ガーナ共和国
野口記念医学研究所プロジェクト(第II期)
終了時評価報告書

平成8年7月
(1996年7月)

国際協力事業団
医療協力部

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国 際 協 力 事 業 団
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序　　文

ガーナ政府は、医療分野全体の整備充実を図るためわが国に技術協力を要請し、これを受けてわが国は、昭和43年からガーナ大学医学部に対して数次にわたる技術協力を開始しました。この成果を踏まえ、昭和52、53年度には無償資金協力によりガーナ大学附属野口記念医学研究所が新設（昭和54年11月完工）されました。同研究所の建設に合わせて、昭和55年から６年間、「下痢症と低栄養」をテーマにわが国による研究協力が実施され、次いで昭和61年から５年間、プロジェクト方式技術協力「野口記念医学研究所プロジェクト」においてウイルス学、栄養学、疫学の３分野の協力が実施されて同研究所の技術基盤が整備されました。

ガーナ政府はこれまでの協力を高く評価し、保健医療・行政および一般国民のための基礎医学研究機能の充実を図るべく、新たに技術協力の要請がなされました。わが国はこれを受けて、平成３年10月から第Ⅱ期に移行することを決定し、５年間の協力を開始しました。本協力では① ＥＰＩワクチンの効果の評価，② 乳幼児下痢症の実態調査と対策，③ エイズなどの感染症の診断、④ 住血吸虫症の対策、を主要目的に掲げ、これまで協力を行ってきています。

このたび、プロジェクト協力期間が平成８年９月末に終了することから、本プロジェクトの最終評価を実施し、今後のとり得る方策についてガーナ側と協議するため、平成８年６月に厚生省国立予防衛生研究所長 山崎修道氏を団長とする終了時評価調査団を派遣しました。

本報告書は、同調査団の調査およびその協議内容とその結果を取りまとめたものです。

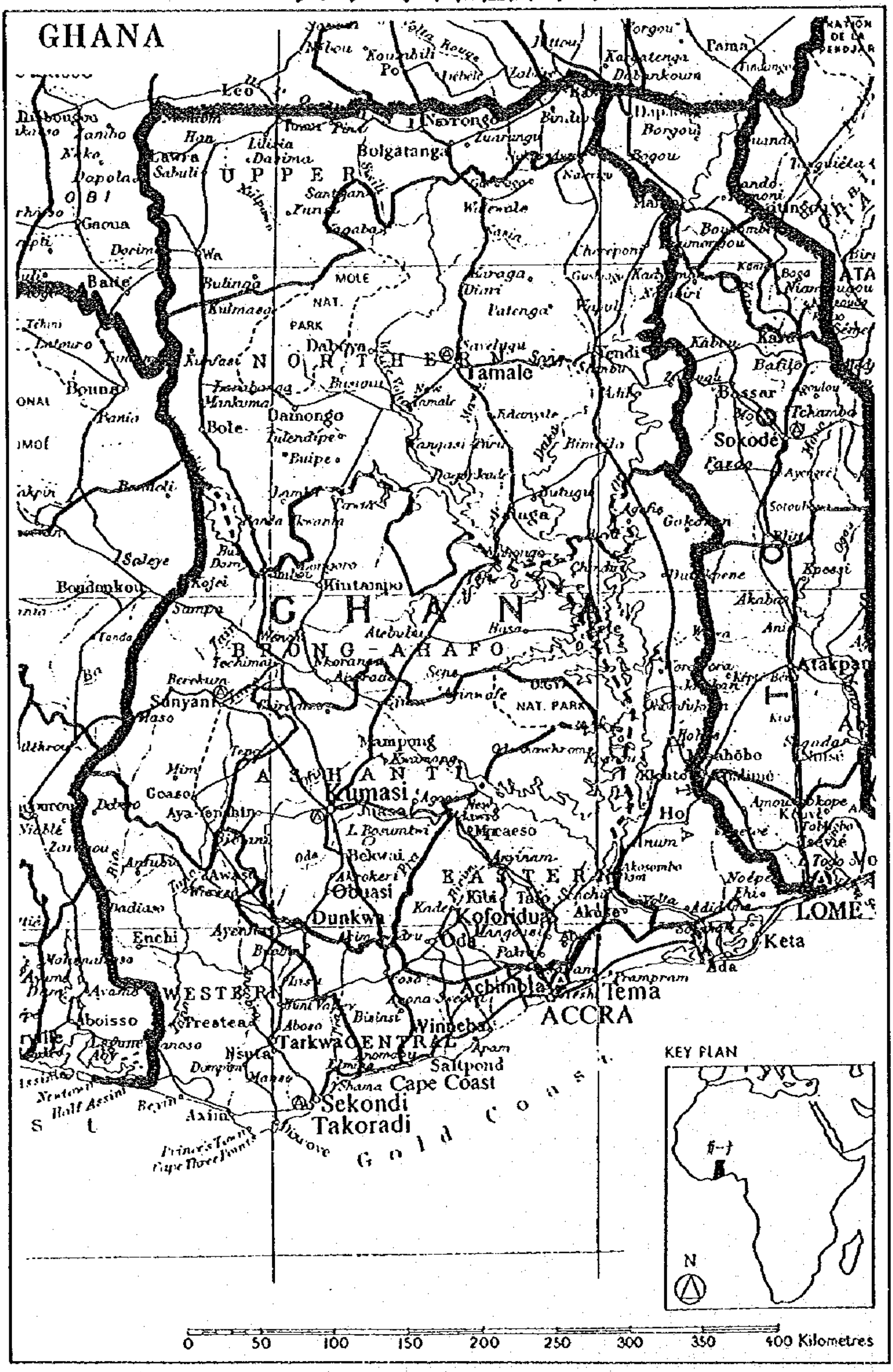
ここに、本調査にご協力を賜わりました関係各位に対しまして、深甚なる謝意を表す次第です。

平成８年７月

国際協力事業団

理事　小澤　大二

プロジェクト位置図（1）


GHANA
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BRONG-AHAFO
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ASHANTI
Kumasi
Mampong
Obuasi
Dunkwa
EASTERN
Koforidua
Akosombo
Tema
ACCRA
Achimota
Winneba
Saltpond
Cape Coast
Sekondi
Takoradi
Tarkwa
CENTRAL
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Sokode
Bassar
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ガーナ
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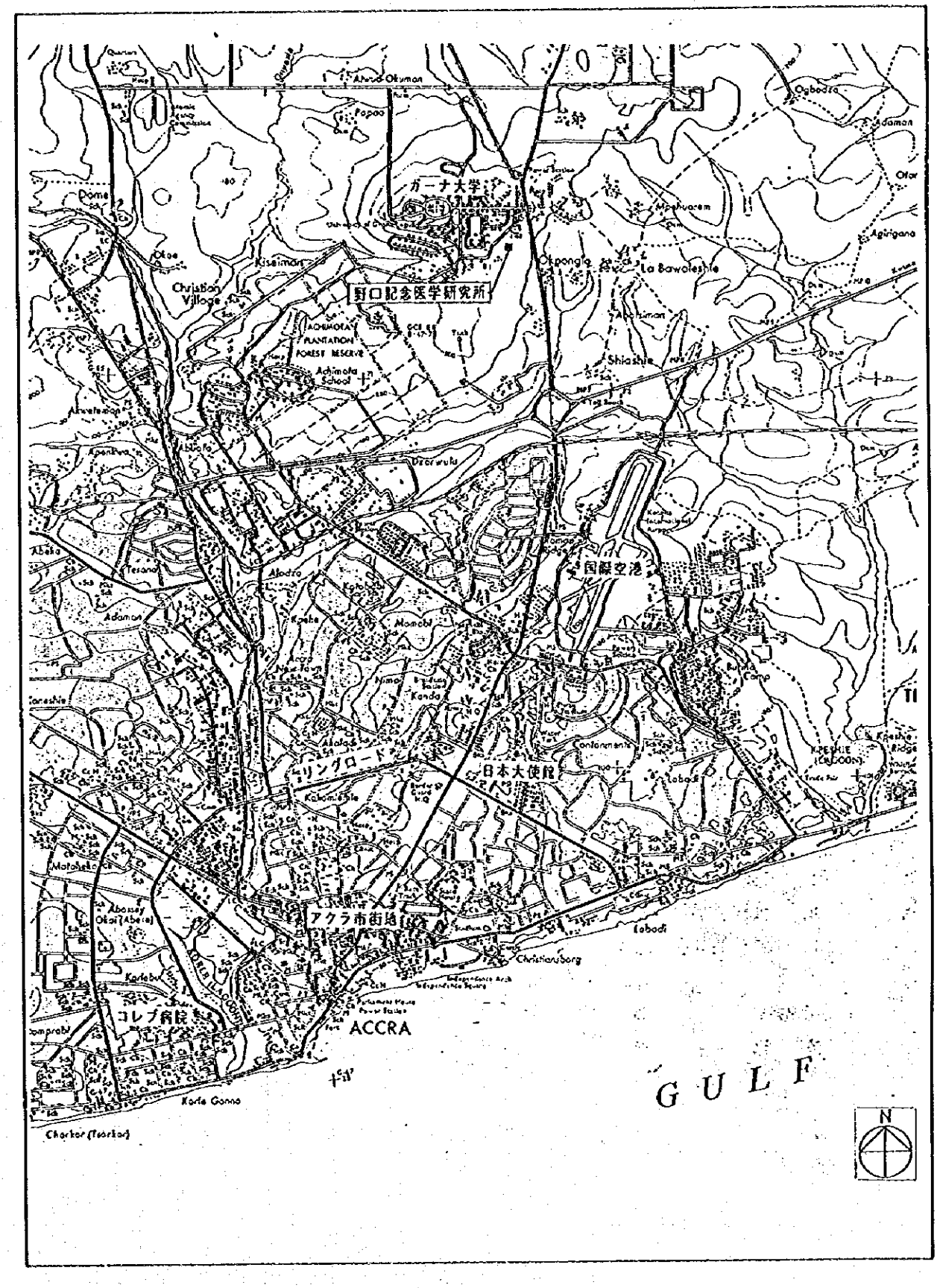
プロジェクト位置図（2）


ガーナ大学
野口記念医学研究所
国際空港
日本大使館
リングロード
アクラ市街地
コレブ病院
ACCRA
GULF
Ogbodra
Adaman
Otaw
Agirigano
Christian Village
Kisseman
Okponglo
La Bawaleshie
Shiashie
Achimota School
ACHIMOTA FOREST RESERVE
Abeka
Tesano
Alajo
Kaneshie
Mamobi
Kanda
Labadi
Christiansborg
Korle Gonno
Chorkor (Teorkor)
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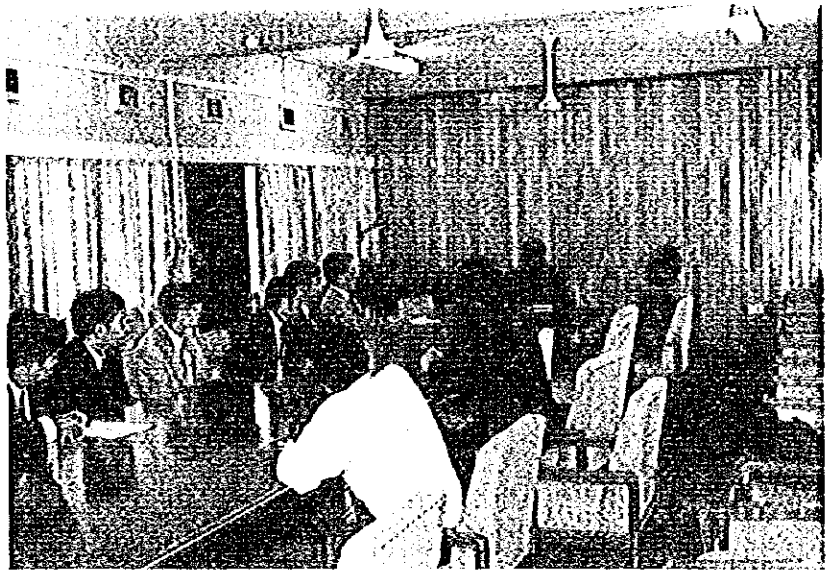
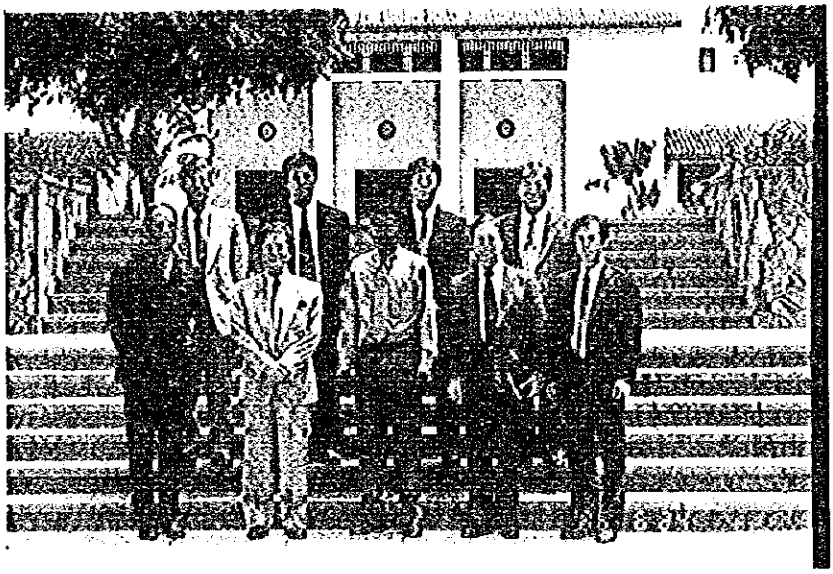


