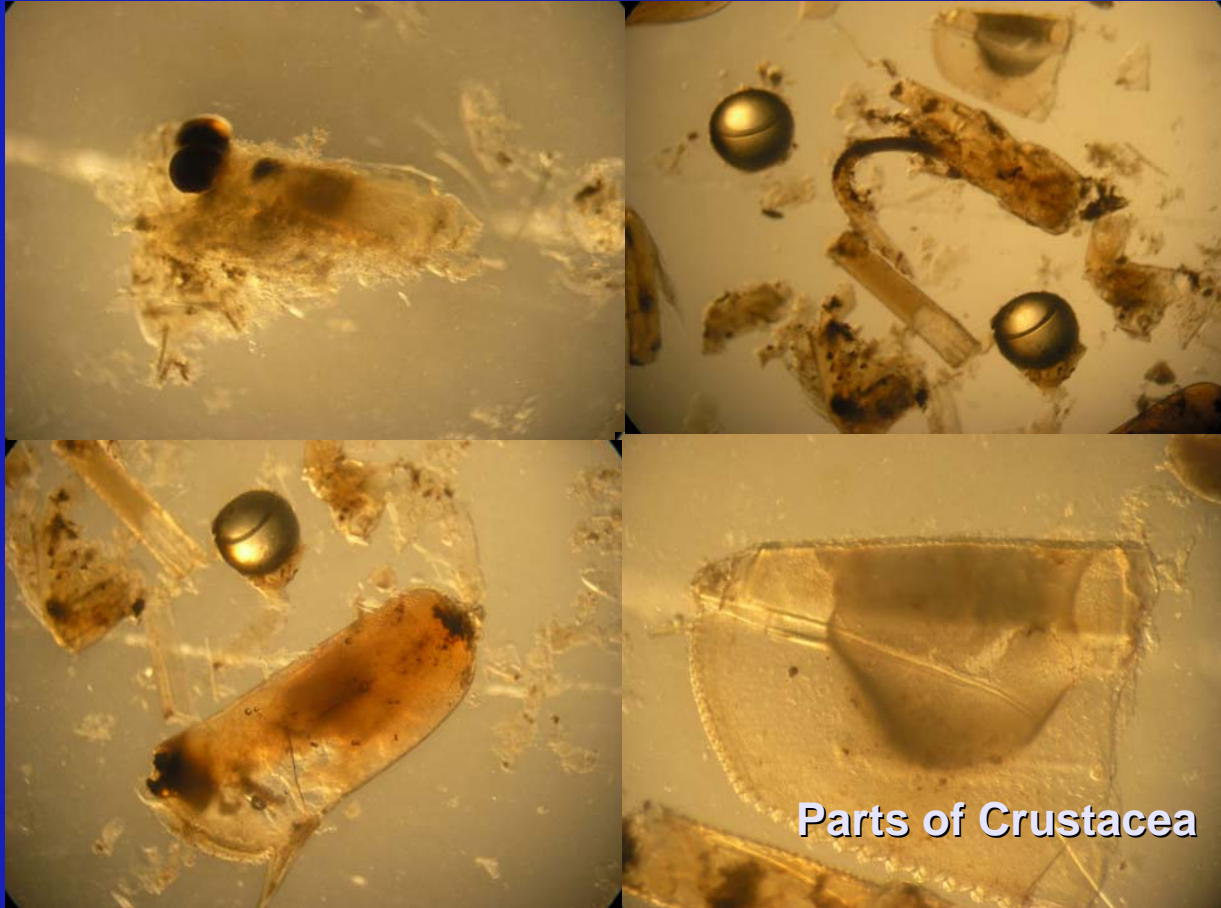
The pictures of stomach contents

Squid



The pictures of stomach contents

