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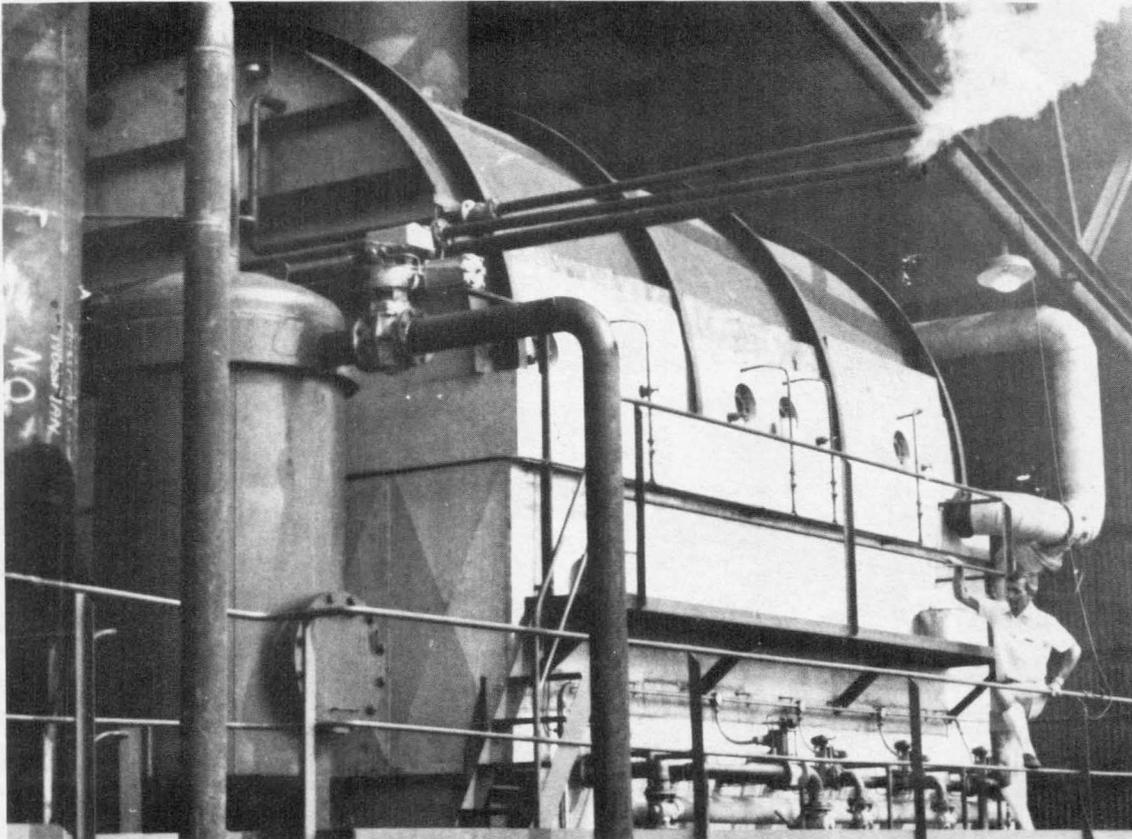


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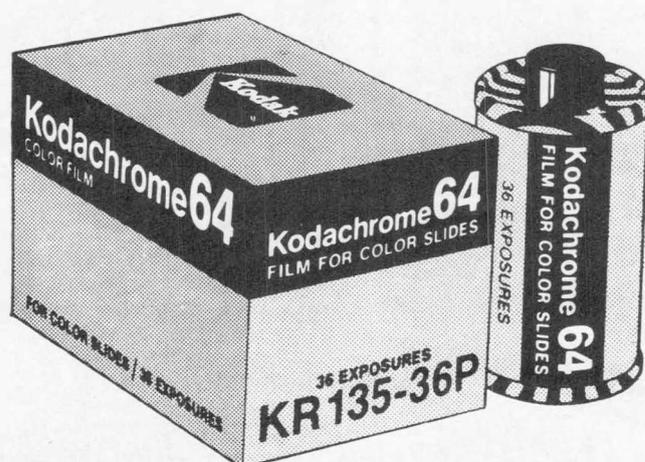
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## Cover

Last issue, we ran a small news item concerning Dr Ian Fairbairn, SPC Economist, who had recently received the chiefly title of Te'o in the Western Samoan village of Fasito'outa. Our cover this issue was taken at the ceremony at which the title was presented showing Dr Fairbairn with Auelua, Samoan head of the Sa Petaia family, to which Dr Fairbairn belongs. On page 28, Dr Fairbairn has an article on a meeting of Pacific Islands industrial specialists and next issue he writes on Guam's green revolution.

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The South Pacific Bulletin, first published in January 1951, features articles on activities in the South Pacific Commission's three main fields of operation: economic, health and social development. Articles are contributed by specialists working in these and related fields in the SPC area. The Bulletin has a selective, world distribution among people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission.

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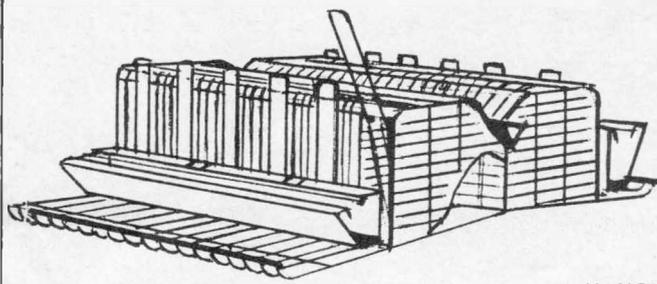
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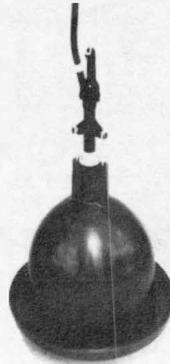
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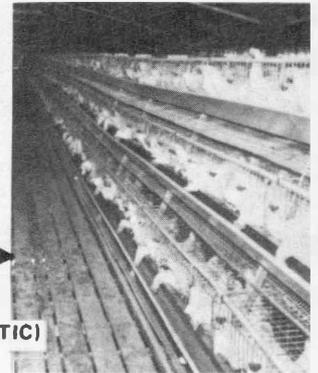
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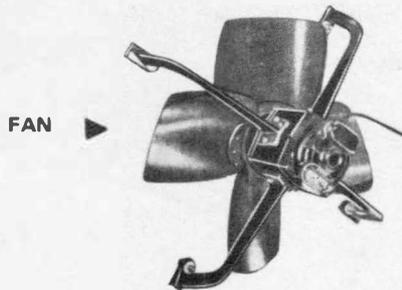


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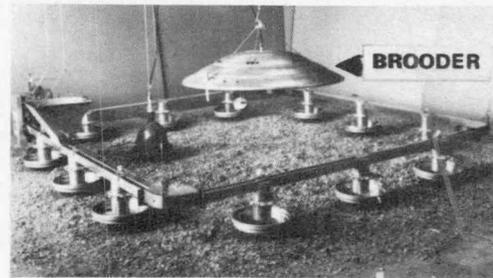
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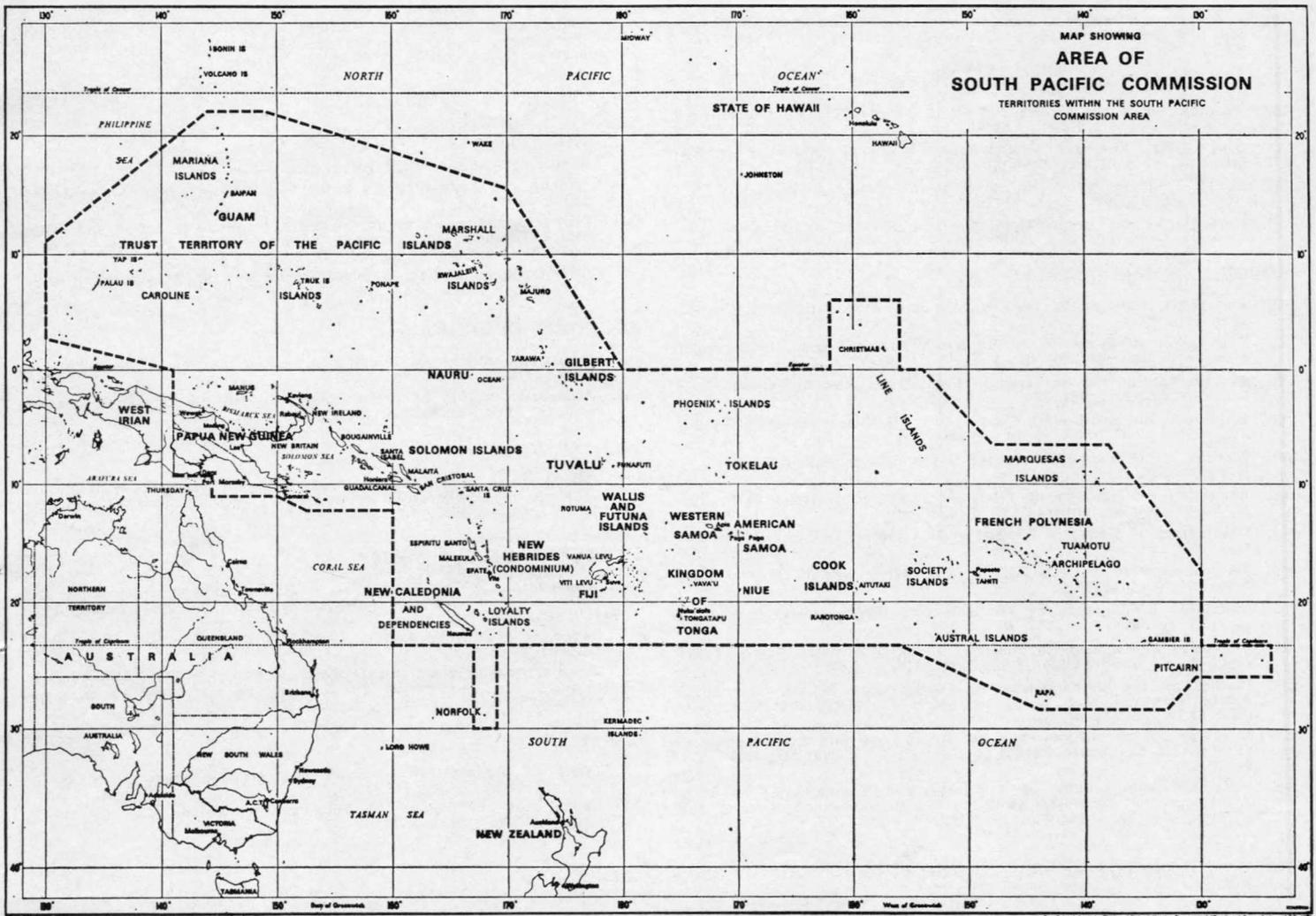
The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific island territories. The Commission's work programme provides for activities in the fields of food and materials, marine resources, rural management and technology, community services and information services and

data analysis. The Commission's headquarters are in Noumea, New Caledonia.

Until 1974, Commissioners from the participating Governments met in annual Session. The South Pacific Conference first met in 1950, and became an annual event in 1967. It was attended by delegates from countries and territories within the Commission's area of action, and met immediately before the Session.

In October 1974, in Rarotonga, Cook Islands, representatives of the participating Governments signed a Memorandum of Understanding which provides for the Commission and the Conference to meet annually in a joint session known as the South Pacific Conference.

The Principal Officers of the Commission are: the Secretary-General, Dr E. Macu Salato; the Director of Administration, Dr Frank Mahony; and the Director of Programmes, Dr Guy Motha.



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# THE 'POPULATION PROBLEM' in the South Pacific



By M.L. BAKKER, School of Social & Economic Development, University of the South Pacific, Suva, Fiji.

This paper focuses on the problems associated with population growth in the South Pacific and is a revised and updated version of an address to the S.P.C./I.L.O. Sub-Regional Seminar on Cooperatives and Population held in Suva from 13-15 December 1976. The first section gives a general picture of past and contemporary population growth in the Pacific, illustrated by means of the demographic transition model; the second section presents a very restricted summary of a few already existing or anticipated consequences of population growth in the Pacific and finally the third section discusses a few alternative answers to Pacific "population problems."

## 1. Population growth in the South Pacific

The current world "population problem" is often illustrated by means of a simple diagram, the demographic transition model. Before the demographic transition takes place, a population

normally has high birth rates (the crude birth rate is approximately 40 per thousand), which are counter-balanced by high and extremely fluctuating death rates. Consequently populations

remain almost stationary, or grow very slowly. Later, with improvement and expansion of food production, manufacturing, nutrition and hygiene, public health services, medical technology etc., the death rates start to decrease and as birth rates remain high, populations begin to grow. Finally, after a certain time lag, if the birth rates follow the downward trend of the death rates, a new equilibrium will eventually be reached at a much lower level.

This process of demographic transition as it has occurred in some European countries is illustrated in **Fig. 1a**; but in 1977, there are few populations in the world that have actually completed this demographic transition and it is not clear whether the majority of the world's populations and especially the group of so-called "developing countries", will go through the same process as these. After World War II, it became clear that many developing countries, which at that moment were in the initial phase of demographic transition, were growing at much higher rates than the few European countries had done at the same stage of their demographic transition. Death rates fell much more rapidly than in European countries because of the sudden and massive introduction of modern medicine (**Fig. 1b**). At first, birth rates remained at the traditional level in most of these countries, but after some time they began to decline very slowly. However, in many developing countries there is still no evidence at all that the fertility has even increased; consequently, world population has begun to grow at a tremendous speed. This phenomenon, usually labelled the 'Population Explosion', is represented in **Fig. 2**. World population growth rates reached the unprecedented level of approximately two per cent per year, but annual growth rates of more than three per cent for individual countries are also common.

How does the demographic situation in the South Pacific compare with that of the world in general? **Table 1** attempts to provide a picture of the demographic situation of South Pacific countries and territories at the time of the most recent censuses, the annual rate of growth since the previous census and some other demographic parameters. The implications of the rapid annual growth rates are shown in the following rating scale developed by the American demographer D. J. Bogue:

Using this rating scale, most Pacific Island countries have annual rates of growth which fall into the category of 'explosive' growth.

There are a few notable exceptions. In the first place there are a number of small island populations which have in fact experienced a negative growth, owing to out-migration (Niue,

Rating	Annual rate of growth	No. of years required for the pop. to double in size
Stationary pop.	No growth	.....
Slow growth	Less than 0.5pc	More than 139 years
Moderate growth	0.5 to 1.0pc	139-70 years
Rapid growth	1.0 to 1.5pc	70-47 years
Very rapid growth	1.5 to 2.0pc	47-35 years
Explosive growth	2.0 to 2.5pc	35-28 years
Explosive growth	2.5 to 3.0pc	28-23 years
Explosive growth	3.0 to 3.5pc	23-20 years
Explosive growth	3.5 to 4.0pc	20-18 years

Pitcairn and Tokelau). The rapid **natural** growth of the Cook Islands is evidenced by the fact that despite large-scale emigration to New Zealand since 1955, this country still had a positive annual rate of growth of two per cent between 1966 and 1971. Since then, the Cook Islands have experienced rapid depopulation; between 1973 and 1976 the country had a **negative** annual growth rate of almost four per cent. However, since 1976 there has been a reverse flow of migrants as a consequence of the deteriorating employment situation in New Zealand.

Next, it should be noted that the annual rates of growth between the last two censuses of Tonga and Western Samoa are much lower than during the previous intercensal periods. The Tongan rate dropped from 3.04 to 1.68 per cent and the Western Samoan rate from 2.15 to 0.62 per cent. This, however, is mainly a consequence of external migration, although the Tongans experienced

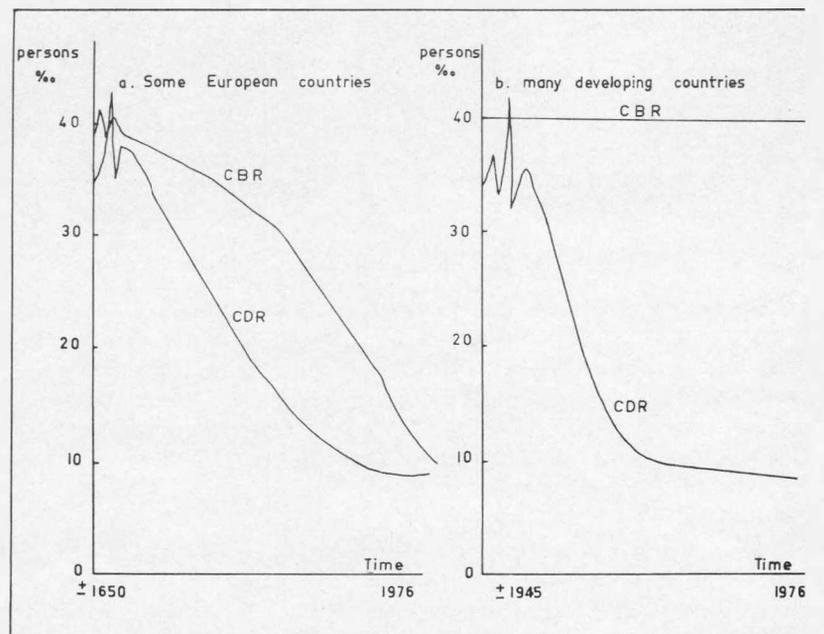


Figure 1 : Schematic representation of the demographic transition model

**TABLE 1**

Summary of population size at the time of the most recent census, annual rate of growth since previous census, and some demographic implications of these rates for countries in the South Pacific region.

COUNTRY	last cens. yr.	pop. nr.	ann. growth rate (%)	pop. dens. (per km <sup>2</sup> )	doubl. time (yrs.)	no. yrs until 1 m <sup>2</sup> /pers.
Am. Samoa	1974	29,191*	1.61	148	43	548
Cook Islands	1976	18,112*	- 3.88	75	-	-
Fiji	1976	585,000*	2.05	32	34	506
French Polynesia	1971	119,168	4.16	36	17	246
Gilbert & Ellice Is.	1973	57,813	1.54	81	45	611
Guam	1970	84,996	2.37	157	29	369
Nauru ***	1966	6,057	5.45	288	13	150
New Hebrides **	1975	94,000	2.31	7	30	509
New Caledonia	1976	133,233	3.94	7	18	302
Niue Island	1976	3,858*	- 5.05	15	-	-
Norfolk Island	1971	1,683	7.58	47	9	132
Papua New Guinea	1971	2,489,935	2.61	5	27	464
Pitcairn Island	1975	70	-6.07	14	-	-
Solomon Islands	1976	196,823	3.35	7	21	355
Tokelau Islands	1972	1,599	-3.20	160	-	-
Tonga ****	1976	90,128*	1.52	129	46	590
Trust Territory Pac. Isls.	1973	115,251	3.57	63	19	271
Wallis and Futuna	1976	9,162	0.99	36	70	1,029
Western Samoa	1976	151,275*	0.62	52	111	1,582

\* Provisional figure

\*\* Estimated figure, not based on census

\*\*\* Last census was held on 22/1/77, but figures are not yet available

\*\*\*\* 1976 census was a "de-jure" census

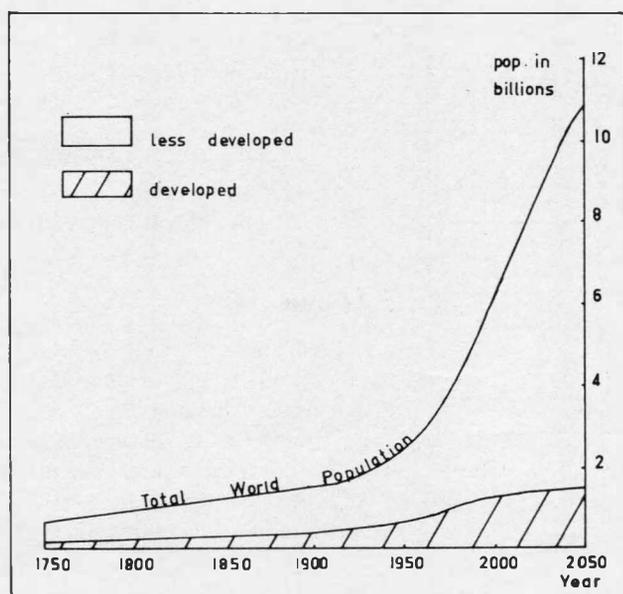


Figure 2 : The World population explosion. The trend after 1976 is based on U.N. medium projections.

some decrease in their birth rate during the last five years.