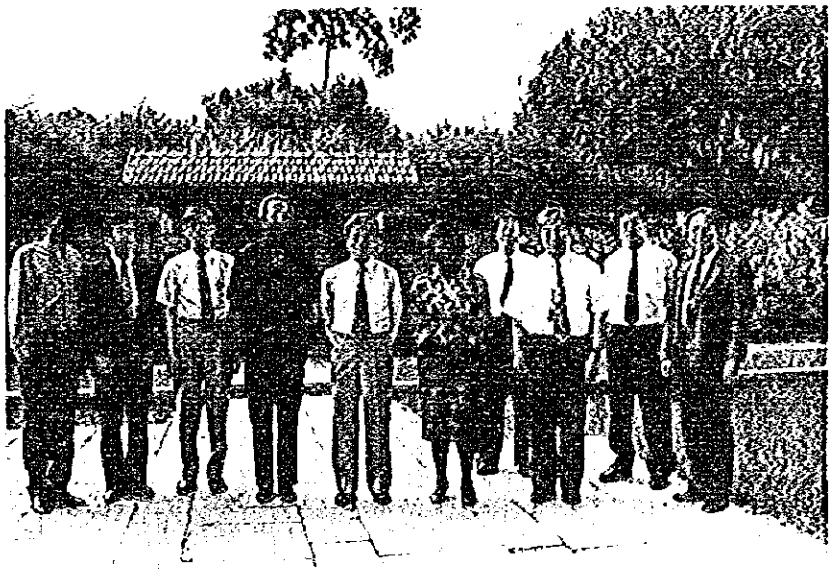
▶
保健省表敬

▶
野口記念医学研究所における
協議風景

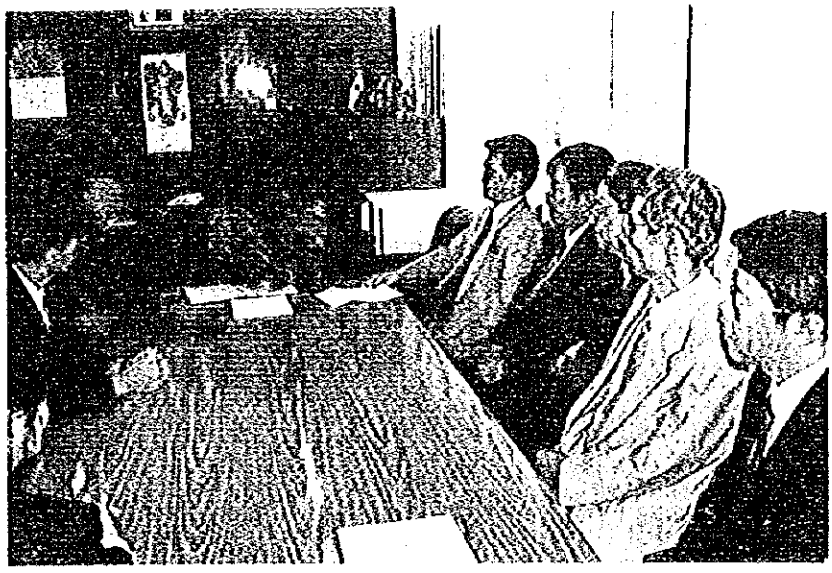
▶
下痢症研究発表セミナー
（於：野口記念医学研究所）



野口記念医学研究所関係者
および終了時評価チーム



ガーナ大学副学長、野口記念医
学研究所関係者および終了時評
価チーム



大蔵経済企画省表敬

目　　次

第１章　終了時評価調査団の派遣

1-1　調査団派遣の経緯と目的

ガーナでは1957年の独立以降も医療事情の改善が進展せず、熱帯地方特有の感染症が蔓延し劣悪な医療環境にあった。また、当時の保健医療行政上も経済不振のため医療従事者の養成が進まなかったため、これら状況の改革には至らなかった。これら事情から、同国は医療分野全体の整備充実を図るためわが国に技術協力を要請してきた。これに対してわが国は、1968年からガーナ大学医学部に対し技術協力を開始し、① ウイルス学と電子顕微鏡、② 低栄養と感染症、③ 病態生理学と免疫学、をテーマに基盤整備を行った。この成果を踏まえ、1977、1978年度には無償資金協力（計20億円）によりガーナ大学医学部附属野口記念医学研究所が新設（1979年11月）され、④ 下痢症と低栄養が新たに協力内容に加わった。

その後、1986年10月からは野口記念医学研究所プロジェクトが開始され① ウイルス学、② 栄養学、③ 疫学、が主要協力テーマとなった。同協力は1991年９月末に５年間の協力期間を終了することとなったが、ガーナ政府はこれまでの協力を高く評価し、研究成果を保健医療行政を通じて広く国民に還元させるために技術協力継続を要請してきた。

わが国は、これを受けて1991年10月から第Ⅱ期に移行することを決定し５年間の協力を開始した。本協力では① ＥＰＩワクチンの効果の評価、② 乳幼児下痢症の実態調査と対策、③ エイズなどの感染症の診断、④ 住血吸虫症の対策、を主要目的に掲げ、これまで協力を行ってきている。

本調査は、1996年９月末にプロジェクト協力期間が終了することから、終了に先立ち国内委員を中心として構成された終了時評価調査団を派遣し、実施内容および実績の評価を行った結果から提言などを導き出し、今後の協力の方向性を定めることを目的としたものである。

1-2　調査団の構成

（担　当）	（氏　名）	（所　属）
団長・総括	山崎　修道	厚生省国立予防衛生研究所長
疫学	神谷　齊	厚生省国立療養所三重病院長
寄生虫学	小島　荘明	東京大学医科学研究所寄生虫研究部教授
栄養学	岸　恭一	徳島大学医学部栄養学科栄養生理学教室教授
ウイルス学	佐多徹太郎	国立予防衛生研究所エイズ研究センター感染病理室長
計画評価	青木　利道	国際協力事業団医療協力部医療協力第二課

1-3　調査日程

日順	月　日	曜日	移　動　お　よ　び　業　務
1	6月20日	木	移動：成田→チューリヒ（ＳＲ169）
2	6月21日	金	移動：チューリヒ→アクラ（ＳＲ264） 〔佐多団員：移動　成田→チューリヒ（ＪＬ407）〕
3	6月22日	土	派遣専門家との事前打合せ 〔佐多団員：移動　チューリヒ→アクラ（ＬＨ564）〕
4	6月23日	日	派遣専門家との事前打合せ 資料整理
5	6月24日	月	ＪＩＣＡガーナ事務所表敬・打合せ 野口記念医学研究所表敬・打合せ ガーナ大学表敬 野口記念医学研究所における協議
6	6月25日	火	保健省表敬 大蔵経済企画省表敬 野口記念医学研究所における分野別協議（下痢症関連分野、エイズ分野）
7	6月26日	水	「下痢症研究発表セミナー」（野口記念医学研究所）参加 野口記念医学研究所における分野別協議（住血吸虫症分野）
8	6月27日	木	野口記念医学研究所における分野別協議（ワクチン関連分野） 合同委員会会議参加
9	6月28日	金	合同評価報告書署名 在ガーナ日本大使館：ＪＩＣＡガーナ事務所に報告 〔山崎団長・小島団員：アクラ発（ＢＡ078）〕
10	6月29日	土	移動：アクラ発（ＬＨ565） 〔山崎団長・ロンドン着、同発（ＢＡ006）、 小島団員：ロンドン着〕
11	6月30日	日	移動：フランクフルト着 （山崎団長・東京着、小島団員：ロンドン発）
12	7月1日	月	移動：フランクフルト発（ＬＨ710、ＬＨ740） （小島団員：東京着）
13	7月2日	火	移動：東京、大阪着

1-4 主要面談者

＜ガーナ側＞

（1） 教育省

Prof. A. N. Deheer-Amissah	Executive Secretary National Council for Tertiary Education

（2） 保健省

Dr. J. D. Otoo	Director of Medical Service
Dr. K. Ahmed	Director, Public Health Division

（3） 大蔵経済企画省

Mrs. A. Batsa	Director, International Economic Relations Division

（4） ガーナ大学

Prof. F. Dolphyne	Pro-Vice-Chancellor
Prof. I. Addae-Mensah	Dean, Faculty of Science

（5） 野口記念医学研究所

Prof. F. K. Nkrumah	Director
Mr. S. W. Opoku-Agyakwa	Administrative Secretary
Dr. K. A. Kpram	Epidemiology Unit
Dr. S. K. Dunyo	Epidemiology Unit
Dr. P. Mensah	Bacteriology Unit
Dr. M. Armah-Klimesu	Nutrition Unit
Ms. J. Yartey	Nutrition Unit
Dr. N. K. Ayisi	Virology Unit
Dr. J. A. M. Brandful	Virology Unit
Dr. G. Armah	Electro-Microschope
Dr. M. E. Aryeetey	Parasityogy Unit
Dr. K. M. Bosompem	Parasityogy Unit

＜日本側＞

（1） 在ガーナ日本大使館

田中 明久	特命全権大使
妹尾 創	一等書記官

（2） ＪＩＣＡガーナ事務所

八林　明生	所長
小瀬川　修	次長
阿部記実夫	所員

（3） プロジェクト派遣専門家

神谷　敏也	チームリーダー
金丸　晃治	調整員

1-5　終了時評価の方法

（1） 参照資料

① 討議議事録（Ｒ／Ｄ）

② 暫定実施計画（ＴＳＩ）

③ その他の協議ミニッツ等

（2） 評価方法

各協力分野における５年間の実績、成果を確認し、ガーナ側の評価報告をもとに協議を行い、下記の評価項目、対象分野によりガーナ側と共同で評価を行う。これにより得られた評価結果および日本側専門家、ガーナ側関係者との協議結果を、合同評価報告書として取りまとめて双方で署名する。