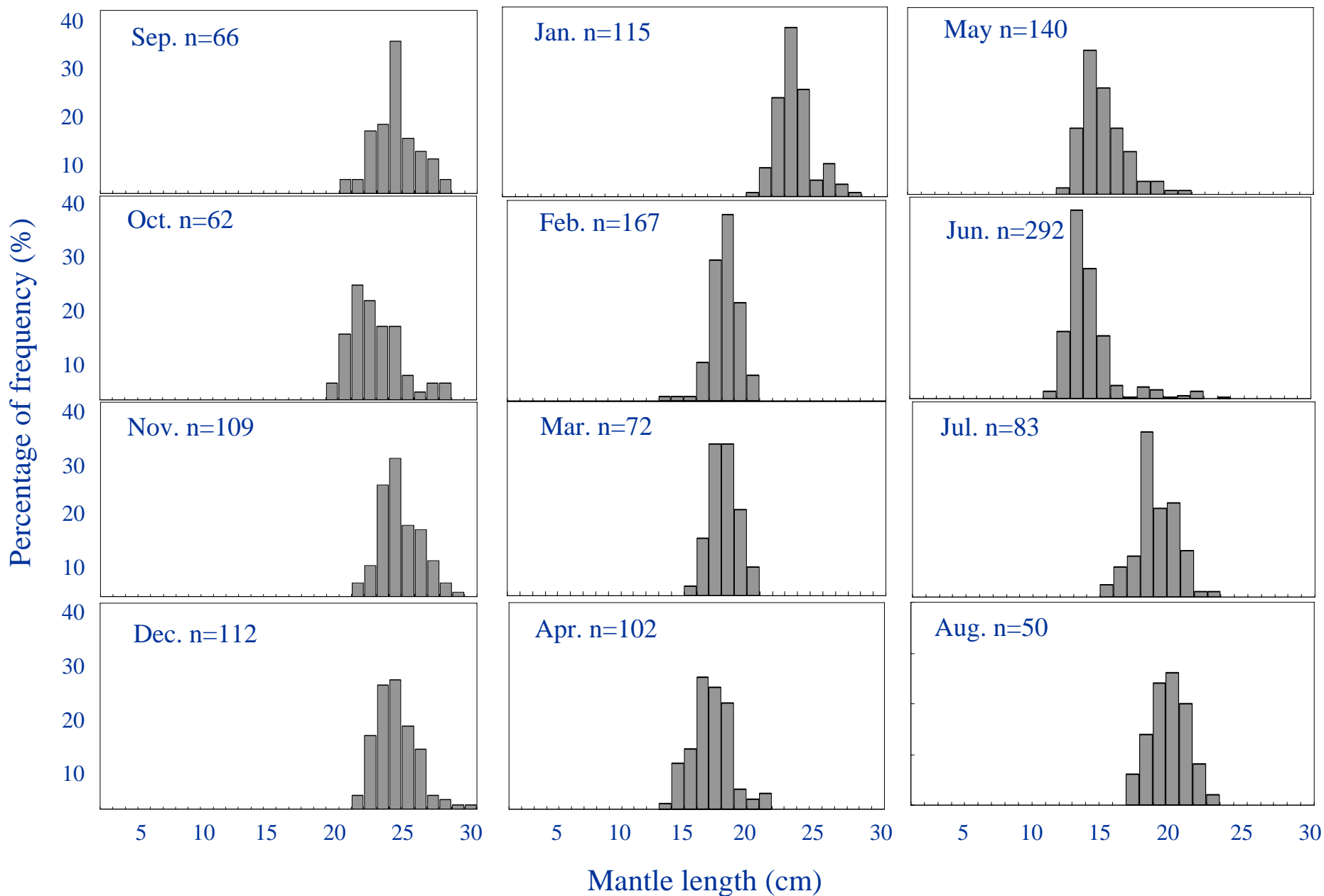
Zooplankton



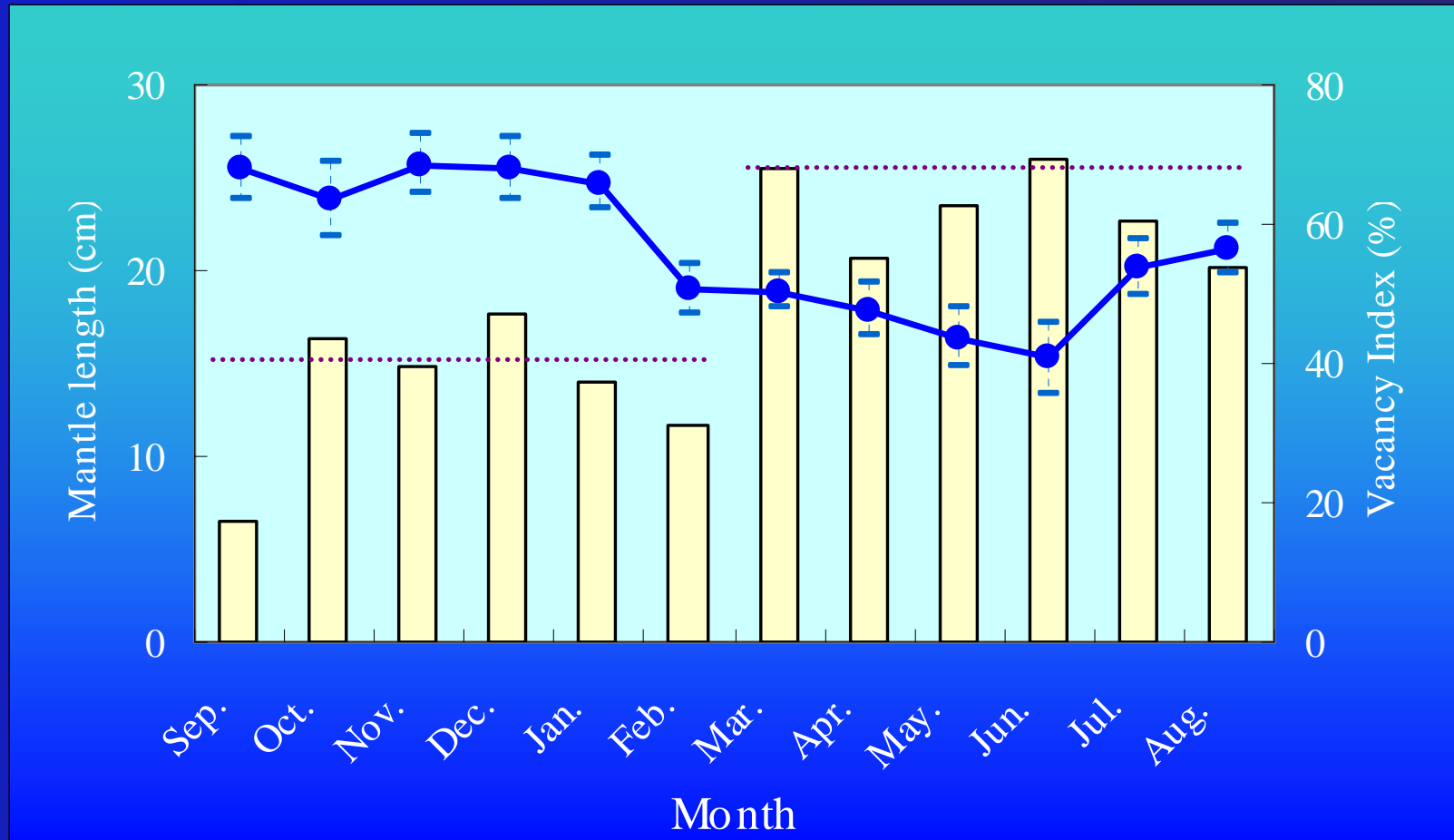
Results

- .. Mantle length *vs* VI
- .. Composition of stomach contents and RI
- .. Ontogenetic and seasonal changes
in prey items and SCI

Size distribution (8~31 cm ML)



