

# タイ国地域保健活動向上計画

## 報告書

### Ⅲ

昭和54年10月

国際協力事業団

JAPAN INTERNATIONAL COOPERATION AGENCY

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受入 月日 '84. 4. 21	122
登録No. 03724	98.2
	MCS

## は　じ　め　に

地域保健活動向上計画プロジェクトは、昭和51年1月に、派遣した実施協議チームと、タイ国政府関係者との間で取り交わした討議々事録（R/D）に基づき、タイ国のモデル地区内の保健活動の向上、推進及び中央研究機関とリンクした検査機関の強化を目的とし、昭和51年4月から昭和56年3月までの5年間にわたり協力を行なっている。

本報告書は、タイ地域保健活動向上計画報告書Ⅱに引きつづき、昭和53年4月から昭和54年3月末までのプロジェクト活動状況を取りまとめたものであり、今後のプロジェクト推進上の参考に供する次第である。

末筆ながら、本報告書作成にあたり御協力いただいた関係者各位に対し深甚なる謝意を表すると共に、本プロジェクトの成功を強く期待するものである。

昭和54年10月

国際協力事業団

理事 長谷川 正 男

タイ国地域保健活動向上計画に関しては、既に、下記の報告書が刊行されている。

1. タイ国医療協力基礎調査団報告書

(昭和50年2月, 医74-32(1221))

2. タイ地域保健活動向上計画(調査専門家, 実施調査団, 第1回調整委員会)  
総合報告書

(昭和52年1月, 医76-14(163))

3. タイ地域保健活動向上計画報告書I

(昭和52年8月, 医77-(12)-(175))

4. タイ国地域保健活動向上計画報告書II

(昭和54年2月, 医=JR 79-2)

5.

本報告書は、これらの報告書に続くものである。

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## I タイ国地域保健向上計画概観

熊岡 爽 一 日本チームリーダー

タイ国地域保健促進プロジェクトの概略の報告は、1979年のProgress Report Ⅴに発表されて居り、平易な文体による英文発表であるので、特に和文でくりかえす必要を認めないが、唯、二、三の強調すべき事を簡単にふれておきたいと思う。

本プロジェクトの特徴：地域保健促進は明瞭に公衆衛生の分野のプロジェクトである。少なくとも公衆衛生学を専攻し、低開発国において地域保健促進問題にとり組むに際しては、WHOの推進しているVillage Practitioner を養成して医療サービスの絶対的不足を補うことは第一に着手すべき手段であろう。現にLampang 県におけるタイ国公衆衛生省とU.S.A.との共同プロジェクトにおいてはVillage Practitioner の養成が重要な業務になっている。Village PractitionerはWechakornと呼ばれ、Nurse, Midwife, Sanitarian等を一年間Provincial Hospitalで教育し、医療業務、保健業務に従事せしめ、極端な医師不足をカバーする要員である。Primary Health Careを担当するのがWechakornであり、このようにしてHealth Delivery Systemを辺地に進めるのがWHOの戦略である。

しかし、日本政府の協力している本プロジェクトは決してこのようなオーソドックスな低開発国における保健業務推進のパターンを踏んでいない。先ず我々日本人専門家の相手は医科学局であつて、この部門は医学研究と全国の衛生検査室の技術指導を行なっている。この部門に技術援助を行なうことによつて公衆衛生活動をfield 地区で促進する為の道筋は、先ず衛生試験所の機能を高めるといふことからはじめるといふことであつた。公衆衛生向上の本道を逆方向から進行したと言へるであろう。

このような判断は一部の識者からは疑問を投げかけられている。しかし、我々は進みはじめており、しかも、衛生試験所の機能を高めるといふことは日本人にとって最も得意な所でもあつたのである。

このようなプロジェクトの進め方は決して日本側のみの希望ではなくて、タイ国公衆衛生省のUnder-secretary of StateであるDr.Prakorb Tuchinda以下のタイ国首脳の見方でもあつた訳である。

我々がこのような計画をすゝめるに當つて、タイ国が医療サービスの「きわめて希薄な国」とは考えない。現在医師対住民比は1:10,000であり、道路の発達と公共交通機関の発達は僻地の住民でさえ比較的短時間に医療機関への到達を可能にしている現状である。Wechakornによつて、正確な診断のないまま一律に薬剤を投与されるようなことを避けて、原因菌を検索し、薬剤耐性を調べて薬剤を正當に使用する。適正な治療によつて耐性菌の出限をできるだけ抑制す

るという医療の本道にできるだけ接近した公衆衛生活動をすることを終始理想と考える。以上がこのプロジェクト推進理念である。

更に公衆衛生省は辺地に無線電話網を設置する計画を全国的に推進しており、Chanthaburi 県においても Prapokklao Hospital に親局を、辺地には電話機の設置を開始している。我々はこの計画に沿ってこの計画の実現を早く広くなるように援助する。また公衆衛生省は村落毎に Volunteer Communicator と Health Volunteer をおくことを計画しておりすでに計画は着々実現している。Communicator は学歴、人格、資産、人望等を考慮して 10 家族に 1 人の割合いで選出され、一定の訓練を受けて、村人の健康状態を朝の集会で知り、保健所へ報告すると共に、予防接種、家族計画、衛生教育等の情報を村人に告げるのである。Health Volunteer は更に少数であるが、主に簡単な救急医療を担当するものとされている。我々はこのようなタイ国公衆衛生省の自主的な計画に乗ってこれを援助し利用することを行っている。つまり、プロジェクトのフィールドにおける Communicator 達に自動車を供与し、毎日の村人の健康状態の報告には一定の書類を用いて、疫学的監視体制を整え、緊急の場合に保健所から無線電話で処置を仰ぐこともでき、mobile team の緊急出動を要請することもできる。これだけの監視体制があれば、特に Wechakorn のような非合法的な healer を必要としないと言い切っても良いのではないかと思うのである。

以上のことを別の言い方をすれば、我々はタイ国を少なくとも医療の面では後進国とは見ないで、中進国乃至文字通り発展途上国と考える立場に立つ訳である。

Chanthaburi 県における活動状況：県衛生試験所および一級保健所（地域病院）の検査室のレベルアップを計るという計画は進行中であり、その精度管理の実施の現状と検査件数の前年比 2～3 倍の伸びよりみて、現スタッフによるギリギリ一杯の上昇とみてよい。これ以上は、検査室を大きく拡張し、スタッフを増員し、電力事情と配水を大巾に改善しない限りとうてい望むことはできない。

一方、field として選定された地域の保健業務に必要な住民簿は英文に翻訳してカードにのせて保管しており、県下唯一の総合病院の退院記録もカードに転記して保管されて行なっている。この Prapokklao 病院の入院患者数は年間 30,000 人であり、Chanthaburi 県の総人口が 300,000 人であるから、疾病統計分析上から大事な資料である。

また、field における小学校の学童から Rectal Swab によって糞便を採取して病原菌の検索が行なわれており、多数の Shigella Salmonella および Vibrio parahaemolyticus が検出された。この研究は現在続行中であり、まだ発表の段階ではない。しかし、この検索は毎年くりかえされ、この結果の推移が住民の健康の示標となるものと思われる。衛生状態が改善されるにつれて健康保菌者も減少するものと予想される。寄生虫卵の検査も現在同時に行なわれている。

Chanthaburi 衛生試験所において分離された病原菌の種類およびその薬剤耐性、また同試験所生化学部門における検査およびその成績の改善努力に関する結果は夫々の専門家の報告に詳らかである。

## II 細菌学

丸 山 務

派遣期間中の業務内容については任国着任時に JICA 及び相手国側に提出した「技術指導計画書」及び「Detailed Plan of the Action in Bacteriology, in 1978」に添って活動し、その経過については Quarterly Progress Report Ⅱ, Ⅲ, Ⅳ に報告済みであるが、ここにこれらを総括し、総合報告書とする。

なお、本専門家の JICA より依頼を受けた業務内容は細菌学指導であるが、前記提出書類にも示した通り、当プロジェクトの目的から、Gastrointestinal Diseases の細菌学に活動の範囲を限定した。

### I PHL の強化 (Activity 1)

1978年5月、任地着任当時、Chanthaburi PHL の細菌検査室は開放性の一室に寄生虫、尿の検査室を兼ねており、居室も、洗浄室も無く、病原細菌を扱う検査室としては極めて不完全であった。また職員も経験3年以下のMLA (Medical Laboratory Assistant) のみで指導的立場の人員配置がなされていなかったため彼等の細菌学に対する知識、技術も決して十分といえる状態ではなかった。専門家の赴任、供与器材および専門家の携行器材の導入により下記事項の改善を徐々に実施した。また、routine work あるいは専門家の research work を通して職員の指導、教育を行なった。

#### 1) 施設の改善

PHL は近い将来改築する建物に移転する予定であり、また経済的理由から根本的な改築は不可能であったので、細菌検査室として最も重要な無菌操作が可能で他の作業と隔離したスペースの確保に主眼において、また限られたスペースをより有効に使用するためふ卵器、冷蔵庫等の移動、作業台の新設など室内の配置に若干の改善を加えた。

#### 2) 検査の能率化、省力化

限られた人員と設備とでより正確でより迅速な検査を実施するために下記の改善を行なった。

- a. 大型コック蒸気釜を準備し、大量の器材、培地の滅菌、消毒を可能にした。
- b. 培地連続分注器を準備し、培地作成の均一化、迅速化を進めた。
- c. 試験管の綿栓をすべてプラスチック製キャップに切りかえた。
- d. ペトリ皿をガラス製から一部プラスチック製に切りかえた。
- e. 確認培養のための小試験管を豊富に提供した。

- f. 試験管立て、金鋼罐などを提供し、作業を整理してその流れを能率化するように努めた。
- g. 検体の平板培地への塗抹に際し、白金耳法から滅菌ガラス棒を用いる方法を採用して作業能率を高めた。
- h. 大型冷蔵庫の供与により常用培地のストックを可能にし、緊急時の検査にも対応できる態勢をととのえた。

### 3) 検査システムの改善

検査法あるいは検査技術について改善すべき点は多々あったが、まず腸管系病原菌の検査を確実にこなえるよう下記3項目に改良を加えて検査システムを確立させ、これを定着させた。

- a. 増菌培養法の採用：Salmonella のために Selenite broth を、また Vibrio Species のために 2% NaCl 加 Alkaline Peptone Water の増菌培養法を従来の直接分離培養法に併用させた。
- b. 確認培養の実施：分離株の確認、正確な同定のために、TSI 寒天、LIM 培地による確認培養のステップを導入した。
- c. 血清学的試験の充実：分離株の同定、血清型決定を PHL 段階で可能にするため、Shigella は S. flexneri の Subtyping を含む全血清型別を V. parahaemolyticus は K 型別を、また、S. typhi, S. paratyphi については H 抗原分析まで実施できるようにした。

## II Research Work (主として Activity V および II)

### 1. Chanthaburi 県における Gastrointestinal Diseases の細菌学的原因解析

Chanthaburi 県における Gastrointestinal Diseases の原因物質を明らかにする目的で、1978年5月から1979年3月まで主として Prapok-khao 病院に入院又は外来の下痢患者を対象に病原菌の検索を行なった。

検体は下痢患者の Rectal swab、発熱患者の血液、および感染源、感染経路追求を目的として食品、水を採取した。Rectal swab の検体は県下4つの District Hospital に来院の下痢患者も同様に検査対象とした。検体数は Rectal swab が 12,768 件、血液 336 件、食品 252 件、水 171 件、合計 13,022 件である。

Rectal swab の採取から菌の同定にいたる検査方法は図1に示した通りである。血液は滅菌注射器で患者より採血後直ちに Tryptic Soy Broth に接種、一部は Culture bottle 瓶 4 (Dx gall broth ; Eiken) を併用して2週間培養した。食品については、Selenite broth および 2% NaCl 加 Alkaline Peptone Water による増菌培養を行なった。水からの病原菌検索は Membrane filter 法を用いた。

各種検査材料からの病原菌検出状況は表1の通りである。

これらの成績から Chanthaburi 県における下痢症の最も重要な起因菌は *Shigella* 及び *V. parahaemolyticus* であるという事ができる。*V. cholerae* は下痢症の起因菌としてまた国際検疫伝染病菌として勿論重要であるが、本調査期間では1978年2月から10月までの流行時のものであり、疾病構造としては流動的なものである。これに対し、*Shigella*、*V. parahaemolyticus*、*Salmonella* は月毎に多少の変動はあるにしても年間を通じて検出され、この地区に定着した病原菌であるという意味では *V. cholerae* 以上に重要である。特に、*Shigella* の検出が高率であることは他地域、例えば Bangkok 地区と比較しても際立っており、その背景に多数の保菌者が存在することが予想される。

現在のところ、*V. cholerae* 以外は患者の治療および防疫措置、予防対策についてはほとんど何の対策も講じられていないのが実状であるが、*Shigella*、*Salmonella* 患者については、保菌者の発見等の疫学調査を手はじめとして本格的予防対策がたてられるべきであろう。

患者を材料としながらも腸管系病原菌の検出率は低い。今回は既知の病原菌で、タイ国でも最も重要であろうと思われる *V. cholerae* (NAG *Vibrio* を含む)、*V. parahaemolyticus*、*Shigella*、*Salmonella*、Enteropathogenic *E. Coli* の5菌種を検索対象菌としたが、今後は *Clostridium*、*Bacillus* などの他の病原菌も同時に検索する必要がある。また今回の検査対象は病院への来院患者であったためある程度以上の激症患者に限られていたと想像される District Hospital の検出率は Prapokklao Hospital のそれを上向っているのは *V. parahaemolyticus* の検出率が高いためであって比較的軽症の本菌の下痢患者が District Hospital には来院しやすい理由によるかも知れない。Hospital あるいは Health Center にも届出されない軽症患者も含めた真の下痢症の実態を今後は明らかにしてゆく必要がある。その為には現在この Project の Activity III の活動として進行中のボランティアによる Community Participation 活動を活用し、患者発生の確認時に常時検体を採取し、PHL に送付するシステムが確立されるべきであろう。

## 2. モデル地区の健康学童における腸管系病原菌の保菌実態

前項 Research Work 1 「Chanthaburi 県における Gastrointestinal Diseases の細菌学的原因解析」の成績から腸管系病原菌、特に *Shigella* の検出率が高くその background としての保菌者の存在が示唆されたので、モデル地区の学童における腸管系病原菌の保菌状況を明らかにする目的で本調査を実施した。

モデル地区内の小学生(6才~12才)全学童を対象とし、検体採取時に下痢、発熱等の症状が無い健康者を条件とした。

検査材料は Rectal swab とし、その採取は担当 Health Center の Sanitarian 及び

Midwifeにより、学校教師、Chanthaburi PHL担当官の協力により行なわれた。

検体の採取からその輸送、検査法についてはResearch work 1 の記載と同様である。

1978年9月より1979年3月までに Tambon Tagad-ngao (Amper Thamai) および Tambon Bo (Amper Klung) の2地区の調査が終り、その成績は表2の通りである。

Chanthaburi 県内モデル地区の学童における腸管系病原菌の保菌はそれぞれ Shigella 0.6%、Salmonella 1.5%、V. parahaemolyticus 3.0%であり、2地区の比較では Tagad-ngao 地区が Bo地区よりもやゝ高い検出率であった。

Chanthaburi 県における下痢症患者からの Shigella、Salmonella、V. parahaemolyticus の検出率がそれぞれ 6.4%、0.8%、4.8%であることを比較してみれば健康保菌が極めて高率であることが明らかである。

V. parahaemolyticus感染に関するこれまでの研究では本菌感染症は小児においては極めてまれであるとされてきたが、Chanthaburi 県においては小児の下痢症からもしばしば本菌が検出される事実とあわせて、健康小児にこれほどまでに高率保菌がみられる事実は極めて重大な知見である。陽性者が全く無症状の健康者であり、また、本菌による感染は赤痢菌や Salmonella のような長期保菌が考えにくいとする感染病理のこれまでの定説を正しとするならば小児においても V. parahaemolyticus の Subclinical infection が起りうるし、健康者からの検出菌は一時通過菌 (Transit) と解釈するのが妥当であろう。しかし、健康者由来菌が患者由来菌と全く同一の性状を示すかどうか、今後両者の詳細な比較検討を行なう必要がある。いずれにしても、V. parahaemolyticus 感染症は Thailand においては小児においてもごく普通に存在し得るし、その感染の機会は極めて頻度の高いことを裏付けるデータである。

Salmonella、Shigella の場合もその保菌率は高い、特に Salmonellaでは患者からの検出率よりも高いことは本菌感染が住民の間に広く浸透していることを意味している。

