AGE DETERMINATION OF *CHAMPSOCEPHALUS GUNNARI* LÖNNBERG, 1905 (CHANNICHTHYIDAE) TAKEN IN THE SOUTH GEORGIA AREA IN 1990

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Abstract

In January/February 1990 the UK and the USSR conducted two research cruises using the vessels RV *Hill Cove* and RV *Akademik Knipovich* to study the status of the *Champsocephalus gunnari* stock in the South Georgia area. In February 1990 the size composition of catches taken by *Akademik Knipovich* had three peaks corresponding to size groups of 16-18, 24-26 and 30-34 cm. Only vertebra samples (**n**=140) were used in age determination. Age groups from 1+ to 9+ were present in catches. Two peaks in size composition correspond with fish of the 1987 and 1985/86 year classes. The first small peak corresponds with the strong 1988 year class.

Résumé

En janvier/février 1990, la Grande-Bretagne et l'URSS ont mené deux campagnes de recherche sur les navires de recherche *Hill Cove* et *Akademik Knipovich* afin d'étudier l'état du stock de *Champsocephalus gunnari* en zone de Géorgie du Sud. En février 1990, la composition par tailles des captures effectuées par l'*Akademik Knipovich* a connu trois points culminants correspondant aux groupes de taille de 16 à 18, de 24 à 26 et de 30 à 34 cm. La détermination des âges n'a été effectuée qu'à partir d'échantillons de vertèbres (**n**=140). Les groupes d'âge de 1+ à 9+ étaient présents dans les captures. Deux des niveaux optimaux dans la composition par tailles correspondent aux poissons appartenant aux classes des années 1987 et 1985/86. Le premier point culminant faible, correspond à la classe forte de l'année 1988.

Резюме

С целью изучения состояния запаса *Champsocephalus gunnari* в районе Южной Георгии в январе-феврале 1990 г. Советским Союзом и Соединенным Королевством были выполнены два научно-исследовательских рейса на судах *Hill Cove* и *Академик Книпович*. В феврале 1990 г. по данным, получен-ным судном *Академик Книпович*, распределение размеров имело три пика, соответствующие размерным группам 16-18, 24-26 и 30-34 см. При определении возраста использовались только образцы позвонков (**n**=140). В уловах присутствовали особи, принадлежащие к размерным группам от 1I до 9I. Два пика в размерном составе соответствуют рыбе возрастных классов 1987 и 1985/86 гг. Первый небольшой пик соответствует мощному годовому классу 1988 г.

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Resumen

Durante enero/febrero de 1990, la URSS y el RU llevaron a cabo dos campañas de investigación empleando los buques RV*Hill Cove* y *Akademic Knipovich*, con el objeto de estudiar el estado de la población de *Champsocephalus gunnari* en el área de Georgia del Sur. En el mes de febrero de 1990, la composición por tallas de las capturas del *Akademic Knipovich* tuvo tres máximos correspondientes a los grupos de tallas de 16-18, 24-26 y 30-34 cm. Sólo se utilizaron muestras de vértebras (**n**=140) para la determinación de la edad y sólo se encontraron formando parte de la captura los grupos de edades de 1+ a 9+. Los dos máximos en la composición por tallas correspondieron a los peces de las clases anuales de 1987 y 1985/86. El primer máximo de menor intensidad corresponde a la recia clase anual de 1988.

1. INTRODUCTION

The accuracy of fish population structure assessments and, consequently, setting an optimum catch quota depends on the accuracy of age determination. Since *Champsocephalus gunnari* is one of the most abundant fish species exploited in the Antarctic, it is of primary importance that its age strcture be determined accurately. Assessing the age of this species is made more difficult because it lacks scales, has poorly calcified bones and small otoliths which are, without special treatment, almost opaque. Published data on *C. gunnari* age determination are therefore somewhat contradictory.

2. RESULTS

In January/February 1990 the UK and the USSR conducted two research cruises on the vessels RV *Hill Cove* and RV *Akademik Knipovich* to study the status of the *C. gunnari* stock in the South Georgia area. Investigations of the size composition of catches revealed three well-defined peaks. In January 1990 these peaks corresponded to size groups 14-16, 22-24, and 31-33 cm with the maximum being in the second size group (*Hill Cove*) while in February they were 16-18, 24-26 and 30-34 cm with the maximums being in the second and third size groups (*Akademik Knipovich*).