Mean & SD of mantle length and Vacancy Index

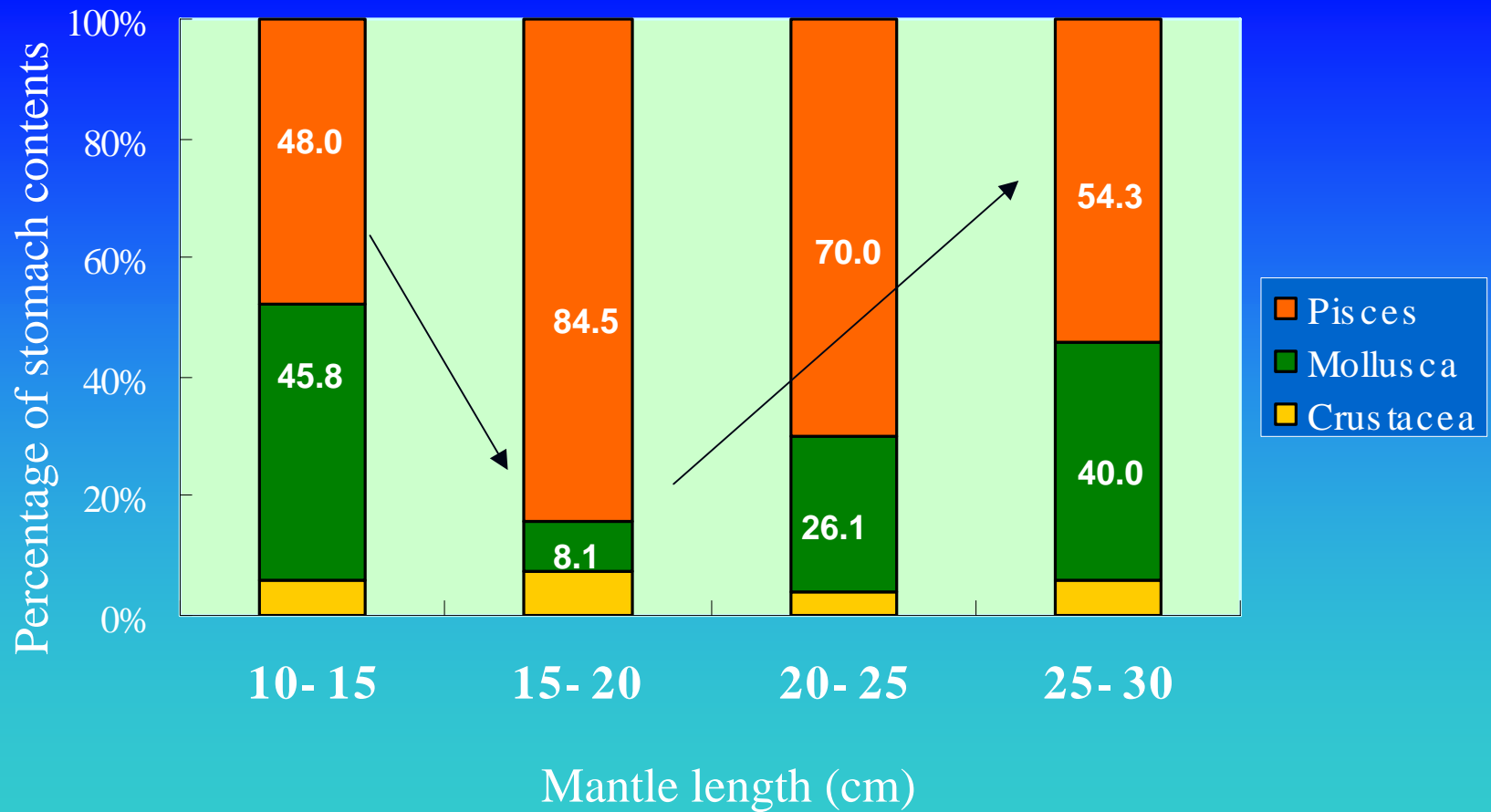


Composition of the stomach contents

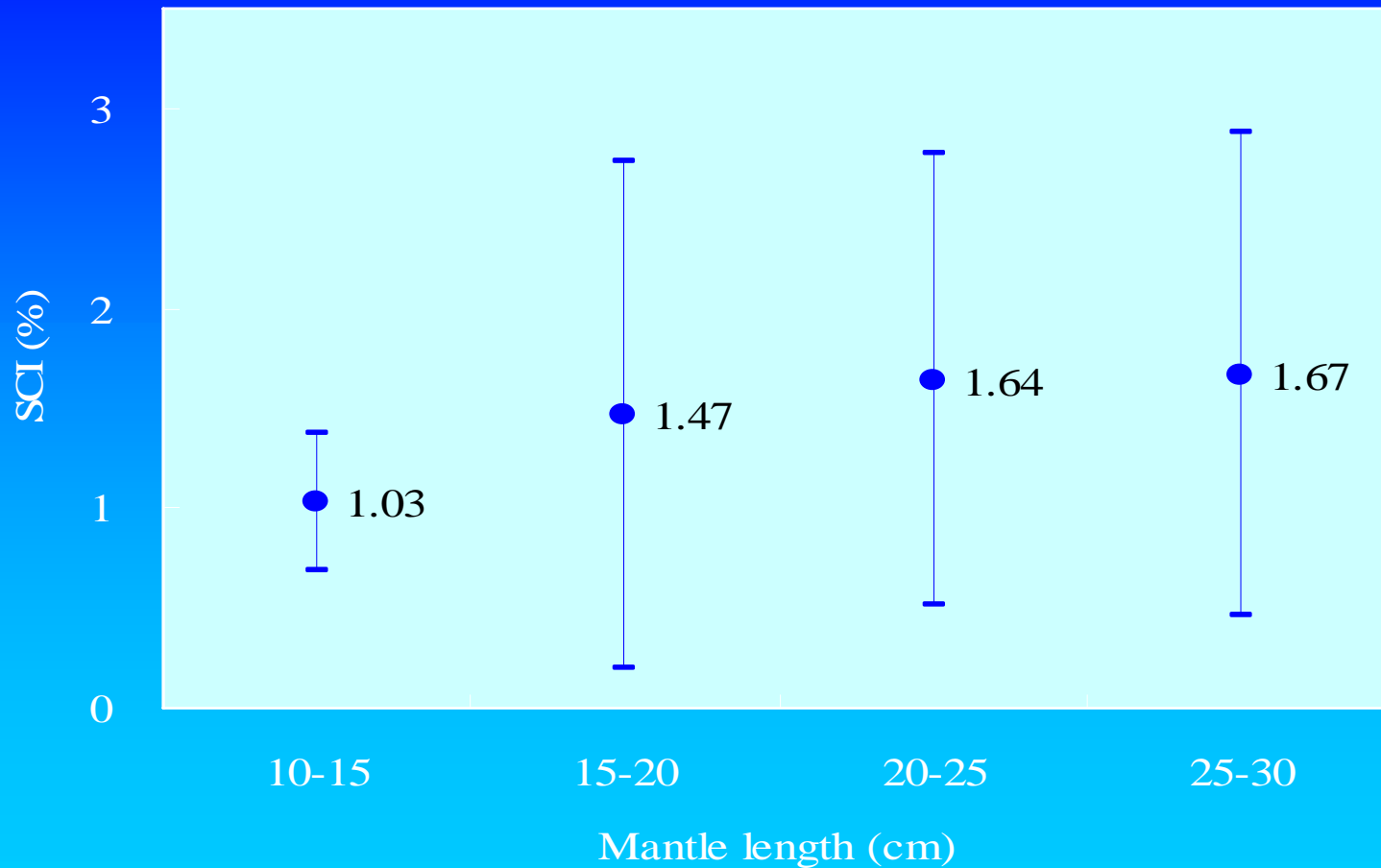
Prey organism	Occurrence (%)	Dry weight (%)	RI	RI(%)
Crustacea	15.0	5.5	82.5	2.1
Copepoda	0.3	+	+	
Amphipoda	1.4	+	0.1	
Gammaridea	+	+	+	
Caridea	1.7	2.9	5.0	
Brachyura	0.4	+	+	
Stomatopoda	0.1	0.3	+	
Unidentified crustacea	12.3	2.0	25.0	
Mollusca	49.3	22.5	1108.3	27.7
Cephalopoda	47.7	21.9	1046.1	
Bivalvia	1.7	0.5	0.9	
Pisces	39.4	71.1	2801.3	70.2
Eggs	2.1	0.2	0.4	
Total		100.0		100.0