本調査は以後継続して実施されるべきである。学童に関しては他の1つのモデル地区 Tambon Sai-Kao (Amper Pong-namron) が残っており、3モデル地区の比較は Saikao 地区の調査が終った時点で検討されるであろう。すべての腸管感染症はすべて経口感染である理由から、本調査はさらに今後食品製造者、食品販売提供者等食料品取扱いを対象とすべきであり、保菌者の発見とその感染予防のための対策を講ずる必要がある。また、陽性者に対して配布した薬剤の投与効果を追跡調査する必要がある。

### 3. Chanthaburi PHLで分離された腸管系病原菌の性状

Chanthaburi PHLで分離された各種腸管系病原菌の特徴を明らかにする目的で血清型、フェージ型、薬剤感受性、毒素産生能など詳細な細菌学的検討を行なった。

本 Research work は Chanthaburi PHL のみで実施不可能な研究項目もあったので

Division of Clinical Pathology, Department of Medical Sciences, Bangkok および Department of Microbiology, Tokyo Metropolitan Research Laboratory of Public Health, Tokyo と共同で実施した。

研究対象菌株は1978年5月から同年11月までに Chanthaburi PHL で主として下痢患者から分離された *V. cholerae* 58株、NAG vibrio 52株、*V. parahaemolyticus* 227株、*Shigella* 315株、*Salmonella* 59株、*E. coli* 367株、計1,090株である。

各菌種の性状は下記の通りである。

1) *V. cholerae* 58株

供試58株の性状は全て *Vibrio cholerae*、biotype El-Tor、Serotype Ogawa であった。薬剤感受性試験の結果、全58株が Chloramphenicol, Tetracycline, Streptomycin, Kanamycin, Ampicillin の5剤すべてに感受性であった (MIC 法、 $< 50 \mu\text{g}/\text{ml}$ )。

2) NAG Vibrio 52株

供試52株はすべて NAG Vibrio の性状に一致し、このうち任意に抽出した32株の Phage typing は Heiberg's group I 17株、group II 8株、group III 3株、group V 4株であった。

3) *V. parahaemolyticus* 227株

供試227株中現在検討中の12株を除いた215株の O, K typing および神奈川現象 (Kanagawa Phenomenon) の成績は表3に示した通りである。

血清型については O 型別では O3, O4 群に属するものが比較的多くみられるが、これに K 型別を組み合わせた血清型としては、特に特定の群に集積する傾向はみられなかった。

神奈川現象は供試215株のうち165株 (76.7%) のみが陽性であり、患者由来株としては陽性率の低い成績であった。

4) *Shigella* 315株

供試315株の Serotyping と MIC 法による薬剤感受性試験の成績を表4にまとめた。

血清型別では315株のうち *Shigella flexneri* が263株 (83.5%) で分離株の大部分を占め、次いで *Shigella sonnei* 35株 (11.1%)、*Shigella dysenteriae* 15株 (4.8%)、*Shigella boydii* 2株 (0.6%) であった。*Shigella flexneri* の中でも Subtype 1b が171株 (54.3%)、Subtype 2b 50株 (15.9%) で、この2菌型の合計は221株で全体の70%以上を占めている。すなわち、Chanthaburi 県における *Shigella* 感染の主流は *Shigella flexneri* 1b と 2b であるといえる。



薬剤感受性試験の成績では315株中308株(97.8%)が何らかの薬剤に耐性を持ち、しかもその大部分は3剤以上の多剤耐性株であった。最も検出頻度の高いShiflexneri 1bの約96%はChloramphenicol, Tetracycline, Streptomycin, Ampicillinの4剤耐性、Shiflexneri 2bの80%はChloramphenicol, Tetracycline, Streptomycinの3剤耐性株であった。

Shi. sonnei 35株のcolicin typeはO型16株、6型15株、9A型3株、型別不能株1株であった。

5) Salmonella 59株

供試59株の血清型別成績を表5に示した。

検出頻度の高い菌型としてはB群のS. derby 15株、E群のS. welterreden 12株、C群のS. bovismorbificans 11株、D群S. typhi 6株などである。S. typhiは本研究に供した6株を含めて1979年3月までにRectal swabより7件、Bloodより4件、計11件が検出されており、THAILANDにおいてはチフス症がまだかなりの割合で存在していることを示している。

分離株の大部分はChloramphenicol, Tetracycline, Streptomycin, Kanamycin Ampicillinのすべての薬剤に感受性であったが、S. typhiの6株中2株はStreptomycinにS. agona 2株中1株が上記5剤全てに、S. bovismorbificans 7株中1株がKanamycinを除く4剤にそれぞれ耐性であった。

6) E. coli 367株

367株中213株についてToxin産生能を調べた結果、ST(Heatstable toxin)、LT(Heatstable toxin)両毒素産生株が5株、STのみ産生株2株が検出された。ST、LT両毒素産生株の5株はすべてその血清型がO78:H12であり、STのみ産生株2株のうち1株はOUT:H10、他の1株はOUT:H7であった。

以 上

Table 1.

Isolation and identification of enteropathogenic bacteria isolated from patients in Chanthaburi PHL

	Total	Rectal swab		Blood	Water	Food
		Prapokklao Hp.	District Hp			
Number of specimen	13022	12768	254	336	171	252
Number of positive	2376	2162	54	4	31	125
V. cholerae	129	129				
NAG vibrio	170	77			18	75
V. parahaemolyticus	627	597	30		12	50
Shigella	841	825	16			
Salmonella	109	101	8	4*	1	
E coli	433	433				

\* All of 4 strains are S. typhi

Table 2.

Healthy carrier state of enteropathogenic bacteria in school children

	Total	Tagad-ngo	Bo
Number of specimen	1406	791	615
Number of positive	71	47	24
(%)	(5.0)	(5.9)	(3.9)
Shigella	8	4	4
Salmonella	21	16	5
V. parahaemolyticus	42	27	15

Table 3.

Vibrio parahaemolyticus : Results of serotyping and Kanagawa phenomenon

Serotype		Kanagawa phenomenon			Serotype		Kanagawa phenomenon			
O	K	positive	negative		O	K	positive	negative		
1	32	1	1		5	15	3	3		
	33	1		1		17	3		3	
	38	1	1			36	3	2	1	
	56	17	15	2		47	5	3	2	
	58	2	2			60	4	4	0	
	UT	6	3	3		UT	6	4	2	
2	3	13	12	1	6	18	3	2	1	
	28	1		1		UT	1	1		
	UT	1		1	7	UT	1		1	
3	4	1	1		8	20	1		1	
	6	1	1			22	5	5		
	7	13	12	1		26	1		1	
	29	13	13			39	1		1	
	33	10	10			50	1		1	
	57	2	2			UT	2	1	1	
	58	1	1			10	UT	6		6
	UT	5	1	4		11	30	1		1
4	4	2	2		UT	8	2	6		
	8	8	8							
	12	13	11	2						
	42	2		2						
	49	1	1							
	55	9	9							
	9	1		1						
	29	1		1						
	UT	34	32	2						
	Total							215	165	50
UT : untypable										

Table 4.

## Shigella : Results of Serotyping and Antibiotic Sensitivity Test

Species/serotype	No. of strains tested		No. of strains (MIC: $\geq 50 \mu\text{g}/\text{ml}$ )		C		C		C		C		C	
	1	2	3	10	T	C	T	C	T	C	T	C	T	C
<i>S. dysenteriae</i>	1	2	3	10				3						
<i>S. flexneri</i>	1a	17	17	170			15							2
	1b	171	170			2	2	2	1				165	
	2a	11	11		2		8						1	
	2b	50	50				40			1			4	3
	3a	7	7				5						2	
	3c	4	4							1			2	
	4a	2	2							2				
var. Y	1	1	1							1				
<i>S. boydii</i>	2	2	2				2							
<i>S. sonnei</i>	35	32	32		1		21			3		6		1
Total	315	308	308		3	2	106		1	7		178		3

C: Chloramphenicol, T: Tetracycline, S: Streptomycin, K: Kanamycin, P: Ampicillin.

Table 5.

## Salmonella : Results of serotyping

O group		Number of strain
B	S. derby	15
	S. stanley	2
	S. agana	2
	S. java	2
	S. typhimurium	1
C	S. bovismorbificans	7
	S. montevideo	1
	S. burunei	1
	UT*	1
D	S. typhi	6
	S. panama	3
E	S. weltevreden	12
	S. lexington	4
	S. anatum	2
Total		59

\* UT : untypable

### Ⅲ 食品衛生学分野における中間報告

食品衛生学専門家 石 綿 肇

食品衛生、特に化学関係、における重要な問題は食品添加物と食品汚染物とに分けられる。指導目標で述べた如く、食品添加物特に亜硝酸塩、硝酸塩を中心とし、N-ニトロ化合物生成の基礎検討を行なうと共に食品中の添加物および汚染物の分析の指導、協力を行なってきた。

#### 1. 食品中の亜硝酸塩、硝酸塩の分析（1978年8月～1979年2月）

タイ国“Food Quality Control Acts”（日本の食品衛生法に相当）によれば亜硝酸塩、硝酸塩の使用基準はナトリウム塩として前者が200 ppm、後者が500 ppmと規定されている。しかし、分析法が未だ導入されておらず、野ばなしの状態である。そこで、まず分析法の技術移転から始めた。

##### a) 亜硝酸塩、硝酸塩の分析法の導入及び基礎検討

実験の目的、展開方法、分析技術のチェック、試料の選択法等について説明。

##### b) 加工食品への応用

肉製品22検体、魚介類43検体、計65検体。

このうち14検体についてはFood Quality Control Acts の使用基準を上まわる亜硝酸塩Xは硝酸塩が検出された。

##### c) 野菜類への応用

野菜類34検体

野菜類では亜硝酸塩は検出されなかったが、1000 ppm をこす硝酸塩を含むものが少なかった。（これは天然成分であり、取り締りの対象にはならない）

#### 2. 食品中のジメチルアミンの分析（1979年1月～）

ジメチルアミンは天然成分であり、取り締り対象にはならないが、亜硝酸塩と食品中あるいは胃内で反応して発がん物質であるニトロ化合物を生成する。そこで、本物質の食品中濃度を調べる予定である。

##### a) ジメチルアミンの分析法の導入及び基礎検討

現在、ジメチルアミンの抽出率および回収率等を検討中である。

### 3. Chanthaburi 地区で採取した食品中の添加物、汚染物の分析 (1978年8月～)

本項は著者の着任以前よりすでに行なわれており(1977年10月より)、1978年9月までの分が当プロジェクトの Progress Report に報告済みである。総計141検体中36検体の違判品(25.5%)があり、特に不許可の食用色素の使用が目立っている。

### 4. その他の活動状況

- a) 現在、タイ国では食品の容器、包装の規格、基準作製の準備段階にあり、我国の食品衛生法等の英訳を行なっている。参考までに列挙すると食品衛生法、衛生試験法、農林規格、JIS規格等のうち、容器包装の部である。
- b) ガスクロマトグラフの稼動に関しては順調に進んでおり、“Food Quality Control Act” 中茶の規格のうち、カフェイン含量の規定については従来のUV吸収法からガスクロマトグラフィーに変え、十分に利用できる事を確認した。
- c) その他各種の分析技術上のコンサルティングに関してはその都度適ぎ行なっている。

### 5. ま と め

Division of Food Analysis の主たる業務は検定であり、各室員は研究業務に関してもかなり意欲をもっているが、実際には検定におわれ、研究にまで手がまわらないのが実状である。そこで、検査、検定業務を研究業務にまで発展させる事の重要性を示すため一例として食品中の亜硝酸塩、硝酸塩の分析から始めた。分析法の技術移転、食品への応用については比較的スムーズにすすんだが、得た結果の解析、それをもとにして次の実験への展開をどうするかという点になると未だとまどいが見える。しかし、これは各実験毎にくりかえし考察し、レポートを書く事により身についてくる様になると思われる。

一方、検定業務に関しては、一部の人がその全ほうをつかんでいるにすぎず、各実験担当者はその結果がどのように活用されているかの認識がやや低い様に感じられる。これは一つには行政機構が分析部門と取り締り部門とで別々の Department になっている事にもよると思われる。また、担当者がナマのデータを各自のノートに記載しているだけであり、これも前述の如く、ある程度データが集積したらそれをまとめ、考察し、レポートを書く様指導するつもりでいる。

Division of Food Analysis の業務内容は約10項目ほどに分かれており、これを1人の expert が一年ですべてをカバーする事は不可能であり、今後、ひきつづき食品衛生関係の expert の派遣が必要な事を強く感じた。

## Ⅳ 生 化 学

宮 崎 武 夫

### 1. 緒 言

昭和54年4月11日バンコック着。4月中は挨拶まわりと、業務の打合わせに殆んど費やして了解。

同年4月26日 Medical Sciences 講堂に於いて“生化学検査の実施上の注意及び精度管理に就いて”約30分講義。

同年4月28日 CHANTHABURI に移動開始。

(4月～6月)

既に供与された機材の点検と未設置、未使用の機材の検討を行ない、すべて活用の出来るように方策を講じた。

基礎的な技術の訓練と、自家製の Pooled Serum によって検査精度の管理を開始した。

日本では考えられない基本的な試薬及び器具の不足が目立ち、可能なものより Bangkok にて調達、補給した。

(7月～9月)

機器の精度管理と試薬の管理、コマーシャル血清による精度管理を実施。

日立200型分光光度計を用いての“新生児ビリルビン検査法の微量化、COSMO 電気泳動セットを用いての“血清蛋白分画泳動技術”の訓練、更にそれに関連して血清総蛋白及びアルブミンの測定法の検討をした。

血糖試薬の比較検討では他病院より最も良好な成績を得ることが出来た。

(10月～12月)

前半期にほぼ基礎的訓練を終了出来たと判断し、SRL (Side Room Laboratory) の強化のため巡回することにした。

その間各地域より健常者の血液を採取約95名の協力を得て CHANTHABURI 地域の始めてタイ人血清成分正常値を分析、統計処理することが出来た。

(1月～3月)

正常値の分析を継続し、免疫グロブリンの定量も小数例ではあるが実施した。血清アルブミンの測定法も理想的な方法が確立出来、他方精度管理も既知のコマーシャル血清であるシグマ社のレファレンス血清 (Reference Serum) を用いて実施した。広義の精度管理法の一つとして異常値の出現率を調査した。

勿論日常的な技術訓練と機器の管理は当然のことである。



以上が約一年間に亘って実施した活動内容の概要であるが、主要な問題について以下各項目別に述べることにする。

## 2. 各 論

### 1) Laboratory 運営上の問題点

P. H. L ( Provincial Health Laboratory ) に働く技術員は約 30 名 ( よく移動がある ) で、中央の Medical Sciences に属して配置されているものが約  $\frac{2}{3}$ 、残りの約  $\frac{1}{3}$  は病院に属しておりその大部分は生化学部門に勤務している。そして技師長 ( Chief Medical Technologist ) を中心に、主任級の技師 ( Medical Technologist ) は四年制の大学を卒業しており、小生の関係する生化学部門の主任は Medical Technologist ) ではないが四年制の大学を出た ( 秀れた ) 理学士である。

その下に技術員 ( Medical Laboratory Assistant ) とそのまた助手が働いている。実際日常働く内容に於いては分担制であり技術上 1 年しか教育を受けていない技術員のレベルに多少問題を含んでいる。進歩した医学検査をこなしていくためには、教育不足であろう。

タイの人々を見ていて感じた事は他の発展途上国でよくいわれるように仕事の内容に対する個人の自覚がやややすいようで、責任を持って仕事を最後までやりとげる人が少なく、時間がくればやはり翌日まわしにする等、残業をする人は決っていた。

そこで先づ小生の着任した時から系統的な仕事の進め方と緊急検査の重要性を説明し受付時間と作動時間の計画的な実行に考えを切換えさせることが出来、丁度検査件数が急上昇していた 5 ~ 6 月頃であったので、一寸した考え方で毎日の労働が多少楽になり、責任の重要性の認識が徐々に理解されたようである。

幸い小生のカウンターパートにあたる人として生化学主任の Mr Wanchai が ( 心を配って ) 運営に協力してくれた。

検査件数も 1977・1976 各年度を比較すると表 1、図 1 に示したように急激な増加に驚くと共に、質的なレベル低下を防止することに最大の注意が必要であった。

一年間を通じて電圧の変動と長時間及び短時間度々の停電と乾季の断水にはよく泣かされた。Laboratory で水と電気を取上げられたならばなす術が全くない。

検査以前のこれら根本的な問題の解決が急がれよう。

設備としては 1976・1977・1978 年度供与機材として立派な機器が多数供与されたが、元来殆んど何もなかった所で然も急に Laboratory の活用が医師により叫ばれ実行されてきたため、まだ生化学部門に関しては充分とは言えないし、供与されるもの以前の基礎的な細かい器具、試薬不足が目立ち、タイ国内でも補給しにくいもののがかなり見受けられる。

