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SEMINAR ON ICHTHYOSARCOTOXISM

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ICHTHYOSARCOTOXISM (FISH POISONING)
IN NEW GUINEA

by

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1. INTRODUCTION

General information available shows that although some serious tragedies have occurred when many people have died from fish poisoning, the reported deaths have averaged about one a year over a period of 30 years and cases of illness between, one and two cases a year. In the words of one research worker in this field, "New Guinea is fortunate in respect to poisoning from eating tropical fish". Sharks (Rapson 1962) appear to take a greater toll, and crocodiles in attacks on village people possibly take even more than sharks. However, a survey carried out from September 1960 to September 1962 showed that two people died and 14 others suffered illness in this period. Other evidence collected during this period showed that many people who suffer from fish poisoning do not go to hospital. People may die without apparently suffering much pain and may therefore go unrecorded as fish poisoning victims. With data available, there is no way of judging what the real death or sickness rate could be. The continued use of species from which people suffer poisoning, suggests that while the direct causes of death from fish poisoning may be one or two cases per year, as an indirect cause this form of illness is a problem deserving urgent attention.

2. FISH POISONING STATISTICS

Although the statistics are incomplete, Text Table 1 shows the distribution of deaths and illness from fish poisoning by Districts: it is by far the greatest in the Milne Bay District followed by Central; these two areas account for about 85% of the recorded illness and 73% of the deaths. Many coastal peoples in these two areas are dependent on fish for a large part of their food and fish is plentiful. Appended Table 1 gives the record of species of fish eaten causing death and illness since about 1935 for each locality known and a summary of relevant data: for completeness, "several" has been interpreted as three and "many" as five. The evidence is that puffer fish viscera is the greatest killer followed by box fish, flying fish roe and Grammistes (Appendix 2).

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Only three recoveries are recorded after eating puffer fish (Tetrodontidae) by 21 people who ate this species on seven occasions. The data does not always record that viscera was eaten. Fresh water puffer fish eaten on two occasions included above caused serious illness but not death; hospital treatment was given early, but the toxin may be less potent in puffer fish from fresh water.

Box fishes (Ostracioidei) eaten on two occasions caused 11 deaths. The records do not give method of preparation or if viscera was eaten, nor if any people who ate this fish recovered from the illness. Like the puffer fish, box fish properly prepared is widely eaten and a blue variety is considered a delicacy at Manus Island.

Chinaman fish (Symphorus nematophorus) are the most serious cause of illness, but although this was always severe, no deaths are recorded. All identified cases are from the Milne Bay District. The "red fish" referred to may be the Chinaman fish or red bass (Lutjanus waigiensis or L. coatesi).

Fish poisoning has been most serious for Rossel Islanders of whom nine died and 27 were made seriously ill, a total of 36 people of the 46 cases given in the statistics for Milne Bay. These cases are recorded from eating fish on only four occasions but Osborne (1961) says "there was a lot of fish poisoning around Rossel Island ten to twelve years ago. I have not seen a case for the last five or six years: this could be due to us catching less fish, also the fish we suspect are usually discarded". The records also show poisoning from a greater variety of fish at Rossel Island than from all other places together and the species causing non-fatal illness include reef cod (Grouper), chinaman fish (Symphorus nematophorus) (also called Paradichthys and Mesoprion Blkr.), barracuda (Sphyraena), Lutjanus waigiensis and L. coatesi.

The paucity of statistics is also shown by the following report by Banner (1961): A Rabaul fisherman stated that "he had been poisoned by a red fish in Talasea and several times by mullet (Mugil), (hallucinatory poisoning). None of these cases received medical treatment and they are not recorded". The data is included only in appendix 2 for a single fisherman.

No cases of illness were reported from New Ireland or from the Solomon Islands during 1960-62, nor from Manus Island. That no reports of illness were received from Missima in the Milne Bay District may have significance, as this island is surrounded by deep water, while Rossel is surrounded by one of the largest lagoons in New Guinea.

3.

SUMMARY OF REPORTS FROM HOSPITALSTETRODONTIDAE.

Appendix 3 summarises the fish poisoning symptoms.

On 11.9.60, a female aged 18 years was admitted to hospital 16 hours after eating fresh water puffer fish with severe abdominal pains and continuous vomiting, pain in all joints and muscles:- these conditions continued for four days. Treatment was with epsom salts mixt bis sed crystalline penicillin and aspro. After nine days, the patient was allowed to return to her village.

On 7.10.60, a female aged 26 years was admitted four hours after eating puffer fish. There was severe vomiting and a semi-comatose condition. Epsom salts and (250 mgm) adrenaline in oil and saline intravenous were administered. Patient returned home after four days.