Finally, these countries with negative annual rates of growth on the one hand and lower than expected annual rates of growth on the other hand, all have annual rates of **natural** increase (births-deaths, external migration excluded) which exceed two per cent. Without the possibility of external migration, they would therefore also fall in the category of 'explosive growth'. Consequently, doubling times of most Pacific countries are much lower than the world average figure of some 35 years, which is the doubling time corresponding with an annual growth rate of two per cent.

From the data in **Table 1**, it is quite clear that most Pacific populations are still in the very early stage of demographic transition, or have not yet begun transition. We will investigate this a little more thoroughly for two countries, Fiji and Tonga. Fiji is chosen because the Indian component of the Fijian population has, until now, been the most successful population in the Pacific with fertility decline, while Tonga is an example of a Pacific country with very high fertility rates, where a very moderate decline in fertility has started only recently.

## Fiji

**Table 2** gives the growth of the Fijian population from the earliest census in 1881 until the last census in 1976. The **Fijian** component of this population had higher death than birth rates from the moment of European impact until about 1921. As a consequence, this component population was reduced from 114,748 in 1881 to 84,475 in 1921; but from 1921 onwards, the Fijian component underwent an accelerated growth. Therefore the year 1921 can be considered the take-off point. This accelerated growth resulted from rapidly declining mortality; fertility remained on the high pre-1921 level.

**Table 3** gives a summary of the value of some demographic parameters around 1966. These figures are based not on vital registration reports but on measurement by indirect estimation methods based on census data. There are considerable discrepancies between the values in this table and the official figures which are annually published in the Registrar-General's Reports in Fiji. This is due to under-registration of births and deaths in the Vital Records of Fiji.

From **Table 3**, it is clear that, since 1966, the mortality levels have been very low indeed and the average life expectancies high compared to most developing countries. Mortality for the Fijian component has thus declined considerably in a short period of time.

TABLE 2

Summary of population size, annual growth rates since previous census and doubling times of Fijian and Indian components and total population of Fiji, for the censuses between 1881 and 1976.

FIJIANS				INDIANS				TOTAL POPULATION			
Census		Ann. growth rate (%)	doubl. time (yrs)	Census		Ann. growth rate (%)	doubl. time (yrs)	Census		Ann. growth rate (%)	doubl. time (yrs)
Year	No.			Year	No.			Year	No.		
1881	114,748	-	-	1881	588	-	-	1881	127,486	-	-
1891	105,800	-0.81	85*	1891	7,468	+25.41	3	1891	121,180	-0.51	137*
1901	94,397	-1.14	61*	1901	17,105	+82.99	8	1901	120,124	-0.09	790*
1911	87,096	-0.81	86*	1911	40,286	+ 8.56	8	1911	139,541	+1.50	46
1921	84,475	-0.30	228	1921	60,634	+ 4.06	17	1921	157,266	+1.19	58
1936	97,651	+0.97	72	1936	85,002	+ 2.25	31	1936	198,379	+1.55	45
1946	117,448	+1.77	39	1946	120,063	+ 3.31	21	1946	259,638	+2.58	27
1956	148,134	+2.33	30	1956	169,403	+ 3.45	20	1956	345,737	+2.88	24
1966	202,176	+3.12	22	1966	240,960	+ 3.54	20	1966	476,727	+3.23	21
1976**	-	-	-	1976	-	-	-	1976	585,000	+2.05	34

Notes: \*Having time  
\*\* 1976 Census figures provisional

As far as fertility is concerned, the situation is different. Fig. 3 gives the general fertility rates from 1957 to 1972. It appears that the fertility level of the Fijian component remained largely unchanged between 1921 and 1966; but after 1966, there was a slight downward trend in fertility. The picture for the Indian component differs considerably from the Fijian component.

Until 1921, rates of this component are obscured as a result of the arrival of indentured labourers. This immigration started in 1879 and

TABLE 3

Vital estimates of the Fijian and Indian component of the population of Fiji and of the Tongan component of the population of Tonga, (males, females and total population) around 1966, obtained by means of selected estimation methods.

ESTIMATION METHOD	Pop. parameter	FIJI						TONGA		
		Fijians			Indians			m	fem	tot.
		m	fem	tot.	m	fem	tot.			
Intercensal survival methods (Coale/Demeny and Brass) 1956-1966	CDR (‰)	13.3	12.6	13.0	18.8	14.2	16.5	13.9	14.2	14.1
	e <sub>0</sub> (yrs)	52.8	55.1	53.9	45.4	49.8	47.6	54.2	53.4	53.8
	e <sub>5</sub> (yrs)	56.8	58.8	57.8	51.4	55.7	53.6	57.6	57.8	57.7
Stable and quasi-stable population analysis, 1966	d (‰)	8.5	8.5	8.5	-	-	-	15.5	14.1	14.8
	b (‰)	40.0	40.0	40.0	-	-	-	45.5	44.1	44.8
	e <sub>0</sub> (yrs)	61.6	62.8	62.2	-	-	-	49.5	52.3	50.9
Brass method of estimating infant and child mortality (Fiji: 1973, Tonga: 1966)	p(2) (‰)	-	-	93.6	-	-	94.3	-	-	94.1
	I.M.R. (‰)	-	-	47.0	-	-	52.0	-	-	53.5
Construction of hybrid life tables. (1966 census and 1973 fert. surv. Fiji.)	e <sub>0</sub> (yrs)	59.3	62.4	60.8	58.1	61.3	59.7	-	-	-
	I.M.R. (‰)	51.9	40.3	46.1	56.1	44.0	50.1	-	-	-

Notes: 1) Explanation of symbols used in this table:  
C.D.R. = Crude Death Rate  
I.M.R. = Infant Mortality Rate  
p(2) = Probability to survive until exact age 2

d = death rate in stable population  
b = birth rate in stable population  
e<sub>0</sub>, (e<sub>5</sub>) = expectation of life at birth (at age 5)

2) In the calculations, Coale and Demeny's "West" models are used (Coale and Demeny, 1966)  
3) The I.M.R. estimates are minimum estimates (Brass et al. 1968, p119)

between 1879 and 1916, when sponsored immigration virtually ceased, some 40,000 to 50,000 Indians were introduced into Fiji. In 1921, the number of Indians in Fiji was 60,634. The extremely high annual growth rates for Indians until 1921 are almost completely a consequence of the migration component of the annual growth rate. After 1921, the disturbing influence of this migration factor on the Indian rates decreases gradually, and the natural increase component becomes more and more a predominant part of the annual growth rate. The Indian natural growth rate after 1921 is much more progressive than the Fijian. This is the result of rapidly declining mortality and extremely high fertility rates. Once more, Table 3 gives a summary of some vital estimates around 1966. The mortality situation is very favourable for a developing country, which, as we have seen, was also the case for the Fijian component.

Indian fertility started declining at an earlier stage and at a much faster rate than Fijian fertility. The general fertility rates between 1957 and 1972 indicate that Indian fertility began to decline as early as 1960 (Fig. 3).

The percentage of the demographic transition which a population has completed can be somewhat arbitrarily measured by means of a method developed by Bogue. He uses the level of fertility of those countries which have the highest and lowest fertility today as extremes of a continuum and measures the progress of an individual population in making the transition from high to low fertility by tracing its movement between these two extremes. The progress which the Fijians and Indians have made since 1957 is given in Fig. 4. Until 1957, the Indian component was lagging far behind the Fijian component but they closed this gap in a very short period of about six years. Since 1966, when the decline of the Fijian component started, both components have made similar progress. It should, however, be noted that since 1972, transitional progress for Fijians as well as Indians has almost come to a standstill.

## Tonga

Unfortunately, the demographic knowledge of this country is more limited than for Fiji; it is true that Tonga has conducted censuses since 1891, but most of these censuses are nothing more than rather unprecise head counts. However, the 1939, 1956 and 1966 censuses have provided more extensive and accurate information.

Tonga's vital registration system was and is more deficient than Fiji's; the extent of its shortcomings is clearly exemplified by the published crude death rate and infant death rate in 1969.

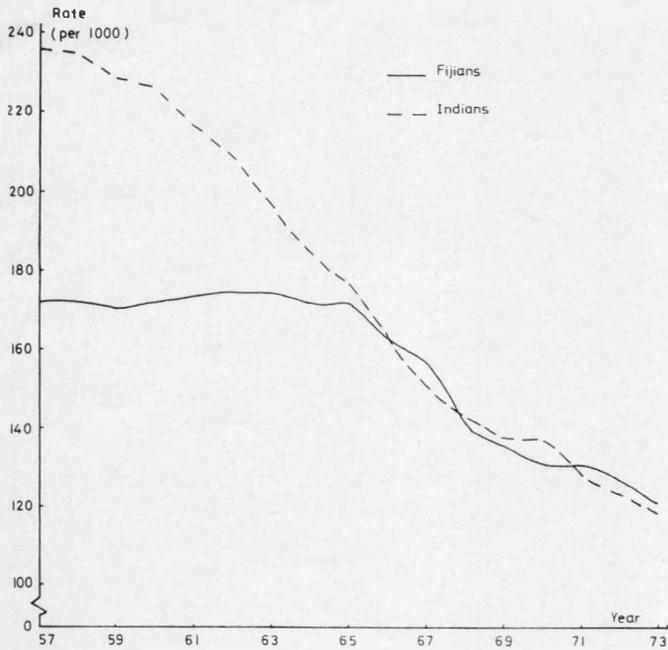


Figure 3 : General fertility rates for the Fijian and Indian components of the population of Fiji between 1957 and 1973.

According to the Report of the Department of Justice for the year 1969, both mortality parameters assumed the extremely low and unrealistic value of 2.8 per thousand.

In Fig. 5 an overall picture is given of the growth of the Tongan population since the first estimates were made by James Cook. It appears that until 1900 the population was not growing at all, whereas between 1900 and about 1921 the population perhaps grew a little; but, from 1921 onwards, the Tongan population started to grow at an increasing rate. Between 1939 and 1966, the annual rate of growth was at a very high level of approximately three per cent. In the past decade, the annual rate of natural increase dropped below three per cent.

The course of the Tongan growth rates since 1891 is given in Table 4. A comparison of the rates in this table and the rates for the Fijian component in Table 2 indicates that the growth of these two populations has taken a similar course since 1921, the point of take off which both populations have in common.

In pre-transitional Tonga, before 1921, the crude death rate fluctuated round 35 per thousand. The fluctuations were the result of introduced diseases, a protracted Tongan civil war, years of famine etc., common features of a pre-transitional society.

After 1921, the crude death rate dropped very rapidly (Fig. 6). However, this figure reflects not only the downward trend in mortality but the extent of under-registration in Tonga. If, for instan-

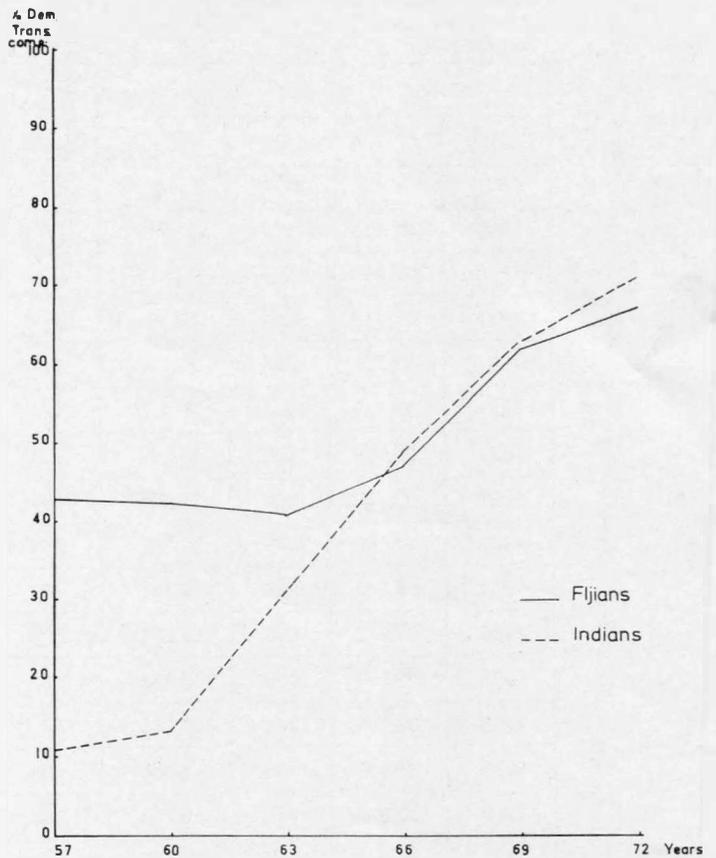


Figure 4 : Percentage of demographic transition completed by the Fijian and Indian components of the population of Fiji between 1957 and 1972.

ce, we compare the crude death rate and infant death rate for 1966 (Table 3) with the corresponding values in Fig. 6 which are based on reports of the Department of Justice, it appears that the

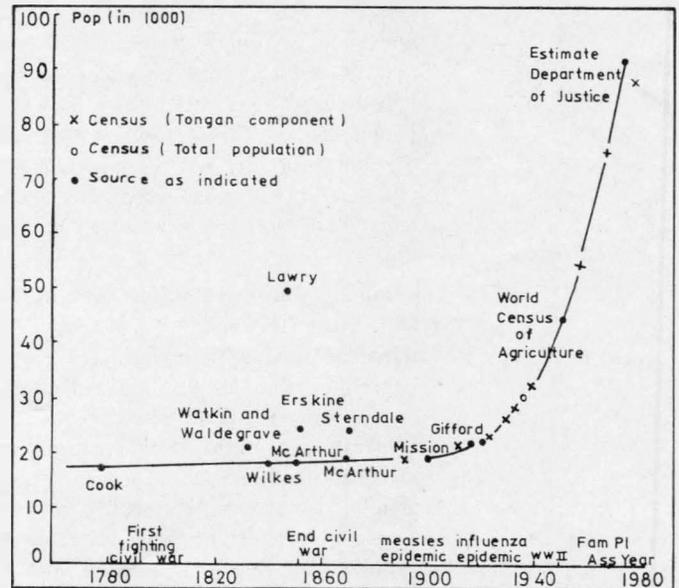


Figure 5 : Population growth in Tonga since 1777

**TABLE 4**

Summary of population size, annual intercensal growth rates and doubling times of the Tongan component of the population of Tonga for the censuses between 1891 and 1976.

Census		Census		intercensal ann. growth rate(%)	doubl. time (yrs)
year	tot. pop.	year	tot. pop.		
1891	19,196	1921	23,759	0.71	97
1900	20,019	1911	21,712	0.74	94
1900	20,019	1921	23,759	0.82	85
1911	21,712	1921	23,759	0.90	77
1921	23,759	1931	27,700	1.54	45
1921	23,759	1933	29,720	1.87	37
1921	23,759	1939	32,862	1.81	38
1921	23,759	1956	55,156	2.38	29
1931	27,700	1939	32,862	2.16	32
1931	27,700	1956	55,156	2.71	26
1935	31,873*	1956	56,838*	2.70	26
1936	32,790*	1956	56,838*	2.69	26
1938	33,785*	1956	56,838*	2.82	25
1939	34,130*	1956	56,838*	2.91	24
1939	32,862	1956	55,156	2.96	23
1956	55,156	1966	76,121	3.17	22
1966	76,121	1976	90,128**	1.68	41

Notes: \* All components of the population

\*\* The 1976 Census-figure is provisional. Comparison between the 1966 and 1976 census is complicated by the fact that the 1966 census was a "de-facto" census and the 1976 census a "de-jure" census.

under-registration of deaths at that time was more than 70 per cent and the under-registration of infant deaths even more than 80 per cent. The parameters in Table 3 suggest that, around 1966, Tongan mortality was slightly higher than mortality in Fiji. In other words, the decline in mortality since 1921 has been slower in Tonga than in Fiji.

Tongan fertility changed very little until 1921 and after the take-off in 1921, fertility has remained on the same high level. Fig. 6 gives the impression that fertility declined after 1921. This decline however is the result of differential under-registration of births. If we correct for this under-registration, the apparent decline disappears completely. Moreover, if fertility is measured by means of indirect methods based on censuses, it appears that the Tongan crude birth rate was at least 40 per thousand until 1939; whereas, between 1939 and 1966, fertility even increased slightly, especially in the decade 1956-1966.

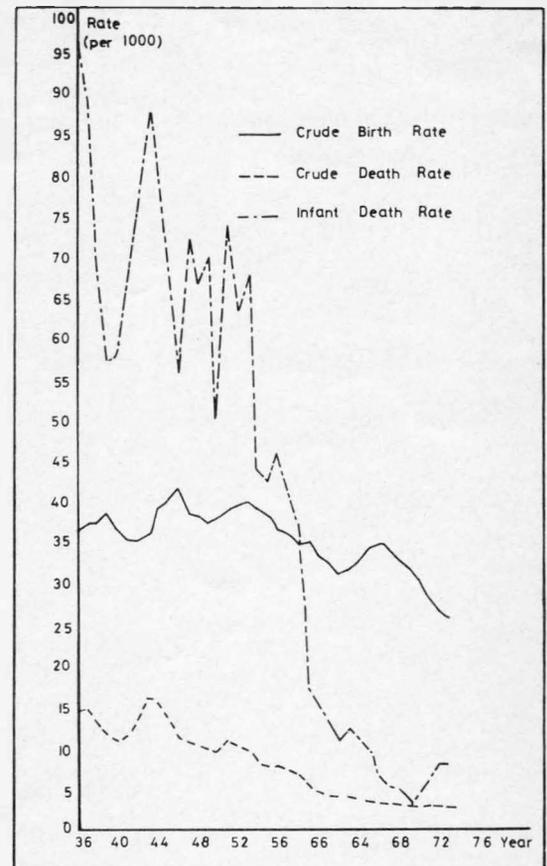


Figure 6 : Three-year moving average crude birth rates, crude death rates and infant death rates in Tonga from 1936 to 1973.

