WP 15

SOUTH PACIFIC ALBACORE WORKSHOP

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PARASITE STUDIES

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The use of parasites to delineate stocks for management purposes is a well established technique (McKenzie 1983, Anon 1984, Rhode 1984). Parasites can also give information on the zoogeography of the host (Rhode 1984) and can indicate phylogenetic relationships (Kabata and Ho 1981).

Lester et al. (1985) studied school to school variation in skipjack parasites to evaluate how long schools were staying together. Their evidence suggested that New Zealand caught skipjack smaller than 57 cm had recently arrived from the tropics. Aloncle and Delaporte (1970, 1974) successfully used the albacore stomach parasite Hirudinella as a biological stock marker in the North Atlantic and also showed that the presence of a nematode (Thynnascaris) was correlated with the type and quantity of food in albacore stomachs.

In New Zealand, albacore are the subject of a research programme which will include tagging. Data on the incidence and intensity of albacore parasites may offer an independent means of studying the relationships between albacore from the different fisheries around New Zealand and a method of inferring migration routes within the South Pacific.

The first null hypothesis which we wish to test is 'that there is no parasitological evidence that New Zealand caught albacore come from tropical waters' and the second null hypothesis is 'that no statistically significant differences in parasite incidence can be detected in albacore from different areas both around New Zealand and between New Zealand and the tropical South Pacific'.

In order to reject the first hypothesis we will need to show that the parasites in question are not acquired in New Zealand waters, and are of tropical origin. Evaluating the second hypothesis will depend on our ability to show that the differences due to loss or gain of parasites during movements between areas can be detected, and that differences due to the age of the host, environment and season are unimportant.

METHODS

Samples of parasites are obtained from the head and viscera of up to 15 fish per school and from up to two schools per day. A school is operationally defined as a discrete burst of continuous fishing activity. Immediately upon capture each fish is measured and the head and viscera removed by a transverse dorso-ventral cut made from between the head and first dorsal spine, to the vent. A small quantity of 10% formalin is injected into the oesophagus prior to freezing to arrest digestion.

When convenient, samples are thawed, dissected, and examined for parasites which are identified and counted. Analyses of similarities and differences in parasite fauna between areas will be investigated using cluster analysis and multivariate cannonical analysis.

RESULTS TO DATE

At the end of May 1986, 44 albacore had been dissected and 27 species of parasite had been recovered. Of the 44 fish examined, 40 were from 6 schools (Table 1).

Although the sample size is still very small, some patterns are emerging though whether these are due to seasonal or geographic differences is not yet clear.

A sporozoan, tentatively identified as a coccidian, occurs in the liver and spleen of all the albacore examined. This parasite has not previously been recorded from tunas.

The digenean fluke *Hirudinella* is much more common in the North Cape sample than in the west coast North Island samples (WCNI) and is absent from the fish caught by the 'Townsend Cromwell' west of 173°W though it occurs in 'Townsend Cromwell' samples east of that line.

The cestode larva *Hepatoxylon* was more common in the WCNI samples and the only two specimens recovered from the 'Townsend Cromwell' samples were decomposing prior to the capture of the host fish.

The nematodes *Thynnascaris* and *Anisakis*, and the copepod *Euryphorus*, are more common in the North Cape samples.

The acanthocephalan is less common in the WCNI area.

When parasites are grouped by host lengths, despite the small sample sizes involved, there appears to be an increase in numbers of both *Hepatoxylon* and *Anisakis* with host length. Since both worms are acquired through the food chain, and albacore are only an intermediate host, such an increase would be expected. The final hosts of Hepatoxylon are sharks (several species) and for Anisakis are cetaceans and a few pinnipeds. Anisakis eggs are eaten by zooplankton and hatch into larvae. In New Zealand waters, Hurst (1984) found Anisakis larvae in the euphausid Nyctiphanes australis, and in anchovies (Engraulis australis), barracouta (Thyrsites atun), jack mackerels (Trachurus spp.) and sprats (Sprattus spp.). All five are among foods eaten by albacore.

Combining all species of diymozoid trematodes, there are slightly more fish infected with one or more species of these worms in the WCNI samples than in the North Cape samples, and smaller fish seem to have a higher incidence than larger fish in both areas. These are almost exclusively a tropical group (Lester et al. 1985) and as with skipjack, are probably picked up by albacore in the tropics. The WCNI fish sampled were slightly smaller (mean = 56 cm, n = 26) than the North Cape fish (mean = 67, n = 9).

In summary, although the sample size is still too small to draw firm conclusions, the findings are not inconsistent with a movement of smaller albacore south along the west coast of the North Island.

REFERENCES

Anon. 1984. Distribution and discrimination of stocks. pp 6-7. In Aberdeen Laboratory triennial review of research 1979-81: 74 p.

Aloncle, H. & Delaporte, F. 1970. Populations et activite de Thunnus alalunga de atlantique N-E etudiees en fonction du parasitisme stomachal. Rev. Trav. Inst. Peches marit., 34 (3): 297-300.

__________ 1974. Données nouvelles sur le germon Thunnus alalunga Bonnaterre, 1788 dans le norde-est Atlantique. Rev. Trav. Inst. Peches marit., 38: 5-102.

Hurst, R.J. 1984. Marine invertebrate hosts of New Zealand Anisakidae (Nematoda). N.Z. jl. mar. freshwat. res. 18: 187-196.

Kabata, Z. & Ho, Ju Shey. 1981. The origin and dispersal of Hake (genus Merluccius : Pisces : Teleostei) as indicated by its copepod parasites. Mar. biol. ann. rev., 19: 381-404.

Lester, R.J.B., Barnes, A., & Habib, G. 1985. Parasites of skipjack tuna: fishery implications. U.S. fish Bulletin 83: 343-356.

MacKenzie, K. 1983. Parasites as biological tags in fish population studies. Adv. appl. biol., 7: 251-331.

Rhode, K. 1984. Zoogeography of marine parasites. Helgolander Meeresunters 37: 35-52.

Table 1.

	West Coast North Island				North Cape	South Pacific
	40°42'S : 176°37'E	40°22'S : 176°48'E	40°39'S : 177°22'E	39°36'S : 178°15'E	34°27'S : 173°25'E	39°10'S : 146°53'W
Sample size	16	2	4	4	9	5*
sporozoan	16	2	4	4	9	5
DIGENEA						
Platocystis sp.	7		1	2	4	2
Koellikeria sp.	8					1
Hirudinella sp.	2				7	
didymozoid sp. A	7		3	3	3	4
" B	14	2	4	4	3	5
" C	1		1	2		
" D	10	1	1	2	2	4
" E	2					
" F	14	2	3	1	3	5
" G	11	2	4	3	5	2
" H	3	1				
" I	11	1	2		6	5
" J	7		4	1	6	1
CESTODA						
Hepatoxylon sp.	6	1	4	3	2	2?
Tentacularia sp.		1				
Species A	1	1	1	1	1	
NEMATODA						
Camallanus sp.	2	1	1		1	1
Thynnascaris sp.		1			7	1
Anisakis simplex	1		1	1	4	
ACANTHOCEPHALA						
Species A			1		8	3
COPEPODA						
Euryphorus sp.	1		1	2	8	
Pseudocycnus sp.	10		3	2	5	2

? = degenerating

* = not all heads examined yet