（3） 評価項目

① 目的

② 活動実績、技術移転状況

③ 目標達成度

④ 評価

⑤ 今後の目標と提案

（4） 対象分野

① ワクチン関連分野

② 下痢症関連分野

③ エイズ分野

④ 住血吸虫症分野

第2章　プロジェクトの当初計画

2-1　相手国の要請とわが国の対応

1968年　医療協力要請を受け調査団派遣

1969年　ガーナ大学医学部（コレブ病院）へ専門家派遣、技術協力開始
第１次協力分野「ウイルス学と電子顕微鏡」

1973年　第２次協力分野「低栄養と感染症」

1976年　第３次協力分野「病態生理と免疫学」

1977年　ガーナ大学医学部へ研究所建設のため無償資金協力（10億円）

1978年　ガーナ大学医学部へ研究所建設のため無償資金協力（10億円）

1979年　野口記念医学研究所完成・開所

1980年　野口記念医学研究所において技術協力開始
第４次協力分野「下痢と低栄養」

1983年　野口記念医学研究所へ高圧電流配電施設建設のため無償資金協力（８億4000万円）

1986年　野口記念医学研究所プロジェクト
協力分野「ウイルス学」「栄養学」「疫学」

1991年　野口記念医学研究所プロジェクト第Ⅱ期
協力分野「ワクチン関連」「下痢症関連」「エイズ分野」「住血吸虫症分野」

1996年　９月終了予定

2-2　プロジェクトの成立と経緯

1991年３月　ガーナ政府から技術協力要請を受理

1991年７月　長期調査員により要請内容の確認と協力計画の策定

1991年９月　実施協議調査団派遣、討議議事録（Ｒ／Ｄ）署名

1991年10月　プロジェクト第Ⅱ期開始

1992年12月　計画打合せ調査団派遣（進捗状況の確認、研究成果の評価、ＴＳＩ見直し）

1994年１月　巡回指導調査団派遣（進捗状況の確認、研究成果の評価、ＴＳＩ見直し）

1995年１月　運営指導チーム派遣（進捗状況の確認、研究成果の評価、ＴＳＩ見直し）

2-3　プロジェクトの目的

（1）　プロジェクトの目的

感染症と免疫学の研究を強化し、感染症への重症化要因の決定と、よりよき感染症対

策を研究する一方、レファレンスラボラトリーとしての機能付与、人材育成の場を確立する。

（2） 協力対象分野および目標

① ワクチン関連分野

Ⅰ）ＤＰＴワクチン

Ⅱ）麻疹ワクチン

Ⅲ）免疫学的研究

Ⅳ）品質管理

② 下痢症関連分野

Ⅰ）難治性下痢症原因の検討

Ⅱ）難治性下痢症に関係する水や離乳食および個人の衛生指標の汚染の検討

Ⅲ）難治性下痢発症に関連する乳児摂食状況の調査

Ⅳ）免疫栄養学的研究／難治性下痢症と栄養状態および免疫能に関する研究

Ⅴ）穀物ベースＯＲＳ研究／評価

③ エイズ分野

Ⅰ）ＨＩＶ感染症の診断技術移転

Ⅱ）疫学的伝播経路研究／母子感染研究

Ⅲ）ウイルス分離と性質の分子生物学的研究

Ⅳ）ＡＩＤＳ患者の臨床的、免疫学的、ウイルス学的検討

④ 住血吸虫症分野

〔フィールド研究〕

Ⅰ）住血吸虫症基礎調査

Ⅱ）疫学的、社会文化学的、経済学的および行動学的因子

〔実験室研究〕

Ⅲ）化学療法を併用した制圧法の検討

Ⅳ）有効な殺貝剤開発

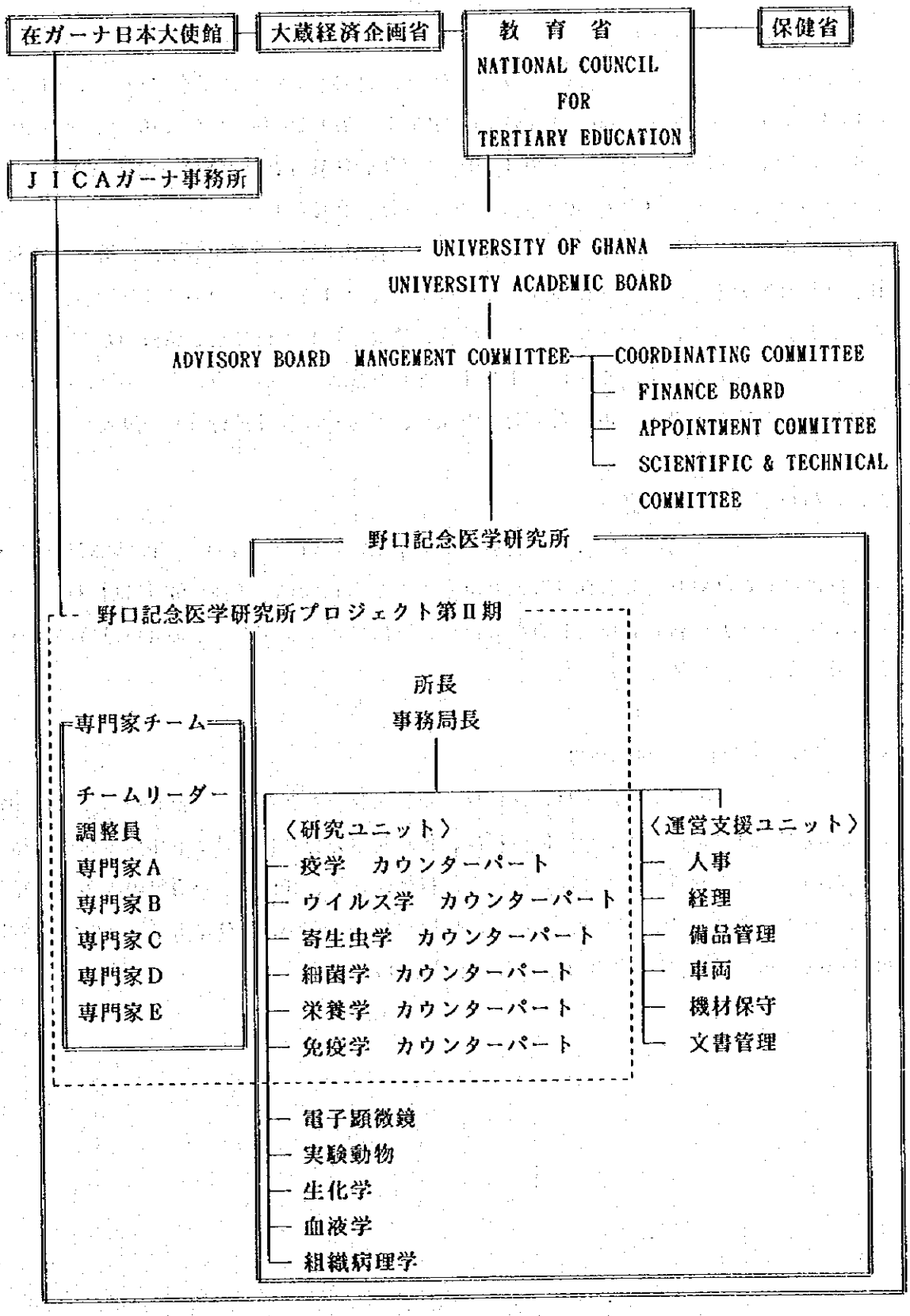
Ⅴ）S.Haematobiumの亜種の研究

Ⅵ）免疫診断法の開発

2-4 プロジェクトの活動計画と投入計画

合同評価報告書ANNEX５の暫定実施計画（ＴＳＩ）のとおりである（資料２参照）。

2-5　相手側の実施機関


在ガーナ日本大使館
大蔵経済企画省
教　育　省
NATIONAL COUNCIL
FOR
TERTIARY EDUCATION
保健省
ＪＩＣＡガーナ事務所
UNIVERSITY OF GHANA
UNIVERSITY ACADEMIC BOARD
ADVISORY BOARD
MANGEMENT COMMITTEE
COORDINATING COMMITTEE
FINANCE BOARD
APPOINTMENT COMMITTEE
SCIENTIFIC & TECHNICAL
COMMITTEE
野口記念医学研究所
野口記念医学研究所プロジェクト第Ⅱ期
所長
事務局長
専門家チーム
チームリーダー
調整員
専門家A
専門家B
専門家C
専門家D
専門家E
〈研究ユニット〉
疫学　カウンターパート
ウイルス学　カウンターパート
寄生虫学　カウンターパート
細菌学　カウンターパート
栄養学　カウンターパート
免疫学　カウンターパート
電子顕微鏡
実験動物
生化学
血液学
組織病理学
〈運営支援ユニット〉
人事
経理
備品管理
車両
機材保守
文書管理

第3章　プロジェクトの実績

3-1　プロジェクトの投入実績

本プロジェクトの投入実績は、合同評価報告書ANNEX２の専門家派遣、研修員受入(DISPATCHED EXPERTS AND COUNTERPART PERSONNEL TRAINED IN JAPAN FROM FY1991 TO FY 1996)、同ANNEX３の機材供与（PROVISION OF TECHNICAL EQUIPMENT）および同ANNEX４の実施経費（SUMMARY OF COST）のとおりである（資料２参照）。

専門家派遣、研修員受入れおよび機材供与は、暫定実施計画（ＴＳＩ）に沿って実施され、技術移転の進捗度、受入側の都合などにより変更はあったもののほぼ計画どおりに実施された。実施経費については、５年間の協力期間中に日本側は約３億3700万円（専門家派遣、研修員受入諸費を除く、1996年６月現在）を投入した。一方、ガーナ側は研究所運営経費として約２億3600万円（人件費、研究費、運営費、施設維持費）を投入した。

3-2　プロジェクトの活動実績

本プロジェクトの活動実績は、合同評価報告書ANNEX６のACTUAL IMPLEMENTATION OF THE NOGUCHI MEMORIAL INSTITUTE PROJECTⅡおよび同ANNEX７のLIST OF PUBLICATIONのとおりである。また、各研究協力分野の実績は、評価ワーキングシートのACHIEVEMENTS欄のとおりである（資料４参照）。

3-3　プロジェクトの目標達成度

本プロジェクトの目標達成度は、評価ワーキングシート（資料４参照）をベースに測定され、双方の検討資料とされた。同資料は、各研究協力分野における５年間の活動実績をみるため、ガーナ側の報告と協議に基づき、目標、実績、評価および今後の課題別に結果を取りまとめ作成した。目標達成度の検討結果は、最終的に合同評価報告書のV. RESULT OF EVALUATIONとして各研究協力分野別に記載された。

第4章　プロジェクトの評価

4-1　プロジェクトの当初計画とプロジェクトの実績の比較

プロジェクトの当初計画とプロジェクトの実績の比較は、合同評価報告書ANNEX５の暫定実施計画(ＴＳＩ)とANNEX６のACUTUAL IMPLEMENTATION OF NOGUHI MEMORIAL INSTITUTE PROJECTⅡ（資料２）、および評価ワーキングシート（資料４）のとおりである。

4-2　プロジェクト運営管理と適正度

（１）　相手国政府のプロジェクト実施体制

①　実施機関存立への政策的支援

野口記念医学研究所は、教育省高等教育審議会（National Council for Tertiary Education）により管轄されるガーナ大学の附属研究機関である。研究所運営は、半自治方式（SEMI-AUTONOMOUS）で運営組織上はガーナ大学に属するが、実施予算についてはガーナ大学と同様に教育省高等教育審議会により直接承認および配分される。

運営上の組織機構は、第２章2-5「相手側の実施機関」の機構図のとおりである。各委員会の詳細は、野口記念医学研究所の組織について（NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH/ORGANISATION）のとおりである（資料５、６）。なお、各委員会名と主な機能は次のとおりである。

[委員会名]	[主な機能]
Management Committee	運営の基本方針策定、運営および研究の承認
Advisory Committee	政府関連機関との調整連絡、国家計画に関する助言
Co-ordinating Committee	日本の医療協力プログラム運営に関する実施監督
Finance Board	会計監督
Appointment Committee	一般研究所員の人事
Scientific and Technical Committee	研究計画の審査、見直しおよび運営に関する協議

野口記念医学研究所は、以上の組織のもとに運営され、行政上および財政上の自己運営能力は確保されており、ガーナ政府の同研究所に対する実績の評価と期待がうかがえる。しかし、長年の技術協力の結果として同研究所の実力および知名度は高くなってはいるものの、運営組織へのより高度なレベルでの政策的支援は活発でなく、十