Note: The rates are three-year moving averages.

In 1966 the Tongan Family Planning Association began operation and fertility began declining slightly. It seems clear that Tonga is an example of a Pacific country which is still at the very beginning of demographic transition.

**Summary**

When we compare the situation of the other South Pacific countries and territories to Fiji and Tonga, it seems that most of these countries have basic demographic characteristics (growth rates, structures, death and birth rates etc.) which are much nearer to the Tongan than to the Fiji-Indian ones. For some of these countries the situation is in fact considerably more unfavourable than in Tonga (see Table 1).

Summarizing, we may say:

- a. Most Pacific countries are at the very beginning of demographic transition, and growth rates are higher than the world average figure of two per cent per year.
- b. Mortality dropped sharply in many Pacific countries and reached low levels compared to

most developing countries. For some of these countries, such as Fiji, Tonga and Western Samoa, the take-off point seems to be around 1921 (after the influenza epidemics). For other countries this point is much later (for example, large parts of Papua New Guinea, Solomon Islands and New Hebrides) and mortality levels in these countries are still much higher. The Solomon Islands experienced a tremendous drop in mortality after the malaria campaign.

c. Fertility levels in most Pacific countries remained on a very high, traditional level. For some countries there has been a slight fertility decline in recent years but there seems to be little momentum in the downward trend. The Fiji Indians appear to be most advanced in the transition process, and in many other countries there is no evidence that fertility has started declining.

d. The annual rate of growth measures the combined effect of fertility, mortality and migration. In some of the Pacific countries the growth rates in **Table 1** are very much obscured by external migration. The annual rates of **natural** increase for all these countries, however, are very high and fall in the category of explosive growth.

Continued in our next issue.

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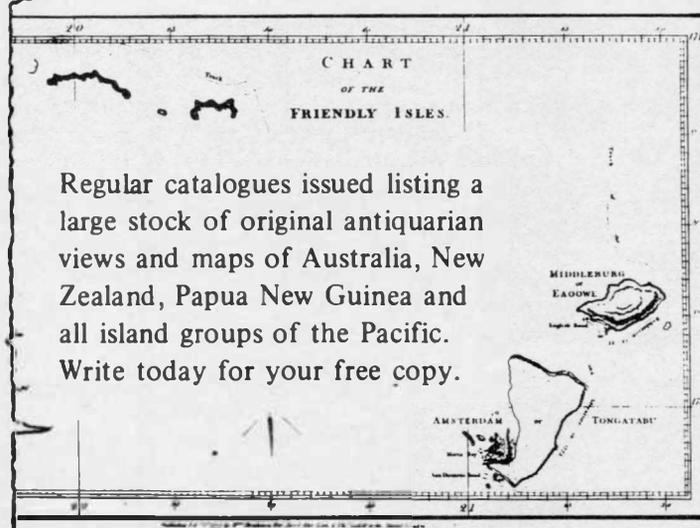
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## MAPS AND PRINTS OF THE OLD PACIFIC



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# TURTLE FARMING FOR THE SOUTH PACIFIC



BY DR. U. RAJ, University of the South Pacific, Suva, Fiji

The concept of turtle farming has been interpreted in several ways. A true turtle farm must include a breeding stock of turtles; that is, it must not rely on wild populations for eggs or young hatchlings for rearing in captivity. Until now, turtle rearing activities in the South Pacific and throughout the world (except on Grand Cayman) have been dependent on a supply of eggs and hatchlings from the nesting beaches of the wild. In this regard the practice has been one of **turtle ranching rather than turtle farming**. Also, when turtle farming is being considered, it must be clearly defined either as a venture on a commercial scale or as a village-level subsistence activity.

Reviewing the turtle farming-turtle ranching activities of various organisations and isolated populations of oceanic peoples around the world, one is led to conclude that nearly all efforts have been directed towards ranching turtles in small, non-commercial ventures. However, attempts are now being made to systematize use of the turtle resource in various places. For example, in Australia, a Government organisation, Ecology Property Limited, is now involved in research and support for the utilisation of marine turtles by the aboriginal population of the Torres Straits. Similarly, Government agencies in the Middle East, Papua New Guinea and the Caribbean are

in the process of formulating policies, through research, designed to realise the full potential of the marine turtle. The only turtle farm now operating on a commercial scale exists on Grand Cayman Island in the West Indies.

In the South Pacific it is clearly evident that scientific information on the turtle resource is meagre in spite of the traditional place of this animal in Oceanic societies. Two general reviews on South Pacific Islands marine turtle resources have been published by Hirth and Hendrickson. Subsequent to these reports, no other reviews have appeared. At SPC's Seventh Technical Meeting on Fisheries, held in Tonga in 1974, it was agreed that information on marine turtles should be forwarded by the fisheries agencies of each country to SPC and the University of the South Pacific in order to centralise data and enable periodic reviews of this resource to be undertaken. It was also recommended that SPC facilitate visits to interested territories by staff engaged in the SPC project for consultation. Only one country forwarded information on turtles and except for a visit by the author to the Cook Islands where the SPC turtle project is based, wider consultation on marine turtle resource of the South Pacific has not been achieved. In order to provide a worthwhile review of this resource it is absolutely essential that up-to-date

information be gathered and processed centrally for distribution.

The SPC turtle project is divided into two sub-projects. One is based at the University of the South Pacific in Suva, the other at Rarotonga in the Cook Islands. The objectives of the Fiji part of the project are mainly scientific; they include study of the hatching rate under laboratory conditions (temperature, duration of incubation), study of the rate of survival and of its independence upon water quality, density in the tanks, food quality, conversion rate, bacterial diseases, fungal infections and the osmotic regulation. The objectives of the studies in Rarotonga are directed rather towards the economic feasibility of turtle farming in relation to the local food supplies and logistical problems. Both project managers are working close together in co-operation with the local Fisheries Departments.

From the little data available, it appears that the South Pacific Islands do not have enormous breeding colonies of turtles. Five species of marine turtles have been recorded from the South Pacific. These are *Chelonia mydas* (green turtle), *Eretmochelys imbricata* (hawksbill turtle), *Caretta caretta* (loggerhead turtle), *Lepidochelys olivacea* (Pacific ridley) and *Dermochelys coriacea* (leatherback turtle). Among these, the green turtle and the hawksbill turtle are the commonest; the other species are rarely encountered. Although these two species nest widely in the South Pacific, the numbers of individuals visiting the nesting sites are not very large compared with those in Northern and North-East Australian islands or in the Caribbean. For this reason alone, use of wild eggs and hatchlings must be viewed with care. The most logical approach appears to be the establishment of a breeding colony of turtles. Experience shows that the green turtle is the most profitable choice. It grows faster and its flesh is preferable to the hawksbill. Also, it is a herbivorous species, whereas the hawksbill clearly prefers animal flesh for food.

A technique of breeding the green turtle in captivity has been evolved in Grand Cayman Island. It seems worthwhile to learn this technique and apply it in our own situation in the South Pacific. The main effort on the part of the University of the South Pacific will be to set up a breeding pool and to stock it with adult turtles. The breeding pool on the mariculture farm in Grand Cayman Island is 200ft (60.5m) by 86ft (26.5 m) with an area of about 0.4 acres (0.2 ha). It is about 10 ft (3.1 m) deep at one end and shelves up to an artificial beach about 35 ft (10 m) high on the other side. The capacity of this pool is quoted as 0.75 million gallons of seawater and the rate of water change is given as 18 changes per day. The cost of construction and proper maintenance of such a pool located on a South Pacific Island would appear, at first sight, to be expensive, but by using some natural beaches and shores to enable natural flushing at each tide, the task could be accomplished with ease and relatively cheaply.

The capture of breeding females can be carried out during a nesting season but the capture of mature males, which normally do not come up on the beaches, may prove difficult, although not impossible. Indeed, experience in Cayman Island shows that it is almost necessary to introduce wild males in the breeding pool to induce courtship and mating, otherwise males and females co-habiting the pool become too familiar with each other to mate. It is possible that in the near future frozen sperm may be obtainable from the Cayman farm for artificial insemination.

Thus, by actually producing farmed eggs and hatchlings we can ensure that the wild population is not in any danger of depletion, should turtle farming become a reality. Indeed, by releasing a percentage of farm-produced hatchlings we can help conserve and increase the wild population. It is therefore recommended that research effort be directed to actually breeding turtles in captivity, not only from the egg stage but also by inducing mating and egg-laying in artificial situations.

The South Pacific Commission's own research programme on turtles has contributed to a greater success rate in incubation and hatching in artificial situations. According to our studies, hatching and emergency rates of about 100 per cent are possible compared to about 50 per cent respectively, in nature. From these figures it is apparent that by doubling the hatching success of wild eggs one can remove 50 per cent of the hatchlings for artificial rearing and allow the same number of young to enter the wild population.

Rearing the hatchlings in artificial ponds and fenced areas of sea has been widely practised in the south Pacific. Nevertheless, the stocking and feeding rates have been very variable. Our research indicates that there is an optimum stocking rate which depends on the quality of pond water, size of hatchlings and availability of food. Increase in density of individuals leads to constant biting, not unlike pecking in chickens.

Also, constant renewal of pond water or treatment of standing water is essential to avoid fungal infection, particularly in hatchlings up to a year in age. The fungal infection, responds to treatment by 1 per cent of potassium permanganate. The other common problem encountered in the rearing of hatchlings is *Pseudomonas* infection, particularly in ponds with depressed salinities. The most effective cure is Chloromycetin given orally, in solution. However, unless the pond is flushed and cleared of *Pseudomonas*, this infection is persistent and usually fatal. Therefore, research on the disease problems and search for effective cures must continue. It is pertinent to note here that the Cayman farm is also experiencing widespread fungal and bacterial infections amongst the hatchlings (personal communication).

Research on diet of green turtles has been extensive. The composition of an artificially



*Turtle hatchlings: Hatching of turtles in captivity may contribute to conservation of the species.*

prepared and a good balanced diet has been published by Simon, Ulrich and Parkes. Manufacture of such a feed on a small scale appears expensive and inappropriate. We must continue to evolve a diet similar to this but drawn from inexpensive regional food sources. In this regard, research must be encouraged on further analysis of the natural foods of green turtles in the South Pacific (example, *Syringodium isoetifolium*, *Halodule uninervis*, *Halophila ovalis*, *Deplanthera wrightii*, *Thalassia testudinum*, *Chaulerpa* spp.). Also, a blend of other possible sources of food, for example coconuts, mangrove leaves, tropical fruits and succulent plants must be investigated as an alternate diet. Given the increasing demand for fish for human consumption and the rising costs of fish capture, it would appear uneconomical to feed turtles largely on fish, although some form of animal protein, such as fish meal, might well be used as supplementary diet.

If a true turtle farm is established in the South Pacific it is most likely that the first individuals

will take at least two to three years to breed. It is well-known that mature females breed only every second or third year. Therefore, husbandry of adults and sub-adults must be understood. In this regard, stocking rate and hygiene will form the main areas of study. A substantial part of this information may be obtained from the mariculture farm.

In conclusion, it would seem most appropriate to concentrate research efforts on establishing a breeding colony of green turtles for the South Pacific. It is quite possible that this could become a central agency in supplying farm eggs and hatchlings to all interested Island territories. Research must continue on the diet and disease problems of rearing hatchlings and sub-adults. At the same time an up-to-date review of the turtle resource of the South Pacific is required, while a study of the supply and demand of turtle and turtle produce, locally and overseas, will prove valuable. Island governments of the region must formulate a joint and effective policy, possibly through similar legislations, to govern the turtle resource of the South Pacific. □

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# How to Write in Micronesian

By SUZANNE E. JACOBS, University of Hawaii

*Ewe noomw nefineen kkewe fenu Eet, Udot me Ewiyan...*

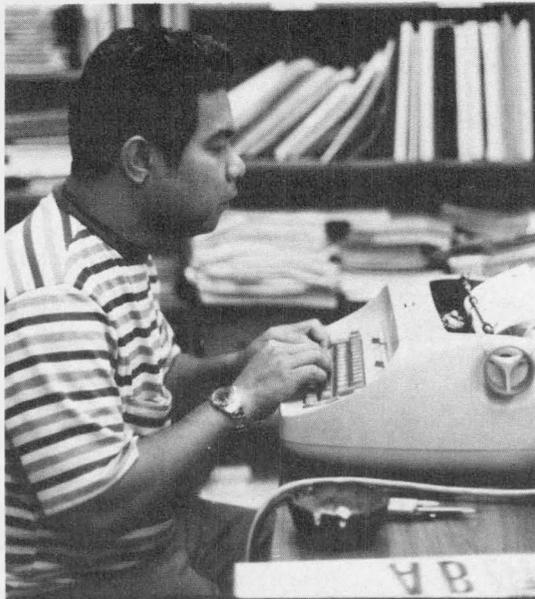
*The channel between the islands of Eet, Udot, and Ewiyan is very rough for motor boats when the winds come. Namio says that the Tol people call this place the "taro patch." The tidal currents and strong winds sometimes combine to confuse the wave patterns. In a taro swamp the big plants are behind you, in front of you, and beside you, so that you cannot see beyond you. It is the same here on rough days; big waves come from all directions, surrounding you so that you cannot see your way through them.*

### Basita (Truk Lagoon)

Those of us who live in primarily one-language countries of long standing take for granted the values of having a written literature, an abundance of books, magazines, and films using our language. When we learn to write our language, not only can we already speak it but we are also surrounded by our language in print. We see models of written language every day of our lives in newspapers, advertising posters, letters, and so on. Even so, most school children still find writing difficult, and most adults do, too. This article is about the experiences of Micronesian teachers and curriculum specialists who began to write some of the first stories, histories, and school lessons in their own vernacular languages. Not only did they have the usual problems of trying to put thoughts into writing, they also had the added difficulty of writing in languages that were, for most practical purposes, not written languages.

Chamorro, Marshallese, Yapese, and Kusayan. Particularly in schools was this felt. Children coming to school for the first time were given reading instruction, just as they are in Japan, Australia, or the U.S., but the task was nearly impossible for the materials were all printed in English, an almost completely foreign tongue to the first graders. The teaching of reading involved the almost simultaneous teaching of English. As an aid to teaching children how to read with fluency, interest, and comprehension, it was necessary to produce materials that had instant and immediate interest for them, materials in their own language and preferably materials that reflected their own cultural values.

Micronesian teachers and curriculum specialists knew from their own experience what it was like to be educated entirely in a second language. English has been the basic medium of education since the end of World War II, although some of the vernaculars have been used in a small way in the lower grades. In some schools, indeed, the



*Tony Zacherias (Marshalls) typing out a class paper.*



*Alfred Capelle (Marshalls) and Toyoko Ruluked (Palau) in a classroom materials writing class.*

native language has been prescribed, and punishments administered for using it.

Textbooks have been in English (and, under earlier colonial administrations, in Japanese or German), and some of the teachers have spoken only English and no other language. Children not used to the ways of a Westernized school system have had to struggle through the language barrier to master mathematical and scientific concepts, which present difficulties even for Americans, Australians, New Zealanders, and British using English as a native tongue. It is hardly surprising that for many Micronesian children, perhaps for

most, their education has been of very limited value.

Recent studies of English reading ability in Micronesia have indicated that by ninth grade most Micronesian children read at third grade level. What problems this must present for classes in biology, mathematics, or social studies should be obvious, for their textbooks are universally English-language textbooks, usually textbooks written for U.S. mainland schools.

It is a tribute to Micronesians and to their teachers that despite these handicaps there have been some who have broken through the language barrier to become skilled writers, thinkers, scientists and teachers, in an alien tongue. One wonders what these might have achieved if the language handicap had been removed.

It was to Micronesian teachers that the Trust Territory government turned for help in changing a system of education that for many people had become not a pathway to learning but a barrier. If materials for literature, science, and history could be written in the vernacular languages, then more people would be able to read them or listen to them being read.

Learning to read and write English was still regarded as important for those who wanted college degrees or jobs in tourism or commerce or government, but it was felt that learning to read and write the children's mother tongue would not impede their progress in English. Studies in various bilingual countries of the world have shown that progress in the second language is at least as fast when accompanied by study in the native language as it is when studied alone.

Help was sought from the language specialists at the University of Hawaii who had been working for the previous ten years on grammars and dictionaries of Micronesian languages. The trust territory government now invited these linguists to participate in the training of vernacular materials writers. Professors of English as a Second Language also were asked to participate, as people who knew about the general problems of bilingualism.

In the winter of 1974-75, 30 Micronesian teachers and curriculum specialists travelled to Honolulu for a year's study at the University of Hawaii in a project that has continued since then under the label BEPM, or Bilingual Education Project for Micronesia. Their course of study was to include the grammar of Chamorro, Palauan, Poncepican, Trukese, or whatever was their native language; also, the grammar of English as it compared with the grammar of their own language. There was a writing course in their own language, and also a writing course in English. Their final semester of study would be the time for writing

the materials to take back to the schools of their island districts.

How to teach the course in vernacular writing was something of a puzzle. There were no teachers who had ever written the languages themselves; in fact, the languages had been rarely if ever written at all. Missionaries had translated portions of the Bible, as well as hymns and prayers into the vernacular languages, and teachers had previously written out very simple stories for their first grade classes, but there was no quantity of written material to serve as models, either to the University of Hawaii staff people or to the Micronesian teachers.

Members of the staff sent to other areas of the nation and overseas for details of programmes that might be relevant to Micronesian needs, but in general the staff was disappointed at what they received. Most of the programme outlines and materials they saw were designed for quite different needs for language and cultural maintenance in situations where maintenance was seen as a transitional stage on the way to competence in English.

Other projects spoke of using vernacular materials in schools, but none had dealt with the mechanical and human problems of materials production. Who writes the materials? Who produces them? What do they cost? What training have the writers had? What is the quality of these materials? How does one begin to evaluate their quality?

Many people have apparently taken it for granted that stories and other materials could be written once a standardized spelling system and alphabet had been agreed on by those who use the language. All one had to do was hire a native speaker of the language who was close at hand. This person could sit down and write out the materials. But anyone who thinks that materials are simply "written out" has skipped over the difficulties of writing and forgotten how difficult it is to compose, extend, shape, and work at a piece of writing.

Many of the 30 or so Micronesian teachers who came to Honolulu were those who had written the first vernacular materials for their schools. They were bright and capable educational leaders, but few had had education beyond the high school diploma. Several were curriculum developers for their districts or language arts specialists, but none had ever had the chance to write at length for purposes for self-expression, creativity, or persuasion. With almost no exceptions, their English instruction in school had been limited to the writing of grammatically correct sentences and paragraphs. The writing problems they now faced

were the ones universally faced by writers of all cultures — how to produce writing that is full, rich, complex, subtle and interesting.

But this problem was obviously compounded. Two participants had translated some short narratives written by American expatriates, but few had ever tried to compose in their native language. One or two had written brief stories for elementary readers, these rarely are more than five pages, each page consisting of an illustration and one or two sentences.

