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Note on the Effect of Explosives on Fish in Siamese Coastal Waters

BY

Boon Indrambarya B.Sc.
Department of Fisheries, Thailand.

After the war, the use of explosives in sea-fishing is common in Siamese coastal waters. To suppress it is a hide-and-seek job. The practical way which will be to arrest at the landing place any fishing boat which has on board fish that are suspected to be captured from the use of the explosives. A question arises. How are the signs of damage to fish? The Royal Siamese Navy then decided to carry out a series of operations on the use of explosives. The work was undertaken jointly by the Navy and the Department of Fisheries from 8th. to 11th. October 1948, off Sattahib Naval Base on the East coast of the Gulf of Thailand.

This note is a summary of observations made and reported in Siamese by Sawang Charoenpol and Sanan Ruamraks of the Department of Fisheries.

The explosives were prepared by the Navy. The explosive powder used was "plastic C.2." On the 8th. 9th. and 10th October 5 explosives were used. Each was thrown to a point at a distance of about 4 metres away from the working sampan which was paddled out as quick as possible to a position about 14 metres from the blast centre. The fuse was adjusted so that the explosive was

to explode at the sea bottom. After the explosion, the depth of water was measured at the blast centre, and all killed fish that floated were collected and examined. The time of collecting lasted about one to one and a half hours. The result of the operations is given in Table I.

The external signs of damage varied. Some fish had fins torn, scales detached, eyes broken, belly or body bruised, blood effused, or part of viscera protruding out of the vent. One or more of these signs occurred to the fish that were collected about 3 metres from the blast centre.

The internal examinations revealed that, in the killed fish collected about 3 metres from the blast centre, the contents of the body cavity were all crushed and mixed with blood. Ribs were broken. In some killed fish collected farther away the blood vessels were ruptured and the air bladders bursted, and in some specimens the air bladders did not show sign of damage but the blood effused from the vertebral region.

Near the third blast centre, the water was transparent and was 5.5 metres in depth. A white sheet of fish forms on the bottom was observed from the deck of the motor-boat. Swang Charoenpol dived down to check up. He found the killed fish were *Sphyræna*, of about 30 to 35 centimetres in length, lying ventral side up. As the sea-bed was of sharp corals and abound with spiny sea urchin (*Diadema?*), it was inconvenient to collect the fish specimens. He brought up two of them weighing 450 grams and 500 grams. They were bruised and had a number of scales detached, and the contents of the body cavities were crushed and thickly covered with blood. Swang also chanced to see some

stunned *Sphyræna* floating under the surface of the water. Upon touching them, the fish swam a short distance and stopped.

In the fifth explosion, the explosive was aimed at a school of small pla-tu (*Rastrelliger*). On observing from the working sampan near the blast centre after the explosion, some of them were found lying dead on the bottom, and some floating under the surface of the water. On touching some of the latters, they swam a short distance and stopped. It took 3 or 4 short chases to get one of them. Seven were caught. All were of 7 centimetres in length. Upon dissection, they showed ruptured blood vessels.

AN EXPERIMENT ON FISH

As a further test of the effect of the explosive, an experiment was carried out on the 11th. October. Five fishes which were obtained from a trap were used. They were three *Platax*, weighing 720 grams, 740 grams and 1,450 grams, one *Epinephelus* weighing 1,300 grams, and one *Teuthis* weighing 300 grams. Each of them was tied through the mouth and the gill cleft, and fastened to the suspending line from a wooden float at the point where the distal end of the suspending line was fastened to a piece of heavy stone on the bottom. The wooden floats with the fishes on their suspending lines were arranged in such a way that two rows were set up. One, set in the direction of the current, had the 720-gram *Platax*, the 1,300-gram *Epinephelus* and the 1,450-gram *Platax* at a distance of 5 metres 10 metres and 15 metres respectively from the blast centre. The other row, set across the direction of the current had the 300-gram *Teuthis* and the 740-gram *Platax* at a distance of 5 metres and 10 metres respectively from the blast centre. The depth of water was 3 metres. The weight of explosive powder was 600 grams. The result of observations is given in Table II.