分な行政能力および財政能力を持つに至っていない。今後は、指導監督機関である教育省および同研究所の実績活用に不可欠な保健省のさらなる支援、および連携が必要とされている。

② 管理運営体制

野口記念医学研究所の管理運営体制としては、合同評価報告書ANNEX 1 のNOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH/STAFF LIST 1996のとおりである。全職員数は、118名。内訳は、研究所長と事務局長以下、研究職員が61名、事務職員が19名、管理職員が38名である（資料２参照）。

運営上の人員確保については、各部門ごとに人員定数が設定されているが、主に財政上の制約から全体的に人員不足の状況にある。特に研究職員については、十分な能力を持つ人材の確保が難しく、若手の育成が重要な課題になっている。人員確保における主な障害は、基準となるガーナ大学の給与レベルが低いことが一因である。また、運営能力については、各部門ともに一般職員の能力不足が内外から指摘されており、組織的な支援、対策が実施されている。同研究所は、人材育成および能力の開発を目的として、ガーナ政府機関の主催する教育・研修プログラムに職員を派遣し、運営および技術能力の向上を支援している。わが国の技術協力による人材育成と同様に、ガーナ側の自覚により、実施体制の整備および強化が地道に行われている点は評価すべきである。

③ 財務体制

野口記念医学研究所の財政状況は、ガーナ国内経済の推移ならびにガーナ政府の財政状態と連動し、当初の状況よりも下降傾向にある。しかし、同研究所は、同国唯一の医学研究機関として教育省およびガーナ大学から実績を高く評価されており、同様の研究機関に比べその財政調達能力は優れており、研究所運営に関する諸経費は十分とはいえないものの確保されている。したがって、本プロジェクトをはじめとする外部支援機関の支援は、研究に関する経費負担が中心である。

プロジェクト終了後にガーナ側のみの研究継続および研究所運営を想定した場合、研究費の調達が重要な課題となるであろう。また、増大する運営経費分の確保も不可欠である。研究費の調達は、ガーナ政府からすべて供給されるのが原則であるが、現状では大部分がわが国を含めた国内外の支援機関から直接調達されている。同国経済の発展は、見通しが流動的であることから、引き続き外部からの研究費支援が必要不可欠である。

幸いに先進国の研究機関の同研究所への評価は高く、多くの交流が行われている。1996年度当初の外部との研究協力プロジェクトは、国内外から合計21分野に及んでい

る。同研究所は、外部の支援機関との協力に耐え得る技術レベルを維持、向上させることに努力しており、今後も引き続き各研究分野の研究費支援は得られるであろう。

4-3 評価の総括

（1） 評価結果および今後の課題

各研究協力分野の評価結果は次のとおりであった。

① ワクチン関連分野

ワクチン関連分野の当初の目的は、ワクチンの品質と効果の評価およびＥＰＩワクチンに対する免疫反応の評価をすることであった。その目的を達成するために次の４つのプロジェクトが計画された。

ⅰ）ＡＰＤＴワクチントライアル

ⅱ）麻疹（ＡＩＫ-Ｃ）ワクチントライアル

ⅲ）ワクチン接種と免疫獲得の評価および適切な接種時期の決定

ⅳ）ワクチン品質管理システムの開発

各プロジェクトの成果と評価結果は次のとおりであった。

ⅰ）わが国で開発した熱安定ＤＰＩワクチンと従来ガーナで使用されてきたＤＰＴワクチンとの比較試験を実施し、効果において有意差はなくまた副作用においても局所反応以外に差がなく、発展途上国において使用可能と判断された。日本では追加接種を実施しているがガーナ（ＷＨＯ／ＥＰＩ）では実施しておらず、今後、発展途上国で追加接種が必要であるかどうかについては検討課題である。

ⅱ）麻疹は発展途上国では生後６カ月から罹患するため、その時期から接種可能なワクチンが要望されている。ガーナにおいて日本で開発されたＡＩＫ-Ｃワクチン（６カ月時接種）と従来使用されているSchwartzワクチン（９カ月時接種）との比較試験を実施した。両ワクチン間に有効性と安全性において有意差はないと判断された。

ⅲ）対象患者が得られなかったため、基礎研究として最も一般的な病気であるガーナの子供の麻疹罹患時における免疫学的変化を、新しく導入したＦＡＣスキャン技法を用いて検討し、日本の子供との間に差が認められている。

ⅳ）ワクチンの品質管理（ポリオ、麻疹、黄熱）については技術移転を完了した。今後保健省が野口記念医学研究所の能力を活用するようアピールすることを確認した。

② 下痢症関連分野

下痢症分野の当初の目的は、特にガーナの小児における下痢症に着目し下痢症制圧

の適切な方法の確立であった。その目的を達成するために次の５つのプロジェクトが計画された。

ⅰ）持続性下痢症の原因の検討

ⅱ）下痢症に関係する水や離乳食の汚染および個人の衛生指標の検討

ⅲ）下痢症発症に関連する乳児の摂食状況の観察

ⅳ）持続性下痢症と栄養状態および免疫能に関する研究

ⅴ）穀物ベースＯＲＳの組成の決定と評価、ならびに発酵／非発酵離乳食を利用した食事療法

各プロジェクトで得られた知見は、次のとおりであった。

Ⅰ）持続性下痢症患児の糞便および食品、飲料水から多数の細菌、ウイルス、寄生虫を検出し、個人衛生の重要性が指摘された。

ⅱ）持続性下痢症と関連づけて、幼児の栄養法を観察し、早期の補食および汚染された離乳食の投与が持続性下痢症の誘因となることを明らかにした。

ⅲ）伝統的なトウモロコシ発酵食品が下痢の予防に有効であることを見つけた。

ⅳ）持続性下痢症患児は細胞性免疫が障害されていた。

ⅴ）村で作製可能な穀類経口補液剤の開発を行い、それが臨床的に有用であり、地域レベルでも効果があることを確認した。

以上、持続性下痢症においてはその発生原因の解明について大きな成果が得られるとともに、衛生面だけではなく社会学的／教育学的な見地からの住民への衛生知識啓蒙が必要であることが判明した。また、村落レベルでも入手可能な伝統食を利用してのＯＲＳ作製方法の確立など、理論面だけではなく実践面においても寄与することができた。これらのことから、持続性下痢症プロジェクトは順調に遂行されたと判断される。今回得られた知見を持続性下痢症の予防と治療に活用できるよう、今後の行政側の対応が課題であろう。

③　ＡＩＤＳ分野

ＡＩＤＳ分野の当初の目的は、ＨＩＶ研究に必要な適切な技術を開発し確立すること、およびそれらの疫学的研究であった。その目的を達成するために次の４つのプロジェクトが計画された。

Ⅰ）ＨＩＶ感染症の診断技術移転

ⅱ）疫学的伝搬経路研究／母子感染研究

ⅲ）ウイルス分離と性質の分子生物学的研究

ⅳ）ＡＩＤＳ患者の臨床的、免疫学的、ウイルス学的検討

各プロジェクトの成果と評価結果は次のとおりであった。

Ⅰ）ＨＩＶ感染症の診断に必要な技術移転はほとんど終了し、実際の血液検体について検索が行われている。ＰＣＲ法（Polymerase chain reaction：遺伝子増幅法）の有用性は高く評価され、ウイルスユニットのスタッフにも広く使われている。しかし、ＰＣＲ法を用いた診断には今後より多くの経験が必要である。

Ⅱ）ＨＩＶ感染症の診断として十分な検体数について検討され、ガーナにおけるＨＩＶ／ＡＩＤＳ感染状況を知ることが可能となった。こういった基礎的なデータは非常に重要で、ガーナ国内における感染症の新しい傾向を理解し、エイズの予防治療面で重要な情報となる。

Ⅲ）ウイルス分離は効果的に行えるようになったが、より標準化された技法としては十分とはいえない。末梢血リンパ球を用いたウイルス分離法は今後より役立つと思われる。一部については分子生物学的な検討が行われたが、いまだ十分とはいえない。

Ⅳ）ＨＩＶ感染症の臨床例や病理解剖例における日和見感染症のガーナにおける現状が判明した。ガーナ人の標準末梢血ＣＤ４とＣＤ８数が判明し、今後の患者の病態把握に有用と考えられる。

以上、ウイルスユニットではＨＩＶ／ＡＩＤＳ診断法の技術移転は、当初計画どおりなされたといえる。さらにＨＩＶ感染臨床例について日和見感染症の情報が得られたことから、今後本プロジェクトの研究結果が臨床面でも生かされるようになると思われる。以上の研究により学術論文７編が国際誌に発表された。万一、研究の実施において、ウイルスユニットにおける実施体制面（特に人員配置上の問題）が十分でなく、研究体制にも影響を与えていることから、今後これらの問題を改善していくことが必要であろう。

④　住血吸虫症分野

住血吸虫症分野の当初目的は、ガーナにおける住血吸虫症制圧に有効で実行可能な方法を確立することであった。その目的を達成するために、フィールド研究と実験室研究で次の６つのプロジェクトが計画された。

［フィールド研究］

Ⅰ）保健省と共同しガーナにおける住血吸虫症の罹患状況を調査

Ⅱ）コミュニティーにおける住血吸虫症に関連する基本的な疫学的、社会文化学的、経済的および行動学的因子を調査

Ⅲ）化学療法を併用した住血吸虫症制圧法の有効性検討

［実験室研究］

Ⅳ）有効な殺貝剤の開発

V）S.haematobiumの亜種の研究

VI）免疫診断法の開発

その後、研究方法に合わせて次のように組み替えられた。

Part１：a:Parasitological background data

b:KAPB study

c:Focus group discussion

Part２：Water contact studies

Distribution of host snail

Part３：Intervention Study

Part４：Echo screening, Immunological diagnosis, Subtype of haematobium, Mollucicide

Part１からPart４まではフィールド研究で、Dr.Aryeeteyがカウンターパートとして研究を進めた。基礎調査が遅れたため、化学療法開始が遅れ、ＴＳＩでは３回予定されていた化学療法が１回しかされないように変更された。1995年８月の小島短期専門家の派遣でもう一度化学療法を行うこととされ、1996年３月末より二度目の化学療法が行われている。

乾季水辺行動調査の大量のデータエントリーは終了したが分析はなされておらず、報告書の作製を９月中に完了するのは無理と思われる。２度目の化学療法後の評価も９月中に終了する見込みはない。積極的に介入した村では、井戸やトイレを供給することが行われ、住血吸虫症対策のみならず、村落開発をも行ったともいえる。いずれにしてもフィールド調査で得られた住血吸虫症の流行状況やそのコントロールのために現地で経験されたことがらは、今後保健省による対策にも有用な情報を提供したものと考えられる。

また、実験室研究では住血吸虫症の免疫診断に関し、簡便なスティック診断法の開発に成功したほか、殺貝剤、亜種については今後の発展が期待できるような初期段階の成果が得られた。

以上の研究により、学術論文７編（うち２編は印刷中）が国際誌に投稿され、国際学会などでの研究発表６編、修士論文１編の形で成果が発表されている。

したがって、乾季水辺行動調査の結果分析、化学療法の評価については時間的にも第Ⅱ期終了の９月までには完成しないことになるが、フィールド調査に基づく実践的な住血吸虫症対策については、十分な成果が得られたものと判断される。

（２） 評価の総括

日本・ガーナ双方による合同評価の結果、本プロジェクトの実施計画は、投入実績、

活動実績および各研究協力分野からの報告に示されているとおり、運営上の都合により多少の変更があったものの、ほぼ当初の計画に則して実施された。報告された実績は、当初の目的をおおむね達成しているものと評価された。

ただし、各研究協力分野の成果の詳細からは、いくつかの面で今後の課題となる事項が見受けられた。これらの事項については今後、フォローアップなどの形で協力を継続していけば、よりいっそうの協力効果が得られるものと判断された。