When they attended the first classes in vernacular writing, the Micronesian participants in the project found they were asked to describe someone else in the class, what they looked like, what they often did, how they walked, and so on. Could the others guess who it was from what they had written? The second task was to describe a food, and could the others taste it from what they had heard? The third was to describe their home village or town, and could the others see it?



*Casiano Shoniber (Ponape) ponders a question during a class.*

What the writers found was that some members of their group were naturally more gifted than others. Some of the best "teaching" occurred when the very best efforts in the class were read out — the rough English versions were read out so that speakers of all the languages could hear them — and then those of normal abilities could imitate the techniques used by their gifted friends. The following, for example, is a first try by someone of normal writing skill. She describes a food adequately, as one might tell it to another, but she has not recreated the experience of making and eating the food:

*This food is made of unripe green papaya. When you bite it, it's crispy and has a salty, sour and hot taste. Its colour is sometimes red, yellow, or white, depending on the personal choice. Sometimes the papaya is grated or sliced thin and*

long. You mix it with salt, vinegar, accent, garlic, and a little bit of hot pepper.

Then she heard what her classmate had written, the description of a Chamorro appetizer or hot relish, a description that recreates the experience as the writer remembered it:

#### Chamorro Fina "Denne" Chamorro Appetizer)

*To make a fina "denne," use two juicy half ripe green small and round sweet-smell lemons. Cut it open in half which some juicy white substance runs down the blade of knife and onto the cutting-board. Squeeze each half on a small white round*



Misael Setile (Truk) working on the cover design for the book he wrote during 1975.

*saucer, until all the halves are squeezed out of its juicy substance. Then add dashes of salt until gradually mixed with the white juicy and watery liquid till you get the taste just right like little bit sour and little bit of saltiness. Then you add enough red small not pepper crushed to the white substance. Now you will see a beautiful juicy red watery and sour-salty liquid in a small, white, round saucer.*

*Chopped about three small stalk of leafy green onions to give a sweet likeable aroma of a true native appetizer. Then take a piece of roasted fish, cold sliced in small sizeable bites of fresh tuna and dip in the red juicy watery sour-salty and aroma of leafy green onions, then put it in your*

*mouth and feel that juicy red sour-salty hot liquid and aroma of leafy green fresh onions, with cold soft piece of fresh tuna or meat and chew it. You will experience the taste that your saliva keeps squirting out in your mouth that it becomes full you start to swallow it down little by little down your throat. Then you said, "MMMMMM. Mmmmmm. It's delicious."*

*The more it stings your tongue the more you keep on eating, until the watery white substance in your nose is running down and you have to run and blow it out. It was so good that you start to puff out air through your mouth trying to cool off the stinging of the red hot pepper.*

*When you can't stand it anymore you take a glass of very cold ice water to quench the tongue of flame coming out from the mouth. That feels better — whistling air out and taking air in through the mouth as fast as you can. Now you can feel that the fire is out and white smoke is coming out. That means that if you want to start another fire keep dipping your piece of meat or fish in the sweet smell of leafy green aroma of onions and sour-salty watery red liquid. Nevertheless, a very cold water or a piece of ice cube is the answer.*

*The native fina "denne" shows who is the stout hearted men, who can fight the small red hot pepper.*

(the original in Chamorro by Teresa Taitano)

On the next assignment the first writer showed what she had learned from her classmate. The following description which she wrote of her home is now full of lively and evocative detail. The reader can now share in the writer's experience:

#### Morning on Rota

*The roosters on the kamachili trees around my house are already crowing. From a distant I can hear the church bell ringing. This wakes up the people early in the morning to attend morning mass. It never fails for the old rusty bell to ring every morning at four o'clock, three times every half hour.*

*I got up from where I was sleeping because I could hear my grandmother and grandfather talking to each other. My grandmother already finished folding their mat, and is fixing herself to go to mass. I can hear all her movements in their room because the walls in our house are old and*

thin. There are also some parts where there are small holes in which we love to peep through. Their room is not pretty, kind of bare. There's only the bed, the few statues of saints on the shelf. There are also some boxes against the wall in which their clothes are put. The floor mat is placed standing against the corner of the room where it will not be in the way.

My grandfather is already outside the house taking down his fishing net where it was hanging against the wall. He has become very dark from the sun. His hair has only a few grey strands compared to his age, his body is well built. He is still a very



Raphael Defeg (Yap) and Ewalt Joseph (Ponape) in a lighter moment between classes.

strong man, and healthy too. He can make almost anything. He is a farmer, a fisherman, and he can also make rope out of tree bark.

I love to go fishing with him because he makes me carry the fish pail. He usually scolds me for being very active and running in the water where I chase the fish away. He will often say to me, "Stay behind me and walk slowly and quietly. If you keep on misbehaving, I will have to send you home and you can work at home."

Every morning when we leave to go fishing, we would start on the beach below



Peter Soumwei (Truk) listening to another participant's story.

our house, going either South or North till the end of the village. Sometimes we would be late and we would find a lot of fishermen on the shore. It is not year round that people go net fishing for these particular fish. They have seasons when they will appear on the sea shore. They are long, (probably the same size as our fingers) sort of silver in colour, and very easy to scale. They have very fine bones. We eat the bones if my grandmother fries the fish. If she fixes it as fish kelaguin, she would scale the fish, cut the stomach and remove the insides, then she would remove the bones. She mashes them up very fine and she then mixes it in lemon juice and salt. Sometimes she will put soy sauce instead of salt and make it hot with red hot pepper. How delicious it tastes with hot steaming rice!

(the original in Chamorro by Rita Inos)

The problem of using detail — enough of it and the selection of it to convey a particular feeling — was the same for these writers as it usually is for native speakers of English when they first begin to write compositions. But a problem that was different for the Micronesian writers was the problem of style. Trying for good style means trying to get the prose to sound natural, to select words that are really on target in the sense that they convey exactly the nuance that the writer intends, to use certain kinds of sentence constructions to good effect, and in fact to use all of the stylistic options that the language has to offer.

The problem of how to discover and make use of the stylistic options offered by their languages

was approached in two different ways. The group of Palauan writers said they had the most luck at this when they decided that each one would write a translated version of an English story, trying to get good-sounding prose in the vernacular, and then they would compare versions. This, they said, helped them get down to the level of syntax and word choice. One of the group, however, said she discovered that in the case of particular words they could not get consensus. Two or more words might fit the meaning and the grammatical context, and the choice between them seemed to depend on personal taste.

One of the Chamorro speakers said that the study of the structure of her language had opened her eyes to the fact that there were many ways of showing focus and emphasis in her language that were determined by the grammatical structure one used. She recalled her earlier attempts to produce primary reading materials in the vernacular this way:

I would write something and it would follow an English pattern and it would sound dull. In my language it would sound dull. But I would think this must be correct because this is how it is in English, and I was actually putting down a literal translation of what is going on...

On coming into the vernacular-writing course, she said, she had been "still doing this one-to-one correspondence thing" (English to Chamorro word-for-word) but having had the experience of working with Chamorro grammar, learning how her language actually worked, it now began to "get to (her) that Chamorro is really different than English."

Chamorro is indeed different from English in grammatical structure since it has nothing comparable to the English active passive but has a number of different passive-like constructions. These allow the speaker to focus on various "participants" in an event, on the **person** who did it one time, and on the **means** of doing it another time.

For Palauan also there are a variety of grammatical constructions from which the speaker chooses, depending on what one wishes to emphasize. Palauan is only a few degrees closer to English than is Chamorro in many of its allowable stylistic options. But other languages, notably Kusayan, Marshallese, and the several Trukic and Ponapeic languages, seem to have choices of style rather like those of English.

Chamorro may be the most distant from English. The vernacular writing instructor, who had been one of the teachers for the English grammar course, found that, for the Chamorro

speakers, it was difficult to see any significant likenesses between the English structures they studied and structures from their own language (and these were bright students). For the Paluans there were some that seemed significant; for the Trukese, the Ponapeans, and the single Kusayan writer many structural similarities were perceived.

An interesting thing happened when the vernacular writing course first began. The speakers of Palauan and Chamorro wrote their first drafts in **English** and then arrived at their vernacular compositions by translation. The instructor, somehow guessing that they were doing this, said they had to change their method and **think** in their own language, then put down these thoughts in words. This is obvious perhaps but not easy when habits are so strong. For the Micronesians, writing — almost by definition — meant writing in English. It was difficult to think in the vernacular language when one had paper in front of him and a pen in the hand because that situation had always been an "English" situation in the past. To use the vernacular for something different from a speaking situation required a new kind of effort. One of the Chamorro participants said she had to teach herself to "hear" her language in her head. It took an extreme act of will, she said, to do this.

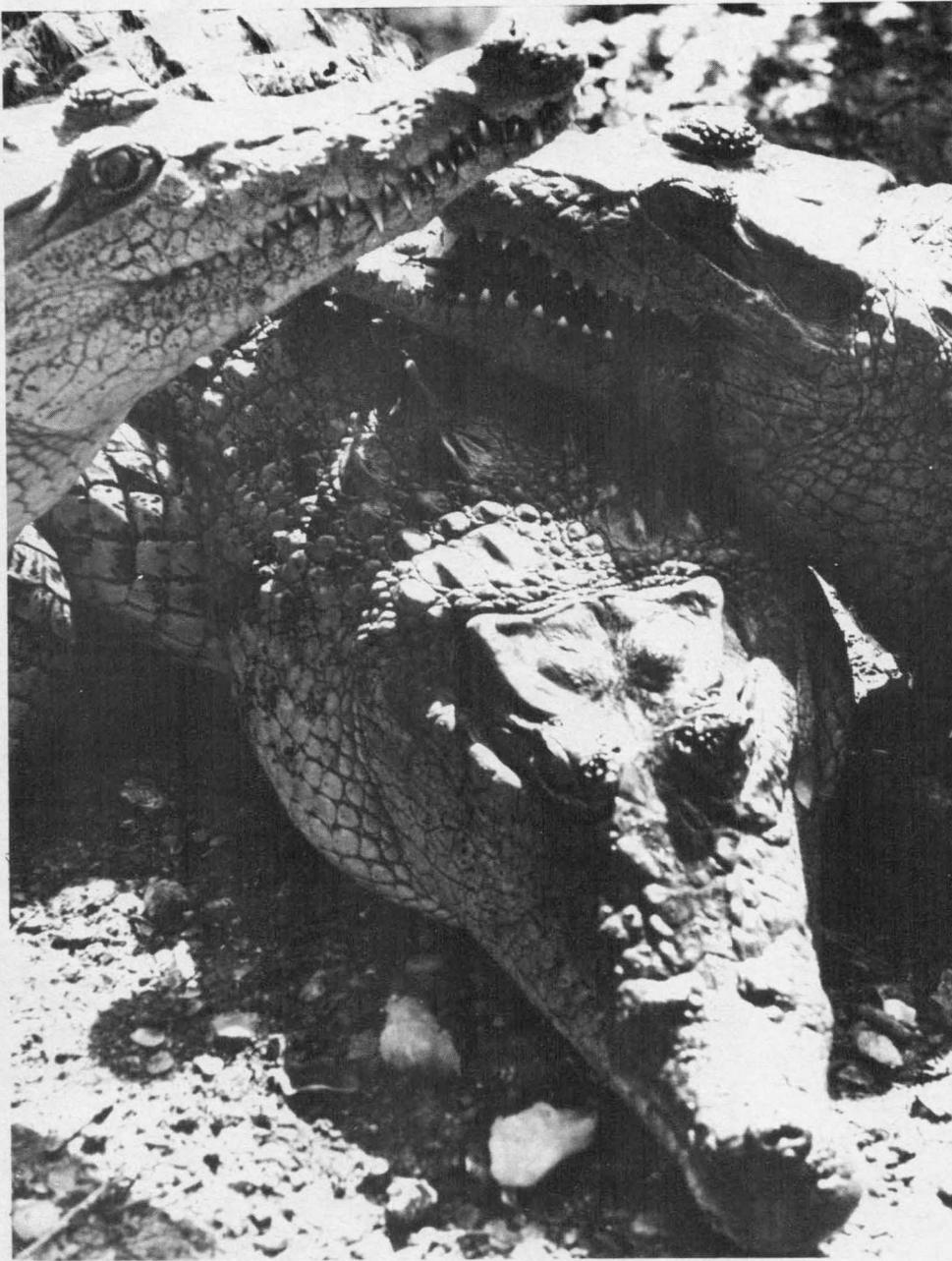
Writing in the native language seemed to create another difficulty, this one of a positive kind. One of the Palauan speakers said:

At first I was slow and didn't know how to put the right word in the sentence. It was really hard for me. I think my own language is harder (than English) because I had to find the right word.

Here the speaker is referring to what happens when there are several alternative ways of expressing an idea, but probably all of them subtly different. Picking the right level of formality and the appropriate focus to express exactly what one has in mind becomes important in real-world discourse or in writing that is long enough to have created a fully-developed context, complete with characters, events past and present, and several **ifs** and **buts**. The writers now encountered constraints which forced them to choose words carefully, omit certain details and include others.

Some writers chose to translate into the vernacular children's stories from American and European cultures. Such projects gave rise to the questions of just how much explaining of the foreign culture would be necessary to allow island children to understand the stories fully. For *Charlotte's Web*, the American children's novel by

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# PNG'S SURPRISE NEW INDUSTRY CROCODILE FARMING

By MELVIN BOLTON

*These freshwater crocodiles (crocodylus novaeguineae) do not mind crowded conditions on farms.*

The United Nations Development Programme Food and Agriculture Organization (UNDP/FAO) and the Papua New Guinea government are working on a project that could make PNG the crocodile capital of the world. PNG exports annually 30 to 50,000 skins to Singapore, the US and France, with arrangements coming up for trade with Italy and Japan. Crocodile farming looms up as an important export industry. Hence, the UNDP/FAO assistance.

The first UN expert to help in the project is Mr Melvin Bolton of the UK, an FAO specialist who has worked in similar projects

in Africa and Nepal since February 1974 and has much experience in wildlife management. He is stationed at Wewak and will be in PNG for at least a year. Mr Bolton writes on the need for proper crocodile farming and tells how good management can help PNG improve its foreign exchange earnings.

On January 1 this year, a new large-scale UN project became operational in Papua New Guinea. Officially titled "Assistance to the Crocodile Skin Industry," the project is being funded by the UNDP (through FAO) and the Papua New Guinea Government. At first sight the

project may seem surprising: what, one may ask, is FAO doing assisting a crocodile skin industry? In fact, it is not the only crocodile project in which FAO is involved and the need for assistance in this field is apparent in several parts of the world; but at present in Papua New Guinea, the potential value of a properly organized scheme for harvesting crocodile skins is almost certainly greater than elsewhere.

Extensive areas of the country consist of swamp, notably the flood plains of the Sepik and Ramu Rivers in the north of the mainland and of the Fly River and the many smaller rivers flowing into the Gulf of Papua to the south. These and associated riverine, estuarine, and coastal areas still support wild crocodile populations where human densities and consequent habitat destruction are light. The people of these regions are not only very familiar with crocodiles but have incorporated them into their cultural (and culinary) traditional practices. It is a relatively short step from hunting to a simple form of crocodile husbandry. And the people have not been slow to appreciate the benefits and prestige of a village crocodile farm.

Until the mid-sixties, heavy exploitation of crocodiles and other wildlife resources was permitted with virtually no restriction, but in 1966 a Wildlife Branch was established within the Ministry of Agriculture Stock and Fisheries and in 1968 Mr Maxwell Downes was appointed as the Branch's ecologist. Max Downes's very considerable energy and enthusiasm resulted in legislation to control the destruction of wild crocodiles, and in the establishment of a number of crocodile farms and experimental stations. Progress on both fronts has been commendable though Mr Downes has now returned to Australia where he continues his work on wildlife.

At present the point has been reached where wild crocodile breeding stocks are protected by a prohibition (well enforced) on the export of all skins of over 50cm (20 inches) belly-width which corresponds to about two metres in length (or less) — the size at which crocodiles start breeding. The wasteful killing of crocodiles at a small, uneconomical size is discouraged by a tariff which makes the export of very small skins unprofitable.

In addition to the small numbers of government-run demonstration and experimental farms there are now more than 200 small village farms throughout the country and several large business groups have been formed, each with a holding of over 1000 crocodiles. The majority of the small farms, however, are not operating at anywhere near maximum efficiency because of lack of technical know-how, shortage of funds for basic equipment and the many pervasive problems confronting village folk living in remote areas.

*John Lever, the Project Manager, gives a skinning demonstration.*





The project in which FAO is assisting has been designed to improve and extend the existing network of farms so as to establish an organized, integrated industry with the aim of producing top quality raw skins for export. The benefits envisaged are an increase in foreign exchange earnings for the nation and the consolidation of a rural industry singularly appropriate to the isolated lowland communities who have little land suitable for most other forms of agriculture and who are vulnerable to the dangers of the rural-urban drift.

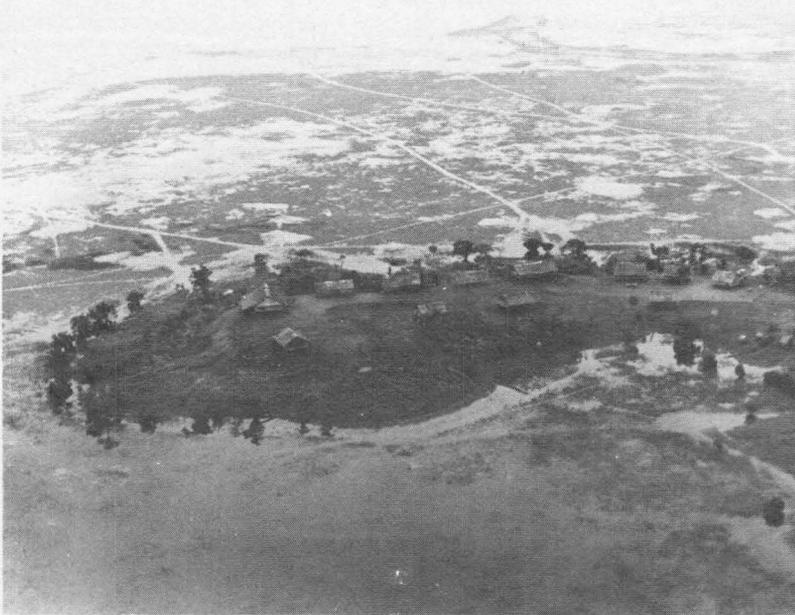
It is appropriate here to explain just what is involved in "farming" crocodiles. In Papua New Guinea at present, almost all farms are stocked by small wild hatchlings which are captured in the swamps. These are kept in pens, usually with fences built from local unseasoned wood, and fed each day on fish or offal as available. Crocodiles are not normally very active animals and need relatively little food; a pen of fifty youngsters would need less than two kilogrammes (4.4lb) a day during the first year. The important thing is that the food is fresh and the pens, which must be supplied with water and shade, are kept clean. Under these conditions growth rates in Papua New Guinea are good and the crocodiles are ready for slaughter after three years when the belly width is approaching 50cm.