TABLE I.
Grams of Fish Killed by Explosives, off
Sattahib Naval Base.

Locality and date	100 metres from Lam Pu Chao Oct. 8, 1948	20 metres from Ki Seu Rock Oct. 8, 1948	250 metres from Koh Kram Noi Oct. 9, 1948	10 metres from Koh Tau Mor Oct. 10, 1948	250 metres from shore Sattahib Bay Oct. 10, 1948	Total
Depth of water in metres.....	7	4	5.5	6	6	-
Weight of explo- sive powder in grams.....	600	600	600	600	900	3,300
Grams of fish:-						
Caesio	200	14,030	1,500	3,500	-	19,230
Myripristis.....	110	1,700	-	-	-	1,810
Caranx.....	3,460	28,600	-	-	-	32,060
Calliodon.....	-	1,840	2,000	3,900	-	7,740
Pempheris	-	200	-	-	-	200
Dussumieria...	-	400	-	-	-	400
Scolopsis.....	-	1,600	2,000	800	-	4,400
Lutianus	-	2,510	-	2,700	500	5,710
Abudefduf.....	-	1,030	-	800	-	1,830
Epinephelus...	-	3,690	600	600	-	4,890
Heniochus.....	-	400	-	1,500	-	1,900
Tylosurus.....	-	200	-	-	-	200
Taeniura.....	-	700	-	-	-	700
Sphyraena.....	-	-	15,000	-	-	15,000
Platax.....	-	-	-	1,800	-	1,800
Rastrelliger....	-	-	-	-	1,500	1,500
Leiognathus....	-	-	-	-	20	20
Total	3,770	56,900	21,100	15,600	2,020	99,390

TABLE II.

Effect of 600 Gram Explosive on Fish, Sattahib Bay.

October 11, 1948.

Fish	Manner set up	Distance from blast centre in metres.	Observations
Platax, 720 grams	in the direction of the current	5	Instantly killed. Belly bruised externally. Only air bladder bursted, and ribs broken.
Epinephelus, 1300 grams	-do-	10	Died soon. No external damage. Only blood vessels ruptured.
Platax, 1,450 grams	-do-	15	Died soon, No external damage. Only blood effused from vertebral region.
Tenthis, 300 grams	acrose the direction of the current	5	Instantly killed. No external damage. Air bladder bursted, reproductive organs crushed, blood vessels ruptured, and viscera not in proper position.
Platax, 740 grams	-do-	10	Died soon. No External damage. Only blood vessels ruptured.

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California Fish and Game, Vol. 33, No. 1, pp. 23-30.
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in California coastal waters.
California Fish and Game, Vol. 34, No. 2, pp. 53-70.
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Fig. 1. Oct. 8, 1948 - Motor fish-carrier and sampans used in the experiment.

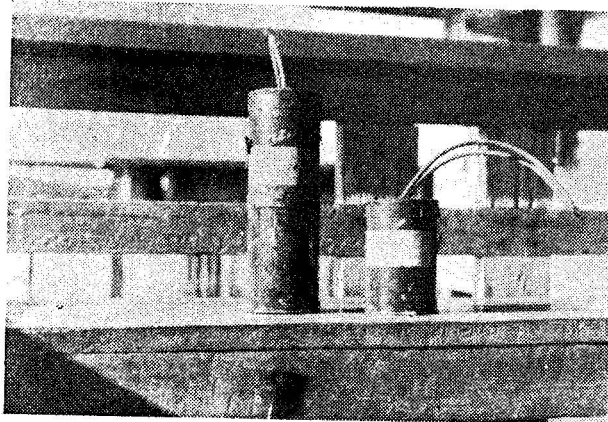


Fig. 2. Oct. 8, 1948. The tall one is 900-gram explosive and the other 600-gram.