各研究協力分野の評価総括については次のとおりであった。

① ワクチン関連分野

ワクチン関連分野については、麻疹ワクチンのフォローアップを除いておおむね研究課題を達成しており、ワクチンの品質管理については技術移転が完了した。また、麻疹罹患時に日本の小児とガーナの小児の間に免疫反応に差があることを示唆するデータを得た。ガーナでは麻疹に罹患する年齢も早く、ワクチン接種時期と免疫反応の関係についても検討の必要性が残されていることから、今後、継続的な研究が必要である。

② 下痢症関連分野

下痢症関連分野については、ガーナの子供に多くみられる持続性下痢症（２週間以上にわたって続く下痢）について、その発生原因の解明に寄与した。また、下痢症の治療に使用される経口補液（ＯＲＳ、下痢症による脱水症状を防ぐため、電解質などを加え体内に吸収されやすくした液体）を現地産の材料で作製することに成功し、今後、住民への普及が待たれている。

③ ＡＩＤＳ分野

ＡＩＤＳ分野については、ＨＩＶ／ＡＩＤＳ診断法の技術移転は予定どおり終了し、今後これら技術が研究面だけでなく、ガーナ国内におけるレファレンスセンターとしても活用されることが期待されている。

ガーナでもエイズ対策が重要な保健政策になっている点にも鑑み、エイズ分野の研究については今後とも最新の情報と技術を導入しつつ継続的に実施していくことが重要である。なお、本分野はウイルスユニットでの研究が進められているが、ユニット長のリーダーシップに問題があるなど、ガーナ側はカウンターパートの配置体制を再検討する必要がある。

④ 住血吸虫症分野

住血吸虫症分野では、住血吸虫症制圧に有効で実行可能な方法を確立することを目的に、疫学調査、住民の社会文化的背景調査を行い、住血吸虫症対策に有効な知見を得た。また、実験室内研究では、フィールドで利用可能な診断キットが開発された。

これらのことから、ガーナでの住血吸虫症対策にあたって、その基礎データの収集および方法論策定に寄与したものと判断される。

4-4 結論

本プロジェクトの協力計画は、ほぼ当初計画に則して実施され、みるべき成果があげられた。これらの成果は、ガーナ側カウンターパートと日本人専門家との一貫した連携協力から生み出されたものであり、当初の目的をおおむね達成したものと評価される。

評価作業のなかで、各研究協力分野ともにいくつかの面で今後の課題が指摘された。ガーナ側当局は、これらの課題について研究協力を継続し、よりいっそうの協力効果を得るために、本プロジェクトのフォローアップ協力を強く要望した。

今回の評価調査で意見交換を行ったガーナ大学、教育省、保健省、大蔵経済企画省の各関係者は一致して、わが国のガーナへの援助、特に野口記念医学研究所への援助と多くの実績に対し、高い評価をしており、今後の同研究所における協力関係の継続が同国の医療事情の改善にきわめて大切であると述べた。

終了時評価調査団は、今回の評価結果およびガーナ側の要請を日本へ持ち帰り、関係当局へ報告することでガーナ側関係者と同意した。また、評価結果を受けた今後の計画については、正式ルートを通じて手続きを進めることとした。

資　　料

1　ミニッツ
2　合同評価報告書
3　合同委員会会議議事録
4　評価ワーキングシート
5　野口記念医学研究所の組織について
6　組織図
7　研究課題実施状況表
8　プロジェクト評価シート（総括：和文、ユニット別：英文）
9　野口記念医学研究所における外部協力先一覧

MINUTES OF DISCUSSION

In pursuance of the implementation of the Japanese technical cooperation for the Noguchi Memorial Institute Project phase II project (hereinafter referred to as "the project") as provided in the Record of Discussions signed in Accra on 27th September 1991, Dr Shudo Yamazaki, Leader of the Evaluation Mission, Director General, National Institute of Health, Ministry of Health and Welfare representing the Japan International Coopereation Agency (hereinafter referred to as "JICA"), held a series of discusssions with the Ghanaian authorities concerned. The discussions were in accordance with the results of the joint evaluation conducted in Accra, from 24th to 28th June 1996, by the both Japanese and Ghanaian teams.

As the result of the discussions, both sides agreed to present to the respective Governments, the evaluation of the Project described in the document attached hereto.

Accra, June 28th, 1996

山崎修道

Dr. Shudo Yamazaki
Leader, Evaluation Mission
Japan International Cooperation Agency

Francis Nkrumah

Prof. F. K. Nkrumah
Director,
Noguchi Memorial Institute for Medical Research

2　合同評価報告書

JOINT EVALUATION REPORT

ON

THE JAPANESE TECHNICAL COOPERATION (1991 - 1996)

FOR

THE NOGUCHI MEMORIAL INSTITUTE PROJECT PHASE II

JUNE 28, 1996

Accra

The Republic of Ghana

Mutually attested and submitted to all concerned

A c c r a

The Republic of Ghana

JUNE 28, 1 9 9 6

山崎修道

Dr. Shudo Yamazaki
Leader,
Japanese Evaluation Team,
Japan International Cooperation
Agency,
Japan

Professor F. K. Nkrumah
Director,
Noguchi Memorial Institute
for Medical Research
Republic of Ghana

Meeting between the Evaluation Team of Japan International Cooperation Agency (JICA) and Noguchi Memorial Institute for Medical Research (NMIMR) on the evaluation of the Japanese Technical Cooperation for the Noguchi Memorial Institute Project Phase II.

Date : June 24 - June 29, 1996

Place : Noguchi Memorial Institute for Medical Research, University of Ghana

Attendance : JAPANESE SIDE

Dr. Shudo Yamazaki	Director General, National Institute of Health
Dr. Hitoshi Kamiya	Director, Mie National Hospital
Prof. Kyoichi Kishi	Professor, School of Medicine, University of Tokushima
Prof. Somei Kojima	Professor, Institute of Medical Science University of Tokyo
Dr. Tetsutaro Sata	Head, Laboratory of Pathology AIDS Research Centre, N.I.H.
Mr. Toshimichi Aoki	Staff, Medical Cooperation Div. Medical Cooperation Dept. JICA
Dr. Toshiya Kamiya	Leader/Expert on Epidemiology
Mr. Koji Kanemaru	Coordinator
Mr. Kimio Abe	Assistant Resident Rep. JICA Ghana Office.

OBSERVER

Mr. Hajime Senoo	First Secretary, Japan Embassy

GHANAIAN SIDE

Prof. F.K. Nkrumah	Director,	NMIMR
Dr. K. A. Koram	Epidemiology,	NMIMR
Dr. Mary E. Aryeetey	Parasitology,	NMIMR
Dr. K. M. Bosompem	Parasitology,	NMIMR
Dr. N. K. Ayisi	Virology,	NMIMR
Mr. J.A.M. Brandful	Virology,	NMIMR
Dr. Patience Akpedonu	Bacteriology,	NMIMR
Dr. M. Armah-Klemesu	Nutrition,	NMIMR
Ms. Juliana Yartey	Nutrition,	NMIMR
Mr. S. W. Opoku-Agyakwa	Admin. Secretary,	NMIMR
Prof.I.Addae-Mensah	Rep. of Faculty, Legon.	
Dr. Kofi Ahmed	Rep. of Min. of Health.	

I. INTRODUCTION

The Japanese Evaluation Team (hereinafter referred to as "the Team") organised by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Shudo Yamazaki visited the Republic of Ghana from June 21 to June 29 1996, in order to jointly evaluate with the Ghanaian authorities concerned the past achievements of the Japanese Technical Cooperation for the Noguchi Memorial Institute Project (hereinafter referred to as "the Project") on the basis of the Record of Discussions signed on September 27th, 1991.

During its stay in the Republic of Ghana, the Team discussed and studied together with concerned Ghanaian counterpart personnel, various aspects regarding the progress, performance and achievements of the Project.

Through careful assessment and discussions, both sides summarized their findings and observations as described below.

II. METHOD OF EVALUATION

1. Documents used as reference

In order to evaluate the past performance and achievements both quantitatively and qualitatively, the following documents were used as a basis of reference:

(1) The Record of Discussions (R/D)

(2) The Tentative Schedule of implementation (TSI)

(3) The official requests on forms A-1, A-2, A-3 and A-4 made by the Government of the Republic of Ghana with respect to dispatch of Japanese experts, Ghanaian

counterpart personnel training in Japan and provision equipment.

(4) The Minutes of Discussions agreed in the process implementation of the Project.

(5) Project Reports (1991 - 1996) of Vaccine Preventable Diseases, Persistent Diarrhoea, AIDS and Schistosomiasis at the Noguchi Memorial Institute for Medical Research.

2. Discussions and Observations

The Team discussed various aspects of the Project and observed the buildings, machinery, equipment, facilities and utilities made available to the Project.

To assess the impact and relevance of the training, discussions were held with the counterparts trained in Japan, during the period of the project.

III. OBJECTIVE AND ITEMS OF TECHNICAL COOPERATION OF THE PROJECT

1. Objective of the Project

According to the Record of Discussions signed on September 27th, 1991, the Goal of the project was 'to further improve the functions of the Noguchi Memorial Institute for Medical Research as both a reference laboratory and a centre for human resource development, by strengthening its research capabilities in the fields of epidemiology, immunology, virology, parasitology, bacteriology and nutritional science related to infectious diseases, by analyzing the underlying determinants causing serious infections, and by studying the counter measures for such determinants, and accordingly, to contribute to the promotion of

public health in Ghana through application of the results of the Project.'

2. Items of Technical Cooperation

In order to accomplish the above-mentioned objective, both sides agreed that technical cooperation should be implemented in respect of the research areas through dispatch of Japanese experts, acceptance of Ghanaian counterpart personnel for technical training in Japan and provision of equipment.

(1) Vaccine Preventable Diseases
Research Activities
a) DPT Vaccines
b) Measles Vaccine
c) Evaluation on Immunocompromised host
e) Vaccine quality control

(2) Persistent Diarrhoea
Research Activities
a) Investigation of aetiology in persistent diarrhoea
b) Evaluation of contaminated water
c) Observation of infant feeding
d) Examination of nutritional and immunological status of diarrhoea
e) Formulation and evaluation of cereal based-ORS

(3) AIDS
Research Activities
a) Determination of HIV-1,-2 (and HTLV-1)
b) HIV infections
c) Virus isolation

(4) Schistosomiasis

Research Activities

a) Field Research

- Analyzing the present status of schistosomiasis.
- Examining schistosomiasis in defined communities.
- Examining the effectiveness of combined control measure of schistosomiasis.

b) Laboratory Research

- Development of plant mollucicides.
- Studying different strains in S. haematobium.
- Development of immunodiagnosis.

IV. IMPLEMENTATION OF THE PROJECT

1. Staffing

A total of 17 Ghanaian counterpart personnel were assigned to the Project for the effective implementation and the successful transfer of technology. The list of the Ghanaian counterpart personnel as of June, 1996 is in ANNEX 1.

2. Management and Administration

All administrative and managerial services were provided by Ghanaian counterpart personnel. The Coordinating Committee meetings, made up of members representing, the university, Ministry of Health, Ministry of Finance and Economic Planning, Noguchi Institute, Japanese experts, JICA Ghana Office and Embassy of Japan (as observers) were held at least once a year for smooth implementation of the Project. The regular meetings of representatives from NMIMR, and Japanese experts were held frequently to assist the

Coordinating Committee in reviewing and recommending the annual work plan of the project.

3. Japanese experts

JICA dispatched ten (10) long-term experts and twenty-eight (28) short-term experts whose names and fields are listed in ANNEX 2.

4. Ghanaian Counterpart Personnel Training in Japan

Eighteen (18) Ghanaian counterpart personnel were sent to Japan for either observation or technical training. Their names are listed in ANNEX 2. JICA accepted the Ghanaian counterpart personnel in the fields agreed in the Record of Discussions. In FY1996, the training in the field of Bacteriology (1) and Virology (1) were requested, in FY1996, is yet to be approved.

5. Equipment

Between FY1991 and FY1996, items of equipment worth about 289,055,655 yen (C.I.F. Accra) were donated by the Government of Japan. Details are shown in Annex 3. Equipment provided for the project was used efficiently for the activities of the Project. Supplementary equipment supply in the Japanese fiscal year 1995 - 1996 is now been processed.