次第に実動場所が狭くなっているため、整備しないと運営が行づまるであろう。これらの事は出来るだけ次年度で解決していきたい。

検査機器の管理と技術管理については、考えられるだけのチェック方法を用いて実施したが雨季の湿度の高さと機器の保守が検査以前の大きさを課題である。

## 2) 生化学分析の検討

日本と同じようにタイ国に於いても年々分析種目が増加してきている。基本的な精度管理を実施しながら分析方法を採血量即ち検体必要量の少量ですむように微量化に努力した。

血清ビリルビン検査法は以前は血清にして0.2~0.5 ml必要であったが供与された高性能の日立200型ダブルビーム分光光度計により二波長法を用いれば従来の $\frac{1}{10}$ の血清量で精密に測定可能なので緊急を要する新生児黄疸検査には最大の威力を発揮し大へん喜こばれた。

血清による糖質検査は採血後長時間放置されると解糖現象をおこすため温度の高い所では殊更促進されるので充分注意をし、材料の取扱い方の重要性を認識させた。

Medical Sciences より配布された血糖検査試薬と当 Laboratory で調整した試薬による120例の試料分析比較データでは  $y = 4.43 + 0.9567x$  (我々の試薬を  $x$  とし、テスト配布試薬のデータを  $y$  とする) という最良に近い回帰を示した。その時の分析に用いたコールマン比色計による規準値の安定度は0.5 SD (Standard Deviation) 以内に納まるよい技術を示していた。

代表的な分析項目についての精度管理の結果は総蛋白、A/G比(アルブミン値)、血糖、尿酸、ビリルビン、ナトリウム、カリウム等の検査は許容範囲内の変動域値に納まる良好な成績を示したが、総コレステロール、尿素窒素、クレアチニン、諸酵素検査(ALP、GOT、GPT)等は、手技も複雑であり今後尙充分精度管理を特にする必要がある。

## 3) 血清蛋白分画法の実施

既に供与されて未使用のCOSMO社の血清蛋白電気泳動装置を用いて蛋白分画の分析を訓練し正常値の設定も試みた。この設定は第一次的なものとしCHANTHABURI地方の三地区(P. H. L, Phong nam-ron, Thamai)の各地区病院を中心に健常者に自発的な協力を得て出来たものである。(P. H. Lは地区名としてはMuang·CHANTHABURIの中心地)(表2)。(表3)に地区別の平均値と $M \pm 2SD$ を(表4)に、男・女別及び日本人・アメリカ人の平均値を比較して示した。勿論地域保健活動をする上に、正常値の規準が必要である。(表4)に示したように日本人及びアメリカ人より総蛋白量に於いて多少低値を示しているが、予想より高値であったものの、これらの人々は勿論恵まれた環境下にある公務員であったことは言うまでもなく、真実の一部を表現していないかも知れない。

アルブミン値がグロブリン値に比較して低く、これらが何を意味するかは次年度に残され

た問題であろう。

( 図 2、図 3 ) に Pra-Pokk Lao Hospital 入院患者の半年間の血清総蛋白量、A/G 比検査成績を分布図として示した。日本の場合と比べてみるとかなり低値で入院患者層の違いが考えられるが、( 表 5 ) に示したように異常値の出現が低い方に多く頻度も全体として日本の倍で入院患者の半数は何らかの異常を示している。( 表 6 ) に少数例であるが免疫グロブリンの定量を試み、WHO の正常域値と比較してみた。

#### 4) 正常値の設定( 代表的な血清成分の分析 )

先の血清蛋白分画正常値設定に用いた全く同じ材料で同時期に血糖、総コレステロール、尿酸、総ビリルビン、アルカリホスファターゼ、トランスアミナーゼ、尿素窒素、クレアチニン、ナトリウム、カリウム等 13 項目の分析を試みた。( 表 7、表 8 ) に地区別、男女別のそれぞれ平均値を示したが地域差が多少認められると同時に全体的に男の方が女より高値を示した。( 表 9 ) に全体の平均と  $M \pm 1SD$ 、 $M \pm 2SD$  を表示し、( 表 10 ) に於いて、比較出来得る日本人のものと、現行の正常値と今後改訂されるべき目標域値を我々の分析した結果と比較してみた。

現行の正常値は成書によるものでタイ人のものではない。先にも述べた通り総蛋白量と A/G 比とは多少低値を示すので変更を要し、生体色素の影響によるのか、或いは潜在的な肝疾患によるのか不明であるが、総ビリルビン及び酵素系検査( ALP、GOT、GPT ) 等に於いてやや高い値を示しており( 表 11 ) のチュラロン大腎機能検査室の研究発表での正常値( 男女別 Normal Ranges ) とロッジ社設定のものと我々の分析値を比較してみても、我々としては酵素系については現行のロッジ社設定のものを、総ビリルビンについては一応観察的に上限値を日本でもしばしば用いられている  $1.2 \text{ mg/dl}$  まで引上げた方がよいと判断した。

( 表 12 に前記病院の入院患者一カ月分( Dec' 78 ) の分析値での異常値の出現率を示し、( 表 13 ) に於いて日本人の健常人、患者のそれと、今回の健常者試料分析中でのそれを比較してみた。日本人・タイ人共に健常者群( Health Group ) に於いても必ず異常値を示すものが何%もあり、完全な正常人対象を得ることの難しさを示している。一方患者群に於いてはタイ人の方がやはり日本人の倍以上の頻度を示しており、入院患者の層として大差を物語っている。( 質的問題 )

以上のようにすべて第一次的な正常値の設定であり、結論的には次年度に持越さねばならなかった。

### 3. 結 論

当初計画した Scope of work in 1978 に記載した全体の中で約 85% の目標は達成出来た

と判断する。やはり中心が生化学部門になり、その中で環境条件として、現状ではとうてい無理な計画だったのが酵素のKinetic Analysisである。これは最終の問題としたい。他の部門即ち、血清学的、血液学的その他の検査及び地区病院のSRLの強化についても次年度にどれだけなし得るか、目下検討中である。

Plan of Operationを振り返ってみてActivity Iについては以前に述べたすべてであるが（詳細は年間報告書に）Activity IIはMedical Sciencesの生化学部門にDr Charinと連絡をとりつつ次年度以降に力をそそぎたい。本年度としては4月と3月の2回全国技師長会議で精度管理と正常値設定について発表しただけでその間血糖試薬を全国に配布されてのサーベイ、精度管理のサーベイと2回集計してみたが、検査方法及びレベルがばらばらでまとまった報告書を作ることが出来なかった。Activity IIIについては、一応、正常値の設定が出来たので、今度はSRLを中心に異常値の分析に方向を向ければ疫学サーベイランスの一つともなるであろう。Activity IVは、たえず日常の教育訓練の連続であり、対話、談話の中に徐々に進むものと思われる。

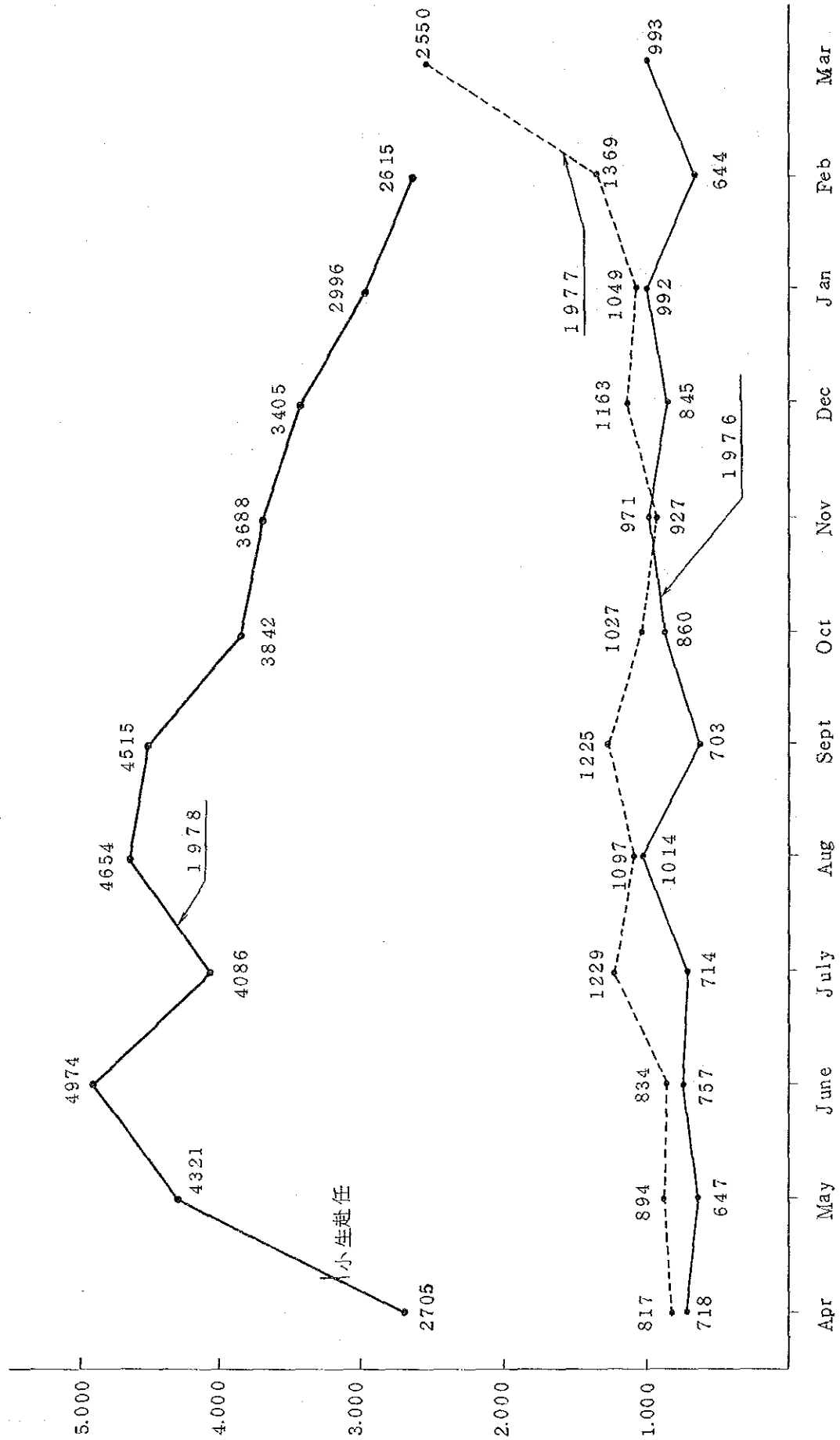
Activity Vについては、正常と異常を検索していく中で南方に多い肝疾患像及び他の所見等も次第に研究されていくであろうし、短かい年月ではとうてい結論づけるのが困難でせめて2-3年以上は必要ではなからうか。

以上一年間のまとめをしてみたが昭和53年4月より昭和54年3月までの3ヵ月毎の報告書とあわせ現地での医療協力事業の重要性、困難性を判断して頂きたいと念願する。

◎ 3カ年間の生化学件数の比較 (表1)

	1976		1977		1978	
	(S51)	(S52)	(対前年)	(S53)	(対前年)	
April	718	817	1.1倍	2,705	3.3倍	
May	647	894	1.4	4,321	4.8	
June	757	834	1.1	4,974	5.9	
(小計)	2,122	2,545	1.2	12,000	4.7	
July	714	1,229	1.7	4,086	3.3	
August	1,014	1,097	1.1	4,654	4.2	
September	703	1,225	1.7	4,515	3.6	
(小計)	2,431	3,551	1.5	13,255	3.7	
October	860	1,027	1.2	3,842	3.7	
November	971	928	0.9	3,688	3.9	
December	845	1,163	1.4	3,405	2.9	
(小計)	2,676	3,118	1.2	10,935	3.5	
January	992	1,049	1.2	2,996	2.8	
February	644	1,369	2.1	2,615	1.9	
March	993	2,550	2.6			
(小計)	2,629	4,968	1.9			
Total	9,858	14,182	1.4			

◎ 3カ年間の生化学検査件数の比較 (図1)



( 表 2 )

	Male				Female				Total
	PHL	phong nam ron	Thamai	(Total)	PHL	phong nam ron	Thamai	(Total)	
19 ~ 20	1	1	0	2	1	0	0	1	3
21 ~ 25	5	1	1	7	4	7	3	14	21
26 ~ 30	2	4	4	10	3	5	5	13	23
31 ~ 35	3	5	5	13	3	2	4	9	22
36 ~ 40	0	6	5	11	1	1	7	9	20
41 ~ 50	1	1	0	2	0	0	0	0	2
51 ~	1	1	0	2	0	0	2	2	4
Total	13	19	15	47	12	15	21	48	95

(表3)

	$\bar{x}$ (Mean)						M $\pm$ 2SD	
	P. H. L	Phong nam ron	Thamai	Total Male	Total Female	Total	S. D	
Total Protein (g/dl)	6.87	6.81	7.23	7.01	6.95	6.98	0.468	6.04 ~ 7.92
A/G ratio	1.49	1.43	1.28	1.47	1.31	1.39	0.23	0.93 ~ 1.85
Albumin (%)	59.43	58.57	55.99	59.12	56.56	57.84	3.85	50.1 ~ 65.5
$\alpha_1$ - Glob ( " )	29.4	3.19	3.07	2.99	3.18	3.08	0.48	2.1 ~ 4.0
$\alpha_2$ " "	7.99	10.96	9.12	9.43	9.53	9.48	1.96	5.6 ~ 13.4
$\beta$ " "	10.40	6.98	10.07	8.67	9.89	9.28	2.29	4.7 ~ 13.9
$\gamma$ " "	18.98	20.01	20.83	19.50	20.58	20.04	3.66	12.7 ~ 27.4



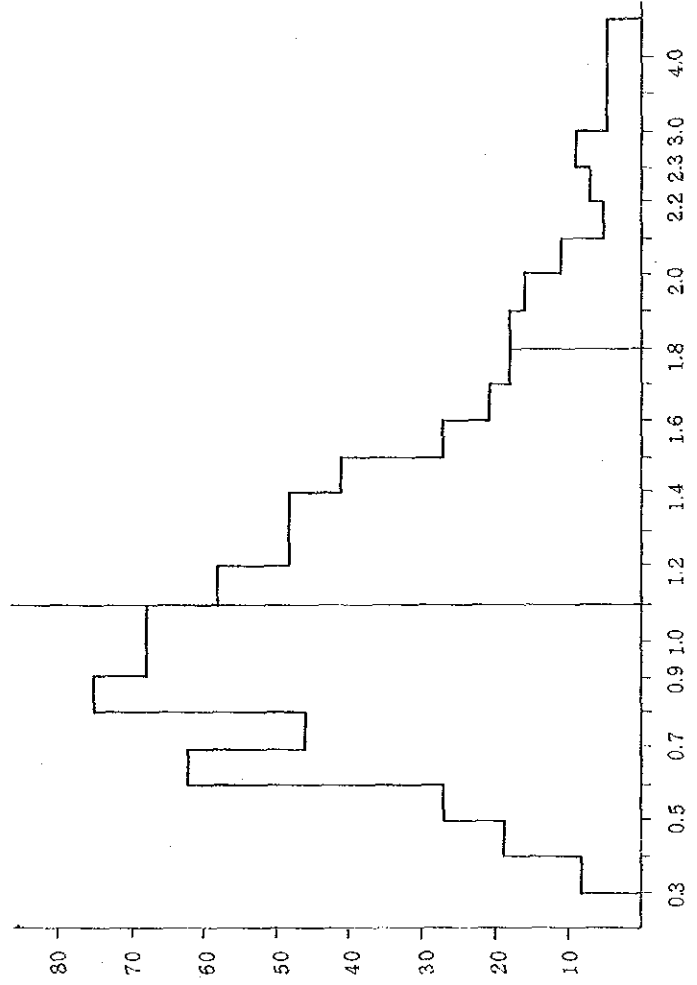
(表4)

	Mean ( $\bar{x}$ )	SD	M $\pm$ 2 SD	Mean( $\bar{x}$ )		JAPAN	U. S. A.
				Male	Female		
Total Protein(g/dl)	6.98	0.468	6.04 ~ 7.92	7.01	6.95	6.7 ~ 8.3	6.5 ~ 8.2
A/G ratio	1.39	0.23	0.93 ~ 1.85	1.47	1.31	1.27 ~ 2.38	1.17 ~ 2.85
Albumin (%)	57.84	3.85	50.1 ~ 65.5	59.12	56.56	56.0 ~ 70.4	54 ~ 74
$\alpha_1$ - Glob (")	3.08	0.48	2.1 ~ 4.0	2.99	3.18	2.3 ~ 3.9	1.1 ~ 4.2
$\alpha_2$ "	9.48	1.96	5.6 ~ 13.4	9.43	9.53	4.7 ~ 10.7	4.6 ~ 13.0
$\beta$ "	9.28	2.29	4.7 ~ 13.9	8.67	9.89	6.5 ~ 12.9	7.3 ~ 13.5
$\gamma$ "	20.04	3.66	12.7 ~ 27.4	19.50	20.58	11.7 ~ 20.9	8.1 ~ 19.9