Killing is done quickly and humanely by severing the spinal cord with a knife just behind the skull, the crocodile having been caught with a noose around its jaws and the jaws tied. Skinning is done in such a way as to remove the skin of the belly, flanks and limbs in one piece. Any damage at this stage will lower the grade and value of the skin. The feet and the plated dorsal strip of skin are discarded.

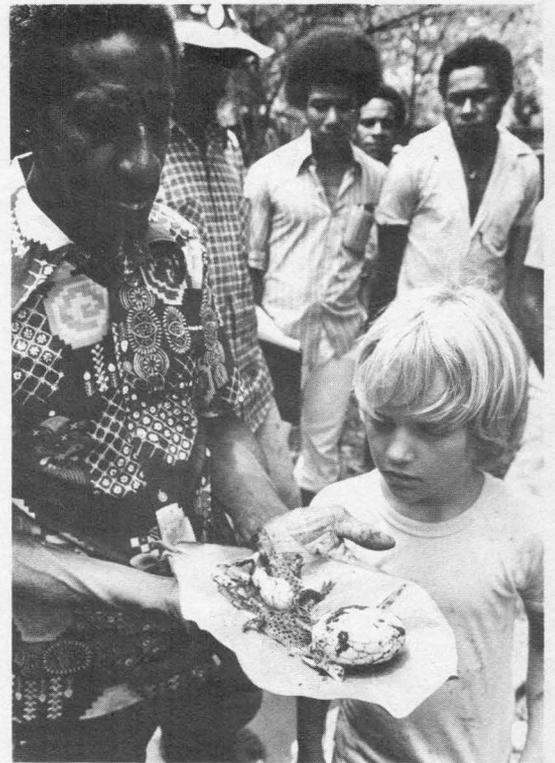
The meat can be cooked and eaten, it is quite wholesome, or it can be fed to the crocodiles. Preservation of the skin is vitally important and it must be properly cleaned and treated with salt and other preservatives before being rolled for storage and transport. At this stage the skin may be exported by the owner, if he has an export licence, or sold to an exporter as appropriate. Indeed, some village farms prefer to grow crocodiles for a year or two then sell them as live animals to a bigger holding which is better placed for dealing with the animals in their final year. The aim is for all levels of involvement to be capable of showing profit without any crocodiles being wasted by premature slaughter or inadequate skinning and preservation.

It will be obvious from this brief outline that everything depends upon a continuing supply of wild crocodile hatchlings and high priority has been given in project planning to running a census on the wild population and assessing its status to determine whether it really can, as is believed, sustain the industry at present or increased levels of cropping.

There exists in the legislation provision for set-



*This is a typical swamp village: Kavianunga in the Western Province, Papua New Guinea.*



*Young Matthew Lever, son of the Project Manager John Lever, watching saltwater crocodiles (*C. porosus*) hatch under the watchful eye of Wandiva Mego, who looks after the young crocs.*

*A good-sized skin of the New Guinea freshwater crocodile.*





A village pen in the East Sepik district with crocodiles in their first year. The chipped food is placed on a board or sheet of tin to avoid polluting the water.

ting aside wildlife management areas in which the capture or disturbance of crocodiles could be prohibited if need be, either permanently or seasonally. Such measures could only be successful with the support of the local people but there is reason to believe that the support will be there if the need for specially protected areas can be shown. At present the vast swamps appear to be yielding a healthy supply of young crocodiles and since the majority would certainly not survive to maturity in the wild state there is obviously an annual harvest to be taken provided that wild breeding stocks can be maintained.

In the longer term, breeding crocodiles in captivity is a feasible proposition. There are two species in Papua New Guinea: the freshwater crocodile (*Crocodylus novaeguineae*) and the so-called saltwater crocodile (*C. porosus*) which lives in both sea and inland waters. Both have bred successfully in the government's main demonstration farm near Port Moresby, but breeding requires extra care, extra space and is not economically attractive as long as there are wild hatchlings virtually on the doorstep. Although both species can be expected to produce upwards of 30 eggs a year, the freshwater crocodile is not sexually mature until it is eight to ten years old

and the saltwater species may not mature until it is considerably older.

So, for the time being, at the village farming level, the project will concentrate on conservation in the sense of "wise utilisation" of the wild stocks. Captive breeding will continue as a research programme only.

Research is also being organized to test different feeding and husbandry techniques and investigations into several aspects of crocodile biology are continuing. Market research will not, of course, be ignored but the project does not include skin processing beyond the preparation of raw skins for export. Top-grade, good-sized, wet, salted skins find a ready market both in the east and in the west where leading tanneries in the USA and France carry out the final processing. The finished, high quality leather is then dyed to fashionable colours and made up into durable, if expensive, bags, shoes, wallets and similar articles for sale in the world's stylish boutiques and shoeshops.

Market prospects are good for Papua New Guinea. A good demand exists; the world supply of crocodile skins is decreasing because of crocodile extermination both by deliberate hunting and by the mere pressure of expanding human populations occupying and interfering with the reptiles' habitat. Some species of crocodiles are already extinct, or virtually so, in countries

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# MEETING OF PACIFIC ISLANDS INDUSTRIAL SPECIALISTS

By DR. TE'O IAN FAIRBAIRN, Economist, South Pacific Commission

A meeting of industrial specialists from the South Pacific region was recently held in Suva under the joint auspices of the Commonwealth Secretariat and the South Pacific Bureau for Economic Co-operation (SPEC). (1) Specialists attended from the Cook Islands, Fiji, Nauru, Papua New Guinea, the Solomon Islands, Tonga and Western Samoa. Also in attendance were representatives from the South Pacific Commission (SPC) and the University of the South Pacific in addition to those from the Commonwealth Secretariat and SPEC.

The main objective of the meeting was to provide a forum for senior industrial specialists from the region to report on and discuss the industrial situation in their respective countries — their experience and progress to date, problems encountered and scope for regional co-operation. The conclusions arising from the meeting were to be presented to a Commonwealth Secretariat team of industrial specialists, along with similar reports compiled for other developing regions, for the preparation of a more general report covering the industrial needs and problems of Commonwealth developing countries through co-operative efforts and was to be placed before the Heads of Commonwealth Governments meeting, June 1977, for consideration.

The meeting of Pacific specialists in this field is symptomatic of a growing interest in industrialization in the region. This stems from a recognition on the part of many Pacific countries, such as Fiji, Tonga and Western Samoa, of the potential of industrial development for boosting economic growth, including the achievement of higher levels of Gross National Product (GNP), employment, foreign exchange earnings and tax revenue. It also reflects, for better or worse, increasing pressure from outside organizations and countries for Pacific countries to promote a greater degree of economic diversification by means of industrialization.

International organizations such as the Economic and Social Commission for Asia and the Pacific (ESCAP), the United Nations Industrial Development Organization (UNIDO) and the Commonwealth Secretariat have been in the vanguard of this process; they tend to see increased industrial development in the region as

(1) The meeting was funded by the Commonwealth Secretariat, London, and was held at SPEC headquarters, Suva, from 29 to 31 March, 1977.

being an integral part of a global development strategy for the achievement of a new economic order for less developed countries. It also reflects the particular policies of metropolitan countries such as New Zealand and Australia, which have an interest in promoting economic development in the region, especially the expansion of employment opportunities.

## *Topics Discussed*

The present meeting, as noted above, was concerned mainly with the compilation of information about the industrial situations of Pacific Island countries. For this purpose the meeting focused on four main areas of industrial development:

- (a) present plans and priorities — the importance of industrialization in current development plans, areas of industrial concentration, and role of foreign capital;
- (b) problems and constraints — a consideration of various internal (e.g. local infrastructures) and external barriers (markets and transportation) to the achievement of planned industrial targets;
- (c) prospects — mainly the possibility of establishing new industries and expanding existing enterprises;
- (d) co-operative measures — an identification of types of assistance required from outside governments and international organizations for industrial development, and suitable machinery for regional co-operation.

The procedure followed in the meeting was straightforward: each specialist spoke on his country's industrial position under the separate heads above and also responded to any request from other participants to clarify or elaborate a particular point. It was very much a case of technical knowledge in reverse flow — from the local specialists to the so-called industrial experts, in this case the Commonwealth Secretariat.

The meeting raised many issues of vital importance to industrial development in the Pacific region, in particular the question of regional co-operation and collaboration. Some of these issues are worth noting.

## **Points of Interest**

In the first place, one was impressed by the high priority several Pacific countries gave to rural development as opposed to industrialization. The representatives from Papua New Guinea and the Solomon Islands in particular informed the

meeting of their countries' commitment to raising the social and economic life of village communities by a variety of measures including investment in rural infrastructure and social facilities, encouragement of food production, training measures and improved marketing services. This concern appeared to stem not just from a matter of economics or politics but from a genuine attempt to broaden the benefits of industrial development and to strengthen and enhance the attractiveness of traditional village life against the forces of modernization, urbanization and the kind of development mentality that supports growth for growth's sake.

In this context, industrial growth was seen as playing a subordinate role; and where opportunities for industrialization existed they should as far as possible be developed in a way consistent with, and supporting, rural development. This might take the form, for example, of assistance for the establishment of industrial operations in rural areas in order to provide rural employment; promotion of processing activities that use local raw materials; and provision of adequate financial and related incentives to stimulate industrial activities that provide inputs and repair facilities to the rural sector.

Representatives from several other Pacific countries tended to view industrialization with a greater sense of urgency than, say, Papua New Guinea or the Solomon Islands. This was particularly true of Fiji, Tonga and Western Samoa. Each of these countries showed a special concern for the specific goal of increasing employment opportunities for their underemployed labour and for the ever-increasing number of school leavers who swell the labour market each year. There were undoubtedly other motives behind this preference, such as a desire for greater diversification of economic structures and a need to reduce dependence on imported industrial products and foodstuffs and to develop local resources. So, while not minimising the importance of rural development, these countries favoured rapid industrialization as a means of achieving economic growth, particularly for the immediate future.

Accounts of progress made to date by Pacific countries in the development and exploitation of natural resources were also of interest. Most impressive were the efforts made by Papua New Guinea and the Solomon Islands to develop a widely based list of natural resource projects. For Papua New Guinea these include ventures in actual or imminent operation in such fields as oil palms, timber, fish processing, tea, rice, sugar, coffee, other food processing activities and cement manufacture, not to mention several large-scale mining operations.

The Solomon Islands have in operation sizeable ventures in tuna, palm oil, timber, rice and cattle which provide a fair degree of variety. The economies of the smaller Pacific Islands represen-

ted at the meeting, with the exception of Fiji, are much less broadly-based; this reflects to some extent a time-lag in the exploitation of available resources rather than an actual absence of resources.

Another issue raised at the meeting was the possibility of conflict between national and regional interests in industrial development. The principle of regional co-operation in industrial and trade development was endorsed, but it was recognized that its application is likely to meet with all kinds of difficulties. Thus, a country with a new industry may be interested in exporting to a neighbouring Island country but finds that it cannot do so because of trade and related restrictions. The benefits of establishing regional enterprises in a particular location may be clear, but each Pacific country may prefer to build up its own industrial structures rather than co-operate in the establishment of a regional venture. The tendency to 'go it alone' seems a natural reaction to a situation of limited opportunities for industrial investment, while the influence of political factors cannot be ignored.

A final point of interest concerns measures in the finance field necessary to support the industrial development programmes of Pacific countries and to promote industrial co-operation. Representatives of the Commonwealth Secretariat raised the possibility of a Commonwealth Investment Bank which would act to bring together capital, technical and managerial know-how, training aspects and other related inputs required for getting specific projects into operation.

This idea did not, however, provoke much enthusiasm from the participants: it seemed too much like the introduction of yet another high cost development organization geared to the development of large-scale projects as opposed to the small and medium-sized projects likely to be of more importance to the region. The line of thinking adopted by participants was that if a regional credit institution was to be considered, a development bank for small businesses should perhaps be looked at as a first possibility.

### **SPEC and SPC Involvement**

The meeting afforded an opportunity for SPEC and other regional organizations represented at the meeting to outline and discuss some of the regional industrial projects with which they were currently or about to be involved. SPEC representatives gave an up-to-date account of their organization's work on trade promotion, shipping, telecommunications, survey of air freighting possibilities, study of major regional agricultural products and industrial promotion. SPEC's work since its inception in 1972 has been concerned mainly with trade promotion, both intra-regional and inter-regional, shipping and telecommunications; but it now seems set to take a greater initiative in the promotion of industrial

development and co-ordination in the region.

SPEC's objectives in the industrial field in the region are set out in the Agreement establishing SPEC under Article VII, Section 1(c) as follows:

*to 'prepare studies of the development plans and policies of member governments in an effort to promote co-operation in the region; and investigate the scope for regional development planning aimed among other things at a rationalisation of manufacturing and processing industries and the achievement of economies of scale in certain regional enterprises.'*

In line with these objectives SPEC has completed a number of surveys related to industry over the past few years. One of these was a feasibility study of a regional copra crushing mill carried out in 1975 by the Tropical Products Institute, London, on behalf of SPEC; this study was directed mainly at the possibility of establishing such a mill among the Pacific Islands members of SPEC, but came out against the idea of a single regional venture. <sup>(2)</sup> The other was a trade and industry study conducted by a United Nations team in 1973/74 which, among other things, identified a total of 14 industries capable of being developed through regional co-operation. <sup>(3)</sup> SPEC has also been active in promoting regional trade in a number of locally produced commodities, principally kava, sugar, taro and ginger.

A major project which SPEC is currently preparing is a comprehensive regional industrial survey proposal to be submitted to outside agencies for funding and execution. SPEC has received two preliminary drafts of possible projects, one from ESCAP and another from the Commonwealth Secretariat. In brief, these projects aim to survey the industrial situation and prospects of each Pacific country willing to co-operate, and to identify areas of possible co-operative action in terms, for example of regional industries and approaches to marketing, investment and certain infrastructural problems.

The value of such a survey was not questioned at the meeting; it would provide basic information for launching a more intensive effort in regional co-operation, aimed at exploiting possible economies of scale and potential areas of complementarity in economic structures. It would also provide basic information on industrial possibilities for individual countries and would be of particular value to those Pacific countries which have as yet not carried out industrial sur-

veys on their own. <sup>(4)</sup> Participants were able to voice their views on the merits of the respective proposals and this, no doubt, helped SPEC in eventually formulating a satisfactory survey proposal.

While recognizing SPEC's special interest in promoting regional industrial development, SPC is not altogether without an interest in this field. At present this interest is three-fold. The first aspect is the encouragement of experimental work in the processing of foodstuffs and related raw materials such as that being undertaken at the Food Processing Laboratory at Alafua, Western Samoa. With the stimulation of food production in the region as one of its major concerns, SPC is obviously interested in the development of new processing possibilities — both for local consumption and for export — that might serve as an incentive for increased food production as well as improving nutritional standards.

A second aspect is a regional project on rural employment promotion which SPC has recently launched. This modest-sized project is concerned with the identification, and later development, of small-scale industrial activities suitable for the rural village setting. This project will have a two-year duration in the first instance. A third area of interest is the completion of a study of industrial investment incentives operating in the region which was initiated in 1973 at the request of the Government of Fiji. This survey will analyse and evaluate the effectiveness or otherwise of existing incentive schemes in the region and submit suggestions for improving them where this is deemed justified. It is expected to be completed later this year. <sup>(5)</sup>

The above areas of involvement are somewhat peripheral to SPC's principal mandate and guidelines, which were recently reviewed to give greater emphasis to rural development, community improvement, training work and data collection and distribution. Recognition, too, is given by SPC to SPEC's role in this field and the need to avoid duplication.

### Other Regional Projects

Another development of regional interest raised at the meeting was the Pacific Islands Industrial Development Scheme recently introduced by the New Zealand Government to promote industrial and economic development in the region. This scheme is still at the infant stage of preparation

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<sup>(2)</sup>J.A. Cornelius & C.J. Lockhart-Smith *Report on a feasibility of a regional copra crushing mill within the region covered by the South Pacific Bureau for Economic Co-operation region (SPEC)*, Tropical Products Institute, London, 1975, pp. 111.

<sup>(3)</sup>United Nations Preliminary Mission, *Prospects for trade expansion and economic co-operation in SPEC Island member countries*, Geneva, 1974, pp. 88.

<sup>(4)</sup>Representatives from Fiji, Papua New Guinea, Tonga and Western Samoa indicated that industrial surveys had already been undertaken in their respective countries. Papua New Guinea has apparently completed several such surveys over the past few years.

<sup>(5)</sup>SPC is also obliged to render assistance in this field to Pacific Island countries which are not members of SPEC, though admittedly such countries are not precluded from approaching SPEC for assistance in solving industrial problems.

but has recently been broadened to include a number of Pacific countries not covered by the original proposal (such as the Solomon Islands and Papua New Guinea). The scheme is designed to encourage New Zealand companies, especially those producing labour-intensive products to set up operations in Pacific Islands locations. It will also provide assistance to develop local services and infrastructures which will confer benefits on indigenous industries.

The basic aim of the scheme is to promote employment in Pacific Islands so as to reduce the pressure leading local people to migrate overseas. The type of assistance likely to be available under the scheme includes assistance with establishment and transfer costs, loan finance, and assistance with training. Access to the New Zealand market on favourable terms is also envisaged.

The above account does not, of course, exhaust the list of international organizations and countries interested in regional industrial promotion in the Pacific region. Thus, the Commonwealth Secretariat is likely to be coming forth, after the June meeting of Commonwealth Government Heads, with practical proposals designed to stimulate industrialization in the region. These proposals are likely to include such measures as training programmes, assistance with negotiations with foreign investors, project evaluation and measures for facilitating the flow of capital and technology into the region. UNIDO has also shown interest in participating in a region-wide industrial survey in addition to the practical work it is doing among some countries in the region and this interest is likely to continue; and no doubt there are other interested parties of which I am not aware.

### Conclusion

With so many different organizations and countries apparently involved in industrial promotion in the region, the task of keeping up with events and of trying to achieve a degree of co-ordination in this development is beginning to look formidable. Assuming that closer co-ordination of industrial development among Pacific countries than has so far occurred is a good thing, it seems essential that the various interested organizations and countries should attempt, at the very least, to keep each other informed of their respective intentions, activities and programmes.

It is also important for Pacific countries to seek closer co-ordination and co-operation among each other and with outside organizations and countries active in this field, for they stand to gain much from an exchange of ideas and experiences and from the opportunity to identify common projects and problems that can be tackled co-operatively. Important too is the need to bring together representatives of the private sector — the manufacturers, businessmen and traders — who will largely be responsible for effecting regional industrial co-operation at the ground level. □

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# THE TRANSPORTATION AND HANDLING OF FISH PRODUCTS AND FRESH FISH IN THE PACIFIC ISLANDS



*A new robust vessel for the island collection service.*

By A.P.J. HOLNESS Chief Fisheries Officer, Gilbert Islands,

Every country, no matter how great or small, will have problems of some kind in the collection and distribution of fresh fish. Road, sea and air communications will pay an important part in collection and distribution of fish products to markets in population centres.

There are times, in the daily activities of any fishery organisation, when appeals are made to increase fish production — force the local fishermen to catch more fish — get things moving — the towns, villages, are short of fish...