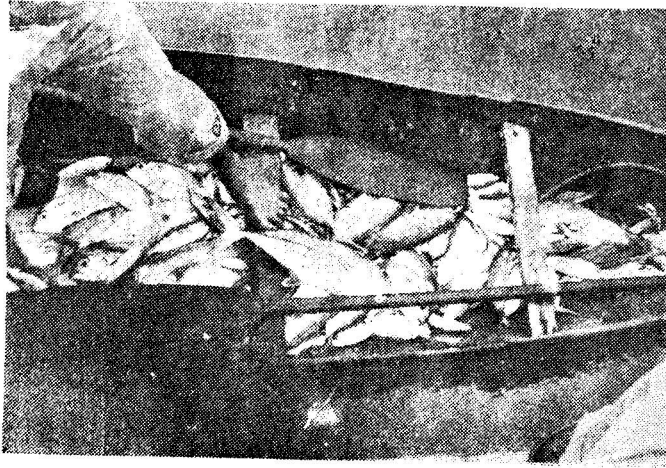


Fig. 3. Oct. 8, 1948. Off Hin Ki Sua
Collection of dead *Caranx*.

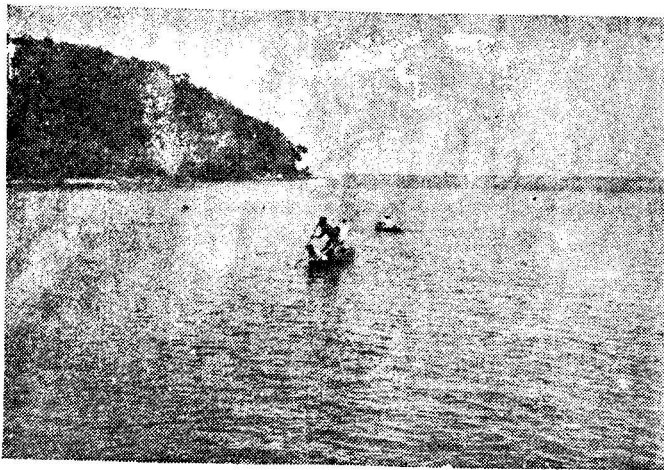


Fig. 4. Oct. 9, 1948 Off Koh Kram Noi
Collecting floating fish after the explosion.

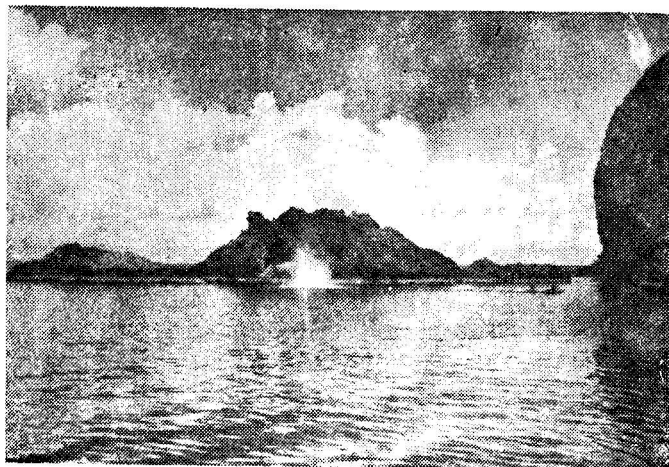


Fig. 5. Oct. 10, 1948. Off Koh Taw Mor.
Explosion of 600 gram-explosive.

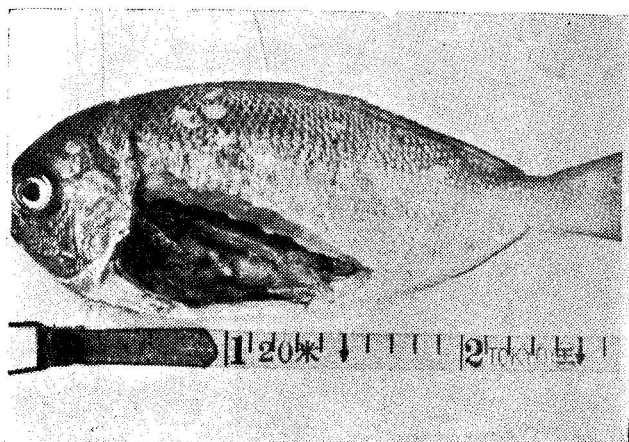


Fig. 6. Oct. 10, 1948 *Caesio* having
blood vessels ruptured.