(图2)

A/G July to Dec.78

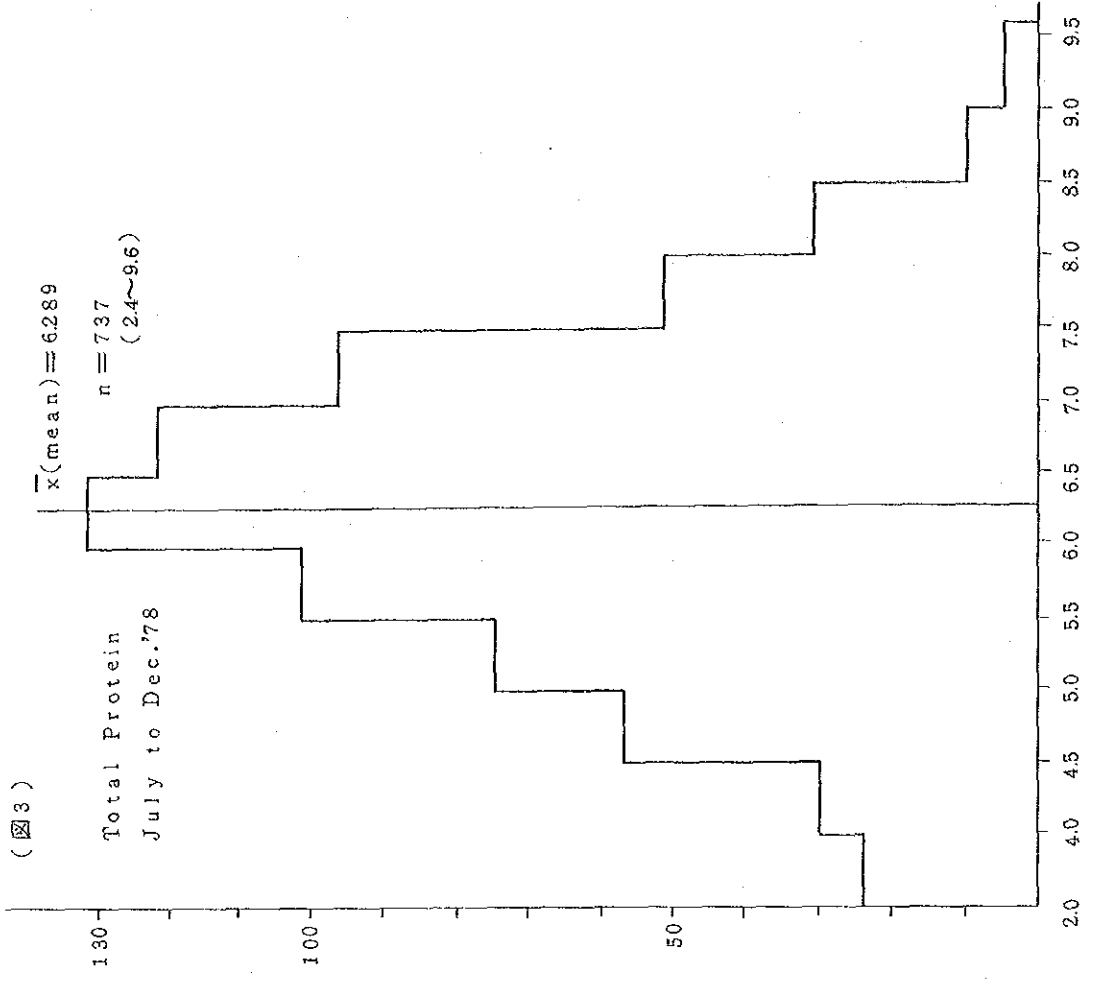
$\bar{x}(\text{mean}) \approx 1.11$   $n = 705$   
(0.3~5.8)



(图3)

Total Protein  
July to Dec.78

$\bar{x}(\text{mean}) \approx 62.89$   
 $n = 737$   
(24~96)



( 表 5 )

	n	Total Abnormal		Low Abnormal		High Abnormal		Method
		n	%	n	%	n	%	
1	737	322	43.6	276	37.4	46	6.2	Biuret.
②	705	331	47.0	305	43.3	26	3.7	Biuret & B. C. G
3	919	204	22.2	129	14.0	75	8.2	Reflacto -Meter
4	637	112	17.5	93	14.5	19	3.0	Biuret.

(表6)

	IgG	IgA	IgM	C'3
Mean	n=29 1,365.5	n=27 193.3	n=29 157.2	n=23 151.0
S. D	228.4	57.5	80.9	26.4
2SD	909~1,822	78~308	0~319	98~204
(WHO)	(384~1,681)	(42~354)	(52~376)	(62~212)
Mean	n=15 1,356.7	n=14 191.2	n=15 145.3	n=12 153.2
S. D	263.7	63.7	87.1	24.2
Mean	n=14 1,375.0	n=13 206.0	n=14 169.9	n=11 148.6
S. D	193.1	51.4	74.8	29.5
TOTAL				
MALE				
FEMALE				

(表7)

	P. H. L		Phong nam ron		Thamai		Total	
	n	Mean	n	Mean	n	Mean	n	Mean
Total Protein	25	6.87	34	6.81	36	7.23	95	6.98
A/G ratio	25	1.48	34	1.41	36	1.30	95	1.39
Glucose	25	86.92	32	75.56	35	73.94	92	78.0
Cholesterol	25	183.0	31	182.60	36	219.80	92	197.26
Uric Acid	24	5.32	34	5.14	36	4.76	94	5.0
Total Bilirubin	25	1.10	33	1.24	36	1.23	94	1.19
A. L. P	25	28.60	34	24.40	36	28.80	95	27.19
G. O. T	24	7.29	34	7.26	34	6.23	92	6.89
G. P. T	24	5.46	34	4.35	35	5.40	93	5.03
B. U. N	25	11.90	33	13.08	36	12.67	94	12.62
Creatinine	24	0.82	34	0.75	36	0.81	94	0.79
Na	24	133.66	32	140.40	34	141.79	90	139.10
K	24	4.07	32	4.28	34	4.09	90	4.17

(表8)

	Total			Male		Female	
	n	Mean	S. D	n	Mean	n	Mean
Total Protein	95	6.98	0.468	47	7.01	48	6.95
A/G ratio	95	1.39	0.21	47	1.45	48	1.32
Glucose	92	78.0	20.95	44	79.34	48	76.83
Cholesterol	92	197.26	52.49	44	202.79	48	192.19
Uric Acid	94	5.0	1.25	46	5.59	48	4.51
Total Bilirubin	94	1.199	0.26	46	1.24	48	1.16
A. L. P	95	27.19	12.29	47	32.02	48	22.46
G. O. T	92	6.89	4.07	46	7.69	46	6.09
G. P. T	93	5.03	4.63	46	6.24	47	3.85
B. U. N	94	12.62	3.69	46	13.11	48	11.93
Creatinine	94	0.79	0.279	46	0.84	48	0.74
Na	90	139.1	6.3	44	139.27	46	136.84
K	90	4.17	0.41	44	4.24	46	4.09

(表9)

	Total			M±1SD	M±2SD
	n	Mean	S. D		
Total Protein	95	6.98	0.468	6.51 ~ 7.45	6.04 ~ 7.92
A/G ratio	95	1.39	0.21	1.18 ~ 1.60	0.97 ~ 1.81
Glucose	92	78.0	20.95	57.1 ~ 98.9	36.1 ~ 119.9
Cholesterol	92	197.26	52.49	144.8 ~ 249.8	92.3 ~ 302.2
Uric Acid	94	5.0	1.25	3.8 ~ 6.3	2.5 ~ 7.5
Total Bilirubin	94	1.199	0.26	0.94 ~ 1.46	0.68 ~ 1.72
A. L. P	95	27.19	12.29	14.9 ~ 39.5	2.6 ~ 51.8
G. O. T	92	6.89	4.07	2.8 ~ 10.9	0 ~ 15.0
G. P. T	93	5.03	4.63	0.4 ~ 9.7	0 ~ 14.3
B. U. N	94	12.62	3.69	8.9 ~ 16.3	5.2 ~ 20.0
Creatinine	94	0.79	0.279	0.51 ~ 1.07	0.23 ~ 1.35
Na	90	139.1	6.3	132.8 ~ 145.4	126.5 ~ 151.7
K	90	4.17	0.41	3.8 ~ 4.6	3.4 ~ 5.0

(表 10)

	Method	JAPAN	Now Using Ranges	Our Investigation	To be improved Normal Ranges
T. P	Biuret	6.5 ~ 8.3	6.0 ~ 8.0 g/dl	6.04 ~ 7.92	6.0 ~ 7.9 g/dl
A/G	(Biuret & B.C.G)	1.0 ~ 2.0	1.5 ~ 2.3	0.95 ~ 1.83	0.9 ~ 1.8
B. G	O-Toluidine	60 ~ 100	60 ~ 100 mg/dl	57.1 ~ 98.9	60 ~ 100 mg/dl
T. C	Klungsoyr	150 ~ 230	150 ~ 250 "	144.8 ~ 249.8	145 ~ 250 "
U. A	Phosphotungstic Acid	2.0 ~ 7.6	3 ~ 7 "	2.5 ~ 7.5	2.5 ~ 7.5 "
T. B	Jendrassik & Grof	0.2 ~ 1.2	0.25 ~ 1.1 "	0.94 ~ 1.46	0.2 ~ 1.2 "
A L P	Bessey Lowery & Brock		13 ~ 50 U/L	2.6 ~ 51.8	13 ~ 50 U/L
G O T	Reitman - Frankel		up to 12 "	0 ~ 15.0	up to 12 "
G P T	"		" " 12 "	0 ~ 14.3	" " " "
B U N	Diacetyl Monoxime	8 ~ 20	10 ~ 20 mg/dl	5.2 ~ 20.0	8 ~ 20 mg/dl
Crea	Jaffe	0.2 ~ 1.2	0.5 ~ 1.2 "	0.23 ~ 1.35	0.5 ~ 1.2 "
Na	Flame Photometer	135 ~ 150	135 ~ 145 mEq/L	132.8 ~ 145.4	135 ~ 145 mEq/L
K	"	3.5 ~ 5.0	3.5 ~ 5.0 "	3.4 ~ 5.0	3.4 ~ 5.0 "



(表 11)

(Mean  $\pm$  2 S D)

	Normal Ranges		Roche's Value	Normal Ranges (Ours)
	Male	Female		
T B (mg/dl)	0.2 ~ 1.2	0.2 ~ 1.0	0.3 ~ 1.1	0.2 ~ 1.2
D B "	0 ~ 0.3	0 ~ 0.3	up to 0.3	~
GOT (U/L)	6.3 ~ 21.6	5.2 ~ 19.5	0 ~ 12	up to 12
GPT "	0.6 ~ 14.6	0.4 ~ 12.5	0 ~ 12	" "
ALP "	15.1 ~ 56.0	12.7 ~ 44.2	13 ~ 50	13 ~ 50
Cholesterol (mg/dl)				
15 ~ 29 yrs	120 ~ 235	116 ~ 252	100 ~ 260	> 145 ~ 250
Over 30 "	118 ~ 293	137 ~ 273	130 ~ 300	

(表 12)

	Now Using Normal Ranges	Total Numbers	Abnormal % of Appearance		
			Low (%)	High (%)	Total
Total Protein	6.0~8.0	97	32(33.0)	6( 6.2)	38(39.2)
A/G ratio	1.0~2.0	95	44(46.3)	~	44(46.3)
Glucose	60~100	209	14( 6.7)	94(45.0)	108(51.7)
Cholesterol	150~250	135	47(34.8)	25(18.5)	72(53.3)
Uric Acid	3.0~7.0	121	9( 7.4)	19(15.7)	28(23.1)
Total Bilirubin	0.25~1.1	120	~	111(92.5)	111(92.5)
Iodine Test	0~1+	60	~	~	11(18.3)
Thymot T. Test	0~6	63	~	28(44.4)	28(44.4)
A. L. P.	13~50	126	7( 5.6)	56(44.4)	63(50.0)
G. O. T.	up to 12	137	~	95(69.3)	95(69.3)
G. P. T.	up to 12	104	~	46(44.2)	46(44.2)
B. U. N.	1.0~2.0	361	72(19.9)	114(31.6)	186(51.5)
Creatinine	0.5~1.2	201	10( 5.0)	69(34.3)	79(39.3)
Na	135~145	273	159(58.2)	18( 6.6)	177(64.8)
K	3.5~5.0	274	40(14.6)	67(24.5)	107(39.1)
Cl	95~106	265	62(23.4)	74(27.9)	136(51.3)

( 表 13 )

	Healthy Group	Patient Group	Healthy Group (Ours)
n	2,709	5,469	95
Total Protein	2.8 %	11.1 %	2.1 %
A/G ratio	1.5	10.7	4.2
Glucose	13.1	23.8	13.0
Cholesterol	6.8	14.1	18.5
Uric Acid	1.8	8.4	0
Total Bilirubin	6.8	9.6	43.6
A. L. P	6.3	16.9	10.5
G. O. T	5.8	24.3	7.6
G. P. T	8.3	26.4	6.5
B. U. N	8.8	15.4	8.5
Creatinine	0.4	14.4	17.0
Na	4.1	6.6	16.7
K	4.9	11.9	3.3

( Reported by WAKABAYASHI et al. 1976 )

Report of expert in Virology during January 1977 - 1979

Name of Expert : Dr. Toshihiko Fukunaga

Objectives :

1. To set up a viral diagnostic laboratory in PHL, Prapok-khao Hospital, Chanthaburi (Activity I)
2. To strengthen the function of VRI (Activity II)
3. Research on arbovirus infections in Chanthaburi area (Activity V)

Results of work during January 1977 - January 1979 are summarized according to the objectives as followings :-

1. To set up a viral diagnostic laboratory in PHL, Prapok-khao Hospital (Activity I)

A medical technologist (MT) from PHL, Chanthaburi was trained in VRI for three months to perform serological diagnosis on dengue, Japanese encephalitis and chikungunya viruses in 1977. Another medical laboratory assistant (MLA) was also trained in VRI for one month in 1978. In March of 1978, a virus laboratory was set up in Prapok-khao Hospital. Japanese expert and some scientists of VRI visited Chanthaburi to give technical advices and assistant, because at the beginning there were many problems in performing the serological examinations. But during the epidemic season of DDF in 1978, the virus laboratory could function well in both points of quality and quantity of the examinations. We believe that the virus laboratory can continue the work well by its staff but it is essential to keep close contact with VRI for quality control and further development and also is essential to have a supply of viral antigens and general technical advices from VRI.

2. To strengthen the function of VRI (Activity II)

The biggest public health problem caused by viruses in Thailand would be dengue hemorrhagic fever (DHF). Therefore activities were concentrated on the study of dengue hemorrhagic fever, especially on 2.1 A new technique for determination of NT-antibody titers against dengue viruses

## 2.2 Trial of the isolation and identification of dengue viruses from DHF patient sera

### 2.1 Establishment of a new technique of determination of NT-antibody titers against dengue viruses.

For the estimation of the NT-antibodies, it is essential to titrate the infectivities of viruses. For dengue viruses, plaque forming activity is usually used as an indicator to measure their infectivities. But this method has not been standardized yet because plaque formation of dengue viruses is not always successful. Therefore, Dr. Y. Okuno, Dr. T. Fukunaga and Dr. K. Fukai (Osaka University) have developed a new method employing enzyme-labeled antibody staining, or peroxidase-antiperoxidase technique. This method is a kind of micromethods and can give results within 3-4 days, while the plaque method takes a week or more. Our main purpose in our project is to utilize this method for mass-examination of NT-antibodies against dengue viruses. For the examination of NT-antibodies, we have to titrate the antibody titers at least on three points of different dilution of the same serum. However, if we can get the standard neutralizing curves for dengue viruses, it is possible to estimate the NT-antibody titer by measuring only one dilution point of the serum and thus it opens the way to mass-examination. As this simplification is well established for the case of Japanese encephalitis, so we have been trying to obtain the standard curves for dengue. So far the trial has not succeeded, because dengue viruses have four types, producing much more complicated immune response than in the case of Japanese encephalitis virus which has only one type. The study for simplification of NT-antibody titration should be continued in this project.

### 2.2 Isolation and identification of dengue viruses from DHF patient sera.

In 1978, the epidemic of DHF was not so big as that of the previous year. In 1977, we employed suckling mouse brain method for the virus isolation, but in 1978, an established mosquito cell line, that is Singh's aedes albopictus cell, clone C 6/36, was used.