+ <0.1

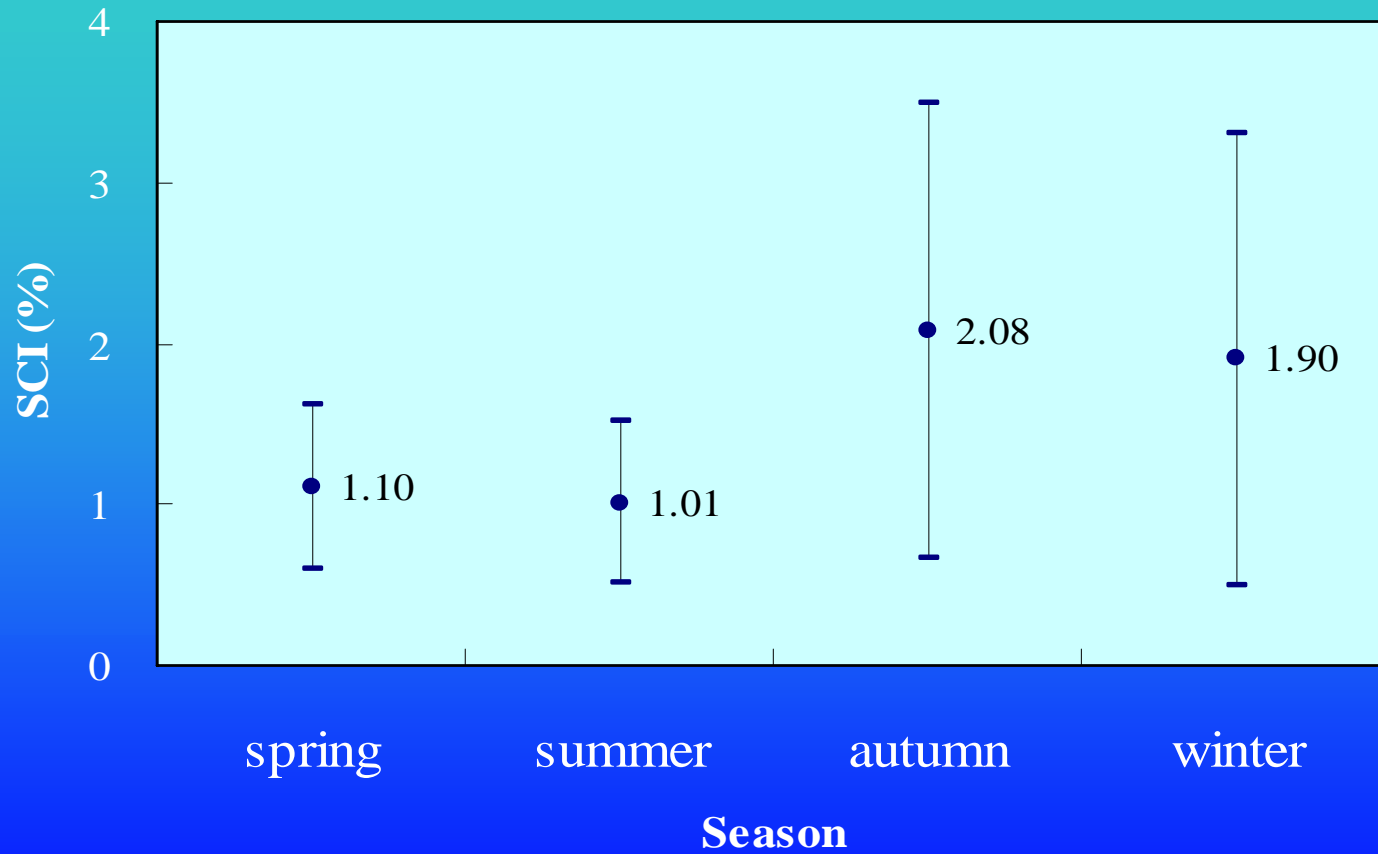
Ontogenetic change in feeding habit