On 1.3.66 after eating puffer fish in the late afternoon, 4 people suffered abdominal pains and weakness and all went for assistance. One boy collapsed on the way and was carried home where he died. A little girl collapsed and died on the way and the mother reached help but died soon after. The father was given three raw eggs and salt, and vomited. Next morning he was breathing shallowly and at one stage was thought dead. He was flown from Marshall Lagoon to Port Moresby hospital. At 1.0 p.m. - 21 hours after eating - he was weak, but facial muscles and tongue had been spared. Prostigmine 1.V had no effect. Tracheotomy was necessary and this was followed by positive pressure respiration for 18 hours. Recovery was then rapid.

SYMPHORUS NEMATOPHORUS.

On 24.7.61:- A man, his wife and two young daughters had a meal of chinaman fish fillets at Samarai. Tingling in the fingertips was first experienced which then extended to the fingers and toes, then the soles of the feet which became so itchy that the pain could be relieved only by scratching them with metal bottle tops. Numbness was then experienced around the mouth, then paresis and later paralysis of the limbs (only in the two small girls). Difficulty in breathing was followed by exceptional pallor, vomiting and diarrhoea. Although 29 people have suffered from eating chinaman fish (given in Appendix 1) and illness was severe in the Milne Bay area, this species is taken off the Gazelle Peninsula in about 100 fathoms and sold filleted as good quality fish.

4.

REPORTS FROM COASTAL STATIONS

In the Abau subdistrict, flesh and liver of a green reef fish Urave (Wanigela name) causes cervical lymph nodes to become swollen and painful. Suppuration often takes place and the symptom slowly subsides. This glandular condition lasts about three-four weeks, is very painful and many people are affected at a time.

A few nights after the serious fish poisoning at Rossel Island affecting 23 people, another fish of the same type was caught in just about the same place. Some of the natives who were still suffering from the first fish ate the second with no concern or affects whatsoever.

From New Ireland at Namatanai - Butterfly cod (Scorpaenidae) and spinefoot (Siganus) have stings which have to be removed with the poison bag before the fish can be eaten or people are said to get a skin rash in a short time. However the stone fish (Synanceichthys) is reported simply cooked on the coals and the skin removed. On the south coast at Kabanaut, a small black scaleless fish, about as big as the index finger, with slimy skin, named locally talultaman, is boiled wrapped in the leaves of beach lilies as soon as it is caught otherwise it causes stomach cramps and vomiting.

5.

DIFFERENT TYPES OF ICHTHYOSARCOTOXIN

The types of poisoning have been described as follows:-

1. Tetrodon (puffer fish) poisoning is usually produced through eating the liver which is large and looks very good, fat and clean without parasitic worms, or eating the roe or viscera or the flesh which has been cooked, either boiled or over the coals with liver and reproductive organs. Illness is of a ciguatera type, but more rapid and violent, so that death

may occur in 20 minutes - 24 hours. There is a reported 60% mortality rate. Medically: gastro intestinal paraesthesiae ataxia motor paralysis. There is, however, not the prolonged recovery period in relation to normal peripheral sensation. Appendix 3 gives comparative data on the information available in New Guinea.

2. Ciguatera poisoning is produced by a variety of species of chinaman fish, red bass, etc. and Grammistes. Only the latter in New Guinea has been reported to be fatal.

3. Gymnothorax poisoning is apparently also caused by a neurotoxin not unlike that of ciguatera, but the illness is more violent with the development of convulsions and paralysis.

The only record from New Guinea which does not fit entirely into the above three groups is the account by Mr F. Osborne, of a visitor to Rossel Island, who ate soup made from boiled Sphyraena. The violence of the attack and recovery is possibly more related to Gymnothorax than other types, however the method of taking the toxin possibly caused the suddenness of the illness.

4. Scombroid poisoning in New Guinea is not recorded, but there is evidence that the tuna Enthynnus affinis may cause this. The spanish mackerels Scomberomorus, Acanthocybium and Grammatorcynus bicarinatus are all valued food fishes which have never been reported to produce toxic effects.

The data in Appendix 3 taken from hospital accounts is reasonably complete only for Tetrodon and ciguatera in New Guinea. The symptoms appear normal for both types and the fatality rate also is in agreement. No cases of Gymnothorax or Scombroid poisoning are recorded. Sphyraena has been separated for comparative purposes and data from other countries, especially for Gymnothorax and Scombroid poisoning is desirable.