One strain from Bangkok and three strains from Chanthaburi were isolated. The strain isolated from a patient submitted from Siriraj Hospital, Bangkok, was identified as dengue virus type 2.

Three strains from Chanthaburi has not been identified yet, because we met some problems during the procedure for identification as followings; the isolate was passed through the mosquito cells and then tested by neutralization with standard anti D1, D2, D3 and D4 rabbit sera. But the infectivity of the isolated virus showed almost no reduction against all four types of standard antisera. We transferred the isolate to suckling mice four times and then tried the neutralization again. By this test the isolate was identified as dengue type 2. Other three strains from Chanthaburi showed similar attitude on the neutralization test and now they are under the procedure to pass through suckling mouse brains. Some strains appear to be very hard to cause symptom in mice so far. The phenomenon mentioned above seems to suggest some interesting characteristics of wild dengue viruses in the viewpoint of ecological study.

3. Research on arbovirus infections in Chanthaburi area.

Since 1977, survey on arbovirus infections in Chanthaburi has been carried out. Twice a year, in pre and post epidemic seasons of DHF, VRI staffs visited Chanthaburi to collect the blood specimens from people in age groups. Such paired sera were tested for HI-titers against dengue and chikungunya viruses. For 1977, the detailed results were reported in the Quarterly Progress Report No.1, and for 1978 they are under examinations.

Dr. Toshihiko Fukunaga  
Expert in Virology  
25 January 1979

## VI 昭和53年度 地域保健活動向上計画・活動経緯

調整員 樋田俊雄

### 1. 昭和53年度活動実績

#### 1-1 専門家及び調査団の派遣

昭和53年の専門家派遣は、i)細菌学 ii)生化学 iii)ウイルス学 iv)食品分析学の4名であった。

氏名	分野	期間
1 宮崎 武夫	生化学	昭和53年4月11日～昭和55年4月10日
2 奥野 良信	ウイルス学	昭和53年4月24日～同年7月23日
3 丸山 務	細菌学	昭和53年5月2日～昭和54年5月1日
4 石綿 肇	食品分析学	昭和53年8月25日～昭和54年8月24日

従って、昭和53年度の専門家数は、前年度より赴任している 1)チームリーダー 熊岡爽一 2)ウイルス学 福永利彦 3)調整員 樋田俊雄 の計7名となった。また、ウイルス学専門家2名は、それぞれ任期を終了し、本年度中に帰国した。

昭和53年の専門家のサービスは総計66.5M/Mであった。また、本年度内に派遣された、調査団数は1、人数は4名であり、昭和54年3月11日から同年同月24日までの2週間当地に滞在し、今後のプロジェクトの活動に対するリコメンデーションがなされた。調査団は団長の橋本正己(国立公衆衛生院)、以下保坂哲也(社会保障研修所)、杉戸大作(厚生省)、大倉理(JICA医療第二課)であった。

尚、調査団の調査結果はメモランダムとしてまとめられた。内容は別記(注1)掲載の通りである。

#### 1-2 研修員受け入れ

昭和53年度の研修員受け入れは10名であった。10名のうち1年間の研修は3名、4ヶ月1名、1ヶ月以内が6名であった。

研修員の氏名、分野等は下記の通り。

氏名	研修先	期間
1 Sujarti JATANASEN (Director of Epidemiology Div. Office of Under-Secretary of State.)	大阪大学 等	昭和53年4月6日～5月5日
2 Somsong SATITISATIAN (Staff of Provincial Health Lab. Services Div. Dept of Medical Sciences.)	東京大学, 国立公衆衛生院	昭和53年5月11日～ 昭和54年5月10日

	氏 名	研 修 先	期 間
3	Laiad KUMSARANEE (Staff of Provincial Chief Medical Office , CHANTHABURI.)	新潟県衛生部等	昭和53年7月20日～8月11日
4	Mongkol TUNGCHAI (	同 上 同 上	同 上 )
5	Surapee SRISUPALUCK (Staff of Provincial Health Lab, Services Div. Dept of Medical Sciences ) CHANTHABURI.	臨床医学総合研究所他	昭和53年10月1日～ 昭和54年9月30日
6	Boonluan PHANTHUMA-- CHINDA (Director of Medical Entomology Div. Dept of Medical Sciences.)	国立予防衛生研究所他	昭和53年11月20日～12月19日
7	Prakai BORIBOON (Staff of Food Analysis Div. Dept of Medical Sciences.)	東京大学他	昭和54年2月8日～6月24日
8	Pramukh CHANDAVIMOL (Director of Provincial Chief Medical Office , Chonburi.)	新潟県衛生部他	昭和54年3月15日～4月14日
9	Suchint PHALAKORNKU-- LE (Director of Chonburi Hospital.)	同 上	同 上
10	Paradee DUMRONGPANTH (Staff of Provincial Health Lab. Chanthaburi.)	東京都衛生研究所他	昭和54年4月3日～ 昭和55年4月2日

尚、10) Pradee については年度内の航空機座席が予約できなく、4月3日の出発となつたが、取り扱いは昭和53年度の研修員である。

### 1-3 機材 供 与

機材供与は昭和52年度分が、昭和53年度になってから送付されたので本項では、昭和52年度、53年度の供与機材について記述する。

#### 1-3-1 昭和52年度供与機材

昭和52年度供与機材の総額は、¥85,540,651 (C-I-F Bangkok) であった。主要機材は車輛、テレファクス、スペクトロフォトメーター、低温冷蔵庫、インキュベーター及び培地等であった。尚、詳細は次の通り。



	船名	C・I・F BKK	B/L& 保険証券NO	主要機材
1	HYEONJIN (K Line)	¥ 1,511,175	B/L YMBK-23 保 1C/TE-E 18368	Mitsubishi Jeep.
2	HERMION (Norwegian Asia Line)	¥ 35,841,762	B/L NB-13 保 1C/TE-E 18892	Freezer up-right type Electric typewriter 他
3	JUTHA DHEWEE (Jutha Maritime)	¥ 16,711,936	B/L YB-36 保 1C/TE-E 19251	Spectrophotometer Phase Contrast Microscope 他
4	KEIYO MARU (Kansai Steamship)	¥ 2,685,740	B/L B-43 保 C/OE 3047	EMB Agar TSI Agar 他
5	HULDA MAERSK (MAERSK Line)	¥ 3,755,963	B/L 16 保 313098020	Toyota Landcruiser, Hi-Ace
6	JL 717 (Japan Air Lines)	¥ 596,450	B/L 131-53441710 保 313098008	Hand Microapplicator 他
7	HERMION (Norwegian Asia Line)	¥ 13,210,613	B/L YB-12 保 1C/TE-E 19525	NEFAX-3000
8	JUTHA KARNCHANA (Jutha Maritime)	¥ 11,227,012	B/L YB-12 保 1C/TE-E 21101	CO <sub>2</sub> Incubator
合計		C・I・F Bangkok ¥ 85,540,651		

1-3-1-2 昭和52年度の携行機材は総額 ¥1,727,435 (C・I・F Bangkok) であつた。尚、詳細は下記の通り。

専門家氏名	Shipping Date	C·I·F BKK	B/L & Flight No	主要機材
1 樋田俊雄	S52. 6. 11	¥ 5 2 1,0 0 5	217-06176295 TG 601	Stationary, etc
2 熊岡爽一	S52. 7. 3	¥ 3 3,2 4 0	217-05109764 TG 611	Zinic Sulfat1, etc
3 "	S52. 9. 27	¥ 7 3,4 3 0	217-06176951 TG 601	Slide file, etc
4 "	S52. 10. 4	¥ 9 6,5 5 0	131-52687106 JL 463	T·P·H·A Antigen
5 "	S52. 10. 5	¥ 4 4,2 1 0	217-06731174 TG 601	Books
6 伊賀弘	S53. 1. 11	¥ 2 2 8,3 9 0	131-53055450 JL 717	Tools
7 熊岡爽一	S53. 1. 22	¥ 1 1 0,3 5 0	131-53225270 JL 461	Centrifugal Humidifier
8 伊賀弘	S53. 2. 2	¥ 2 7 6,2 4 0	131-53225465 JL 767	Transformer
9 熊岡爽一	S53. 2. 14	¥ 3 0 1,2 7 0	131-53334514 JL 463	Electrophoresis Apparatus
10 "	S53. 3. 4	¥ 4 2,7 5 0	131-53334853 JL 717	Desicator glass
合計		¥ 1,7 2 7,4 3 5		

1-3-2 昭和53年度供与機材

本年度より新たに資材費が計上され、機材供与額と資材供与額の総計額は、  
¥101,540,576 (C·I·F Bangkok) であった。

機材費の主な供与機材は、Motor Cycle, 自転車, 車輛, 血球計数器, 顕微鏡, コピーマシン, オートクレーブ, スペクトロフォトメーター等であり、資材費にて供与された機材は、プロビンシャル・ヘルス・ラボラトリーの電源安定化の為の諸機器及びモデルエリアとのコミュニケーションを改善する為の無線装置等であった。

詳細は下記の通り。

	船名	C·I·F BKK	B/L & 保檢証券N°	主要機材
1	JL 473	¥ 104,085	B/L 131-54250512 保 391044426	Reversal Color Film
2	PICHAJ SAMUT	¥ 14,208,082	B/L N-15 保 1C/TE-E 23172	Toyota Hi-Ace Honda Motor Cycle
3	GLORY ISAOH	¥ 1,263,521	B/L YHBK-0083 保 3130831	Acetic Acid Sulfuric Acid
4	JUTHA KARNCHA- NA	¥ 35,058,159	B/L YB-34 保 1C/TE-E 23267	Binocular Microscope Trinocular Microscope
5	TG 601	¥ 5,560,352	B/L 217-06524405 保 3190044627	LIM Medium DHL Agar
6	JL 461	¥ 418,355	B/L 131-54572394 保 319044647	Toner set Premix set
7	HERMION	¥ 1,370,669	B/L YB-8 保 1C/TE-E 23703	Autoclave
8	JL 461	¥ 31,505	B/L 131-54641720 保 319-044756	Lowestein-Jenesen Medium
9	JUTHA DHIPYA	¥ 10,218,410	B/L KB-48 保 1C/TE-E 25149	Cubicle Apparatus
10	JUTHA DHIPYA	¥ 9,503,959	B/L YB-74 保 1C/TE-E 25234	VHF Base radio equipment
11	MONTE RINDO	¥ 21,633,507	B/L YHBK-0002 保 31304037	Refrigerator Spectrophotometre
12	HAI HING	¥ 2,169,972	B/L KB-47 保 1C/TE-E 24935	Airconditioner and Piping Kit
13	SRI CHOL	¥ 3,436,593	B/L YHBK-22 保 31304970	Accessories for Personal Computer
	合計	¥104,977,169		

1-3-2-1 昭和53年度の携行機材はC・I・F Bangkok ¥8,857,922であった。  
詳細は下記の通り。

専門家氏名		Shipping Date	C・I・F BKK	B/L & Flight N°	主要機材
1	丸山 努	S53. 4. 22	¥ 953,021	131-53441706 JL 717	Books Pipette 他
2	熊岡 爽一	S53. 4. 22	¥ 70,000	131-53441710 JL 717	Books 他
3	丸山 努	S53. 4. 29	¥ 2,774,526	131-53441813 JL 717	Measuring Cylinder Test tube Basket pipette sterilizing Box 他
4	奥野 良信	S53. 4. 29			
5	丸山 努	S53. 4. 24	¥ 1,127,810	131-53624443 JL 717	Water bath
6	"	S53. 6. 30	¥ 1,212,802	131-53751482 JL 473	Culture bottle
7	宮崎 武夫	S53. 8. 29	¥ 587,623	131-54044896 JL 463	Micropipette
8	熊岡 爽一	S53. 8. 28	¥ 26,189	217-06926625 TG 601	Books
9	樋田 俊雄	S53. 11. 19	¥ 56,755	217-07968273 TG 607	Hanging flame
10	丸山 努 熊岡 爽一	S54. 3. 14	¥ 1,288,029	131-54811164 JL 717	Burner, Incubator
11	石宮 綿 宮崎 武夫	S54. 4. 19	¥ 761,167	131-54929055 JL 767	shaker 他
合計			¥ 8,857,922		

#### 1-2 プロGRESS・リポート

プロGRESS・リポートは4半期毎に日本・タイ両サイトで原稿が作成され、それぞれの時期における活動がとりまとめられたものである。本項においては、昭和53年4月から6月までのProgress Report II, 7月～9月までのProgress Report III, 10月～12月までのProgress Report IV, 及び昭和54年1月から3月までのProgress Report Vを掲載するものである。尚Progress Report Iについては“タイ国地域保健活動向上計画 報告書II 昭和

54年2月”を参照にされたい。

- |       |                     |              |
|-------|---------------------|--------------|
| 1-2-1 | PROGRESS REPORT II  | 1978年4月～6月   |
| 1-2-2 | PROGRESS REPORT III | 1978年7月～9月   |
| 1-2-3 | PROGRESS REPORT IV  | 1978年10月～12月 |
| 1-2-4 | PROGRESS REPORT V   | 1979年1月～3月   |
- 1-3 第5回コーディネーティングコミッティー

第5回コーディネーティング・コミッティーは、昭和53年5月19日医科学局において実施された。内容は下記の通り。

本項においては、コーディネーティングコミッティーで承認された機材要請の項については省略する。尚コーディネーティング・コミッティーで承認された機材要請に基づく供与機材は“1-3-2昭和53年度供与機材”の通りである。

注1) Memorandums of the JICA Consultation Team on the Project "Promotion of Provincial Health Services" (1976-1981) in Chanthaburi Province .

PROJECT : PROMOTION OF PROVINCIAL HEALTH SERVICES  
REPORT OF THE FIFTH CO-ORDINATING COMMITTEE MEETING  
AT THE DEPARTMENT OF MEDICAL SCIENCES, BANGKOK, THAILAND  
ON MAY 19, 1978 AT 9.30 A.M.

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Name of Attendants :-

1. Dr. Vimol Notananda Director General, Department of Medical Sciences ; Chairman
2. Dr. Sutas Guptarak Deputy Director General ; Project Director
3. Dr. Chaisit Dharakul Director Prapok-khao Hospital ; Field Project Director
4. Mrs. Achara Meevasana Director, Division of Food Analysis
5. Dr. Panchitta Ekachampaka Director, Division of Clinical Pathology
6. Dr. Kanai Chatiyononda Virus Research Institute
7. Dr. Uthai Sudsukh Director, Rural Health Division
8. Dr. Khunthong Sukatipanta Deputy Provincial Chief Officer, Chanthaburi
9. Dr. Rungsun Mahasuntana Assistant Director, Provincial Hospital Division
10. Dr. Swasdi Ramabutr General Communicable Disease Division
11. Mrs. Rumpuey Pattamavichaiporn Colombo Plan Division, DTEC.
12. Miss Paradee Mamaechai Thai Co-ordinator
13. Mr. Yasuo Kitano Director, JICA Bangkok Office
14. Dr. Soichi Kumaoka Japanese Expert Team Leader
15. Dr. Toshihiko Fukunaga Expert in Virology
16. Dr. Yoshinobu Okuno Expert in Virology
17. Dr. Tsutomu Maruyama Expert in Bacteriology
18. Mr. Takeo Miyasaki Expert in Biochemistry
19. Mr. Toshio Hida Japanese Co-ordinator
20. Dr. Mongkol Mokkahasmit Director, Provincial Health Laboratory Division ; Assistant Project Director, Secretary
21. Dr. Boonluan Phanthumachinda Director, Division of Medical Entomology, Assistant Secretary

1. Informations by Chairman

1.1 Arrival of the Japanese experts :-

- Mr. Takeo Miyazaki, expert in Biochemistry, arrived on April 11, 1978 and will work at Chanthaburi for one year.
- Dr. Yoshinobu Okuno, short-term expert in Virology, arrived on April 24, 1978 will work at VRI for three months.
- Dr. Tsutomu Maruyama, expert in Bacteriology, arrived on May 2, 1978 will work at Chanthaburi for one year.

1.2 The Japanese Technical Advisory Team, headed by Dr. Konosuke Fukai, has paid a visit to the Department of Medical Sciences and Chanthaburi to discuss the activity of the project, the equipment lists for 1978 and particularly the budget which will be allocated for the infrastructure, during March 23 to April 6, 1978.

2. Adoption of the fourth report of the Co-ordinating Committee

The fourth report was adopted by the committee with no correction.

3. Approval for the equipment request lists for 1978

In 1978, the budget for the equipment has been allocated in the approximately amount of ¥ 66,331,000 by divided into :-

- a. ¥ 41,340,000 for the equipment.
- b. ¥ 24,990,000 for the infrastructure expenses.

The committee made some little corrections, and then approved the lists to be officially requested.

The full lists of the equipment which have been approved are in the Annex I.