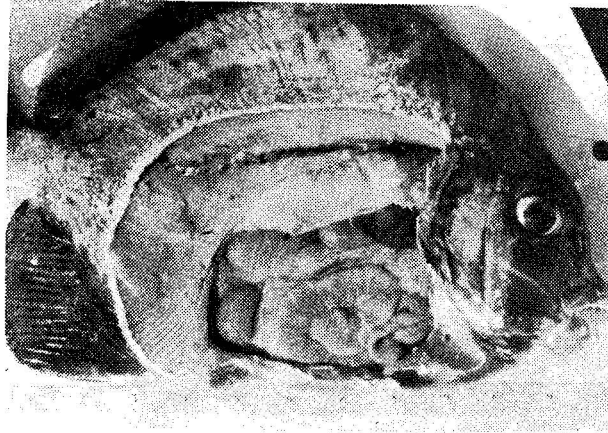


Fig. 7. Oct. 11, 1948 1450 gram *Plataea*,
(Table 2). Blood effused.

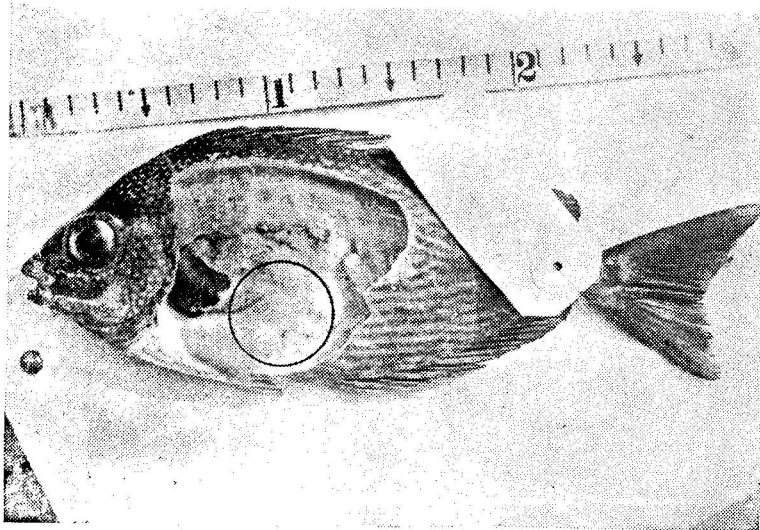


Fig 8. Oct. 11, 1948 (Table 2.)
300-gram *Teuthis* male. Air bladder bursted ; reproductive organs
crushed and blood vessels ruptured

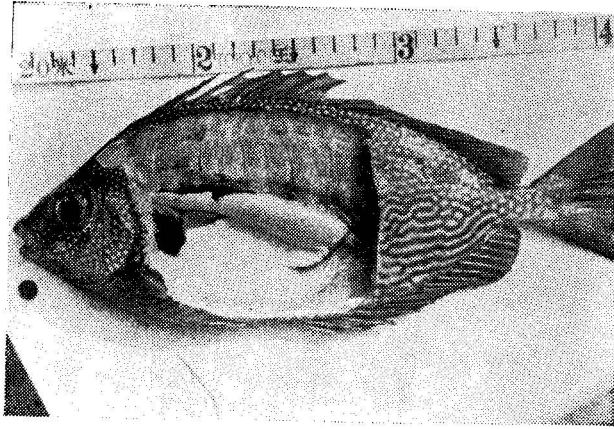


Fig 9. Oct. 11, 1948. Male *Teuthis*,
Showing normal position of internal contents

Note on the Development of OXYELEOTRIS MARMORATUS (Bleeker)

BY

Boon Indrambarya B.Sc.