6. Budget

A summary of Project cost incurred by Japanese and Ghanaian sides is shown in ANNEX 4. Both sides made an

effort to secure the budget necessary for the implementation of the Project.

7. Planned Schedule and Actual Implementation of the Project

Implementation of the Project based on the Record of Discussions is shown in ANNEX 5 and ANNEX 6. The planned schedule is described in ANNEX 5 and the actual implementation is described in ANNEX 6.

V. RESULT OF EVALUATION

A detailed description of accomplishment in each field of cooperation is given as follows :

1. VACCINE PREVENTABLE DISEASES

The objectives set out for the EPI in the project are: To evaluate the quality, effectiveness of vaccines and immune response to vaccines of the EPI.

1-1 Research Programs or Activities (Targets of the Project)

(1) To evaluate the effectiveness of DPT vaccines by epidemiologic and immunologic methods.
(2) To investigate the effectiveness of various measles vaccines and to determine the appropriate timing of vaccination.
(3) To evaluate the acquisition of immunity after administration of EPI vaccines in malnourished and immunocompromised children, and to determine the appropriate schedule of vaccination among both health and immunocompromised hosts.
(4) To advise on the development of vaccine quality control system.

1-2 Achievements

(1) Established that the results of the two component APDT vaccine were as immunogenic as the whole cell PDT vaccine. The Acellular vaccines were less reactogenic than the WCPDT vaccine. Two papers have been published on the results up to 12 months follow-up. 24 and 36 months post vaccination follow-up has been done.
(2) the purpose of the study has so far been achieved. It

has been established that AIK-C vaccine given at 6 months is as immunogenic as Schwarz vaccine given at 9 months.

AIK-C vaccine is able to elicit a strong response in infants with pre-existing abs. It is possible to use AIK-C vaccine at 6 months in Ghanaian children.

(3) It was able to determine immunological responses in natural measles infection. Transfer of FACScan flow cytometer technology has also been done.

(4) Quality control technology is available in the Institute in respect of measles, polio and yellow fever vaccines.

1-3 Evaluation

(1) Good work has been done, which has the potential to contribute to health needs of Ghanaian children. The programme achieved the objectives set out at the beginning.

(2) Good work has been done. Results are clear and important for children for EPI.

(3) The study has been successful and useful. Transfer of flow cytometer technology very useful.

(4) Quality control of EPI vaccines can easily be done on routine basis in the Institute.

1-4 Recommendations/Future

(1) Current work could be terminated here. The results of the 24 and 36 months follow-up should be communicated. Secondly, future work could be considered to address the question of booster dose and may be protective levels of Abs.

(2) The results of 3 and 6 months follow-up and 18 and 36 months follow-up should be published. Work on

comparison of Connaught and Kitasato Institute of the vaccine should be considered as well as comparison of AIK-C and Schwars at the same age.

(3) The paper for publication purposes should be pursued. Also optimum time for vaccination should be determined.

(4) Ministry of Health should be encouraged to use the facility on a regular basis.

(5) Work on Rubella as part of EPI studies should be considered eg. Seroepidemiological studies in susceptible gps.

2. DIARRHOEAL DISEASES

The objectives set out for the Diarrhoeal Diseases in the project are: To establish the appropriate measures for the control of diarrhoeal diseases with special reference to persistent diarrhoea in childhood in Ghana.

2-1 Research Activities (Targets of the Project)

(1) To investigate the aetiology of persistent diarrhoea in childhood (bacterial, viral and intestinal parasitic agents)

(2) To evaluate contamination of water, weaning foods and markers of personal hygiene in relation to diarrhoeal diseases.

(3) To observe infant feeding practice in relation to incidence of diarrhoeal diseases.

(4) To examine the relationship between persistent diarrhoeal diseases, nutritional and immunological status.

(5) To formulate and evaluate cereal based-ORS, and dietary management using fermented and non-fermented

weaning foods.

2-2(a) **Part A: Persistent diarrhoea in childhood: Aetiology, risk factors and outcome.**

2-2(a)-2 Achievements

(1) The overall incidence of diarrhoea was 78/100 child years for acute diarrhoea 46/100 child years and for persistent diarrhoea 9.8/100 child years. Persistent diarrhoea peaked early in life at around four months.

(2) A number of viruses, parasites and bacteria were isolated but none was particularly associated with persistent diarrhoea.

(3) Food, water and hand washing were contaminated with unacceptable levels of bacteria. In some cases the same bacterial enteropathogen was isolated from these samples as well as stool, confirming possible transmission through these routes.

(4) An evaluation of risk factors for diarrhoea showed mother's unemployment and lack of education, presence of animals in the home and feeding of purchased foods as predisposing factors.

(5) Mother's lack of education, presence of animals in the home and contamination of food with E. coli and Staphylococcus were risk factors for persistent diarrhoea.

2-2(a)-3 Evaluation

(1) On the whole the study has gone very well along the lines of the objectives stated.

(2) Aetiological studies have been undertaken but work on E. coli and viruses still continue.

(3) Risk factor for diarrhoea and persistent diarrhoea have been identified but more data analysis is yet to be done.

(4) Techniques have been acquired in especially molecular biology as a tool for diagnosis in bacteriology.

2-2(a)-4 Recommendations/Future

(1) In order to obtain maximum information from the data collected, more time must be allowed for analysis.

(2) Studies on the microbial quality and nutrients of street foods are required.

(3) Studies on the effect of education on diarrhoea morbidity are also indicated.

2-2(b) **Part B: Nutrition and persistent diarrhoea: Study on interactions and outcomes.**

2-2(b)-2 Achievements

(1) The study has extensively described feeding practices and the relationship to diarrhoea incidence and outcome.

(2) Practices that predisposed to diarrhoea were low frequency of breastfeeding (<3 times/day), offering of water to exclusively breastfed infants too early, and feeding of purchased foods.

(3) Practices that ensured a positive outcome of persistent diarrhoea disease by protecting food intake, weight gain and nutritional status were high frequency of breastfeeding and feeding of the traditional fermented porridge.

2-2(b)-3 Evaluation

(1) The objectives specified under the diarrhoeal diseases project relating to feeding practices and incidence of diarrhoea and the relationship between persistent diarrhoea and nutritional status have to a large extent been fulfilled. Further data analysis is yet to be carried out to explore, in depth, relationship and

associations.

2-2(b)-4 Recommendations/Future

(1) There is a need to redefine current educational message on exclusive breastfeeding. Messages should be more explicit about the use of water and other fluids. Future research should focus on 'one-on-one' educational intervention on exclusive breastfeeding.

(2) Use of the traditional fermented porridge for diarrhoea management should be actively promoted.

(3) Purchased foods are predominant in the diets of older children, however there is an obvious risk of diarrhoea associated with such foods and they may not be readily acceptable to younger children. The idea of contracting food vendors to prepare adult foods for sale, which are suitable and acceptable for younger children, should be re-visited. A system that will monitor the nutritional and microbial quality of such foods should be established alongside appropriate education and effective enforcement of regulations on food hygiene in the communities.

2-2(c) Persistent diarrhoea and immune dysfunction

2-2(c)-2 Achievements

(1) Persistent diarrhoea did not affect the nutritional status of the children who visited PML hospital as assessed by blood biochemistry and anthropometry.

(2) Persistent diarrhoea had no impact on serum immunoglobulin subclass and complement level.

(3) CD19 lymphocyte percentage and CD4/CD8 ratio was lower and CD25 expression was reduced in persistent diarrhoea indicating impaired cellular immunity.

2-2(c)-3 Evaluation

(1) Clinical study of persistent diarrhoea was successfully completed giving new results.

2-2(c)-4 Recommendations/Future

(1) In future studies number of subjects should be increased.
(2) Serum IgE and HIV antibody should also be measured.
(3) Mucosal immunity will be investigated by examining sIgA in saliva, tears and faeces of children.

2-2(d) Immuno-competence in protein-energy malnutrition

2-2(d)-2 Achievements

(1) The subpopulation of T lymphocyte and phagocytosis by macrophage in malnourished children was not different from normal children.
(2) Serum IgA and C3 levels were found to be lower in malnourished children.
(3) Technical transfer in the field of immunology was completed

2-2(d)-3 Evaluation

(1) The study on the relation between nutrition and immune function has been successfully completed.

2-2(d)-4 Recommendations/Future

(1) To investigate further in this field the relation between immunocapacity and specific macro-nutrients such as zinc, should be examined.
(2) It will be interesting to examine the alteration of immune function with the improvement of nutritional status.

2-2(e) Cereal based ORT studies

2-2(e)-2 Achievements

Phase 1. Formulation and laboratory evaluation

(1) Formulation of cereal-based ORS using locally available

fermented and unfermented maize flour as the carbohydrate source and common salt (NaCl) as the electrolyte source. The outcome of these series of experiments was a rehydration fluid that was similar to the traditional maize gruel, fermented or unfermented, with appropriate carbohydrate and electrolyte levels for oral rehydration therapy, and simulating the WHO ORS.

(2) Analyses of some common home-available fluids used for ORT done revealed that kenkey water was suitable for oral rehydration considering its carbohydrate and electrolyte levels. However, coconut milk was found to have a high potassium content, and was not recommended for oral rehydration therapy.

Phase 2. Clinical-based evaluation

A clinical trial of the fermented and unfermented maize-based oral rehydration solutions showed that the solutions were as effective as the WHO ORS for oral rehydration therapy. Also, fermented maize solution was more readily accepted by the children than the unfermented solution.

Phase 3. Community-based evaluation

(1) An educational intervention mounted was effective in improving diarrhoea management at the household level. An assessment of diarrhoea management post intervention, revealed changes in diarrhoea management practices and perceptions, increased foods and fluid intakes, less drug use and increased recognition of symptoms.

(2) Appropriate use of fermented maize gruel for diarrhoea management resulted in significant increases in fluid intake, energy and protein intakes and weight gain in children with acute diarrhoea.

(3) An evaluation of the community's perception of the feasibility of using fermented maize gruel for diarrhoea management at the household level, indicated that it was

feasible and acceptable to being readily available in the community and affordable.

(4) Fermented maize gruel is recommended as an appropriate home-available fluid for the first-line management of acute diarrhoea at the household level, to reduce the incidence of diarrhoeal mortality, particularly among children in Ghana.

2-2(e)- 3 Evaluation

(1) Studies on the formulation and evaluation of cereal-based ORS were executed on schedule as planned, and successfully completed in April 1995. Reports on all 3 phases of the studies have been submitted to the Institute and the outcome of the first and second studies were published in the J. Trop. Paediat. and Ann. Trop. Paediat. The outcome of the third phase is being prepared for publication.

(2) The objectives of the studies were achieved and the outcome is expected to contribute immensely to reducing diarrhoeal mortality in Ghana.

2-2(e)-4 Recommendations/Future

(1) The findings of these studies should be disseminated to relevant institutions and organizations in order to aid appropriate policy formulation towards diarrhoeal disease control in Ghana.

3. AIDS

The objectives set out for AIDS in the project are:
To establish and develop appropriate techniques for HIV-1,2 (and HTLV-1) and to study the epidemiology of these infections.

3-1 Research Activities (Targets of the Project)

(1) To transfer diagnostic techniques for determination of HIV-1,2 (and HTLV-1) infections (ELISA, Western blot).

(2) Research on the epidemiology and transmission of HIV infections.

(3) Virus isolation in Cell culture and characterization of the isolation Viruses.

3-2 Achievements

(1) Use of locally isolated HIV strains as antigens in HIV serology.

About 30 indigenous isolates were available to be used as candidate antigens for the improvement of serological test. To be completed September 1996.

(2) Prenatal transmission of HIV infections
Over 2200 pregnant women were screened for HIV-1 & 2, HCV, HBV, HTLV-1 and TP (syphilis) in high and low risk areas in Ghana. Recruitment of mothers and children over a 3-year period was, however, very limited. Perinatal transmission studies were not achieved. To be completed in October, 1996.