4. Second addendum to the Record of Discussions

The committee was informed that the second addendum to the Record of Discussions has been constituted concerning the appointment of the representatives from the Office of the Civil Service Commission and the Budget Bureau as additional members of the Co-ordinating Committee.

A copy of the addendum is in the Annex II.

5. Miscellaneous

- 5.1 The committee was informed that shortage of personnels is the big problem for development of Side-Room laboratory. It is agreed that PCMO will ask the required positions, the Rural Health Division will responsible in providing the positions and the persons will be trained at DPPLS which training will be started from January 1979.
- 5.2 The committee was informed that 9 fellowships will be provided in 1978 which have been approved by the Japanese side.
- 5.3 To improve the electricity fluctuation in Chanthaburi, the committee was informed that the Japanese side will try to provide a budget allocation for the expenses of setting up the new electrical supply system and wiring.
- 5.4 The committee was informed that the permission has been given by the Ministry of Public Health for the operational research on community participation in health promotion which can be operated according to the project's policy, by strengthening the connection between the health officials in amphur, tambol levels and the health communicator first and the health volunteers can be set up later which is a little altered from the policy of the Ministry of Public Health, in three tambols of Chanthaburi
- Takad Ngao, Thamai district
  - Bo, Klung district
  - Saikao, Pong Namron district



注1) MEMORANDUM OF THE JICA CONSULTATION TEAM ON THE PROJECT  
" PROMOTION OF PROVINCIAL HEALTH SERVICES " (1976-1981)  
IN CHANTHABURI PROVINCE, THAILAND

I. Observations and Suggestions

Activity I

1. It was observed that Activity I of the Project is now going on smoothly basing upon the plan of operation, principally by the PHL at Prapokklao Hospital together with four SRLs at district hospitals, cooperated by the PCMO's office. This Activity is undoubtedly a backbone of the Project, and all efforts be made to strengthen training of the local technicians by Japanese experts continuously and to increase the number of technicians as far as possible.
2. According to the achievements and data of bacteriological, virological, and biochemical examinations and analyses during the year 1978, it was observed that a notable progress has been achieved not only in the number of performances but also in its quality, by the efforts of Japanese experts cooperated by the local staff.

Activity II

Referred later

Activity III

1. It was learned that among the three Tambons in the Province, 53 village volunteer communicators were already appointed for the task to report "birth", "death", "fever", and "diarrhea" cases to the second class health centre concerned. We met and talk with several colunteer communicators in the village visited, and were impressed that they are eager to perform their task with a pride.
2. It would undoubtedly be an essential first step of the people's active(not passive) participation in the improvement of their own community health, and it was recognized that this kind of volunteer village workers be appointed in all villages step by step. Telecommunication and bicycles seemed very helpful and effective for the performance of their task.

#### Activity IV

Short-term training courses for sanitarians, midwives, and SRI technicians have been carried out satisfactorily, and it was noted that continuing training programmes and their evaluation be planned and carried out effectively.

#### Activity V

1. Recent research by Japanese experts cooperated by their counterparts and local people, revealed the infection rate of Dengue fever as well as the distribution of pathogenic bacteria, etc. by rectal swab of school children in three Tambons. On the other hand, HBs antigen-antibody tests were conducted for some 300 healthy individual human serum, and revealed the infection rate. Undoubtedly, these results are of extremely valuable to develop an effective strategy and counter-measures against these diseases currently important in the Province.
2. A particular attention be paid to the research on "the methods of villagers' participation in the health promotion" which is now going on. Relating the subject, in addition to the appointment of village volunteer communicators and their work, copy of the family folders of three Tambons is kept at the project headquarter, and records of the discharged patients from Prapokklao Hospital are also collected steadily. It would be expected that statistical processing and analysis of these data provide most helpful basis to develop effective counter-measures for community health improvement together with the achievements of aforementioned research.
3. During the fieldvisit, observation was also made on the conditions of water supply in several places. The results were generally not satisfactory, and particularly health education of the people who are currently depending solely on contained water for daily drinking purpose seems urgently needed. And needless to say, it should be reminded that to assure safe drinking water is a key factor of the prevention of G.I. diseases in a community.

#### II. General Comments

1. To avoid fragmentation of various functions and works carried out

in the Province under the Project, a regular meeting at least once for three months attended by the key personnel of the Project in the Province together with other relevant persons as needed for an effective coordination of various programmes and works. It was strongly impressed that good mutual communication and coordination based on the related informations are of utmost importance to promote the Project effectively and efficiently.

2. Group health education with adequate visual aids based upon real materials and data in a community concerned, on the topics, e.g., practical methods of prevention of prevalent diseases, healthy food, healthy living behaviour, etc. be greatly encouraged.
3. From the view point of community health promotion, following simple surveys are suggested;
  - (1) A survey on various existing social resources in each village, i.e., suitable persons for health volunteer, influential individuals such as school teachers, Buddhism preachers, and facilities, equipments available and helpful for community health promotion programmes.
  - (2) A sampling nutritional survey on family basis of food habits, contents and quality of foods, cooking methods, and so forth.
  - (3) A survey of accessibility of villagers in remoted districts to the various health services provided.
4. Public health nurses are essential health workers for family care, health education, and health survey, etc. together with midwives. Currently, the number of public health nurses seems not enough, and an increase of them and strengthening of their services seemed highly needed.
5. For the protection of people from various food hazards, it is suggested to collect sample materials from market places, restaurants, etc., and to make examinations by technicians desirably on a regulatory basis.

6. This Project is essentially comprehensive in its character and the ultimate goal could be achieved not only by the progress of specialized research and laboratory services, but also full understanding and participation of the local people themselves which is never easy and taking time. And from the public health point of view, it is suggested that to develop a multi-sided evaluative framework of the Project, e.g., progress in accessibility to the services, cost-benefit analysis of each programme, etc. would be most helpful.
7. We learned a "Preliminary Proposal for an Establishment of the Institute for Public Health Research" prepared by the Department of Medical Sciences, Ministry of Public Health, Thailand. Related to Activity II of the Project, a number of Japanese experts are conducting research work together with Thailand counterparts, and providing specialized technology as needed. However, from the viewpoint of national public health research, it seems not enough yet from personnel, facilities, and equipments. And it is noted that to extend the achievements of the Project in Chanthaburi from a nation-wide aspect, the proposal would be most helpful for the purpose. Therefore, the Consultation Team would like to convey this active proposal to the JICA after returning to Japan.

23 March, 1979

*Masami Hashimoto*

Masami Hashimoto, M.D.

Head of the JICA Consultation Team

## PROGRESS REPORT NO. II

APRIL - JUNE 1978

The progresses of all activities are moving smoothly during the period. Since now three more Japanese experts have already arrived so more rapid progress in field operational research is highly expected.

1. Equipment

The Co-ordinating Committee has approved the equipment lists for 1978, which the budget has been allocated in the approximately amount of ¥ 66,331,000 by divided into :-

- a. ¥ 41,340,000 for the equipment.
- b. ¥ 24,990,000 for the infrastructure expenses.

2. Fellowship

In 1978, 9 fellowships have been provided including one extra additional short term fellowship in food survey.

3. Expert

Arrival of the Japanese experts :-

1. Mr. Takeo Miyazaki, expert in Biochemistry, arrived on 11 April 1978 and will work at Chanthaburi for one year.
2. Dr. Yoshinobu Okuno, short term expert in Virology, arrived on 24 April, 1978 will work at VRI for 3 months.
3. Dr. Tsutomu Maruyama, expert in Bacteriology, arrived on 2 May 1978 will work at Chanthaburi for one year.

4. Additional members of the Co-ordinating Committee

The second addendum to the Record of Discussions has been constituted for the appointment of the representatives from the Civil Service Commission and the Budget Bureau as the additional members of the Co-ordinating Committee.

## 5. Project's activities

### 5.1 Activity I

#### 5.1.1 Strengthening of the PHL as a clinical diagnostic laboratory

1. "Pool sera" have been collected and will be used as a part of quality control in clinical chemistry.

2. Serum protein electrophoreses :

The electrophoresis apparatus has been set up and run for testing, under the Japanese Expert's supervision. It is hoped that serum protein electrophoresis and immuno electrophoresis will be available for clinical use in the next few months.

3. Automation of white blood cell count.

The automated blood cell counter (Hycel 300) is presently run as a part of regular service in hematology section.

Number of specimen : 1422

4. Platelet count, phase-contrast method

Number of specimen : 777

5. Coagulation study, prothrombin time

Number of specimen : 133

#### 5.1.2 Strengthening of the PHL as a public health laboratory

1. Serodiagnosis of dengue and DHF suspected patients,

Number of specimen performed (HI test) 128

Number of specimen collected for NT\*\* 37

\*\* performed at VRI, Bangkok

2. Examination of feces for surveillance of Diarrheal diseases

Shortly after the arrival of Japanese Expert in Bacteriology, methods for culture, isolation and identification of enteric bacteria have been strikingly improved. More pathogens have been isolated.

Number of specimen (April - June 1978)

From office of PCMO 4669

From Prapok-khao Hospital 3406

3. Bacteriologic examination of food and water

Food; Number of specimen 130

Water; Number of specimen 146

### 5.1.3 Strengthening of the SRL

One personnel selected by PCMO had been sent to Chanthaburi PHL for training in laboratory. This laboratory worker will be sent to work in SRL at Laem Singha District Hospital when it is ready for opening.

## 5.2 Activity II

### 5.2.1 DPHLS

1. Personnel recruitment, 1 MT and 6 MLA have already been sent to work at PHL Chanthaburi.
2. Media and chemical reagents have been supplied regularly by DPHLS to PHL Chanthaburi.

### 5.2.2 DFA

Collection of food samples for analysis of food additives and contaminants have been started in Chanthaburi areas with the cooperation of PCMO.

The followings are the results of chemical analysis from the first collection of total 62 samples on 24 - 26 April 1978 :-

1. Pesticide residues; In 21 samples, endrine, dieldrine, DDT and lindane were mostly detected from 10 samples of mung bean, egg plant, string bean, corn, cucumber, green pea, duck egg and egg.
2. Aflatoxin; Out of 6 samples, aflatoxin were detected in 2 samples from peanut and ground peanut.
3. Mercury analysis; Mercury were detected in all 7 samples of sea food, the mercury of each sample is within the limit (not over 0.5 ppm).
4. Dye staff; 16 samples out of 24 samples analysed, Rhodamine B and Orange II were found, which should be replaced with Erythrosine and Sunset Yellow FCF respectively.
5. Fish sauces; From 2 samples detected, the quality of each sample is up to the standard.
6. Monosodium glutamate; From 2 samples detected, the quality of each sample is up to the standard.

Second collection of 65 samples was made on 28 June - 1 July 1978, the analyses are undertaking.

### 5.2.3 VRI

#### 1. Supply of antigens

The followings were supplied to PHL Chanthaburi for sero-diagnosis of DHF :-

- |  |                |
|--|----------------|
| 1. Dengue 1 - 4 and chikungunya virus antigens produced by VRI | 105 x 0.5 amps |
| 2. Jar. Gar 01   | 360 x 0.5 amps |
| 3. Nakayama  | 67 x 0.5 amps  |

#### 2. Technical assistance to PHL Chanthaburi

The sero-diagnosis of DHF has been established in PHL, Chanthaburi, but there were some problems that the antibody titer tested were lower than standard control. Two scientists from VRI were invited to solve these problems. It was found that there were non specific haagglutination in test sera. The techniques were corrected and improved.

The defect of the test was because of too warm temperature and water problem. It is advised to perform the test in the air-conditioned room.

### 5.2.4 DMF

*Aedes aegypti* campaign was carried out in Chanthaburi to prevent DHF outbreak. Integrated control measures were used, which composed of public education (March), abate larvicide application (May) and adulticide application (June). Total number of houses received abate treatment were 5,100 which covered 6 districts 20 communities. The larval density was found 50% lesser than the non-treated area. One round treatment of ULV sumithion application was done which covered 10,640 houses in 22 communities and 66,255 population. Prespraying landing rate of *Aedes aegypti* was 6.9 (Female 3.3, Male 3.6). Post application evaluation will be done in July 1978.

### 5.2.5 DCP

1. Confirmation of organisms, 185 specimens were received from PHL Chanthaburi which the results of confirmation are as follows :-

- |  |    |
|--|----|
| a. <i>V. cholerae</i> , biotype El tor, serotype Ogawa | 24 |
| b. Non-Agglutinable <i>Vibrio</i> (NAG)                | 11 |
| c. <i>V. Parahaemolyticus</i>                          | 79 |



d. Salmonella	6
e. Shigella	50
f. E. coli	6
g. Others	9

2. Supply of antisera, antigens and organisms to PHL Chanthaburi ;

a. antisera; Shigella polyvalent group A-D	12 ml.
Salmonella	9 ml.
Enteropathogenic E. coli polyvalent	18 ml.
Vibrio cholerae polyvalent	5 ml.
Vivrio cholera Inaba	2 ml.
Vibrio cholera Ogawa	3 ml.
b. antigens; S. typhi-O antigen	2000 ml.
S. typhi-H antigen	2000 ml.
S. paratyphi A-H antigen	2000 ml.
S. parathyphi B-H antigen	2000 ml.
c. Organisms;	
Staph. aureus ATCC 25923	1 ampoule
E. coli ATCC 25922	1 ampoule

5.2.6 Cholburi

Two fellowships have been awarded to Chief Medical Officer and the Director hospital in 1978.

5.3 Activity III

1. During the cholera outbreak, the staffs of PCMO were recruited for cholera surveillence especially in the model areas. The followings are the numbers of specimen sent from the model areas for cholera confirmation.

Takad ngao, Ta Mai district	8
Bor, Klung district	2
Sai Khao	119

2. Two training courses have been set up during 12 - 17 June and 19 - 24 June 1978 for training of district health officers and midwives to be an instructor for health communicator in the model areas. Ten officers have been trained.

Selection of health communicator is now under the PCMO management.

#### 5.4 Activity IV

The schedules for training of the Public Health personnels and MLT have already been set by Activity IV as usual but unfortunately the training programmes have to be postponed since there was a cholera outbreak in Chanthaburi at that time (April - June 1978).

Anyhow two trainings have been provided as followings :-

##### 1. In-service training

<u>Trainees</u>	Personnels in laboratory service at Prapok-khao Hospital (12 persons)
<u>Duration</u>	April - June 1978
<u>Training</u>	Laboratory in-service training
<u>Evaluation</u>	Evaluation by observation of working

##### 2. Laboratory aid training

<u>Trainee</u>	One personnel from Laem Singha Hospital
<u>Duration</u>	April 29, 1978 until Laem Singha Hospital will be set up.
<u>Training</u>	The training in theory and practice are integrated. Subjects : - Side room laboratory - Hematology - Microscopy (stool & urine) - Bacteria stain (gram stain & acid fast stain)
<u>Evaluation</u>	Evaluation has not been set because the training has not yet finished.

#### 5.5 Activity V

##### 5.5.1 Operational Research in Virology

###### 1. Field research on haemorrhagic fever

865 blood specimens of pre-epidemic season were collected from healthy people in 7 Tambols of Chanthaburi Province in May 1978. The determination for HI antibody are undertaking.

###### 2. Establishment of new technique for determination of NT antibody

The neutralizing antibody titers of dengue hemorrhagic fever (DHF) patients' sera were studied employing the focus counting method stained by the immuno-peroxidase technique.

The purpose of the examination of neutralizing antibody

titers is to know whether the neutralizing curves obtained in Japan from the South-East Asian Country trainees would be applied for the DHF patients' sera.

### Results

1. By HI test the infecting types of dengue viruses could not be known. On the other hand, by neutralization test the infected type can be guessed because of higher type-specificity of NT than that of HI test.
2. In some cases, the neutralizing curves obtained here corresponded well with the curves obtained in Japan, but in some cases did not.

To explain the difference, we have a hypothesis that the neutralizing curves should be different in their inclinations between the infecting and cross-reacting types of dengue viruses.

At this moment, 36 paired sera of DHF patients were obtained by the cooperation of Frapok-khao Hospital (28 pairs) and Siriraj Hospital (8 pairs) and more paired sera will be sent through the DHF epidemic season. By the examination of neutralizing antibody titers of these paired sera, the hypothesis mentioned above might be given the evidence.

As for the virus isolation, one strain of dengue virus was obtained from patients' sera from Siriraj Hospital. The identification of the strain is now under examination.

#### 5.5.2 Analyses on causative agents of GI diseases in the model area

Since the outbreak of cholera in Chanthaburi province which were seen in February 1978 and went on even until July 1978, specimens to be examined in the PHL, Chanthaburi have explosively increased. Among the specimens which were received by PHL in three months (April - June) number of rectal swab from contacts with cholera patients and of specimens collected from admitted diarrheal patients in the Prapok-khao Hospital which their results were shown in the following table.