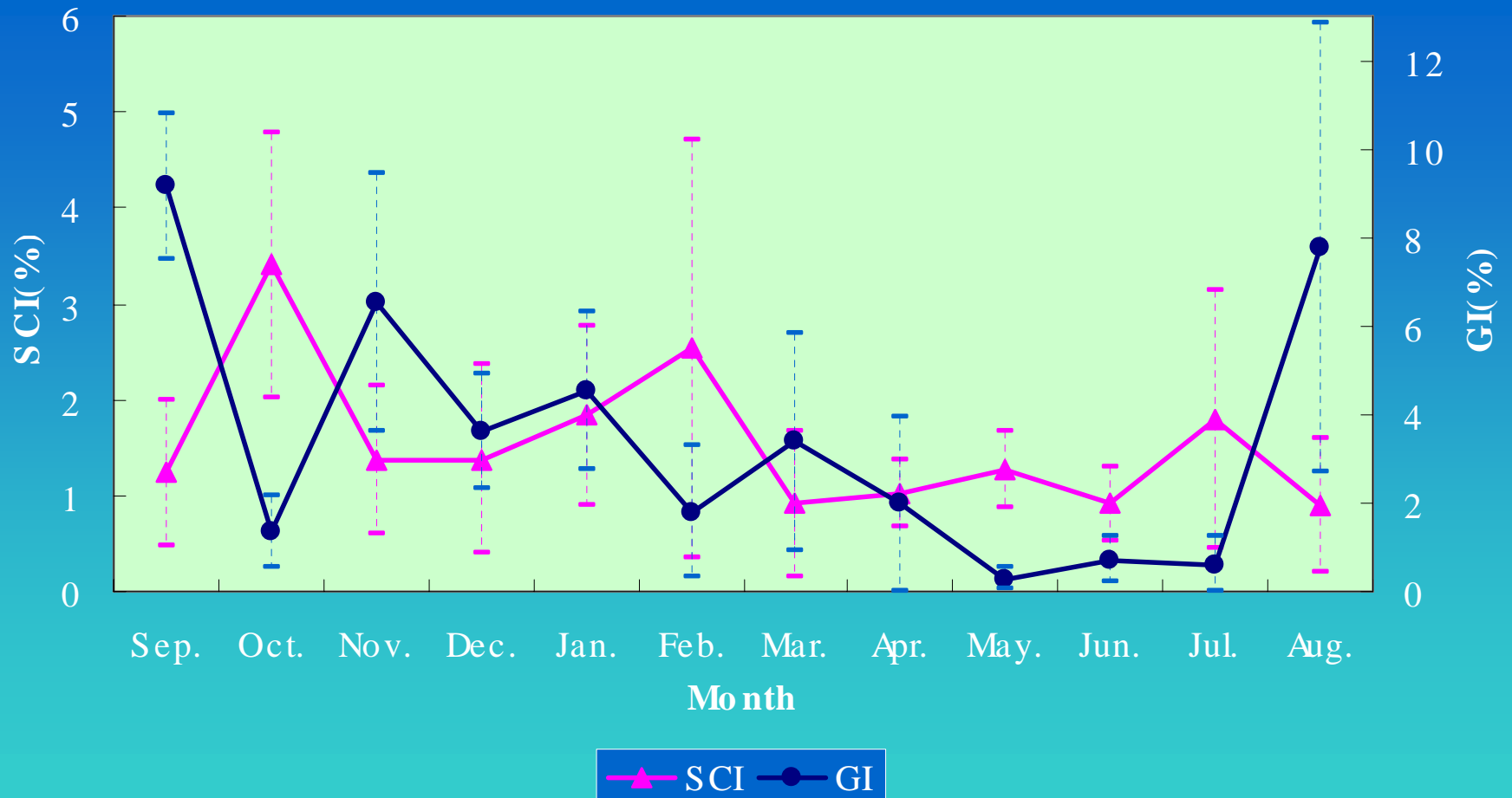
Ontogenetic change of the SCI (%)



