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PARASITES OF THE ALBACORE (THUNNUS ALALUNGA) AS POSSIBLE STOCK MARKERS

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SUMMARY

Parasites are being collected from albacore caught in New Zealand waters. The study has already provided evidence that albacore caught by trolling on the east coast of the North Island have originated in the tropics as has been assumed in past publications. It is possible that this study will also provide information on the movements of albacore around the New Zealand coastline.

Parasites identified thus far include: an unidentified sporozoan from the liver; digenean trematodes (*Platocystis alalongae*, *Hirudinella* sp., plus five species of Didymozoidae) from the skin, buccal cavity, stomach and intestine; cestodes (*Tentacularia coryphaenae* and one other species) from the body cavity and digestive diverticula; two species of intestinal nematodes; and the copepod *Pseudocycnus appendiculatus* from the gills. All of these species are semi-permanent and several have proved useful as markers in other studies. Only *P. appendiculatus* has previously been recorded from albacore caught in New Zealand waters.

INTRODUCTION

Small vessels have traditionally trolled for albacore off the east coast of the North Island (south of East Cape), and off the west coast of both islands between 41 S and 44 S, from December through to the end of March. Albacore are also taken by Japanese and Korean longline vessels north of about 42 S between May and September.

All these fish are considered to be part of the South Pacific stock which enters New Zealand waters when conditions are favourable. Most albacore caught inshore are 50 to 70 cm in length, but very young fish (<44cm) and fish of 80 - 90cm are common. Albacore taken by longline are larger than the trolled fish. No sexually mature fish have been taken in New Zealand waters.

The origin and migration routes of tunas are usually inferred from tagging experiments, or through biochemical studies. This has not yet been done for albacore taken in New Zealand and the relationship between these fish and tropical spawning populations is open to conjecture.

There are several ways to demonstrate relationships between fish from different areas. The most direct method uses artificially marked fish, and relies on subsequent sightings or recaptures to provide evidence as to where the fish go to. Disadvantages include high cost, tag induced mortality, behavioural changes, non-random distribution of the tags in the population and the high numbers of tags required to ensure a significant tag return.

A second method uses intrinsic markers. These may be morphological characters (for example colour variations); biochemical differences in blood type, protein or enzyme differences; or differences in the parasite fauna.
Two advantages of intrinsic markers are that by using naturally occuring properties of the fish the trauma of capture and tagging are avoided and the results can be obtained without first mounting an expensive programme to tag large numbers of fish. A major disadvantage is the frequent difficulty in validating such a marker.

The ideal situation is to be able to demonstrate a relationship between the fish of two areas by using two or more independent techniques.

PARASITES AS MARKERS

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 (Rohde 1984) and can indicate phylogenetic relationships (Kabata & 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 under 57cm had recently arrived from the tropics. Aloncle & Delaporte (1970,1974) successfully used the albacore stomach parasite Hirudinella as a biological stock marker in the North Sea and also showed that the presence of the 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. Collecting data on the incidence and intensity of the albacore parasites therefore offers a cost effective means of studying the relationships between albacore from the different fisheries around New Zealand and an independent method of inferring migration routes within the South Pacific.

THE PROGRAMME

The first null hypothesis which we wished to test was 'that there was no parasitological evidence for New Zealand caught albacore having come from tropical waters' and the second null hypothesis was '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 test the first hypothesis we will attempt to show that the parasites in question are not aquired in New Zealand waters and are tropical in origin. Evaluating the second hypothesis will depend upon our ability to show that 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, environmental differences, and seasonal differences, can be eliminated.

Samples of parasites are obtained as follows: the head and viscera of up to 10 fish per school and from a maximum of 2 schools per day are frozen,individually bagged, labeled and returned to Wellington (a school is operationally defined as a discreet burst of continuous fishing activity).

When convenient, heads are thawed and given a detailed examination for parasites, which are then identified and counted. Analysis of similarities and differences in parasite fauna between the areas will be investigated using cluster analysis and multivariate cannonical analysis (Mardia et al, 1979) as used by Lester et al (in press).

FINDINGS TO DATE

From albacore heads examined by the end of June 1985, all from the East Cape area, 13 parasites had been recovered (table 1).
Although only albacore from one cruise and one area have been examined at least three potential markers are present. The digenean Hirudinella has been used in the Atlantic by Aloncle & Delaporte (1970), and the didymozoids are an almost exclusively tropical group not known to occur on any endemic New Zealand fishes. The cestode Tentacularia was used as a marker by Lester et al (in press), and is also absent from endemic New Zealand fish (such as Scomber). The high number of tropical parasites is thus the first direct evidence for the origin of the New Zealand albacore.

All of these parasites are 'semi-permanent' surviving in the host for at least several months and their numbers can be expected to fall slowly as the host fish spend time in temperate seas. During the same period of time a temperate fauna can be expected to become established.
As our sampling continues, especially of the larger fish caught during the tropical spawning season in October to December (Nishikawa et al 1985) we will be better able to assess the tropical parasite loss and temperate parasite aquisition, especially if we can obtain (through co-operation with interested parties), samples from large albacore caught in the Coral Sea over the same period.

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TABLE 1: Parasites found in New Zealand albacore.

Species	Location	Description	Useful as markers?
PROTOZOA			
Sporozoan	liver	spores 10 x 7 μm	√
DIGENEA			
Platocystis alalongae	skin		?
A	gills		?
B	"		?
C	buccal cavity		?
D	" "		?
E	stomach, intestine		?
Hirudinella sp.	stomach		√
CESTODA			
Tentacularia coryphaenae	body cavity	Postlarvae	√
A	digestive diverticula		?
NEMATODA			
A	intestine		?
B	"		?
COPEPODA			
Pseudocycnus appendiculatus	gills		-

√ = probable marker
- = not suitable
? = uncertain at present