	April	May	June (1978)
Number of rectal swab	2,954	3,394	1,817
Result of examination			
Vibrio cholerae Ogawa	94	83	9
NAG Vibrio	19	8	17
Vibrio parahaemolyticus	113	61	101
Shigella	7	18	87
Salmonella	0	5	15
Enteropathogenic E. coli	33	20	19

Until middle of June 1978, enteropathogenic organisms were identified by direct culture in the PHL, Chanthaburi. However, enrichment culture has also been adopted simultaneously especially for the detection of wide variety of Vibrio and Salmonella since then. Cholera outbreaks in this province seemed to terminate since 5th June. But, one carrier was detected by using enrichment culture on 23rd June and further four asymptomatic carriers were found. As seen on the table, larger number of Salmonella were detected from specimens sent to PHL in June than the previous data.

Adopting confirmation culture using TSI agar and LIM medium, Shigella could be detected without difficulties and accurate identification of species became available. Seventy three strains of enteropathogenic organisms were sent to the Division of Clinical Pathology, Department of Medical Science for the reconfirmation of results obtained in the PHL, Chanthaburi. It was found that the results of identification done in the PHL were correct except for one strain.

#### 5.5.3 Operational research on community participation in health promoting

As well as the laboratory works, 'Operation research on community participation in health promotion' is one of the most important research subjects in Activity V. The Thai and Japanese authorities agreed that practical activity of volunteer communicators, utilization of telecommunication net work and quick response by mobile medical team, to meet the demand of health services in rural area, should be taken place on the basis of the principal policy of the Ministry of Public Health in Thailand. This sort of trial will be attempted in the already selected field tambols (Quarterly Progress Report No. 1, 1978) in this project.

In the present Thai fiscal year (1978), Ministry of Public Health approved to consign 70 volunteer communicators who will be given the necessary knowledge of health services. Before this course of training, health officers in the second class health centers will be trained as instructor for volunteers. Bicycles will be supplied to volunteer communicator for the better and quicker communication and services.

It cannot be overemphasized that without knowing the present situation of people's health and disease pattern in the field area, we cannot consider any better measures to overcome the present problems. Therefore, analytical epidemiological study is urgently required and for this purpose data of admitted patients to the Prapokkiao Hospital from the field tambols are going to be examined. We would be able to estimate a tendency of intestinal flora, disease pattern and others of people living in each field tambol. According to the latest statistics from January to May 1978, about ten cases have been admitted everyday from the three field tambols.

The Admitted Patients in the hospital	Field Tambols		
	Saikao	Tagad-ngao	Bo
10,255	574	80	61

A yearly report of disease statistics and laboratory data and intestinal flora of patients from the field and control tambol will be published.

A constant survey of some aspect of people's health status can be done without any particular difficulties by collecting statistical data and specimens from hospitalized patients.

30 June 1978

*Soichi Kumaoka*

Soichi Kumaoka, M.D.  
Japanese Expert Team Leader

*Sutas Guptarak*

Sutas Guptarak, M.D.  
Project Director

Since the training of health communicators in the model areas has been completely carried out. It is hoped that there will be some progresses on the work for community participation in health promotion, which is one of the most important research, in the near future.

1. Fellowship

One more fellowship for a long term training in Bacteriology for PHL Chanthaburi will be provided, to be altogether 10 fellowships awarded in 1978.

2. Expert

Dr. H. Ishiwata, expert in food chemistry, arrived on 25 August 1978 to work at DFA for one year.

3. Project's activity

3.1 Activity I

3.1.1 Strengthening of the PHL as a clinical diagnostic laboratory

1. Serum protein electrophoresis :

The set-up and testing of the instrument had been finished.  
Regular service will be undertaken in November 1978.

2. Automation of white blood cell count.

Number of specimens : 2743

3. Platelet count, phase-contrast method

Number of specimens : 1074

4. Coagulation study, prothrombin time

Number of specimens : 66

3.1.2 Strengthening of the PHL as a public health laboratory

1. Serodiagnosis of dengue and DHF suspected patients,

Number of specimens (HI test) 102

2. Examination of feces for surveillance of Diarrheal diseases

Number of specimen had been decreased, comparing with the

last period, partly due to fade-out of the out-break of the Vibrio Cholerae in Chanthaburi province.

Number of specimens (July-September 1978)

From office of PCMO 397

From Prapok-khao Hospital 2019

3. Bacteriologic examination of food and water.

Food; Number of specimens 46

Water; Number of specimens 22

3.1.3 Strengthening of the SRL in district hospitals and district health and medical centers

There is no progress within July-September 1978.

In October, necessary laboratory instruments will be sent to district hospitals.

The DPHLS had already made arrangement to send one MLA to each SRL.

3.2 Activity II

3.2.1 DPHLS

1. Personnel recruitment, 4 MLA have already been sent to work at Klung, Pong namron, Lamsingh and Tamai district hospitals.
2. Media and chemical reagents have been supplied regularly by DPHLS to PHL Chanthaburi.

3.2.2 DFA

1. Detection the quantity of Nitrate and Nitrite in various kinds of food are under studying by Dr. H. Ishiwata and DFA scientists.
2. Collection of food samples for analysis of food additives and contaminants have been continued in Chanthaburi.

The followings are the results of analysis from the total of 79 samples collected on 28 June - 1 July 1978 :-

1. Pesticide residues : DDT is the main pesticide residue which were detected from almost of the food samples such as vegetables, fresh sea food, duck eggsm etts and various kinds of bean. The others detected were lindane, endrine and ANB BHC. The quantity of all pesticide residues detected are within the safety limit (as shown in Table I).

2. Aflatoxin : Aflatoxin were detected from 3 samples out of 10 samples. The quantity detected in 3 samples, 2 samples one from peanut and the other from ground peanut are higher than the safety limit (as shown in Table I).
3. Mercury analysis : Mercury were detected from all 8 samples of sea food, the quantity detected is between 0.003 - 0.166 ppm. which is within the safety limit (as shown in Table I).
4. Food colours : 7 samples out of 9 samples analysed, Orange RN, Croceine Scarlet 3B, Malachite green, Orange II, Auramine, Rhodamine B and Patent blue were found.
5. Borax : It was found in 2 samples from 6 samples detected.
6. Fish sauces : Saccharin was detected in one sample analysed.
7. Beverage : All of 4 samples analysed; saccharin and preservative are over the limit and unpermitted food colours were found.
8. Chemical analysis of drinking water : It was found from 2 samples of 6 samples analysed, Iron content were over the limit.

### 3.2.3 VRI

#### 1. Supply of antigens

The followings are antigens which were produced and supplied by VRI to PHL Chanthaburi for sero-diagnosis of DHF and JE.

Dengue 1 - 4, chickungunya and Jar Gar 01	180 x 0.5 amps.
Chikungunya antigen	217 x 0.5 "
Chikungunya seed virus	34 x 0.5 "

#### 2. Assistance in technical training

One MLT from PHL Chanthaburi, was training in HI test of arbovirus for 1 month at VRI in August 1978.

### 3.2.4 DME

After Aedes aegypti campaign in Chanthaburi during the months of May and June. Evaluations for Aedes aegypti density were carried out in July and August at one and two months post applications. The mosquito density was found very low during the first month and went



Table I

Detections for pesticide residue, aflatoxin and mercury from  
food samples in Chanthaburi.

No.	Sample	Sources of origin	Pesticide residue ppm.	Aflatoxin ppb.	Mercury ppm.
1	เงาะ (Rambutan)	Makarn district	DDT trace	-	-
2	สับปะรด (Pineapple)	"	-	-	-
3	ข้าวโพดอ่อน (Young corn)	Muang district	-	-	-
4	แอปเปิ้ล (Sugar apple)	"	DDT trace	-	-
5	มังคุด (Mangosteen)	"	-	-	-
6	ส้มเขียวหวาน (Mandarin)	"	Endrin trace captan 0.03	-	-
7	มะระ (Bitter melon)	"	Lindane trace	-	-
8	รางสาด (Langsard)	"	-	-	-
9	มะเขือพวง (Egg plant species)	"	DDT 0.01	-	-
10	มะเขือเปราะ (Egg plant species)	"	-	-	-
11	แตงโมอ่อน (Young water melon)	"	-	-	-
12	ไข่ไก่ (Eggs)	"	CC BHC trace DDT 0.07	-	-
13	มันเทศ (Sweet potatoes)	"	Lindane trace DDT trace	-	-

No.	Sample	Sources of origin	Pesticide residue ppm.	Aflatoxin ppb.	Mercury ppm.
14	กุ้งสด (Shrimp)	Muang district	-	-	0.003
15	ปลาจระเข้ดำ (Black charamed)	"	DDT trace	-	0.041
16	ปลาหู (Mackerel)	"	DDT trace	-	0.048
17	ปลาตาเดียว (One-eyed fish)	"	DDT trace	-	0.015
18	ปลาอินทรี (Insee fish)	"	DDT trace	-	0.028
19	ปลากระบอก (Krabog fish)	"	DDT trace	-	0.008
20	ไข่ไก่ (Eggs)	"	∞BHC trace Lindane trace DDT 0.12	-	-
21	ถั่วเขียว (Mung beans)	"	∞BHC trace DDT trace	-	-
22	ถั่วลิสงเม็ด (Pea nuts)	"	Endrin trace DDT 0.01	-	-
23	น้ำตาลแดง (Crude cane sugar)	"	-	-	-
24	ปลาเกลือเค็ม (Salted Koo dao fish)	Tamai district	-	-	0.166
25	กุ้งแห้ง (Shrimp dried salted)	"	DDT trace	-	0.046
26	ถั่วเขียว (Mung bean)	"	∞BHC trace Endrin trace DDT 0.04	-	-
27	ถั่วดำ (Black beans)	"	∞BHC 0.01 DDT 0.15	-	-
28	ไข่เป็ด (Duck's eggs)	"	DDT 0.14	-	-
29	ข้าวสาร (Rice, polished)	"	-	-	-

No.	Sample	Sources of origin	Pesticide residue ppm.	Aflatoxin ppb.	Mercury ppm.
30	ถั่วลิสงป่น (Ground pea nuts)	Tamai district	-	89.4	-
31	ถั่วลิสงเม็ด (Pea nuts)	"	DDT trace	-	-
32	ถั่วลิสงเม็ด (Pea nuts)	"	-	38.3	-
33	ขนมถั่วตัด (Sweet pea nut cake)	"	-	14.6	-
34	เต้าเจี้ยวขวด (Fermented soya beans)	"	-	-	-
35	ข้าวสาร (Rice, polished)	Lam singh district	DDT trace	-	-
36	ไข่เป็ด (Duck's eggs)	"	DDT 0.02	-	-
37	ถั่วลิสงเม็ดทั้งเปลือก (Whole pea nuts)	"	-	-	-

up during the second month.

The results are as follows :-

<u>Landing collection</u>	Number mosquitos/per man hour.		
	Female	Male	Total
June (pre spraying)	3.3	3.6	6.9
12 July (1 month post spraying)	.32	.32	.64
16 August (2 months)	2.2	2.5	4.7

Larval Indices

	<u>House Index</u>	<u>Container Index</u>	<u>Breteau Index</u>
June (pre spraying)	38.7	15.8	100
July (1 month)	27.5	8.2	35
August (2 months)	55	19.9	129

Reduction of D.H.F. cases in Chanthaburi

D.H.F. reported cases were reduced after larvicide and adulticide applications. From April to September 1978 there were a total of 166 reported cases.

3.2.5 DCP

1. Confirmation of organisms, 334 specimens were received from PHL Chanthaburi the results are as follows :-

a. V. cholerae, biotype El Tor, serotype Ogawa	23
b. Non-agglutinable Vibrio(NAG)	18
c. Vibrio parahaemolyticus	68
d. Salmonella	33
e. Shigella	161
f. E. Coli	8
g. Others	23

2. Supply of antisera and antigens to PHL Chanthaburi :-

a. Antisera; Shigella polyvalent	2 ml.
Shigella Group A	2 "
Shigella Group B	4 "
Shigella Group C	2 "
Shigella Group D	2 "

E. coli polyvalent I	4 ml.
E.coli polyvalent II	4 "
E.coli polyvalent III	4 "
b. Antigens; Salmonella Antigen	3,000 ml.

### 3.2.6 Cholburi

1. Some requested equipment have been received such as microscope, spectrophotometer, autoclave, deep freezer, centrifuge etc.
2. The following is the report of the laboratory activities of Panatnikhim district hospital during July - September 1978.

a. Complete Blood Count	1707
b. Blood film from Malaria	1073
c. Urine Examination	2159
d. Stool Examination	148
e. Blood Chemistry	222
f. Serology	
- VDRL	472
- Widal Test	154
- Pregnancy test	172
g. Microbiology	
- Gram's stain	115
- AFB stain	168

### 3.3 Activity III

The training of 53 health communicators in the model areas has been completed as by the following details :-

1. Tambon Takad ngao, Tamai district; during 18 - 22 September 1978 for 17 health communicators (all male) in two villages.
2. Tambon Bor, Klung district; during 11 - 15 September 1978 for 16 health communicators (13 males, 3 females) in two villages.
3. Tambon Sai Khao, Pong namron district; during 25 - 29 September 1978 for 20 health communicators (17 males, 3 females) in two villages.

### 3.4 Activity IV

During the period there was no training schedule, but it was the preparational and arrangement period for the next training which will be

held on 6 - 10 November 1978 under the responsible of Activity IV.

### 3.5 Activity V

#### 3.5.1 Operational research in Virology

##### 1. Field research on haemorrhagic fever

The determination of HI antibodies of blood specimens from healthy people at Chanthaburi are under studied.

##### 2. Establishment of new technique for determination of NT antibody

Problems of differing slopes of neutralizing curves among four types of dengue viruses are still under examinations.

Another problem is that when viruses are inoculated into mosquito cells, the antiserum which was prepared from infected mouse brain.

##### 3. Isolation and identification of dengue viruses from DHF patient sera

One strain isolated from a DHF patient in Siriraj Hospital was identified as dengue type 2 virus by neutralization test, employing the peroxidase technique.

Two or three strains are under procedure for isolation from DHF patient sera in Prapok-khao Hospital. These strains are now under passages with mosquito cells and suckling mice for confirmation.

#### 3.5.2 Analysis on causative agents of GI diseases in the model area

1. Refined methods and their results. Identification culture has been done not only for intestinal pathogens but also for vibrio species. H-antigen analysis for *V. parahaemolyticus* and *Salmonella*, which enabled serotyping determination, has been carried out. The first three cases in Chanthaburi province of *Salmonella typhi* were detected in September 1978. The outbreak of cholera in Chanthaburi province has almost ceased since July 1978. But, small number of cholera cases has still been detected. This would be attributed to asymptomatic carriers since *V. cholerae* was detected in five healthy contacts to patients in July 1978.

Number of specimens	July	August	September
1. Rectal swab and stool	1,116	775	477
2. Isolated enteropathogenic organisms			
V. cholerae	18	2	6
NAG Vibrio	28	23	0
V. parahaemolyticus	65	52	20
Shigella	105	65	34
Salmonella	15	4	7
Enteropathogenic E. coli	3	5	6

2. Detection of enteropathogens from school children in the field tambons. In order to make an epidemiological survey on enteropathogens among people in the province, specimens were collected from school children in tambon Tagad-Ngao. 269 specimens were examined in September 1978. Five positive cases of V. parahaemolyticus were found.

### 3.5.3 Operational research on community participation in health promotion

As described in the previous quarterly report (No. 2, 1978), 53 volunteer communicators were selected in the field tambons. District level instructors who were selected from health officers, public health nurses and midwives as tytor for village volunteers were sent to Bangkok for the training in the Ministry of Public Health. And training of volunteer communicators has already done in villages by those tutor.

As mentioned before, only communicators are considered in the selected field tambons and health volunteer will be eliminated at least during the present project is in progress.

The items to be reported to the health centres from villages by volunteer communicators are death, birth, fever and diarrhea. The printed formula on which they have to describe every day will be distributed to each volunteer communicator.

The described matter on family folder of the field tambons is being copied and transcribed to the card. Results of examination on specimen from these tambons will be checked up with family lists. Therefore, analysis on causative agents of GI diseases in the model areas and the community participation in health promotion are closely

related to each other.

The facilities are being provided to promote the quick informations in communicating with the health centres for reporting of health situation in the model areas as well as transportation of some emergency patients. Improving and strengthening of the network between health communicator, health centre, hospital or PCMO are now under the implementation.

29 September 1978

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PROGRESS REPORT NO. IV  
PROJECT ; PROMOTION OF PROVINCIAL HEALTH SERVICES  
OCTOBER -- DECEMBER 1978

The progresses of all activities are moving steadily and smoothly during the period.