It is at this point that we in the various fisheries organisations must pause for thought. What will an all-out fishing effort involve? Who will it involve? What are the economics of such a move? We must consider the following points which will, or should, lead to the formulation of a plan to avoid wastage of funds, manpower, equipment and time.

## The Products

Two types of fish products must be considered from the outset: **fresh** fish and **preserved** (salted, dried, etc.) fish. Fresh fish must reach the holding or distribution centre as quickly and economically as possible, not losing the freshness or quality which the buyer and consumer rightly expect. Various species of fish may require more care in canning, packing and cooling, but the initial period of time between the moment the fish are taken out of the water and their placing

under chilled or iced conditions is vitally important to the end quality of the product.

The preservation of fish is an extremely important factor in more distant and isolated areas, where days or weeks may pass before a fisherman can export his commodity to the village or town centres. His product still has to be a quality product, and the steps he takes to ensure preservation and correct packing are of great importance. The preserved fish must last two or three weeks before deteriorating in quality.

All **shell fish** and crustacea come under the fresh fish category. In addition, they require extremely quick handling procedures from catch to cooling.

Distances are most important in relation to all processes of cooling, icing, chilling or freezing. A set distance must be agreed upon for transport of fresh or preserved fish products; it will depend on the method of transport. A collecting service is the usual practice in the Pacific, mostly by sea. Very few local vessels travel at more than eight or nine knots, so that the range is necessarily limited in order to ensure the delivery of top-quality fresh fish.

Some countries are now in a position to offer ice to the fisherman at the catching area, or may even make cold storage facilities available, but in many cases crushed or flake ice is taken out by the vessel which is used to collect the fish. Fresh ice is unloaded into a large ice box immediately after the first catch of fish has been loaded on to the collection vessel, and the fishermen can immediately commence fishing again, keeping their new catch in ice until the vessel returns. This collection system works very well if:—

- (a) the collection vessel is reliable;
- (b) there is an alternative vessel to send if necessary;
- (c) the ice supply is such that a breakdown will not cut off vital ice supplies.

It is difficult to convince a village fisherman that the collection service is the only answer to the cash problem, so any breakdown in the collection of fish is going to have the following results:-

- (a) fish awaiting collection will go bad;
- (b) if communications are bad, fishermen will continue to bring in further supplies before realising that things have gone wrong;
- (c) all fishing will stop;
- (d) some time may elapse before fishermen can be persuaded to start fishing again;
- (e) the outlet or market at the receiving end will run out of fish, prices will go up, and the agent will start buying fish from other sources.

These points underline the necessity of ensuring a reliable collection service which can operate continuously.

#### **How can this be done?**

In the first place, ice supplies and/or holding cold rooms must be constant and reliable, duplicated if possible, so that there will not be a shortage of ice. Secondly, it is important never to over-stretch the collection service. It is advisable to service only those areas which can be reached under most prevailing weather conditions. A reliable system of communication with the holding centre is necessary.

In most cases, several centres will be serviced by the collection vessel on a single trip, so the

distance factor is critical. It is better to have a few disappointed fishermen in remote villages, if this is necessary to keep the radius manageable and efficient. The fish areas outside the 'fresh fish zone' will be the 'preserved fish zone', until extension of the collection service is possible.

**Communications** play a vital part in the transportation and collection service. 'Communications' means telephone, radio-telephone, or direct transceiver contacts. There may be a time when the fishermen themselves are the defaulters; the result could then be that the vessel, ice, staff and the rest of a carefully organised exercise arrive at their destination to find no fish.

**Transportation costs** are important. Where road collection is possible, it is obviously more practicable and usually more economical. The quality is less likely to suffer because of the speed of the operation; distances which can be safely covered by road will be greater than those covered by other means of transport. In addition, serious problems are not usually encountered if a road serves a fish-landing area, as, in most cases, other



*Off-loading ice from the collection vessel for distribution to the village fish landing.*

independent road carriers of one kind or another are operating and can be called upon in an emergency.

**Air transportation** of fish is usually not possible because of high costs, limited space available, and the natural reluctance of airlines to carry fish owing to the lingering odour which often persists for days afterwards. This suggests that the seaborne collection unit is more practicable.

**The collection vessel** should be carefully designed. Alterations to any vessel are generally extremely costly, and never seem to work as well as an original installation. The size of the vessel mainly depends on the type of seas likely to be



*A well set-up ice plant close to the jetty.*

encountered in the given area. If the collection area comes under constant rough seas, or is a very choppy zone, the vessel must be built to withstand such conditions. Essential equipment should be built in, with special attention given to ways of stacking fish: badly packed products can be bruised and damaged to such an extent that they may be unmarketable on delivery. Carefully planned boxes and stack bins should be placed in slide-proof, divided bays.

It is also advisable to fit a chiller unit, if space permits. This ensures that if extra ice is required at any of the fish holding centres, it is possible to unload more ice than usual to satisfy the fishermen. The vessel can then utilise less ice herself on the return trip, with the chiller operating for her own needs.

The carrying capacity of the vessel is always a difficult question. It should be borne in mind that

an efficient collection service means satisfied fishermen, which in turn leads to bigger and better catches. The simple solution is to provide a fish cold room to hold 'x' tons of fish, because 'x' tons of fish **should** come from that area, but is this always correct? In one year's time, satisfied fishermen might easily provide 25 per cent more fish, and to build a second boat would be uneconomical, so adequate allowances should be made in the original planning. In addition, it may be found possible to include more villages in the operational zone once the scheme is under way, and this, too, will mean that additional hold space will be needed.

It is obvious that the vessel's engine or engines should be of a make which can be easily serviced and repaired. The actual servicing and slipping arrangements of the collection vessel must be carefully planned, with adequate back-up equipment to run an efficient service. Wooden vessels are impracticable as they need constant attention. Glass reinforced plastic, aluminium or concrete are the other alternatives to steel, which probably requires to be slipped three times each year, and is therefore also impracticable. These three alternatives require to be painted once each year, and cleaned out thoroughly only twice annually, which cuts maintenance costs considerably.

**Reception and holding centres** can be regarded as the beginning and end of the fishing industry. Without an adequate complex to receive, clean and pack fish for grading and placing in appropriate holding units (chiller, blast freezer or freezers) for onward distribution, it would be useless even to consider establishing an industry. Careful planning and thought must go into a fishery reception complex. A combination complex may be the most appropriate and economic unit for a developing industry. This would consist of a unit close to the water, where vessels could come alongside, offload fish, refuel, re-ice, collect provisions and leave again for the fishing ground.

Once the fish is unloaded, it is taken to the cleaning and sorting tables, then graded and placed in appropriate fish boxes in ice, and placed in the chiller for retailing or onward transmission to the blast freezer and thence to the holding freezer. Within the same complex, a retail unit can be established to cater for local sales, and a wholesale section to supply fresh iced or frozen fish to retail and catering establishment.

Two ice machines (minimum) are required, one to supply ice for the internal requirements of the reception complex, and the other to supply vessels and/or fishermen. If one breaks down or requires maintenance, the other can be utilised as the main supply unit for all requirements, with lit-

tle or no restriction. If the stocks of ice are used efficiently, other 'side' supplies can be undertaken, such as improvement of sales of iced drinks at roadside stalls.

**Loading ice into vessels** is a very important operation. In the Pacific area, where the average daily temperature is in the region of 28deg C, moving ice the shortest possible distance in the shortest possible time is essential. A short conveyor belt can be used, but it should not be more than 50 feet long. If the distance required is more than this, a closed wooden or fibreglass chute should be used. A tipper truck can be used if a funnel chute is fitted with a swivel pipe below to distribute ice evenly.

If, for any reason, an ice-carrying vessel is laid up for any length of time, it is always advisable to place a certain amount of ice in the hold, to maintain a constant low temperature. This is a simple operation when the vessel has already been carrying ice and fish — the temperature will already be low, requiring only small amounts of ice to be added to maintain it. Cleaning the hold can still be undertaken even if small amounts of ice remain inside. If this system is not used while a vessel is laid up, and the hold temperature is allowed to rise, ice will melt extremely rapidly when re-introduced, and the first trip undertaken could be a wasteful operation with insufficient ice left to service all landings.

**The packing of fish in the tropics** differs slightly from colder climate handling. Good icing results in cooler fish being transported to the holding centre. If fish are placed in ice boxes with ice below the first layer of fish and between each subsequent layer, the maximum low temperature will be obtained without the need to go to the extreme lengths of placing ice in each fish. If fish are merely packed into boxes with a single layer of ice on top, fish at the bottom can be spoiled and tainting can affect the freshness of all other fish in the hold.

Gilling and gutting is necessary to ensure the correct packing of fish. It is easier to receive cleaned fish at the ice box reception centre, as this allows more storage space and avoids further delay before the fish are packed in ice. Cleaning the fish at sea also avoids unnecessary filth on the landing, and is particularly advisable, for health reasons, in small villages.

Bruising of fish being carried in large fish holds can be extremely costly. It is advisable to take up a certain amount of space in the hold by the provision of sectional bins to hold the individual fish boxes, thus avoiding too much movement in rough weather. A supply of fish boxes, each fitting into the other, is the only sure way to avoid

bruising. If it is not practicable to place large quantities of fish in individual boxes, then carefully-built partitions should be fitted to ensure even distribution of fish, although care should be taken to ensure that the bottom layer of fish does not bruise through too much overhead weight.

**Market outlets** are the final necessity in the chain of the fishing industry. Without these outlets, the entire industry could collapse. In the smaller Pacific Islands, marketing is usually a difficult procedure, as, quite often, market facilities are inadequate, with little or very few cold storage facilities, and none of the infrastructure necessary to build up a marketing body.



*Weighing fish at a village fish reception centre.*

Financial allocations are required, comprehensive and detailed plans are needed, and proof of supply, consumption and demand must be obtained. This information is gathered by means of carefully-planned, statistical collections. Once an overall picture is produced, long and short-term plans can be made regarding size and number of markets. Long-term plans would involve permanent, well-built reception and holding centres in the more heavily populated areas. Short-term market facilities could include mobile freezer units, cold rooms or ice boxes, distributed in such a way as to obtain the maximum distribution factor possible, with the minimum effort and cost; but these short-term market outlets require expert supervision, and care should be undertaken to ensure that there are no communication breakdowns.

Price structures must be carefully assessed to give the highest benefit to top and middle grade

varieties of fish, without penalising the lower grades, and bearing in mind residential tastes of any particular area. It should be realised that problems of fishery production, handling and distribution, arising in the isolated Pacific Islands, are completely different from those in more sophisticated catching and distribution regions.

Even though basic fishery lore is a guideline for everyone, unconventional variations are often necessary to fit individual circumstances. One is often faced with local traditional habits and laws, locally sensible and acceptable, which call for drastic changes in a particular fishery scheme. In time, Pacific Islands people will eventually become conversant with modern ideas and techniques and will be prepared to change their ways to meet economic demands; but, until then, it is necessary to adapt fishery knowledge to meet individual situations.

Protein deficiency is a major world food problem, and the ocean provides us with one of the greatest potential sources of food; we must explore, exploit and harvest these resources to the fullest sustainable yield. Time and money spent on a successful fishery is never wasted. □

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The **South Pacific Bulletin** aims to serve the needs and interests of the people of the South Pacific region. It would wish to provide a forum for the interchange of opinions and ideas.

Comment on or criticism of the **Bulletin's** contents and letters on topics of general interest to the Pacific area are cordially invited. Photographs are also welcomed, and, where requested, prints and/or negatives will be returned promptly after use.

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# EXPLORING NEW CALEDONIA'S PAST

Theses and other writings published by the New Caledonian Society for Historical Studies.

By B. BROU

Since its foundation the very active New Caledonian Society for Historical Studies has produced a great deal of highly specialised work, mainly on the following topics:

- prehistory and archeological research;
- protohistory and the traditional indigenous society;
- modern and contemporary history (since Captain Cook's discoveries).

Each of these three periods has been investigated in relation to Southern Melanesia, particularly the New Caledonia, Loyalty and New Hebrides island groups, but also the Coral Sea, the Southern Pacific Ocean, with occasional general reference to the whole Pacific area. The Society's achievements to date include:

30 **Quarterly Bulletins**, issued with consistent regularity and together containing about 200 reports or articles, as well as information of scientific interest;

8 public lectures, of which six were delivered in Noumea and two in Paris;

110 informal talks, given in Noumea at the monthly meetings of members of the Society;

14 publications, comprising:

- 6 doctoral theses or monographs
- 1 "diploma of higher studies"
- 1 ethnographic treatise
- 4 historical narratives
- 2 collections of historical manuscripts.

In addition, the Society was the initiator of the celebrations held in 1974 in honour of Captain James Cook to mark the bicentenary of his discovery of New Caledonia: a dazzling demonstration of our island's friendship with Australia and New Zealand. These neighbouring nations, in fact, provided the bulk of the exhibits — documents, prints, genuine historical artefacts, a large painting, that made the Cook Exhibition the magnificent success it was. Other bicentennial highlights were a memorial to the famous navigator, erected in September 1974, publication of a book entitled **The discovery of New Caledonia**, and an impressive stage-production —

"The Discovery" — which attracted large crowds to the 'Theatre de l'Île.

## Scientific co-operation, mainly in the Pacific

Little by little, contacts were established between the young Society and various organisations concerned with the Pacific. In Paris, the Society for Pacific Studies led by Patrick O'Reilly was among the first to recognise it and offer support, followed by the Pacific Research Centre, the Centre for Research on South-East Asia and Indonesia, the Centre of Higher Studies on Modern Asia, the French Society for Overseas History, and others.

In Noumea, collaboration began with the Centre for Scientific and Technical Research Overseas (ORSTOM) and with the SPC Library, and students from Australia, New Zealand, the United States, Guam, Japan, and other countries were made welcome and given assistance during their visits to New Caledonia. However, the Society's most valuable asset has been the co-operation of scholars from the leading universities in the area, especially the Australian universities. Largely thanks to the dedication and competence of such members as Andre Surleau and George Pisier, privileged relations were developed with:

Mr. R.K. Howe, of Massey University, Palmerston (New Zealand);

Mr. Robert Langdon, Pacific Manuscripts Bureau, Australian National University, Canberra;

Professor D. Shineberg, Australian National University, Canberra, whose thesis, **They came for Sandalwood**, was translated into French and published by the Society;

Mrs Bronwen Douglas, of Latrobe University, Melbourne;

Miss Renee Heyum, Pacific Curator, University of Hawaii;

Mrs. Anne-Gabrielle Thompson, Department of History, University of Queensland;

Miss Linda Latham and Miss Myriam Dornoy, whose fascinating study reports are immensely

popular with French-speaking history-lovers;

Librarians, scholars, teachers, in fact a host of people specialising in history and prehistory.

#### The Society's means and aims

Now eight years old, the New Caledonian Society for Historical Studies was founded by a small group of dedicated and determined private citizens, inspired by a common desire: "to explore New Caledonia's past by discovering and studying the physical, human, and historical elements of its heritage; to salvage and safeguard this heritage by all possible means." This was indeed the original aim of the Society, as defined in its statutes, and it has not altered since, despite the fact that activities and membership have greatly increased over the years.

On November 6, 1969, the new Society was legally registered as a non profit-making organisation, which is to say that it is strictly non-commercial and the only profits members may derive from it are of a cultural and intellectual nature. Funds for the implementation of the Society's programmes come from voluntary contributions of members and outside benefactors, and this accounts for the consistently low price of its publications, even though the number of copies printed is always very small.

While each new publication is well received by connoisseurs, readership is naturally fairly limited: New Caledonia has a very small population of which only a tiny fraction is really interested in the type of works produced. Where in France a first edition would run to 30,000 or 50,000 copies, it cannot be expected to sell more than 2,000, or even 1,500, in Noumea! Moreover, printing costs are higher in New Caledonia than in France, and incomparably higher than in Taiwan or India.

The disadvantages of producing publications locally are further aggravated by current regulations governing the importation of paper and printed matter: paper for printing is liable to an import tax, while books printed outside the Territory may be imported free of tax. Thus the liberal import laws on books, designed to promote culture, are a millstone round the neck of the local printing industry. Nevertheless, the Society for Historical Studies has not wavered in its determination to produce all-Caledonian works, trusting that the discriminatory import regulations will eventually be changed.

Lastly, the young Society has come up against serious competition from commercial enterprises that produce books for the general reading public, often with a historical flavour, but offering no guarantee of accuracy and authenticity. These publishers use a wide range of well-tried



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*1969 à 1975*

**DECEMBRE 1976**

*Two of the publications produced by the New Caledonian Society for Historical Studies: a general index of all articles published in the first 25 quarterly Bulletins and the cover of one of the latest issues, showing how the Society's aim of exploring New Caledonia's past is being realised.*

promotional gimmicks: house-to-house sales, paid advertising in local papers, cocktail parties on the occasion of new releases, dinner invitations, free presentation of copies to influential people. In spite of all these drawbacks, the Society succeeded in publishing 14 major works between 1972 and 1976.

#### Writings published by the Society

Faithful to its expressly cultural vocation: to make available to all and sundry (even if only a small elite composed of scholars, students and visiting history-lovers are initially interested to the point of buying) writings of high standard which otherwise would gather dust in a dark corner of some university library, the Society has so far edited 14 volumes, often at financial loss. Described here, in chronological order of publication, these works form a comprehensive body of related writings:



BULLETIN N° 30  
DE LA SOCIÉTÉ  
D'ÉTUDES HISTORIQUES  
DE LA  
NOUVELLE-CALÉDONIE

1<sup>er</sup> TRIMESTRE  
1977

L'ÂME  
des PIROGUES

COUTUMES  
de LIFOU

Sur les traces de  
LAPÉROUSE

DEUX LÉGENDES  
de  
TOUAOUROU

Les 25 ans de  
l'Église de KOUMAC

CHRONOLOGIE  
de Nlle-Calédonie  
1944

RAPPORT MORAL  
1975-1976

No. 1 — *Kouïe or Isle of Pines*, by George Pisier. Historical monograph on the Isle of Pines. 380 pages, size 27 x 18 cm.

This well documented work, constructed on the lines of a thesis, sums up all there is to be known about the Isle of Pines: history, geography, human settlement, development, the indigenous people and their problems. It contains new and interesting material for the specialist in comparative Pacific Islands history. It demonstrates that, far from being a mere tourist playground, the Isle of Pines constitutes a choice example of human behaviour and relations through the ages.

No. 2 — *The white man came*, two tales by Georges Baudoux.

A literary and historical masterpiece by New Caledonia's foremost author who, better than any other, felt and rendered the harshness of Melanesia, the insularity of its inhabitants, and the beauty of the Melanesian way of life. Not only are these tales among the gems of French literature, but they also give a genuine picture of New Caledonian life in the very early days.

No. 3 — *They came for sandalwood*, a history thesis by Mrs. Dorothy Shineberg, translated into French by Andre Surleau. 452 pages, size 21.5 x 14 cm.

This is the story of the rough pioneer traders who were the first to have regular dealings with the Melanesians of New Caledonia and the New Hebrides. In those days, the sandalwood trade was fraught with danger and attracted mainly the riff-raff, but from among them there occasionally emerge characters of admirable stature. This very vivid narrative makes fascinating reading for all who are interested in the early contacts between the European and the Southern Melanesian.