(3) Isolation and characterisation of HIV strains from Ghana.
Virus isolation was successful. Two isolates were molecularly characterized in the *env* region of the genome using PCR-based techniques after cloning and sequencing.

(4) Clinical, immunological and virological status of AIDS and ARC patients and their seronegative partners as well as seropositive non-progressors.
Major opportunistic infections in Ghana were identified in clinical and autopsy cases, in which

tuberculosis was noticed as a re-emerging disease among AIDS patients. Normal values of CD4 and CD8 count in Ghanaians were estimated. HIV negative AIDS-like disease was identified in Ghana.

3-3 Evaluation

(1) Technical transfer of PA, ELISA, IFA, Western blot and PCR for diagnosis of HIV-1 and HIV-2 infection was mostly completed. These techniques can be extensively employed for routine diagnosis of HIV-1 and HIV-2. Technical skills of the unit staff who received training in Japan are high. PCR technology is being transferred to new staff members. PCR-based diagnosis of HIV-1 and HIV-2 needs to be performed on a large number of samples.

(2) The number of examined cases by serological techniques was enough to know the current status of HIV/AIDS in Ghana; higher incidence of HIV-1 infection over HIV-2 and the presence of dual infection. These baseline data on the incidence and prevalence of understanding new trends of retroviral infection in Ghana, thus providing valuable information for the prevention and control of HIV/AIDS infection.

(3) The techniques of viral isolation in cell culture was effectively transferred to the Virology Unit, but a well standardized, sensitive method has not been fully established yet. Greater familiarization with sero-negative PBMCs is expected with continuing virus isolation activities. Limited number of isolates was characterized at the molecular level.

(4) Identification of major opportunistic infections including tuberculosis may contribute to understanding AIDS and AIDS-like disease in Ghana. Normal value of CD4 and CD8 number determined contribute to follow-up of HIV/AIDS patients. More detailed studies are needed

to conclude if HIV-negative AIDS-like disease is truly present in Ghana.

3-4 Recommendations/Future

(1) More progress would be made in HIV/AIDS research if provided with more appropriate leadership and collaboration of staff members.

(2) Epidemiological survey of HIV-1 and HIV-2 infection in various population in Ghana should be expanded using a well established, constant assay system. Expansion of survey will contribute to HIV-AIDS control in Ghana.

(3) To strengthen its status and function as a reference laboratory for HIV/AIDS, collaboration with clinics, public health reference laboratory at Korle-Bu hospital and WHO, especially by introducing new technology, will be important.

(4) Introduction of more refined molecular analysis on HIV-1 and HIV-2 will be profitable to the HIV/AIDS epidemiology in Ghana.

4. SCHISTOSOMIASIS

The objective set out for Schistosomiasis in the project is: To establish the most effective and feasible measures to control schistosomiasis in Ghana.

4-1 Research Activities (Targets of the Project)

Field Research

(1) To analyze the present status of schistosomiasis prevalence in Ghana in collaboration with Ministry of Health

(2) To examine basic epidemiological, socio-cultural, economic and behaviour factors associated with

schistosomiasis in defined communities

(3) To examine effectiveness of combined control measures of schistosomiasis.

Laboratory Research

(1) To develop effective mollucicides

(2) To study different strains of *S. haematobium*

(3) To develop immunodiagnosis

4-2 Achievements

Field research

A. Status of Urinary Schistosomiasis

(1) A census was conducted in 8 villages with a population of 4636. Urinary schistosomiasis was found to be endemic in the study areas, individuals under 19 years of age being identified as the high risk group. *Schistosoma mansoni* infection was not found although hookworm was found to be the predominant intestinal parasite.

Indirect and direct morbidity studies

(2) Microhaematuria was found to be favourably as sensitive and specific as microscopy. Ultrasonography revealed that 52.7% of 1,202 infected subjects had pathology ranging from mild to severe changes of the urinary tract. Severe cases with kidney pathology were 6.4%. Mild and moderate pathological changes were resolved within 18 months of praziquantel treatment; whereas there were no changes in severe pathological cases.

Snail survey

(3) A survey of 77 water contact sites for schistosomiasis host snails revealed a high infection rate at site 1 in Ayikai Doblo which needs to be followed up.

B. Factors associated with urinary schistosomiasis

(1) Questionnaire based KABP and focus group discussions involving 428 adults and 406 children showed that schistosomiasis infected people had knowledge about the disease.

Water contact observation study

(2) Water contact observational study was conducted in all the 8 villages for 30 days in a total of 70 sites. Data analysis is in progress.

C. Control

(1) The 8 villages were grouped into 3 Areas for the control programme. One area received chemotherapy only; the second chemotherapy and passive health education and the third, chemotherapy and active health education in conjunction with community mobilization.

(2) Modified selective chemotherapy with praziquantel was done for 1,612 children of school going age and *S.haematobium* egg positive adults.

(3) Health education: (1) One hundred and twenty flip charts were prepared with illustrations on rural community activities relating to sanitation and schistosomiasis control measures. (2) two video productions each in 2 local languages and English were made. (3) 15 health education volunteers were trained by the project team and used in house-to-house teaching in their communities.

(4) Communities were mobilized by:(1) Orgazation of 56 durbars in all the 8 villages, (2) Formation of town development committees, (3) Staging a quiz programme on schistosomiasis for school children, (4) Provision of 5 hand-dug wells, (5) Provision of two KVIP toilets in two schools; and six household-toilets in Area 3.

(5) Cure and re-infection rates were monitored for 24 months after treatment and a high rate of re-infection was observed in Area 3. Re-treatment of individuals aged 6-19 yrs was, therefore, carried out 24 months after the first treatment. Follow-up studies are ongoing. Unlike the first treatment exercise infected adults requested for tablets thereby indicating a change in attitude.

Laboratory Research

(A) Molluscicides

(1) The fruits of three saponifying plants (*Balanites aegyptiaca*, *Blighia unijugata* and *Blighia sapida*) were studied and *B. aegyptiaca* was found to be most toxic. Adult schistosomiasis hosts snails were more susceptible.

(B) To study different strains of *S. haematobium*.

(1) Laboratory breeding colonies of the two snail vectors (*Bulinus globous* and *Bulinus truncatus*) have been established, and mixing of the two *S. haematobium* strains in Ghana has been confirmed in some infected individuals and communities.

(2) The first batch of hamsters and mice have been infected with suspected strains of *S. haematobium* and adult worms recovered. Meanwhile, *S. haematobium* strain-specific monoclonal antibodies have been shown to offer an alternative approach to identification of the parasite strains in Ghana.

(C) Immunodiagnosis

(1) We have demonstrated that *S. haematobium* antigens in infected human urine are in the form of immune-complexes and introduced new methods for extraction and purification of the antigens.

(2) We have produced monoclonal antibodies including: (a) an *S. haematobium* species-specific antibody, (b) potentially diagnostic monoclonal antibodies to the *Schistosoma* genus and (c) *S. haematobium* strain specific monoclonal antibodies.

(3) We have developed, standardized and introduced a highly sensitive and specific field applicable urine-based dipstick assay and evaluated it in the field using a population of 229.

Serology

(4) Sero-epidemiological studies on urinary schistosomiasis have revealed that very few infected individuals had serum antibodies (mainly IgA) to paramyosin, an antigen which is currently being investigated for use as a vaccine against schistosomiasis.

(5) Interactive analysis of epidemiological data on parasitological, malacology and water contact has shown that some individuals in the study population may be resistant to reinfection.

4-3 Evaluation

(1) The status of urinary schistosomiasis has been considerably determined for southern Ghana.

(2) Data revealing the interactive importance of epidemiological, socio-cultural, economic and behaviour factors associated with schistosomiasis has been compiled and used as the basis for formulating the control strategies used in the study areas.

(3) The study has revealed that the degree of success

achievable with any of the control measures (chemotherapy alone, chemotherapy + passive health education, and chemotherapy + active health education + community mobilization) used appeared to be highly dependent on available existing structures for safe water supply, organized groups and the time of introduction of the control measure.

(4) Interestingly, the study has identified *B. aegyptiaca* to have potential mollusicidal properties.

(5) This study has demonstrated mixing and possible hybridzation of the *S. haematobium* strains in Ghana. The establishment of the life-cycle is necessary to confirm and facilitate studies with the different strains.

(6) A new immunodiagnostic assay (a monoclonal antibody-based dipstick) has been developed as an alternative to microscopy. This assay will be helpful in rapid assessment of schistosomiasis in the field.

Some of the information and experiences gathered with the project have worldwide applicability and would be quite useful to the Ministry of Health of Ghana in formulating control strategies for urinary schistosomiasis.
Seven papers have been produced from the studies, two of which are in press. Six Abstracts have been presented at International Congresses. A thesis for Masters Degree has also been presented from the data.

4-4 <u>Recommendations/Future</u>

(1) The control of urinary schistosomiasis should now be targeted at the identified high risk group (school going age). There is the need to extend follow-up studies on the different control measures being tested.

(2) Since the molluscicidal study has so far looked at only the fruits of the candidate plants, there is the

need to determine the potency of other plants parts (leaves, bark, roots etc.) before identification of the active ingredient.

(3) To clarify the *S. haematobium* strain differences, more work is needed at the molecular level.

(4) The newly developed immunodiagnostic assay is highly field applicable. There is therefore the need to fully exploit its potentials, i.e., determination of drug efficacy and the intensity of infection and pathology.

(5) The identified target molecules recognized by monoclonal antibodies should be studied further using molecular technology.

Judging from the amount and quality of work and the future implications of the findings from both the field and laboratory researches it is highly recommended that the project should be extended.

5. Publications

List of publications from research activities of the project is shown in Annex 7.

6. Conclusion

(1) In general, the main objectives of the project in the Record of Discussions have almost been achieved. This is largely through the consistent efforts and effective cooperation between the Ghanaian Counterparts and the Japanese experts.

(2) In order to complete present studies, the Ghanaian side requested for extension of the project into a follow-up phase. The Japanese team promised to convey the request to the Japanese authorities.

(3) If the necessity arises, both sides will mutually discuss the plan needed for implementation of a follow-up phase through the official channels of both countries.

COUNTERPART STAFF LIST AS AT 28TH JUNE, 1996

ADMINISTRATION

Prof. F. K. Nkrumah	-	Director
Mr. S. W. Opoku-Agyakwa	-	Administrative Secretary

VACCINE PREVENTABLE DISEASES

Dr. P. Akpedonu	-	Snr. Research Fellow
Dr. K. A. Koram	-	Research Fellow
Dr. Osei-Kwasi	-	Research Fellow
Dr. E. A. Afari	-	Snr. Research Fellow
Dr. S. K. Dunyo	-	Research Fellow
Mr. M. M. Addae	-	Chief Technologist

DIARRHOEAL DISEASES

Dr. P. Akpedonu	-	Snr. Research Fellow
Dr. M. A. Armar-Klemesu	-	Research Fellow
Dr. G. Armah	-	Research Fellow
Dr. M. E. Aryeetey	-	Research Fellow
Miss Juliana Yartey	-	Research Fellow

AIDS

Dr. Osei-Kwasi	-	Research Fellow
Dr. N. K. Ayisi	-	Research Fellow
Mr. J. A. M. Brandful	-	Research Fellow