Project's activity

1. Activity I

1.1 Strengthening of the PHL as a clinical diagnostic laboratory

1. Clinical chemistry

After the extensive analyses and review of the methods previously used in Section of Clinical Chemistry, with the assistance of Japanese Expert in medical technology, the following procedures have been introduced into Section of Clinical Chemistry, in order to achieve the goal in quality control.

- a. Collection of pool serum
- b. Utilization of known pooled sera and commercial sera, provided by Japanese expert, for analyses the precision and accuracy of several methods of test previously used in Section of Clinical chemistry
- c. Modification and standardization of the following tests :
  - Total protein, using method of Weichselbaum
  - Albumin using Bromcresol green method
  - Creatinine, using Jaffe Reaction
  - Total bilirubin in newborn, using direct spectrophotometric method.
  - Total and direct bilirubin, using method of Jendrassik and Grof method

2. Clinical Hematology

- a. Automation of white blood cell count  
Number of specimen : 1706
- b. Platelet count, phase-contrast method  
Number of specimen : 972

c. Prothrombin time

Number of specimen : 64

3. Clinical microbiology

One additional fellowship for training in clinical microbiology has been granted for JFY 1978. It is hoped that the quality of work will be improved after the return of trainee.

4. Blood Banking

Separation of blood components for transfusion will be performed in late 1979 when the appropriate refrigerated centrifuge is received.

1.2 Strengthening of the PHL as a public health laboratory

1. Serodiagnosis of dengue and DHF suspected patients

Number of specimen : 20

2. Examination of feces for surveillance of diarrheal diseases

Number of specimen

from PCMO : 227

from Prapok-khao Hospital : 2325

3. Bacteriological examination of food and water

Food : Number of specimen : 43

Water: Number of specimen : 97

1.3 Strengthening of the SRL in three district hospitals and one district health and medical center

1. Basic laboratory equipments were sent to Klung District Hospital, Tamai District Hospital and Pongnamron District Health and Medical Center.

With some special arrangement, the newly founded Laemsing District Hospital also received some equipments, glass-wares and reagents, at least enough to run some laboratory activities. More equipments have been arrived at the Port of authority and will distributed to Laemsing Hospital in the very near future.

2. Four MLA had been provided by DPHLS to assist in the SRL for only a period of three months, October-December 1978. It is hoped that the Division of Provincial Health will assume the direct responsibility in acquiring the position and personnel at this level (MLA) for all SRLs.

## 2. Activity II

### 2.1 DPHLS

1. Medias and Chemical reagents have been supplied regularly by DPHLS to PHL Chanthaburi.
2. In cooperation in training with Activity IV, the staff of DPHLS has been sent to Chanthaburi as a tutor in the third training course for nurses, midwives, sanitarians and health workers.
3. Three MLA will be sent by DPHLS to assist in the SRI in March, 1979.

### 2.2 DFA

1. Collection of food samples for analysis of food contaminants, food additives and food standard have been carried out in Chanthaburi areas for a total of 80 samples, during 21-23 November 1978.

#### 1.1 Analysis for food contaminants

From a total of 51 samples collected; 40 samples were detected for pesticide residues, 6 samples for aflatoxin and 5 samples for mercury. The results are shown in Table I.

#### 1.2 Analysis for food additives

12 samples out of 18 samples analysed for food colours, Croceine Scarlet 3B, Orange II, Rhodamine B, Auramine were found over the safety limit.

Saccharin were found in 3 samples.

Boric acid were detected from 2 samples and Benzoic acid were detected in one sample as a preservatives.

#### 1.3 Analysis for food standards.

3 samples of drinking water and 1 sample of fish sauce were collected for analysis. The results are within the safety limit.

2. The study on Nitrosamine in food by detection of Nitrate and Nitrite from 60 kinds of food have been carried out, under the supervision of Dr. H. Ishiwata, Japanese Expert.

Table I

## Analysis for feed contaminants

No.	Sample	Sources of origin	Pesticide residue ppm.	Aflatoxin ppb.	Mercury ppm.
1	22 kinds of vegetable	-	-	-	-
2	2 kinds of fruit	-	-	-	-
3	14 samples of rice and beans	-	-	-	-
	- black beans	A. Laemsingh	Endrin 0.11	-	-
	- sesame seed	A. Pong Namron	DDT 0.03	-	-
	- red beans	"	DDT 0.43 0.02	-	-
	- soya beans	"	DDT 0.01	-	-
	- black beans	"	DDT 0.03	-	-
4	duck eggs	A. Laemsingh	DDT 0.02	-	-
	duck eggs	A. Klung	DDT 0.02	-	-
5	sweet pea nut cake	A. Laemsingh	-	12.2	-
6	ground pea nut	"	-	<u>1585.7</u>	-
7	raw whole pea nut	A. Klung	-	5.4	-
8	dried whole pea nut	"	-	<u>1000</u> <u>2757.2</u>	-
9	whole pea nut	A. Pong Namron	-	<u>193.4</u>	-
10	5 kinds of fish	A. Laemsingh	-	-	0.010-

underlined results : over the safety limit.

### 2.3 VRI

#### 1. Production of antigens

245 x 0.5 amps of chikungunya antigen were produced and standardized during October - December 1978.

#### 2. Co-operation in training course

A scientist of VRI gave a lecture on the virological study in the 3rd training course for the public health personnels which were organized by the Activity IV between 6-10 November 1978 at PCMO conference room, Chanthaburi.

### 2.4 DME

During the months of October to December there was no field activity in Chanthaburi. The laboratory colony of Toxorhynchitis was established and had good production. The mosquitos were sent to the virus institute for the study on dengue virus inoculation.

First round of abatè application for 1979 was scheduled in January. Planning and preparing of the equipment and supply were made.

### 2.5 DCP

1. 537 specimens were received from PHL Chanthaburi for confirmation and typing of organisms as following

a. Vibrio cholerae biotype El Tor, serotype Ogawa	12
b. Non-agglutinable Vibrio (NAG)	6
c. Vibrio parahaemolyticus	217
d. Salmonella	36
e. Shigella	180
f. E. coli	80
g. Others	6

2. Supply of antisera and antigens to PHL Chanthaburi :-

a. antisera; E.coli antisera	9 ml.
V.cholerae antisera	11 ml.
b. antigens; Salmonella antigen	3800 ml.

### 2.6 Cholburi

Report of the laboratory activities of hospitals in Cholburi are as follows

1. <u>Cholburi Hospital</u>	
Bacteriological examination	19,905
Serological examination	1,401
Parasitological examination	15,464
Fungi examination	446
Haematological examination	26,454
Clinical Chemistry examination	6,636
Spinal fluid examination	691
Urine examination	12,647
Sanitation	160
Others (media preparation etc)	486,427
2. <u>Panatnikhom district hospital</u>	
Bacteriological examination	352
Serological examination	850
Parasitological examination	109
Haematological examination	1,012
Clinical Chemistry examination	237
Urine examination	2,087

### 3. Activity III

3.1 Co-operate with Activity IV in training of public health personnels which has been carried out during 6-10 November 1978.

3.2 Family folders have been designed and printed. The folders are distributed to health communicators for reporting of birth, death, diarrheal and common diseases in the model areas.

3.3 Detection for intestinal parasites including the treatment of positive cases in the model area of Tambon Bor, Klung district have been planned. At present, collection and examination of feces among the school children and people have been carried out.

### 4. Activity IV

The 3<sup>rd</sup> Training Course has been organized by the Activity IV during November 6-10, 1978 at Provincial Chief Medical Office conference room, Chanthaburi.

- Trainees 1. Public Health Personnels (62)  
2. MLT (12)
- Observers Public Health Personnels (3)
- Objectives The trainees know the net work of epidemiology and surveillance system. They are able to do in their routine job and co-operate with the project.
- Duration 1 week
- Contents 1. The basic knowledge of epidemiology and surveillance system.  
2. The net work of epidemiology and surveillance system.  
3. Important epidemic diseases concerning to this project.  
4. The role of the public health personnels and MLT to the project.
- Methods In the reason of short period (1 week), we could train only the theory by using
1. Lecture
  2. Audio-visual aids e.g. slide projector and overhead projector
  3. Sheets and documents
  4. Discussion among trainers and trainees
- Evaluation 1. Group discussion after training  
2. Questionnaires after training

The result of evaluation

1. Trainees were content in the training program and they would like to have further training program.
2. Trainees gained much knowledge of epidemiology and surveillance system. If there are epidemic diseases in their villages, they realized what they should do.
3. Trainees knew the net work of epidemiology and surveillance system, they were willing to co-operate with this project.

Problems and constraints of the trainees in their routine duty

1. The co-operation between the villagers and the public health personnels is still unsatisfied because the villagers lack basic health education.

2. The public health personnels get the result of specimen's examination lately.
3. The transportation is very inconvenient.
4. The public health personnels lack audio-visual aids and equipments to arouse the villagers' interest in epidemiology.
5. The limited number of public health personnels have plenty of routine work. They are afraid that they do not have much time for this project.

#### Suggestions from the trainees

1. PCMO should supply mobile health education unit to arouse the people and motivate their interest in epidemiology.
2. PCMO should send personnels to collect the specimens punctually at least in three days.
3. The public health personnels should know how to collect the specimens correctly, write correct date and have responsibility in following the result of specimen's examination (suggested by a group of MLT)
4. Please let the public health personnels know the result of specimen's examination quickly.

#### 5. Activity V

##### 5.1 Operational research in Virology

###### 1. Field research on hemorrhagic fever

In December 1978, 435 blood specimens of post - epidemic season were collected from the same residents in different age groups as in pre - epidemic season. The estimation of HI antibody titers and infection rate study are now proceeding.

###### 2. Establishment of a new technique for determination of NT-antibodies against dengue viruses

To estimate the NT-antibodies, it is essential to titrate the infectivities of viruses. For dengue viruses, plaque forming activity is usually used as an indicator to measure their infectivities. But, in general, this method has not been standardized



because it takes about one week to get the results even for type 2 virus which is easiest type to produce plaques among four types and also because plaque formation of dengue viruses is not always successful.

Therefore, Dr. Y. Okuno, Dr. T. Fukunaga and Dr. K. Fukai (Osaka University) have developed a new method employing enzyme-labeled antibody staining, or peroxidase technique. This method is a kind of micromethods and can give results within 3-4 days.

Our main purpose in our project is to utilize this method for mass-examination of NT-antibodies against dengue viruses. For the examination of NT-antibodies, we have to titrate the antibody titers at least on three points of different dilution of the same serum. However, if we can get the standard neutralizing curves for dengue viruses, it is possible to estimate the NT-antibody titer by measuring only one dilution point of the serum and thus it opens the way to mass-examination. As this simplification is well established for the case of Japanese encephalitis, so we have been trying to obtain the standard curves for dengue. So far the trial has not succeeded, because dengue viruses have four types, producing much more complicated immune responses than in the case of Japanese encephalitis virus which has only one type. The study for simplification of NT-antibody titration should be continued in this project.

### 3. Isolation and identification of dengue viruses from DHF patient sera

In 1978, the epidemic of DHF was not big as that of the previous year. In 1977, we employed the suckling mouse brain method for the virus isolation, but this year, 1978, an established mosquito cell line, that is Singh's *Aedes albopictus* cell, clone c6/36, was used. One strain from Bangkok and three strains from Chanthaburi were isolated. The strain from Siriraj Hospital, Bangkok, was identified as dengue virus type 2. Three strains from Chanthaburi have not been identified yet, because we met problems during the procedure for identification as followings.

The isolate was passed through the mosquito cells and then tested by neutralization with standard anti D1, D2, D3 and D4 sera. But the infectivity of the isolated virus showed almost no reduction against all four types of standard antisera. We transferred the isolate to suckling mouse brains and then tried the neutralization again. By this test, the isolate was identified as dengue type 2. Other three

strains from Chanthaburi showed similar attitude on the neutralization test and now they are under the procedure to pass through suckling mouse brains. Some strains appeared to be rather hard to cause symptom in mice so far.

The phenomenon mentioned above seems to suggest some interesting characteristics of wild dengue viruses in the view point of the ecological study.

## 5.2 Analysis on causative agents of GI diseases in the model area

In an effort to study causative agents of acute diarrhea in Chanthaburi province, studying pathogens of feces taken by rectal swab has been done on the diarrheal out and in-patients of the Prapok-khao Hospital, 4 district hospitals and on healthy school children.

### 1. Study on entero pathogens of diarrheal out and in-patients in the Prapok-khao Hospital.

Enrichment culture was done in addition to direct culture for the isolation of entero pathogen on each specimen. All of isolates was confirmed by biochemical characteristics and serological examination. The results are as follows; (Table 1)

Table 1 Results of bacteriological study of diarrheal patients in the Prapok-khao Hospital.

	Oct.	Nov.	Dec.	Total
Number of examination	754	868	930	2,252
Number of positive cases	147	194	219	560
V. cholerae	11	0	0	11
V. parahaemolyticus	61	59	34	154
Shigella	53	58	88	199
Salmonella	0	10	9	19
Enteropathogenic E. coli	22	67	88	177

It is apparent that shigellosis has been seen highly frequently among intestinal infections diseases in Chanthaburi province. Some species were sent to the Division of Clinical Pathology, Department of Medical Sciences and Tokyo Metropolitan Research Institute for Public Health in order to do further study on toxin productivity or

phage typing.

2. Study on entero pathogens of diarrheal patients in the four district hospitals.

Necessary materials and transportation media were supplied previously to the SRL of the hospitals and Japanese mobile team made round to pick up specimens from those hospitals to the PHL. As seen in the Table 2, the study has been done as a routine work. Family of the pathogen positive cases will be examined when it can be done.

Table 2 Results of bacteriological study on diarrheal patients in the four district hospitals.

Hospitals	No. Exam.	Pathogen positive cases	% Positive
Thamai	70	15	21.43
Pong-namron	21	6	28.54
Klung	13	5	38.46
Laemsing	10	0	
Total	114	26	22.81

3. Epidemiological survey on entero pathogens among school children.

Detection of entero pathogenic organisms from school children has been studied. This has been considered as a good indicator of health status of the inhabitants and shall be repeated every year. The results obtained from tambon Tagad-Ngao are seen in Table 3.

Table 3 Carrying rate of entero pathogenic organisms among school children in tambon Tagad-Ngao.

		% Positive
Number of examination	427	
Number of positive cases	31	7.26
V. cholerae	0	
V. parahaemolyticus	14	3.28
Shigella	2	0.47
Salmonella	14	3.28

Bactrim (Trimethoprim and Sulfamethoxazole) has been given by the Japanese Expert Team to the pathogen positive cases in children for 5 days according to the results of drug sensitivity test.

### 5.3 Operational research on community participation in health promotion

Training for midwives and sanitarians as tuiters to village volunteers has been in progress by district level instructors and officers of PCMO. Village volunteer communicators have been selected only from two villages in each field tambons in 1977 Thai fiscal year. Each volunteer communicator will be put in charge of 10 families. This plan will be spread every year.

Transcription of family folder to card in English has already been completed in case of Tambon Tagad-ngao except for village 5 in which family folder has not yet been by health officers. Each family is found to consist of about five persons in average; one at least and 13 at most. The form to be filled and sent to health centers by volunteer communicators concerning birth, death, febrile and diarrheal patients was designed.

### 5.4 Research on HBs Antigen and Antibody

Hbs antigen and antibody were determined by reversed passive hemagglutination and passive hemagglutination method. (Medical Technology 3: 239, 1976) Subtype of antigen was determined at Tokyo Metropolitan Institute of Medical Science.

Blood specimen was drawn from 299 healthy blood donors at the Section of blood bank, Prapok-khao Hospital in Chanthaburi, Thailand.

#### Results

HBs antigen positive cases were 37/299, 12.4 %

Titer	% Positive
2	0
3	2.7
4	2.7
5	5.4
6	2.7
7	5.4
8	13.5
9	13.5
10	18.9
11	18.9

Titer	% Positive
12	10.8
13	2.7
14	2.7

As for subtype of antigen was adr 72.9 % and adw 5.4 %. This figure belongs to the Chinese pattern.

HBs antibody positive cases were 132/299, 44.1 %

Titer	% Positive
2	4.5
3	12.1
4	16.7
5	19.7
6	15.9
7	12.1
8	10.6
9	5.3
10	1.5
11	1.5

Those results confirm those of Nishioka et al. They reported that HBs antigen positive cases in Thailand were 9.8 % and antibody 35.3 % in small number of blood specimens by using the same sensitive method as ours. Subtype of antigen was reported by Nishioka et al to be quite similar to Chinese pattern. The present results were based upon about 300 healthy Thai adult people. The antigen positive rate of 12.4 and the antibody positive rate of 44.1 % are apparently higher than the previous results probably because specimens were taken in rural area instead of urban area. It is possible that about a half of people were or are contaminated with HB virus.

29 December 1978

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