No. 4 — *A history of New Caledonia*: "Modern times." 1774-1925 (from the discovery to the contemporary period), by Bernard Brou. 320 pages, size 27 x 18 cm. Diploma of Higher Studies paper.

Hopes and fears, achievements and failures alternate in this eventful period of New Caledonia's history, which is the product of a dual symbiosis: between the European settlers (British, French, convicts, etc.) and the small Melanesian communities they were thrust into, on the one hand, and a wide variety of tiny foreign minority groups (Reunion Islanders, Indians, Chinese, New Hebrideans) on the other.

No. 5 — *The discovery of New Caledonia*. Documents by Captain Cook, his officers, and the scientists who accompanied him, translated and commented by Georges Pisier. 195 pages, size 27 x 18 cm.

Judicious selection and masterly presentation of material — manuscripts, printed works, sketches and charts — make this comprehensive, faithful and immensely readable account of the momentous event that occurred two centuries ago. Thus is filled an unfortunate void in French-language history on this subject.

No. 6 — *Once upon a time — memories of the convict days*. Short stories by Georges Baudoux.

The son of one of the warders of the *communard* deportees, Georges Baudoux shared the convicts' life for much of his childhood, acutely aware of everything that went on around him.

What he heard, saw, and felt forms the substance of these seven tales. Some are amusing, others tragic; all bear witness to an astonishing sense of observation and photographic memory. The escaped or freed convicts who were among the earliest European settlers of the Colony also come to life in this volume, which includes three poems and the famous "Song of the cobalt diggers" and must be regarded as a literary and historical masterpiece.

No. 7 — *The adventures of Captain Cheyne*. In the Loyalty Islands, on the Isle of Pines, and at Balade, in 1841 and 1842. Introduced and translated by Georges Pisier. 100 pages, size 27 x 18 cm.

Discovered in 1967, published in English in 1971, this remarkable manuscript was published in French by the Society in 1975. The English traders who, from 1841 onwards, came to Southern Melanesia in search of the fabulous sandalwood used to falsify their log books in order to throw their rivals off the scent. It is indeed lucky for us that the first of them, Andrew Cheyne, was an exception to the rule.

No. 8 — *The Sleeping Beauty*. A review of the colonial administration in New Caledonia from 1874 to 1894. Doctoral thesis by Pierre Gascher. 299 pages, size 21.5 x 14 cm.

Reviewing 20 years of history dominated by the all-powerful penal administration, the author compares New Caledonia with a Sleeping Beauty, richly endowed by nature, but whom no Prince Charming ever came along to awaken. This book is an important milestone in the history of New Caledonia as a penal colony. It is neither a diatribe against colonisation, nor an indictment of the administration, but an impartial assessment, the bearing of which extends far beyond the twenty years considered.

No. 9 — *Hopes and realities: New Caledonia from 1925 to 1945*. The Guyon Plan; the movement in favour of General de Gaulle; the War in the Pacific. Doctoral thesis by Bernard Brou.

There was a one-generation gap between the "modern times" dealt with in volume No. 4 and other works mentioned above, and the contemporary era. Bernard Brou fills this void with his fascinating study of an action-packed period comprising the arms race, the arrival of United States troops and the war in the Pacific. He also describes New Caledonia's response to General de Gaulle's 1940 appeal, as well as the Plan devised by Governor Guyon, which gave rise to bitter controversy, for and against the opening of new roads, during and after the Great Depression of the 1930s. Amply illustrated and evading none of the burning issues of the day, this thesis was highly commended by the panel of judges to whom it was submitted.

No. 10 — *Melanesian peasants in the Canala area*. Doctoral thesis by J.P. Doumenge, published jointly by the Society, the French National Centre for Scientific Research, and the Centre for Tropical Geography of Bordeaux. 220 pages, size 30 x 21 cm.

For a thorough understanding of the traditional Melanesian society, its land laws and kinship

structures, this document is essential. Only a very small number of copies was printed, so get one while they are still available!

No. 11 — *Melanesians today*, by an anonymous group of Melanesians.

This book, the first ever written entirely by New Caledonian Melanesians, provides an inside view of the present-day "Kanaka" society in relations to such vital questions as land, the family, the individual, sexuality, and Christianity.

It gives a better insight into the workings of the indigenous mind than even Maurice Leenhardt's writings could do.

No. 12 — *Melanesian canoes*, by Father Neyret. 600 plates, 3000 drawings.

Every type of canoe ever used in the South-Western Pacific — Melanesia, pre-European Australia, New Guinea, etc. — is listed and described in this monumental masterpiece, which no one interested in ethnography and ship-building techniques can afford to miss.

No. 13 — *D'Entrecasteaux in New Caledonia*, by George Pisier. 150 pages, size 27 x 18 cm.

All available documents concerning the exploration of New Caledonia by the French expedition led by Admiral d'Entrecasteaux have been reproduced in this volume. The authors are d'Entrecasteaux himself, his officers, and the various scientists who took part in the expedition;

George Pisier has arranged, analysed and commented this material with characteristic thoroughness, producing a vivid, complete and faithful account of the historic voyages of 1792 and 1793.

No. 14 — *Customs and superstitions of the New Caledonians*. 1976 edition of the great classic of New Caledonian ethnology, written around 1860-70 by Father Lambert and published in a single volume in 1900.

For an understanding of the Pacific Islanders in general, and the New Caledonian Melanesians in particular, this book is still essential. Out of print for the past 70 years, it remained a basic reference work for students and scholars, who had access to it on micro-film. Thanks to this new edition, which is certainly a major event, it is now available to the general public at a very reasonable price.

**Original text:** French.

# SPC Training Courses in Food Hygiene and Control

By **ERIC DUNN, SPC Adviser in Environmental Health and Food Hygiene**

Two training courses in food hygiene and control were organised recently by the South Pacific Commission with generous financial assistance from the Commonwealth Fund for Technical Co-operation. The first took place in Nuku'alofa, Kingdom of Tonga, from 38 March to 7 April, the second in Honiara, Solomon Islands, from 18 to 29 April.

The principal objectives of both courses were:—

- (a) To explain and demonstrate the meaning of food hygiene in relation to the production, processing, preparing, storage, retailing and serving of food.
- (b) To familiarise participants with the epidemiology of food-borne illnesses, the procedures for investigating outbreaks, and the precautions necessary to prevent such outbreaks.



*Participants in the Tonga course*

- (c) To assist in creating an awareness among food handlers of the dangers arising from unsanitary food handling, and their obligations to the consumer and the community.
- (d) To teach skills in the application of sanitary techniques and practices in food preparation and food service, both at the domestic level and in food service operations.
- (e) To acquaint participants with the elements of human nutrition and the nutritional values of local foods.
- (f) To explain the principles and objectives of food control legislation at the national and international levels.

The courses were intended for health inspectors; sanitarians; food inspectors; health educators; supervisors of quantity food serving establishments; canteen and restaurant managers; managers and supervisors of food processing plants and factories, and other persons holding a responsible position in the food trade or in a regulatory or supervisory position in the Government service.

The courses were directed by the South Pacific Commission's Adviser in Environmental Health and Food Hygiene Mr E. G. Dunn, assisted by the Health Education Officer, Miss Bushra Jabre. The Director of the New Zealand Department of Health very kindly arranged for a member of his staff, Mr M. Marks, to act as consultant to the courses. Mr Marks is a Government Supervising Inspector of Health, and Immediate Past President of the New Zealand



*Participants in the Solomon Islands course*

branch of the Royal Society of Health

## **Tonga Course**

The course was formally opened by the Hon. Minister of Health, Dr S. Tapa, who delivered an eloquent keynote address emphasising the importance of food hygiene in combatting the high incidence of enteric disease among the Tongan community, and in the promotion of the tourist industry.

Of the 50 local Tongan participants, more than half represented various sections of the local food industry, including restaurants, hotels, bakeries, cold stores, and institutional catering establishments. The following participants for

overseas territories within the region attended:—

Mr Tipi Seuga *Chief Health Inspector, Western Samoa*

Mr Holotama Ueka *Health Inspector, Niue*

Mr Ernest Nicholls *Health Inspector, Cook Islands*

Mr Tupa Tupa *Health Inspector, Cook Islands*

Mr Walker Clet *Food Inspector, French Polynesia.*

Local lecturers included Dr Tili Puloka, Senior Medical Officer; Mr S. Wolfgramm, Senior Health Inspector; and Mr M. Ramos, Engineer Manager, Tonga Water Board.

Visits to local food establishments were arranged during two full half days and the following premises were visited: restaurant kitchens and bakeries; the market; an aerated water factory; the abattoir; Beulah dairy; a desiccated coconut factory; institutional kitchens at Tupou College, Beulah College, and Liahona High School.

Most participants rated the course excellent and of use to them in their daily work. Many suggested that such courses should be held at regular intervals, and that the course could be improved by more practical field visits and demonstrations.

#### **Solomon Islands Course**

The course was formally opened by the Permanent Secretary, Ministry of Health and

Welfare, Dr Peter Beck, in the absence from Honiara of the Minister, the Hon. Daniel Ho'Ota. Later in the week, the Minister visited the course to address the participants and welcome the overseas delegates.

Local Solomons participants numbered 20, all of them public health personnel — health inspectors, health education officers and students — as Government considered priority should be given to the training of such personnel; the course was geared accordingly. In addition a small number of representatives from the food industry attended some lectures. The following participants from overseas territories within the region attended:—

Mr Neeri Tiaeki *Health Inspector, Gilbert Islands*

Mr Kakaiwa Kirimaui *Health Educator, Gilbert Islands*

Mr Ephraim Kalsakau *Health Inspector, New Hebrides*

Mr Thomas Borja *Trust Territory of the Pacific Islands*

Local lecturers included Mr Rex Hamilton, Chief Health Inspector, and Mr L. Hart and Mr J. Hazbun, WHO Sanitarians.

Most participants rated the course very good and of use to them in their daily work. The general opinion was that such courses should be held more frequently, and preferably in towns with more advanced food manufacturing and catering facilities. □

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## **BOOK REVIEW**

*Education for Rural Development : The Tutu Experiment and Its Relevance in the Pacific*, by a Review Team invited by the Marist Province of Oceania Institute of Pacific Studies, University of the South Pacific, Suva, 1977, 81 pp.

*Rural Youth : A Description of the Development of the Rural Work Programme of the YMCA of Fiji*, by Dennis J. Oliver, YMCA of Fiji; Suva, 1976, 110 pp.

The first of these short books tells the story of the Marist Training Centre at Tutu in Fiji. Since 1969, Tutu has provided training oriented to rural Pacific life for Marist brothers, formal technical training in agriculture for lay students, shorter courses in practical village activities for school leavers, and a special course for married couples to learn useful skills as well as developing their social awareness. Courses are held in the Centre but participants regularly return home to retain their village ties.

In the second half of the book, the writers use the experience of Tutu to consider improved forms of training. They suggest a whole network of small centres through the Pacific. Yet they have not assessed how effective returning Tutu students have been in passing on new skills and attitudes

in their home villages. And occasionally their ideas reflect the very ethnocentrism that they criticize. Appropriately, this book was produced cheaply. But its poor layout and spelling mistakes make it difficult reading. Despite these faults it is a standard for anyone concerned about Pacific development.

The second book is also about Fijian development: the YMCA Rural Work Programme. The YMCA approach is very different from the Tutu experiment. It uses an existing network of clubs to help people, especially young Fijian men, to work out their own plans in their villages. A small number of dedicated rural workers are the key — 18 working in 100 villages by 1976, encouraging loan schemes, mobile schools, village libraries, gardening projects, and new village organization. The project has operated, more or less successfully, on a shoestring budget since 1972; it is more decentralized, and probably more truly indigenous than the Tutu one.

The book is well designed — simply written, clearly illustrated, and attractive to read. If it has a fault it may be that its tone is a little too optimistic: not surprising for it was written by one of the project initiators. Rural development is a very complex process. The YMCA story provides plenty of inspiration, but not all of the answers.

**Alan Bollard**

# *The good ship M.V. Maui is launched*

By GRAEME COATES, SPC Language Teaching Specialist (English)

*(A series of five radio broadcast-tapes for children in their fourth year of English)*

In a co-operative effort using the collective skills of the SPC Broadcasting Officer (Hima Douglas), the SPC Audio-Visual Aids Officer (John Sharp) and the SPC English Language Teaching Specialist (Graeme Coates), a series of broadcast tapes is being prepared in Suva for the fourth year of the Primary School.

After several informal discussions, the group decided to attempt a series of five broadcast episodes about a Pacific Island family which owns a trading vessel that plies between the islands of a mythical island group. The good ship *M.V. Maui* makes a series of voyages, each of which involves the family in some kind of adventure. These voyages take place, of course, during the children's school holidays.

The family consists of the father, *Pita* Manu, an experienced sea-captain; his wife, *Ana*, who was formerly a nurse; *Rima* their eldest son, (14 years) who is of considerable help to his father; *Fisi*, their daughter (11 years). *Sione* (9) is given as prominent a role as possible, for the children are meant to relate themselves to his adventures; some episodes will give greater prominence to *Fisi*. The structural level of English is placed just after that of Oral English Book 9, but there will be considerable extension of vocabulary to include such sea-going terms as *voyage*, *deck*, *cabin*, *hatch*, *motor* etc.

The first five programmes are intended as trial material to be sent out to the countries in the SPC region. As this account is being written, four out of the five scripts are underway with the first entitled "The Manu Family" and the second "The Storm." The titles for the next two have not yet been settled.

The overall plan is to provide a three-day sequence of activities incorporating discussion, listening, comprehension and written exercises. John Sharp is producing a coloured illustrative poster for each episode. On the first day of the sequence the teacher will display the relevant poster to the children, and try to draw out discussion of the situation, or objects, depicted in the illustration. During this discussion, and after-

wards, the new vocabulary used in the episode will be introduced and any important grammatical structures revised.

On the second day the children will listen to the broadcast, after which there will be a brief session of comprehension questions. The main intention will be to find out if the children have followed the sequence of events which occurred in the story.

A short series of written exercises will be presented to the children in a workbook on the third day of the sequence. It is intended that the workbook will be illustrated in an attractive manner.

John Sharp has silk-screened posters in four colours depicting the family, the ship and the mythical island group. The second, third and fourth illustrations have already been drawn and are in the course of production.

Episodes one and two have already been recorded by Hima Douglas and John Usman with their accompanying sound effects, including outboard motors, winches dropping the anchors, two-way radios, the whistling of the wind in the storm, the throb of the motors and the surging of the sea. The series has a signature tune and music is used to promote the proper atmosphere. The draft script for episode three has been prepared and the fourth is being written. It is hoped that the draft script for the final episode will be completed by the time this outline appears in print.

The principal cast members are Hima Douglas (Captain Pita Manu) Talei Williams (*Ana*), Richard Naidu (*Rima*), Olga Williams (*Fisi*) and Martin Williams (*Sione*), but a number of other voices appear in the broadcasts. The accent in the series is on producing a good story line, so that the children will enjoy the series. The simplicity of the dialogue should ensure that it is understood.

The intention is that these trial materials be distributed to the various Island countries in a block consisting of five recorded cassettes accom-

panied by five illustrative posters, and about forty workbooks. Circumstances and time may make it necessary to distribute only three episodes initially but the producers will continue to aim at five. If the trial series is a success the materials will be reproduced in greater numbers through the SPC Publications Bureau in Sydney and further series will be evolved. It is estimated that three series of five episodes would be sufficient for Class 4 while at a later date a series would be envisaged for use in Class 6. At the moment the Riverside ("Tom Sawyer") series is still being used in a number of Island countries at Class 5 level. □

## product/service INFORMATION

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### Australian Sugar Industry Watching New Boiling Process

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The Australian Sugar Industry is keenly watching the new continuous sugar vacuum pan installed at Mossman Sugar Mill, Qld., by Evans Deakin Industries.

This equipment, the first of its kind in Australia, grows sugar crystals from molasses giving a product known as "C" massecuite which flows at a steady rate from the pan. The continuous production rate is a significant improvement over the conventional method of 'batching' which requires large vessels to accommodate the crystal growth, and receivers to average the cyclic production rate.

The process is the result of five years of intensive research and pilot plant testing by Evans Deakin Industries in association with the Sugar Research Institute.

The unit is fed with metered seed material (small sugar crystals and molasses mixture) which is concentrated by boiling under vacuum so that the crystals grow as they move through 6 to 10 cells within the vessel. As the crystals grow, feed molasses is added progressively along the cells. Product massecuite streams from the vessel and is pumped at a steady rate to the continuous crystallizers where final exhaustion occurs before fagalling in the continuous centrifuges.

Research is continuing into the process for continuous production of the seed material, and a crystallizer designed for this purpose was successfully tested at North Eton Sugar Mill during 1976.

As the process is steady state, control of the system is straightforward and fully automatic operation can easily be provided. Initial starting up procedure at the commencement of the season is achieved by cutting a footing into the continuous pan, growing and concentrating as for a batch operation until the desired steady state condition is reached in each cell, and then commencing continuous operation.

Shut-downs over the weekend call only for a slight lightening out of the massecuite in the final cells. The vessel is then left full over the weekend. Monday morning startups entail boiling for a short period to re-establish the steady state conditions, and then commencing continuous operation. Experience has shown that the unit may operate without boiling out for at least two months, and under ideal factory conditions this period should be easily extended.

Evans Deakin Industries are now able to computer simulate, optimize and design a continuous pan system which is already in use in Australia boiling the heavy massecuites the industry is accustomed to.

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### Pig and Poultry Stockfeed Supplier

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Red Comb Stock Feeds (Brisbane) was founded in 1921 and is now the largest Co-operative Feed Mill in Australia. While it is recognised that Pacific farmers are unlikely to be members of an Australian Co-operative the rebate passed on to poultry and pig producers in Australia is reflected in the decreased prices quoted in Pacific markets.

Red Comb's new mill erected just outside Brisbane in 1973 is one of the most modern in Australia; combined with the firm's other two mills, it makes Red Comb a major producer of animal feed for North Australia's tropical and sub-tropical climates. The standard of nutrition achieved is reflected in the rapid expansion of overseas users since this market was first entered four years ago.

The business has its own shipping department ensuring prompt attention and the elimination of the cost of a shipping agent. In addition, freight rates for tonnage can be negotiated using any port in Australia. The culmination of these services is a reduced price to the Pacific user and a guarantee of product quality and service.

# Pacific Reading

Material in this section is contributed by the South Pacific Commission Publications Bureau. Please direct any enquiries to Box 306, Haymarket, NSW, 2000.

## BOOK REVIEWS

*Prophets of Melanesia*, Garry Trompf (ed.).

Institute of PNG Studies, Port Moresby, 1977.

A candidate in Papua New Guinea's recent elections alleged that a rival was using cargoism to gain electoral support. It is but one of many indications that cargo cults continue to flourish even though most foreigners, including some reputable anthropologists, have expected that the spread of Western education and growing familiarity with modern technology would cause the cults to disappear.