Department of Fisheries, Thailand

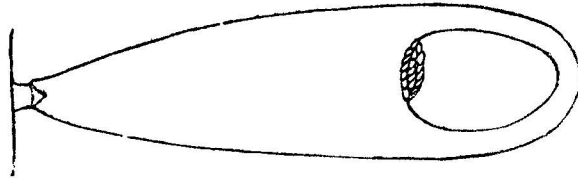
Oxyeleotris Marmoratus (Bleeker), well known as one of the largest gobies of the world, occurs throughout Thailand. The fish has several Thai vernacular names, namely Pla Bu, Pla Bu Sai, Pla Bu Chak, and Pla Bu Lai.

In 1947, at the Bangkhen Pond Cultural Station, six of this fish of 23 cm. in average length were taken from a ditch and put into a 40-gallon aquarium tank. In May 10, 1948, Prida Karnasut and M.L. Pornchai found a circular patch, about 7.6 cm. in diameter, of eggs on one of the cement sides of the aquarium tank. 903 eggs were counted. The gobies were taken out of the tank except the one which fanned the eggs with its breast fins. With the aid of a pipette, Pornchai transferred some eggs into a rectangular glass jar for further close observation. By pressing the rubber bulb at the end of the pipette, the eggs were forced out and attached themselves on one side of the jar. They were transparent and elongated in club shapes. Each was about 2 mm. in length. At the point of the attachment, the outer layer of the egg formed an adhesive stalk, probably consisting of reticulated roots for attachment as reported by Kitahara in the case of the Japanese anadromous goby, *Leucos parion Petersi*.

The drawings were made by M.L. Pornchai. He reported that the fish guarded the egg patch, until the last egg hatched. The hatching period ranged from 24 to 60 hours. The yolk sac was absorbed within 14 days, and the fry reached a length of 7 mm. (Figure 5). Unfortunately Pornchai did not succeed in rearing the fry.

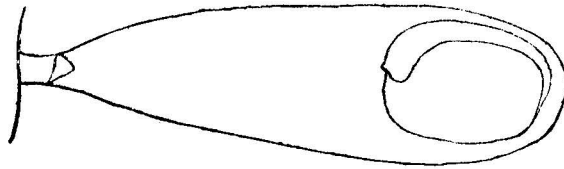
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 - (4) U.S. Nat. Mus. Bull. 188 p. 509.
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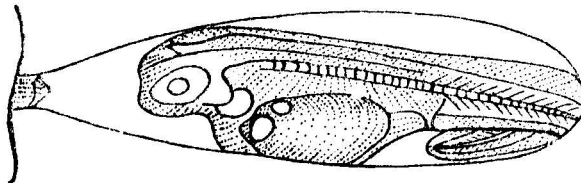
x 30

Fig 1. Egg of *O. marmoratus*



x 30

Fig. 2. Egg of *O. marmoratus*



x 30

Fig. 3. Egg of *O. marmoratus*

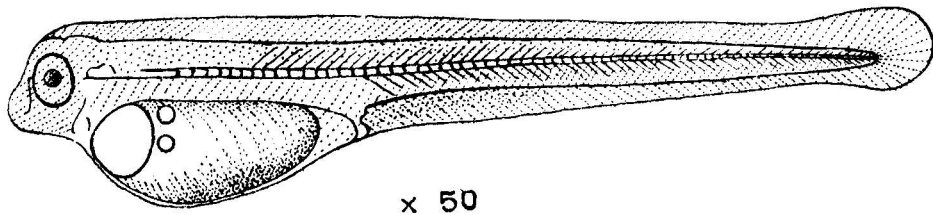


Fig. 4. Newly hatched *O. marmoratus*

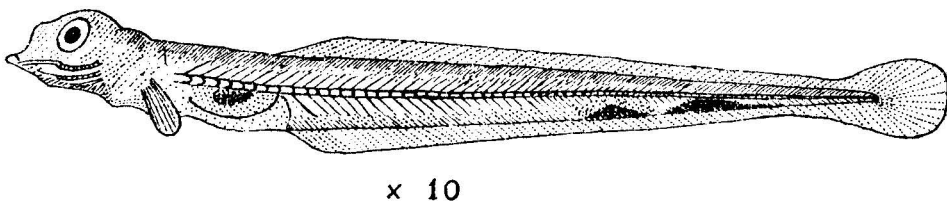


Fig. 5. *O. marmoratus* 14 days old.