6. LOCAL REMEDIES FOR FISH POISONING

There is little data on the effectiveness of local cures. Discorea pentaphylla (one of the yams) and Flagellarea indica leaves are crushed along with the resin in a cup of cold water - only the water is drunk cold. The juicy leaf of one of the Apocynaceae Alstonia is crushed and a few drops of the white sap are used in a cup of cold water. The white lily Crinum asiaticum commonly used for fish lures is used to induce vomiting when fish eaten has been found to be poisonous. Other plants in the Pacific are described by Loison (1955).

The oil fish (Revetus) is reported to be boiled several times, then fried to make it edible: will boiling the flesh of poisonous species in several waters make them non-toxic? Will boiling with the leaves of the beach lily (Crinum) kill the toxin as it does for talultaman in New Ireland? p.3.

7. SHELLFISH IN RELATION TO FISH POISONING

In March 1961, a few people who had collected and eaten shell fish in a village near Talasea on an open coast broke out into a rash accompanied by violent itching. Symptoms disappeared within 24 hours. At Talasea on 22.4.61, a death was due to eating shell fish. The sea then contained "masses of red tide". In May 1963 at Talasea, "at least one man has died" after working in red tide water. A further report states that a woman died after eating food cooked in red tide sea water. On 23.5.62, a man died at Lombrom, Manus Island after eating three or four oysters taken from the bottom of a barge in dry dock.

If sea conditions are unusual with red tide or strong phosphorescence or milkiness in the water, considerable care should be taken in using any fish or shell fish in the area affected. If fish have been found eating any unusual food, coral, shell fish or small plankton-feeding organisms, they should be treated with suspicion.

The reports of "red tide" from Talasea with cases of shell fish poisoning suggests in the absence of reports of toxic fish that "red tide" is not a cause in producing fish toxins of the ciguatera type. However, "red tide" cannot be entirely ruled out on the evidence available, as small fish, plankton feeders and sessile types of marine fauna may be intermediate stages in transferring the microplankton toxin to food fishes which produce the ciguatera type of poison, and they may be lagoon types.

8.

RECOMMENDATIONS

The following suggested lines of research may clarify some of the problems relating to ichthyosarcotoxism in New Guinea:-

1. Investigations of the effect of boiling the small black fish talultaman with leaves of the beach lily (p.3) may give information on how other toxic or suspect species may be safely used.
2. Tests on venomous species could determine the relationship if any between the poisons which produce skin rash and itching and poisonous in the skin, viscera and flesh of species producing ciguatera type toxins. (This may separate types of fish toxins as Mullet p.2, Urave p.3, Talultaman p.3).
3. Studies on Tetrodon liver after rearing fish in aquaria with non-toxic foods may show if the fish is born poisonous, or develops toxins from the food it eats.
4. A survey in the Milne Bay District using mice to test on the spot flesh or viscera of fish suspected of being poisonous, could produce well documented toxic materials for future study.
5. A microplankton study in Rossel Lagoon to determine toxin producing species which may infect fish, co-ordinated with macroplankton work and bottom studies at specific sites where poisonous fish are taken may link fish toxicity to microplankton.

12.

ACKNOWLEDGEMENTS

The basis of this report is information collected by Officers of the Department of Public Health. The reporting was initiated by Dr T.K. Abbott during a visit by Dr A.H. Banner in 1961. The data in about 60 reports warrants further study. Dr I. Maddox, Principal of the Papuan Medical College and Dr W.D. Symes, Assistant Director of Public Health have given much assistance.

13.

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Original Text: English.

TEXT TABLE 1. Showing by District the Number of Reported Cases of Fish Poisoning and Deaths

DISTRICT	PAPUA		DISTRICT	NEW GUINEA	
	TOTAL CASES	DEATHS		TOTAL CASES	DEATHS
Gulf	2	-	Sepik	7	7
Central	16	11	Horobe	2	1
Milne Bay (including Trobriands)	<u>46</u>	<u>11</u>	New Britain	<u>2</u>	<u>=</u>
Total	64	22	Total	11	8

APPENDIX 1. Summary of Deaths and Illness from Ciguatera type poisoning in Papua and New Guinea.