Two fish age-reading structures (otoliths and vertebrae), to be used in determining the age composition of *C. gunnari* stocks, were collected on board the *Akademik Knipovich*. Taking into consideration the similarity of age/length data obtained from a separate examination of otoliths and vertebrae (Kochkin, 1985) and the high labour intensity of treating otoliths having multiple growth lines we conducted age determinations in laboratory conditions using vertebrae only. The work was carried out according to a methodology described in an earlier work (Kochkin, 1980). Examination of age-reading preparations (**n**=140) showed up to six dark lines on vertebrae of fish 14 to 21 cm long (Figure 1). As in previous studies (Kochkin, 1985), each fourth line was taken to be an indicator of one year's growth. Yearly growth marks in vertebrae preparations for the age groups observed usually appear as two dark lines, or more rarely a single wide one (Figures 2 to 8). Our age/length data were on the whole close to analogous UK data from the *Hill Cove* cruise.

3. DISCUSSION

An analysis of age/length and length frequency distribution data, would seem to suggest that in January 1990, specimens born in 1987 were dominant in catches, whereas in February, specimens born in 1985/86 and 1987 were the most abundant. The first small peak in length composition of catches indicates the presence of a strong 1988 year class.

The latest publications on *C. gunnari* growth (Radtke, 1987, 1988 and 1990) indicate a significantly slower growth rate when compared with earlier data produced by most authors (see Table 1). It should be noted that the American scientist, R. Radtke, determined age by counting microincrements of otoliths using an electronic scanning microscope. Radtke's tabular and graphic data on daily growth rates of all age groups of *C. gunnari* (1987, 1988 and 1990) suggest that this species may hatch in all seasons. This conclusion contradicts previous data indicating simultaneous spawning and, consequently, a relatively short period of hatching. It should be noted that a great deal of caution is necessary when determining fish age by counting daily microincrements on otoliths since, according to G. Pannella's data, the inner structure of otoliths is wholly sequential only in the first three to four years of life (Pannella, 1971). It is recommended that these investigations be carried out on only young fish in non-exploited populations (Campana and Neilson, 1982).

It should also be kept in mind that our age/length assessments in 1990 gave results very similar to those obtained from 1981 to 1987 and is almost entirely accounted for by the variations in the size limits, worked out graphically (Kochkin, 1986; Kochkin, 1989), for fish of different ages. This is evidence of a relatively constant growth rate among contemporaneous *C. gunnari* of different generations and allows an approximate age/length structure of a population to be established in the absence of age determinations over a certain period of time.

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Table 1: *C. gunnari* growth according to various authors.

Age in years	Olsen 1955	Kock 1981	Sosinski 1981		Gubsch 1982	Kochkin 1985	Radtke 1990*
1	-	15.8	-	-	-	14.0	14.7
2	-	22.3	21.1	21.3	-	21.1	19.7
3	27.1	27.9	27.6	28.0	26.7	27.2	24.2
4	32.8	33.3	33.6	32.8	29.4	32.7	28.2
5	35.1	37.7	37.1	36.7	37.3	37.5	31.8
6	36.9	43.2	39.2	39.1	40.9	41.6	35.1
7	37.6	46.0	40.4	40.3	44.4	45.3	38.0
8	39.3	48.5	41.7	41.6	48.4	48.6	40.7
9	41.2	-	42.8		48.2	51.4	43.0
10	40.5	-	44.5		-	53.9	45.2
11	41.5	-	44.8		-	56.1	47.1
12	42.5	-	44.7		-	58.0	48.8
13	-	-	48.7		-	59.7	50.4
14	-	-	48.9		-	-	51.8
15	-	-	51.4		-	-	53.1

* Data were calculated according to the author's linear growth equation.

Table 2: Age/length data on *C. gunnari* in the South Georgia area, February 1990.

Age in Years	Variations in Overall Length (cm)	Number of Specimens
1+	14-21	24
2+	21-27	23
3+	27-33	28
4+	32-37	21
5+	35-41	16
6+	38-46	10
7+	47-52	15
8+	54	1
9+	55	2

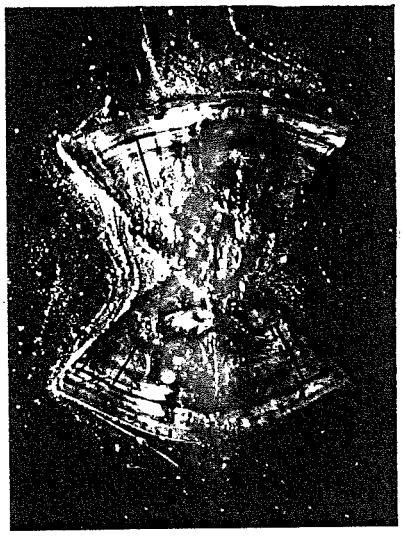


Figure 1: Vertebrae of *C. gunnari* taken by RV *Akademik Knipovich* in the South Georgia area in February 1990. Juvenile. TL=16.5 cm. Age 1^+ years. 17 February 1990.