The Question of Immunity in Experimental Treatment of Malaria*

Quay Ketusunh M.D., D.T.M. (Lieut. R.N.)

During the year 1941, after the outbreak of the war in East Asia, with the usual supply of quinine cut off, the author took up a clinical study of more than thirty indigenous drugs reputed to be effective in the treatment of malaria. ++The investigation was carried out at the Naval Hospital at Sattahib, under the auspices of the Royal Naval Medical Corps. Owing to lack of time and material, the drugs were only subjected to a brief preliminary toxicologic study, then were directly tried out on patients, all of whom were men of the Royal Navy. During the course of the investigation, the author was struck by the finding that every drug gave a number of "cures". There appeared, however, to be a maximum limit to such result, which could not be surpassed no matter how much the dose was increased. Recalling the work of Sinton in monkeys, and of Manwell and Goldstein in canaries, it was thought that the "cures" might really be the result of "labile infection" (Schilling) or "premunition" (Sergent), and it seemed interesting to find out by actual experi-

* Based upon a paper read to the Scientific Section of the Royal Society, Bangkok, in March 1943.

++ Report submitted to the Ministry of War, unpublished.

mentation to what extent such "partial immunity" could play a part in the "cure" of malaria. The following experiment was therefore taken up.

The scheme of work was as follows:— To every patient identified by blood film as cases of malaria, provided his general condition was not grave, neither specific nor symptomatic medication was to be administered, but something inert was to be given instead, for obvious psychological reasons; the percentage of cases thus "cured" would then furnish the information required. It must be understood that at that time malaria in Sattahib was practically epidemic, very probably the result of the introduction of foreign strains from Cambodia. Practically all of the patients had malaria before. The question of re-infection and relapse could never be settled. We took care, however, not to use patients who had had an attack within 30 days previously. The other points for rejection were: condition so serious as to necessitate immediate antimalarial treatment; attack had begun more than 3 days before admission. These rejections were made in order to avoid danger to life and undue taxing of the patient's strength.

MALARIA

Neither the type nor the severity of the infection was taken into account. On the other hand the criteria for "clinical cure" were strict: Besides the absence of fever (temperature measured at four-hour intervals) the blood film must be negative on three successive occasions, tests being made every other day. Moreover, the experiment was to be interrupted, specific treatment given, and the

case counted as "failure" upon any of the following findings: the fever considerably exceeded 40°C for more than a few hours; the patient was much depressed, toxic, or suffering from severe vomiting or prostration; the fever remained high after the fifth day; fever was absent, but the blood film remained positive during five or six tests. These precautions restricted the percentage of "cures" still further.

The "sham" medication given to the first few cases was a tonic mixture (Nux vomica and Sodium bicarbonate); later starch pills were used.

As all the patients were men on active service, they were completely under control. During the experiment they were kept in a separate ward with special staff. The possibility for the patients to obtain quinine for themselves was practically eliminated. Should any one develop fever again after discharge, he was always sent back to the hospital, so that cases of relapse (or re-infection) could well be followed.

Besides the "sham medication" the patients received the best of attention that could be given. Especial care was taken to keep the bowels open, and a good purge often did more benefit to the patient, and no doubt contributed largely to the outcome of the experiment, than any measure except specific treatment could have done.

The experiment occupied 13 months, from April 1941 to April 1942, during which 220 patients were subjected to the experiment. Of these, 116 were cases of *P. vivax*, and 104 of *P. falciparum*. Fifty-seven per cent of the vivax cases and 37 per cent of the falciparum were discharged "cured", making the average percentage

of the total cases "cured" 47. The average duration of the "treatment" from the day of admission to the day when fever subsided was four days. The "cured" cases were, however, kept for observation for not less than 12 days longer.