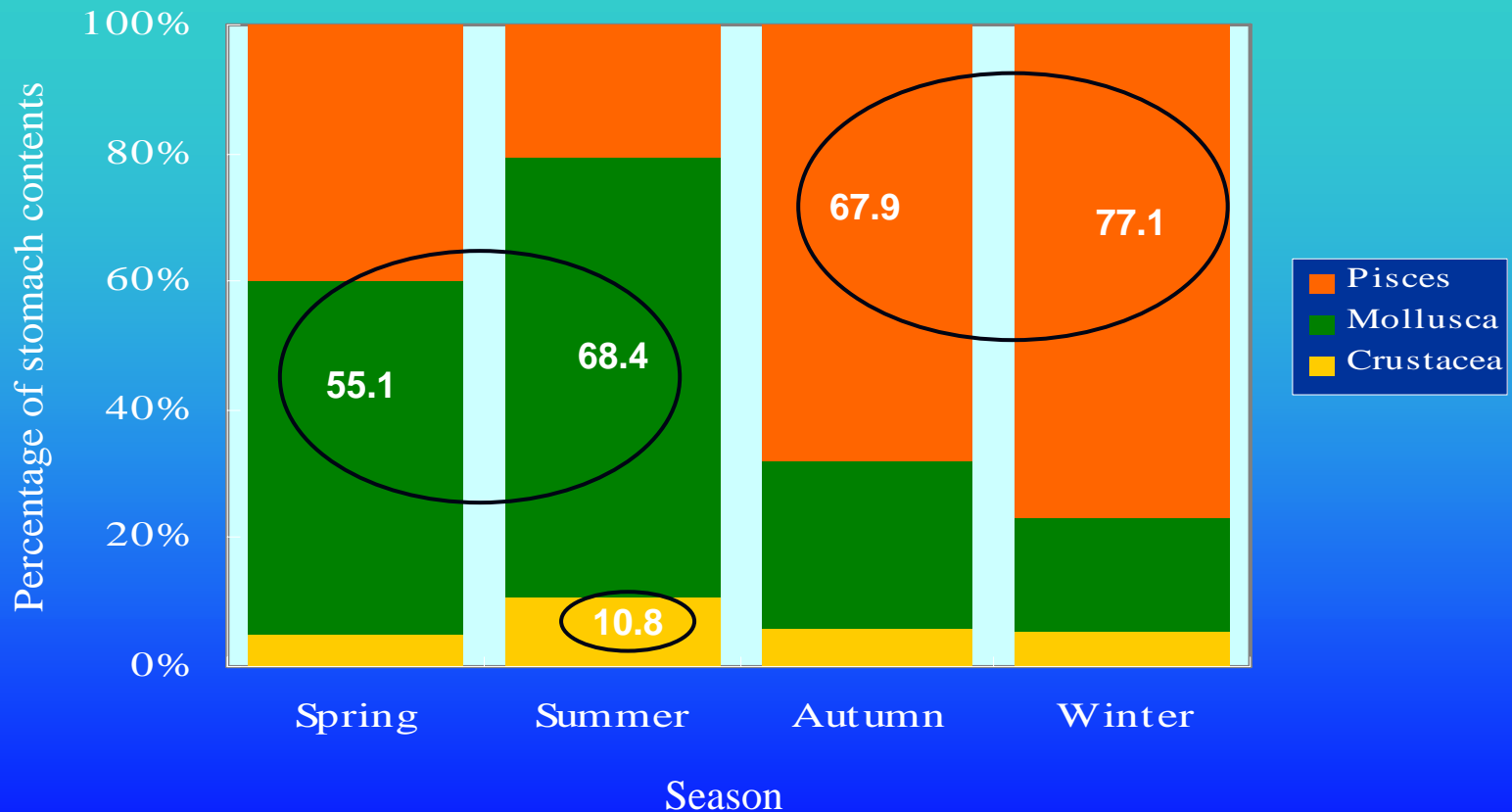
Seasonal change of the SCI (%)



Relationship between GI (%) and SCI (%)



Seasonal change of main prey organisms



Summary

- Main prey items :

Fish are always the major food item of common squid.

Pisces > Mollusca (squids) > Crustacea

- Ontogenetic change in major prey organisms :

Cannibalism was minimum in the size range of 15 to 20 cm, but it was steadily increased with size afterward.

- Ontogenetic change in SCI :

Although there was no statistical difference between sizes, the SCI seemed to increase with squid size.

Summary

■ Seasonal changes

	Season			
	Spring	Summer	Autumn	Winter
Major prey	Mollusca (squids)		Fish	
SCI	← LOW →		← HIGH →	
GI	← LOW →		← HIGH →	
VI	← HIGH →		← LOW →	

Future study

- DNA analysis of prey items
- consideration of the energetic dynamics using calorimetric methodology
- application of statistical tools that treat the growth and seasonal effects on feeding habit concurrently

Thank you