Figure 2: Vertebrae of *C. gunnari* taken by RV *Akademik Knipovich* in the South Georgia area in February 1990. Male (♂ III). TL=21 cm. W=60 g. Age 2^+years. 17 February 1990.

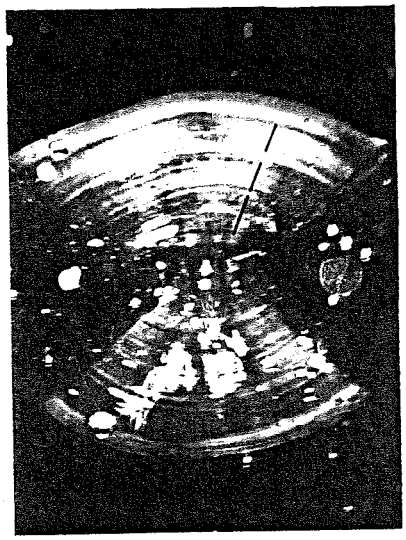


Figure 3: Vertebrae of *C. gunnari* taken by RV *Akademik Knipovich* in the South Georgia area in February 1990. Female (♀ II-III). TL=29 cm. W=130 g. Age 3^+years. 22 February 1990.

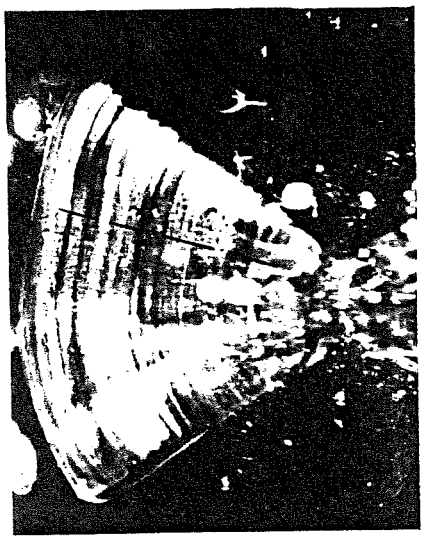
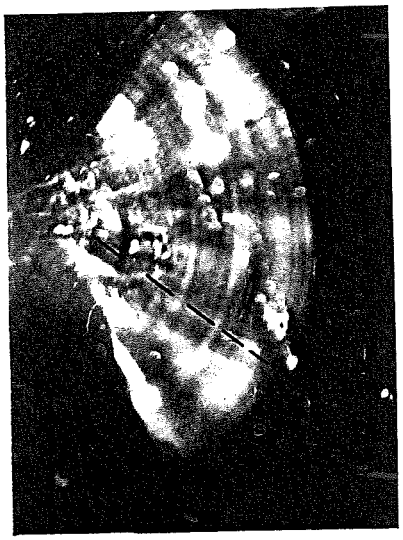


Figure 4: Vertebrae of *C. gunnari* taken by RV *Akademik Knipovich* in the South Georgia area in February 1990. Female (♀ III). TL=34 cm. W=250 g. Age 4^+years. 17 February 1990.



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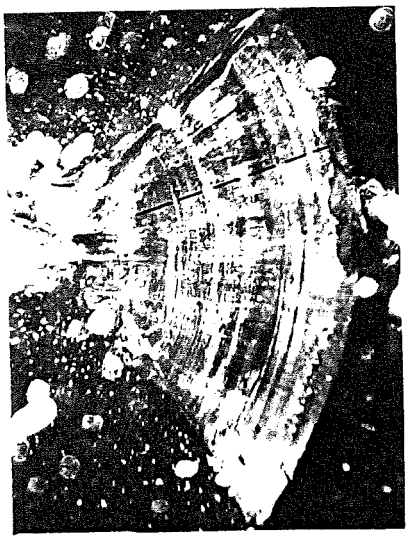

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Figure 8: Vertebrae of *C. gunnari* taken by RV *Akademik Knipovich* in the South Georgia area in February 1990. Female (♀ III). TL=54.5 cm. W=1 400 g. Age 8+years. 17 February 1990.

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