Study of the cases divided into monthly groups give an interesting observation. Whereas the percentage of "cured" varied between 50 and 60 in most of the months, it dropped to an abnormally low level in June (32%), and July (34%) and once again in November (40%) and December (47%). Two things may lie at the bottom of this: the changing weather, and the changing population. In June the rain began to pour, and in November the cool season started. During the latter half of May the recruits came in, and in November a number of the reserves were called back into service.

It is also interesting to note that both the splenic enlargement on admission and the reduction in size of the organ during treatment in the experimental group were not significantly different from other patients. About 8 per cent of all the malaria patients at Sattahib had detectably enlarged spleen.

It was practically impossible to differentiate between relapse and reinfection, because of the super-endemic nature of the infection; so that it could not be ascertained whether or not the patients in the experimental group had relapses more quickly or more frequently than those routinely treated. We made a check, however, on all the patients who returned with fever within 15 days after being discharged, and found no significant difference between the experimental cases and others.

We may, therefore, summarize that malarial patients, who have had malaria before, have a chance of nearly 50 per cent to become "clinically cured" all by themselves, without any specific treatment. This percentage is probably influenced by various factors, some obvious, others more obscure. In studying the efficacy of any new antimalarial remedy, therefore, a plausible conclusion could be drawn only when a parallel series of control cases, who, as in this experiment, are given a "sham treatment", is studied at the same time.

TABLE 1
 Patients "cured" without specific treatment.
 (In monthly groups, from April 1941 to April 1942.)

Months	P. vivax			P. falciparum			Both types		
	Cases tested	Cases cured	Per cent cured	Cases tested	Cases cured	Per cent cured	Cases tested	Cases cured	Per cent cured
April 1941	5	3	60	2	1	50	7	4	57
May	14	8	57	14	8	57	28	15	57
June	12	6	50	10	1	10	22	7	32
July	22	9	40	28	8	28	50	17	34
August	5	3	60	5	2	40	10	5	50
September	5	3	60	8	4	50	13	7	54
October	4	4	100	8	3	38	12	7	58
November	6	4	67	6	2	22	35	6	40
December	6	3	50	9	4	44	15	7	47
January 1942	10	6	60	8	3	37	17	9	53
February	7	5	71	1	1	100	9	6	66
March	8	5	63	1	1	100	9	6	66
April	12	7	58	3	2	67	15	9	60
Total	116	66	57	104	38	37	220	104	47

Note: Results for P. falciparum in February and in March 1942 are not included in the final summary, as the number of cases tried was too small.

TABLE 2

Sample Data. Showing Detailed Results for
November 1941.

Total number of patients tested: 15; Number "cured" : 6 (=40%).

Number of *P. vivax* cases: 6; Number "cured": 4 (=67%).

Number of *P. falciparum* cases: 9; Number "cured": 2 (=22%).

A. "CURED" GROUP.

No fever at all after admission: 2 cases. (1 *P.v.*, 1 *P.f.*).

Fever for 1 day after admission: 1 case. (*P.v.*)

Fever for 2 days after admission: 2 cases. (1 *P.v.*, 1 *P.f.*)

Fever for 3 days after admission: 1 case. (*P.v.*).

Blood film negative on 3rd day: 1 case.

on 5th day: 3 cases.

on 7th day: 1 case.

on 9th day: 1 case.

B. "NOT CURED" GROUP.

Relapse after afebrile interval: 2 cases (*P.f.*), on 6th. and 8th.
days respectively.

Fever about 40°C.: 1 case. (*P.f.*).

Fever persisted longer than 5 days: 3 cases. (*P.f.*).

Irregular paroxysms: 1 case. (*P.v.*).

Afebrile but blood film positive: 2 cases. (*P.f.*, *P.v.*).

(*P.f.* = *P.falciparum*, *P.v.* = *P.vax.*)

พิมพ์ที่ โรงพิมพ์ไทยพิทยา ถนนตะนาว พระนคร
นายเจือ หลิมสาโรช เจ้าของและผู้จัดการ.
นายสำเนา ชงไสว ผู้พิมพ์และผู้โฆษณา
พุทธศักราช ๒๔๘๒