Cargo cults are, of course, not new in Melanesia. Among the earliest were the Tuka Movement (1880's) and Taro Cult (1914) of Fiji and the Mansren Myth in Irian Jaya (which commenced in 1867 and still continues). More recently, John Frum on Tanna, Masinga Rule on Malaita and Hahalis Welfare Society on Buka have made headlines. *Bibliography of Cargo Cults and other Nativistic Movements in the South Pacific*, published in 1957, lists more than 150 books and articles, and there must surely be five times that number or more by now.

Until recently, however, the written accounts have all come from Europeans. Science knows no boundaries or race, and the work of anthropologists like Guiart, Worsley, Burrige and Lawrence is not invalidated because they were born outside Melanesia. Even so, the essays by Willington Jojoga, Matthew Tamoane and Esau Tuza in *Prophets of Melanesia* show that we must look to Melanesians for culturally-based insights if we seek to come as close as possible to the truth. As this review has to be brief, a quote from Jojoga's essay must suffice to illustrate this point. Writing about Jenny Genakuiya Opeiya, his father's mother, who prophesied and exhibited supernatural powers among the Buna people, Jojoga observes:

So-called cargo cultism ... arose ... because native peoples were suppressed by the political and economic superiority of the white man. To obtain freedom and recognition, symbolized in the white man's way of life, their hopes were enlivened and sustained by expectations of a supernatural redemption, as well as by the Christian hope of judgement upon the oppressor and ultimate victory for the oppressed (p. 215).

And:

Christianity has changed the outlook and thought of many Papua New Guinean societies, but its effect has not been uniform. With some it has become well absorbed because Christian beliefs

were in harmony with pre-existing views, or with expectations of a great and prosperous Age or of returning culture heroes. For others the Christian religion has had no significance ... In most Melanesian societies, though, relatively few people have mastered the principles of Christian theology, and so we should not be surprised if we came across some unusual expressions of religion — people claiming to be possessed by the spirits of Christianity, for example, or prophesying as Christians without a deep theological understanding (p. 216).

The views of some early white observers, for example F.E. Williams, who regarded cargo cults as a mental aberration, do no longer have support, but there must be others who, like myself, have tended to take an econo-deterministic approach to the subject. Jojoga, writing lucidly and with commendable detachment, helps us to better understand the ways and aspirations of the Buna people and other Melanesians. The other five essays in this book, too, deserve a wide readership, and the Institute of Papua New Guinea Studies has done well to publish *Prophets of Melanesia*.

Harry Jackman

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*Liklik Buk : A Rural Development Handbook Catalogue For Papua New Guinea*, edited by P.R. Hale and B.D. Williams. The Melanesian Council of Churches; Second Revised English edition, 1977, 271 pp., available from Wantok Publications, P.O. Box 1982, Boroko.

The *Liklik Buk* is remarkable. It all started in 1975 when a hundred church-based rural development workers met in Lae, Papua New Guinea. They discovered that they had all had trouble obtaining the practical information they needed for their grass roots work. A publication committee was formed, and in 1976 the first *Liklik Buk* emerged. Now, here is the second expanded version. It is a reference book: a collection of brief, illustrated, practical articles on every imaginable aspect of village life. Interested in growing winged beans, making home-made insect repellent, piercing a buffalo's nose, surveying a road, making frangipani perfume, or incorporating a business group? It's all here, written in an easy, homely style. Almost all the methods described have been tried and tested by contributors scattered throughout Papua New Guinea.

The *Buk* brings together a wealth of indigenous and new knowledge. But the editors have not yet finished: the next *Buk* will contain more items, and a pidgin version is in progress. Sensibly, it is cheap and printed on newsprint.

I found this catalogue fascinating. But the vital question is, does it help the "leaders, rural school teachers, *didimen*, business development officers, priests, ...", the people with no library, no telegraph, and irregular mail, in their daily work? I have not used it in the field, but I imagine most of its articles would be too thin to use on their own. Perhaps it is more useful as a source of ideas. And are these ideas really applicable to Papua New Guinea? The front-piece contains the very necessary warning: "Supply of this technology except on consideration of social and cultural factors is inappropriate." Let's hope the *Liklik Buk* does not degenerate into just another coffee table ethnic curiosity for Westerners.

Alan Bollard

***Marists and Melanesians*, by Hugh Laracy, ANU Press, Canberra, 1976. \$A12.95.**

The Societe de Marie, the Marists, became an independent religious order of the Catholic Church in 1836. Nine years later, some of its members commenced the Society's work in the Solomon Islands. Within a fortnight, on 16 December 1845, Bishop Epalle was mortally axed on Ysabel. Dr Hugh Laracy, author of *Marists and Melanesians*, a history of Catholic missions in the Solomon Islands, suggests that the underlying cause of Epalle's death was local rivalries rather than previous contact with whites. Certainly, the early spread of Marist activities depended very much upon securing alliances with groups whose main motive in supporting the missionaries was to gain support, moral if not material, in inter-tribal feuding.

In 1847, the Marists attempted to establish themselves on Murua (Woodlark Island) in what is now Papua New Guinea, but they had to give up eight years later, some having been killed by islanders, others by malaria. An attempt to make a station on Umboi, an island between New Britain and New Guinea, in 1848 lasted only a few months. By that time, the Society was making progress in New Zealand and Polynesia.

The Marists returned to the Solomons in 1898 and have been there ever since. The author believes that the early failures were due to the missionaries' preoccupation with their own spiritual life and their inability or unwillingness to 'accommodate themselves to the habits or thoughts of those whose souls they sought'. As the years went by, the missionaries got to know more about the islanders, by learning vernaculars, observing customs and mores, and offering them material benefits.

It took a long time for more than simple evangelism to come from the Marists. During the 1930s, an indigenous sisterhood was founded to give menial support to the European sisters, and by 1949 teaching brothers from Australia had got as far as preparing four Bougainvilleans for seminary training.

Although the missionaries' objective was a Church run by Melanesians, it seems that, until 1942, they measured their work by the number of converts 'ensconced in Christian marriage beyond the reach of Protestantism'. The islanders' religious development was minimal and they only received medical care and secular education where the Marists needed to fob off competition from Anglicans, Methodists, South Sea Evangelicals or Seventh-Day Adventists. Not that the missionaries of other faiths did much better. It took the massive socio-economic changes resulting from the Pacific War to make the ethno-centric purveyors of several 'brands' of Christianity and the equally ethno-centric administrators to mend their ways.

Then, too, the islanders began to bring about political change which affected missionary activities. Cargo cults on Buka, a tax 'strike' on New Georgia, and, above all, the Marching Rule movement throughout much of the then British Solomon Islands Protectorate, a movement which one foreign observer saw as a political party, caused the Marists to make serious efforts to help the islanders develop an indigenous

church. In education and rural business development, the missionaries have made a valuable contribution since the 1950s. Moreover, their training of seminarians has had a special impact, a kind of unintended by-product, in that quite a number of Melanesian priests and other seminary-trained islanders have played and continue to play leading roles in politics. In some instances, especially in the Northern Solomons province of Papua New Guinea, almost every political leader has attended Chanel College on New Britain or some other seminary.

Through well-considered use of documents in Marist archives in several countries, unpublished theses, for example, Dr Hilliard's on the Protestant missions in the Solomon Islands 1849-1942 (1966) and Dr Rimoldi's on the Hahalis Welfare Society (1971), official reports, including Judge Phillip's report of his inquiry into mission policies and activities in the Kieta district (1929) and, I guess, just about every relevant book and article, Dr Laracy has given us a valuable account of the white missionaries' part in the spread of Catholicism among Solomon Islanders. (I looked for and found less-known items' such as J.H.C. Dickinson, *A Trader in the Savage Solomons* (1927) and *Jaunes, Noirs et Blancs* by P. O'Reilly and J.M. Sedes (1949).

The next move is up to Solomon Islanders: to write about how their people saw and reacted to the white missionaries' activities among them.

Harry Jackman

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***Birds of New Guinea and Tropical Australia*, by William S. Peckover and L.W.C. Filewood. Published by A.H. & A.W. Reed, 160 pp. 117 coloured photographs also distribution maps. Price \$14.95.**

This small book is an excellent introduction to New Guinea birds and with the appendix listing all the New Guinea species, a very good idea can be obtained of the bird fauna.

The text is pleasant and easy to read with many first hand observations and notes from other bird observers. The coloured photographs are very good; in most cases the birds have been trapped, placed in a mobile studio for photography and then released. By using this method the correct colours of the soft parts are clearly illustrated. These soft part colours, iris, bill, legs, and bare skin, which can be a help in aging the bird, quickly change after death.

The feather detail also can give some indication of age and in some photos the birds can be seen to be obtaining fresh feathers. On page 47 the Brush cuckoo adult is actually still in immature plumage and the immature is still in juvenile plumage. On page 81 the Willie Wagtail is an immature, still with buff tipped juvenile wing coverts and the flight and tail feathers are also still juvenile. This book is recommended.

H.J. de S. Disney  
Australian Museum

## HOW TO WRITE IN MICRONESIAN

(Continued from page 22)

E.B. White, would the children understand why the children and animals in the story were jubilant when grass and flowers grew in the spring? In Palau, flowers bloom all the year, so what's so special about flowers? For some of Grimm's fairy tales, would it be better to use the words **chief** and **chief's wife** instead of **king** and **queen** so as to place the stories within an island cultural framework? And would the children know what a tiger was? In all of these cases the foreign touches were retained since the writers felt that these were necessary to the story and would not affect the children's appreciation for their own culture. What was most important for their own culture was the medium of the vernacular language.

When the Micronesian educators went back to their island school districts at the end of a year, each person took with him 35 bound copies of his own work. There were 5½ inch x 8 inch booklets, containing the vernacular writing, to be read by island children. Each participant had created a cover design, designed a cover, and silk-screened each of the 35 covers. Staff members had reproduced the typed copy for the body of the booklet on duplicating machines, printing the words on heavy, quality paper.

Preliminary reaction had been enthusiastic. When the translator of *Charlotte's Web* sent back to her home district a tape recording of several chapters in order to get children's reactions, it took a long time getting past the offices of education in Palau district. Everyone in the office was listening and laughing.

Another writer — writing in Pingalapese, a sister of Ponapean — had produced the first-ever written story in his language. (A dictionary and spelling system are only just now being written). When he read it out to other speakers of his language who lived in Honolulu, they were amazed, he said, and very excited.

Several kinds of materials had been written. A principal of a school in Truk had written in story form a set of lessons about the waves and the stars — the traditional source of navigation information for island Micronesian people. A teacher from the Marshalls recounted in story form an experience of being lost at sea after disregarding the wise counsel of an old man of the town. Other projects were sets of lessons written for immediate use in the school such as grammar lessons in the native language.

Those first participants in BEPM at the University of Hawaii went home a little more than a year ago with the sets of books they had

The words of my song

They come to me.

The words of my thoughts.

They come to me from Nareau.

The end of my song is sweet.

It is sweet.

It is sweet, it is sweet.

*Taekan au anene.*

*a roko nakoii.*

*taeka mainanou*

*a roko naitoiu mairoun Naareau.*

*Tokin au anene e karewerewe*

*E boni karewerewe.*

*e karewerewe. e karewerewe.*

From *Te karaki Ni I-Tungaru*

by Terab'ata Groves and Roderick Jacobs

produced in the vernacular language. The books will be reprinted in larger batches by their district offices of education as teaching communities feel the need for them. The books also serve as examples of what others in the larger community outside the school can do. In this way the books may be the first steps toward a fuller written tradition in the vernacular languages.

The educators who produced these books not only have the books themselves. They also have the experience of learning how to write their language with richness and interest, how to work with others to stimulate thinking, and how to work out problems in writing with the help of others. Since returning home some have been hired to work with other teachers in their area. Some continue to write materials in the vernacular language. All have been working to make education in their districts genuinely bilingual. As this happens, and children are stimulated to write, then we can hope that this new freedom to write their thoughts in their own language will bring with it a flowering of the verbal creativity that we have observed in so many Micronesians. □

## CROCODILE FARMING IN PAPUA NEW GUINEA

(Continued from page 27)

where they were common a few decades ago. Consequently, crocodiles are now included on the list of endangered animals, the importation of which is banned by many countries under international convention.

Papua New Guinea could well become exceptional in being able to demonstrate that she can produce crocodile skins in commercial quantities without depleting wild stocks and threatening the continued existence of the species. She is in a favourable position indeed but the government is well aware of the fact and is committed, with UN help, to the task of developing a lucrative industry while conserving the more fundamentally valuable wildlife resource. []

# RECENT STAMP ISSUES

## PITCAIRN ISLANDS

A set of 11 new definitives for Pitcairn Island were scheduled for release on September 12. A ship was headed for the island when we had news of the release and if weather conditions were right the consignment of stamps could be landed to comply with the scheduled issue date.

The complete series was designed by English artist Miss Jennifer Toombs, and printed in multi-colour by Walsall Security Printers Ltd. There are 25 stamps per sheet with the usual CA watermark. Details of the values and designs are:—

- 1c — The Island's Bell
- 2c — Building a Long Boat
- 5c — Landing Cargo
- 6c — Cleaning Wahoo
- 10c — Cultivation Pitcairn
- 20c — Grating Coconut & Bananas
- 35c — The Island Church
- 50c — Fetching Miro Logs
- \$1 — H.R.H. Prince Philip
- \$2 — H.M. Queen Elizabeth II.

First day covers will be prepared by the Pitcairn Islands Post Office, probably two covers will be required for one complete set of the definitives.

## WESTERN SAMOA

The centenary of Western Samoa's stamps was honoured on August 29 with a commemorative issue of four stamps. Designed by John Cooter, they were printed by Questa Colour Security Printers in England in multicolour lithography. Each one reproduces the well known *Samoa Express* stamp. The values and additional design details are:

- 12 sene — First Mail Notice
- 13 sene — An early cover
- 26 sene — Chief Post Office, Apia
- 50 sene — *Energy* with First Mail

The first mail notice announcing this postal service was placed in the *Samoa Times* on 13 October, 1877, and a reproduction of it appears on the 12 sene value. Letters and parcels bearing the *Samoa Express* stamp could be conveyed only to New Zealand, Australia, and some ports on the west coast of the United States. Items with other destinations required additional postage applied by one of these two countries. An early cover depicting this feature appears on the 13 sene value. This cover has been reproduced with the permission of Mr Jack R. Hughes.

The 26 sene shows the Post Office as it appears today. The building, constructed in 1932, houses plant and equipment for postal, telephone, and banking services for Western Samoa. The *Energy* shown on the 50 sene, a 72-ton, fore-and-aft



schooner, registered in New Zealand, was the first ship to carry Samoa's mail. Souvenir first day covers of the stamps with a distinctive postmark are available from the Philatelic Bureau, G.P.O., Apia, Western Samoa.

## FIJI

Fiji honoured the twenty-first anniversary of its annual Hibiscus Festival with a set of four stamps on August 17.

The values are 4c, 15c, 30c and 35c. All show the *Hibiscus rosa-sinensis* in various multicolour settings. The stamps, printed with lithography by Walsall Security Printers, were designed in England by the V. Whiteley Studios. Souvenir first day covers of the stamps with a distinctive postmark are available from the Philatelic Bureau, Fiji Post Office, Box 40, Suva, Fiji. The Philatelic Bureau welcomes the enrolment of collectors in their deposit account. This entitles them to supplies of mint, used and first day covers for all new issues. An opening deposit of US \$20 is required.



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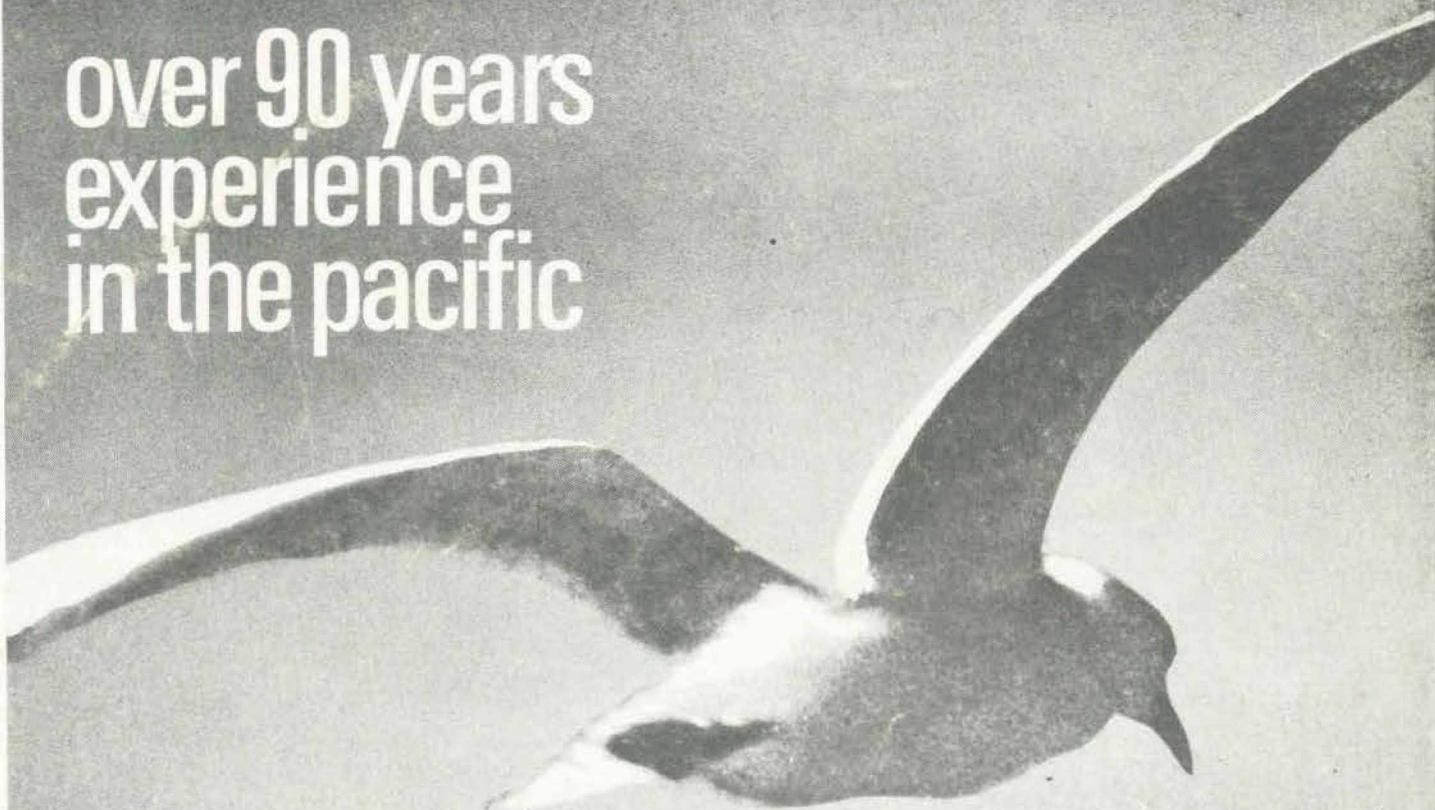
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