1935? - 1968

NO.	YEAR DATE	LOCALITY	DEATHS	ILLNESS	TOTAL	REMARKS
1	1935 ?	Wanigela (Central) Marshall Lagoon	3	-	3	Puffer fish liver eaten
2	Before 1939	Sudest Island (Milne Bay) Eastern Papua	9	-	9	Box fish eaten
3	1942	Kerepuna (Abau) (Central)	2	-	2	Box fish eaten
4	1948 ?	Rossel Island (Milne Bay)	-	Several (3)	Several (3)	Reef cod - <u>Epenephelus</u>
5	1949	Rossel Island (Milne Bay)	-	1	1	Pike or Barracuda - <u>Sphyraena</u>
6	1950	Rossel Island (Milne Bay)	0	23	23	Chinaman fish - also ill 4 cats and 3 dogs
7	?	Talasea (New Britain)	-	1	1	
8	?	South Coast (New Britain)	-	1	1	
9	1953	Wasa Village (Morobe) Belombibi	1	1	2	<u>Grammistes senlineatus</u> eaten
10	1954 ?	Laluora (Abau) (Central)	3	-	3	Puffer fish liver eaten
11	1957	Vanimo (Sepik)	Many (5)	-	Many (5)	Puffer fish including liver eaten
12	1959	Vanimo (Sepik)	2	-	2	Puffer fish including liver eaten
13	1960 11/9 and 7/10	Kukipi (Gulf)	-	2	2	Fresh water puffer fish eaten - 2 cases
14	1960 17/9	Trobriands (Milne Bay)	1	2	3	Puffer fish eaten, one man ate most and died, 1 hour later 2 men ate a very small amount and vomited immediately.
15	1960 10/11? Oct./Nov.?	Kapa Kapa (Rigo) (Central)	-	4	4	Species of fish not known
16	1961 24/7 ?	Samarai (Milne Bay)	-	4	4	Chinaman fish eaten (see text for details)
17	1961?	Samarai (Milne Bay)	-	2	2	Chinaman fish eaten
18	1962 10/9	Trobriands (Milne Bay)	1	-	1	Puffer fish
19	1966 1/3	Marshall Lagoon (Central)	3	1	4	Puffer fish including liver and gonads eaten (see text for details of hospitalisation).
Total Part Estimate			30	45	75	

APPENDIX 2. Record of Types of Fish Eaten with Cases of Illness and of Death

1935 - 1968

SPECIES	TIMES EATEN	TOTAL NUMBER OF PEOPLE AFFECTED	DEATHS	LOCALITIES	REMARKS
Sea puffer fish	7	21	18	Sepik Coast, Morobe, Milne Bay (including Trobriand and Rossel Islands), Central	In record No.10 of Table 1, 2 boys only ate a very small amount, vomited immediately and recovered. Only 1 case recovered after eating a full meal.
Fresh water puffer	2	2	-	Gulf	Early hospitalisation - possibly less poisonous than sea puffer.
Box fish	2	11	11	Milne Bay	No data on patients who may have recovered.
Chinaman fish	3	29	-	Milne Bay	All cases of serious illness.
Reef cod	1	3	-	Milne Bay	Different people were affected in various ways - one man suffered no ill effects after a full meal.
Sphyraena	1	1	-	Milne Bay	Serious illness after drinking soup.
Red fish	1	1	-	Talasea	Doubt on species but could be Chinaman fish, Red bass or <u>L. coatesi</u> .
Grammistes	1	2	1	Morobe	Doubt on species, but specimen submitted positively identified.
Mullet	1	1	-	New Britain coasts	No data.
Unknown	1	4	-	Central	Possibly puffer fish eaten, vomited soon after eating and then hospitalised.
Total	20	75	30		

APPENDIX 3. Showing Fish Poisoning Symptoms of Ciguatera Type and Scombroid Poisoning.

NO.		TETRODON	CIGUATERA	GYMNOTHORAX	SPHYRAENA	SCOMBROID
1	Bizarre parathesia, recovery may take 3 weeks - tingling and numbness	No	Yes			
2	Acute gastro-intestinal symptoms, vomiting	Yes	Yes			
3	Weakness - motor paralysis	Yes	Yes		(Coma - recovery (after one day	
4	Dizziness, headaches	Yes	Yes			
5	Joint and muscular pains	Yes	Yes			
6	Itching	-	Yes			Yes
7	Rash, urticaria ?	-				
8	Central nervous system affected, unco-ordinated movements	Yes	Yes			
9	Respiratory paralysis, distress	Yes	Yes			
10	% Deaths	60%	2-3%			
11	Types of fish	Tetrodon and allies	Snappers Epenephelus			Tunas
12	Parts of fish	Viscera and gonads	Flesh			
13	Taste	Bitter?	Normal			Peppery?
14	Artery and capillary dilation, venous return delayed, swelling and cyanoses of lips and tongue					
15	Remarks			No record in Papua and New Guinea	1 case of eating soup	Doubtful record
16	Tingling or numbness of hands, feet, lips					Some swelling