SCHISTOSOMIASIS

Dr. M. E. Aryeetey	-	Research Fellow
Dr. K. M. Bosompem	-	Research Fellow

ANNEX 1

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH

STAFF LIST - 1996

	NAME OF STAFF	DESIGNATION
	ADMINISTRATION	
1.	Prof. F. K. Nkrumah	Director
2.	S. W. Opoku-Agyakwa	Admin. Secretary
3.	S. K. Tachi	Chief Admin. Asst.
4.	Iris Oppong (Mrs.)	Snr. Admin. Asst.
5.	Vivian Tamakloe	Admin. Asst.
6.	Grace Dzahini	Clerk Grade I.
7.	Beatrice Krah	Clerk Grade I.
8.	Agnes Nkum	Tel. Exch. Sup.
9.	Beatrice Acquah	Tel. Exch. Sup.
10.	Osei Agyemang Duah	Messenger/Cleaner
	LIBRARY	
11.	A. V. T. Azu	Prin. Library Asst.
	BACTERIOLOGY	
12.	Dr. P. Akpedonu	Snr. Research Fellow
13.	Daleth Agbodaze	Research Fellow
14.	A. S. Y. Ablordey	Snr. Res. Asst.
15.	Dorothy Yeboah-Manu	Snr. Res. Asst.
16.	H. E. K. Longmatey	Prin. Technician
17.	S. B. Owusu	Snr. Technician
	PARASITOLOGY	
18.	Dr. M. E. Aryeetey	Research Fellow
19.	Dr. M. D. Wilson	Research Fellow
20.	M. A. Appawu	Research Fellow
21.	Dr. K. M. Bosompem	Research Fellow
22.	Irene Ayi (Mrs.)	Snr. Res. Asst.
23.	J. R. K. Asigbee	Prin. Technician

24. K. H. Kpo	Snr. Technician
25. Haruna Abdul	Snr. Technician
26. J. Otchere	Technician
27. J. K. Quartey	Tech. Asst. II

LABORATORY ANIMALS

28. Dr. P. G. Addo	Jnr. Research Fellow
29. Daniel Osei-Boakye	Prin. Technician
30. S. K. Adjei	Snr. Research Asst.
31. E. Attah Tioh	Tech. Asst. Grd. I
32. J. Quarshie	Labourer
33. Mr. D. Appiah	Messenger/Cleaner

NUTRITION

34. Dr. (Mrs) M. Armar-Klemesu	Research Fellow
35. Dr. E. E. K. Takyi	Snr. Res. Fellow
36. Juliana Yartey	Research Fellow
37. L. A. Brakohiapa (Mrs)	Chief Research Asst.
38. Gloria Folson (Mrs)	Snr. Research Asst.
39. E. K. Harrison	Prin. Reserach Asst.
40. E. A. Addo	Prin. Technician
41. E. Quansah	Snr. Technician
42. N. M. A. Mensah	Messenger/Cleaner

CLINICAL PATHOLOGY

43. Dr. Nii-Ayi Ankrah	Research Fellow
44. I. K. E. Quaye	Research Fellow
45. A. K. Nyarko	Research Fellow
46. Y. A. Akyeampon	Chief Technician
47. F. Ekuban	Prin. Research Asst.
48. M. M. Addae	Supt. Technologist
49. Regina Appiah-Opong	Snr. Research Ass t.
50. B. R. Anku	Prin. Technician
51. W. J. Asaku	Snr. Technician
52. Francis Attigah	Messenger/Cleaner

ELECTRON MICROSCOPY & HISTOLOGY

53. Dr. G. E. Armah	Research Fellow
54. A. K. Dodoo	Prin. Research Asst.
55. A. K. Ayim	Prin. Technician

56. Akwasi Anyanful	Snr. Research Asst.
57. S. Y. Amelor	Prin. Technician
58. Susuna Damanka	Snr. Technician
59. I. A. Hudson-Odoi	Messenger/Cleaner

IMMUNOLOGY

60. Dr. B. D. Akanmori	Research Fellow
61. B. A. Gyan	Research Fellow
62. D. Dodoo	Prin. Research Asst.
63. Enid Owusu (Mrs.)	Technician
64. Francis Owusu	Messenger/Cleaner

EPIDEMIOLOGY

65. Dr. E. A. Afari	Snr. Res. Fellow
66. Dr. K. A. Koram	Research Fellow
67. A. S. Assoku (Mrs.)	Chief Nursing Offr.
68. G. E. Mensah	Prin. Research Asst.
69. J. Fenteng	Snr. Technician
70. C. K. Attiogbe	Technician
71. M. C. Osei-Bonsu	Tech.Asst.Grd.III
72. G. Osei-Kwame	Messenger/Cleaner

VIROLOGY

73. Dr. M. Osei-Kwasi	Research Fellow
74. Dr. N. K. Ayisi	Snr. Res. Fellow
75. J. A. M. Brandful	Research Fellow
76. W. K. Ampofo	Prin. Res. Asst.
77. S. Aidoo	Snr. Res. Asst.
78. J. S. Barnor	Snr. Technician
79. J. Arthur-Quarm	Technician
80. S. K. Dumedah	Messenger/Cleaner

ACCOUNTS

81. Appiah Aborah	Chief Acct. Asst.
82. D. K. Ofosu	Snr. Acct. Asst.
83. G. K. Attorkwe	Snr. Acct. Asst.
84. A. R. A. Pobee	Snr. Acct. Asst.
85. A. B. Agbodzi	Snr. Acct. Asst.

86.	E. H. Attah	Snr. Stores Supt.
87.	E. K. Kally	Accounting Asst.
88.	E. Ameyaw	Storekeeper Grd. II.

TRANSPORT

89.	A. K. Addai	Prin.Asst.T.Offr.
90.	C. K. Osei	Snr. Driver
91.	E. T. Aggoe	Driver Grade I.
92.	E. Asiedu-Opare	Driver Grade I.
93.	E. Danso	Driver Grade I.
94.	A. Kyei	Driver Grade II.
95.	J. Asaah	Driver Grade II.
96.	O. Sekyere	Foreman
97.	L. Wellington	Driver Grade I.

MAINTENANCE

98.	S. K. A. Jones	Snr. Works Supt.
99.	E. O. Lamptey	Snr. Works Supt.
100.	L. Asiedu-Acheampong	Snr. Works Supt.
101.	S. Neequaye	Works Superintendent
102.	J. A. Kortei	Works Supt.
103.	E. Nartey	Foreman
104.	S. M. Adjei	Tradesman Grd. II.

SECURITY

105.	F. K. Matey	Snr. Guard
106.	C. Y. Sakezugu	Snr. Guard
107.	A. K. Appiah	Security Guard Grd.I
108.	L. T. A. Acquah	Sec.Guard Grd.I
109.	Andrew Dzokoto	Sec.Guard Grd. II
110.	I. A. Nsiah	Sec.Guard Grd. II
111.	Ali Kassogue	Watchman
112.	Adongo Awurigya	Watchman
113.	Abu Pelingu	Watchman

GROUNDS & GARDENS

114.	Abdulai Mohammed	Labourer
115.	Baba Builsa	Labourer
116.	John Apuing	Labourer
117.	S. N. Tetteh	Labourer
118.	Asoaku Tamale	Labourer

DISPATCHED EXPERTS AND COUNTERPART PERSONNEL TRAINED IN JAPAN FROM FY1991 TO FY1996

2-1. Japanese Experts

2-1-1. Vaccine Preventable Diseases

1)	Dr. Hiroki Hori	Team Leader/Epi	01 Oct.1991-06 Jan.92
2)	Dr. Yasuhiko Kamiya	Epidemiology	05 Mar.1991-30 Apr.94
3)	Dr. Kiyosu Taniguchi	Team Leader/Epi	10 Nov.1991-31 Mar.95
4)	Dr. Yoshikazu Tada	Immunology	29 Jan.1994-26 Feb.94
5)	Dr. Hitoshi Kamiya	Epidemiology	08 Jan.1995-14 Jan.95
6)	Dr. Toshiya Kamiya	Team Leader/Epi	10 Feb.1995-03 Oct.96
7)	Dr. Toshiaki Ihara	Immunology	30 Nov.1995-20 Dec.95

2-1-2. Diarrhoeal Diseases

1)	Dr. Toru Rikimaru	Nutrition Seminar	07 Dec.1991-30 Dec.92
2)	Dr. Toru Rikimaru	Nutrition	04 Mar.1993-03 Jul.95
3)	Dr. Kazuhito Rokutan	Nutrition	09 Aug.1993-25 Sep.93
4)	Prof. K. Kishi	Nutrition	08 Jan.1993-14 Jan.95
5)	Dr. Yasuhiro Kido	Nutrition	15 Jul.1995-01 Sep.95
6)	Dr. M. Higashitsutsumi	Bacteriology	08 Feb.1996-11 Apr.96

2-1-3 AIDS

1)	Dr. Tetsutaro Sata	Virology	10 Jul.1993-23 Jul.93
2)	Dr. Kohichi Ishikawa	Virology	10 Jul.1993-30 Jul.93
3)	Dr. Sakae Inoue	Virology	08 Jan.1995-14 Jan.95
4)	Dr. Kohichi Ishikawa	Virology	17 Feb.1995-16 Mar.95
5)	Dr. Kohichi Ishikawa	Virology	11 Jan.1996-31 Jan.96
6)	Mr. Toshihiko Komatsu	Biosafety	08 Jan.1996-29 Jan.96
7)	Dr. Toshihiko Asano	Laboratory Animal	08 Jan.1996-29 Jan.96

2-1-4 Schistosomiasis

1)	Dr. Yukiko Wagatsuma	Parasitology	26 Oct.1991-30 Nov.91
2)	Prof. Somei Kojima	Parasitology	26 Oct.1991-11 Nov.91
3)	Dr. Yukiko Wagatsuma	Parasitology	03 May.1992-02 Sep.95
4)	Prof. Hidekazu Hata	Parasitology	20 Jul.1992-30 Aug.92
5)	Prof. Yasuhide Orido	Parasitology	20 Jul.1992-09 Sep.92
6)	Prof. Somei Kojima	Parasitology	10 Aug.1992-09 Sep.92
7)	Dr. Tokuro Arishima	Parasitology	01 May.1993-30 Apr.95
8)	Dr. Takao Yamashita	Parasitology	09 Aug.1993-14 Nov.93
9)	Prof. Somei Kojima	Parasitology	20 Nov.1993-02 Dec.93
10)	Dr. Haruo Kamiya	Parasitology	20 Nov.1993-02 Dec.93
11)	Dr. Takao Yamashita	Parasitology	23 Aug.1994-07 Oct.94
12)	Prof. Somei Kojima	Parasitology	08 Jan.1995-14 Jan.95
13)	Prof. Somei Kojima	Parasitology	05 Aug.1995-26 Aug.95
14)	Dr. Akatsuki Kokaze	Parasitology	09 Mar.1996-30 Mar.96

15) Requested	Parasitology	Jun.1996-	Jun.96
16) Requested	Parasitology	Jul.1996-	Jul.96

2-1-5 Medical Equipment Maintenance

1) Mr. Masaaki Maruyama	Med.Equi.Maint.	27 Nov.1995-	25 Mar.96

2-1-6 Project Co-ordinator

1) Mr. Hidoe Eguchi	Co-ordinator	01 Oct.1991-	30 Sep.92
2) Ms. Yuko Utsumi	Co-ordinator	10 Nov.1992-	09 Nov.94
3) Mr. Koji Kanemaru	Co-ordinator	15 Sep.1994-	14 Sep.96

2-2. Counterpart Training in Japan

2-2-1. Vaccine Preventable Diseases

1) Mr. Micheal Addae	Immunology	22 Mar.1992-14 Oct.93
2) Ms. Enid Owusu	Immunology	05 Oct.1993-30 Aug.94

2-2-2 Diarrhoeal Diseases

1) Mr. David O. Kennedy	Nutrition	29 Mar.1992-22 Mar.93
2) Mr. H. E. Longmatey	Bacteriology	22 Mar.1992-18 Mar.93
3) Dr. M. Armah-Klemesu	Nutrition	17 Mar.1994-15 Jun.94
4) Mr. A.S.Y. Ablordey	Bacteriology	30 Nov.1994-24 Nov.95
5) Ms. D. K. Yeboah-Manu	Bacteriology	04 Mar.1996-21 Dec.96
6) Mr. E. A. Addo	Nutrition	22 Jan.1996-29 Mar.96
7) Dr. Patience Mensah	Bacteriology	Requested Jul.96

2-2-3 AIDS

1) Mr. Simeon Aidoo	Virology	04 Jan.1994-03 Dec.94
2) Mr. J. A. Arthur-Quarm	Virology	07 Nov.1994-02 Nov.95
3) Mr. J. A. M. Brandful	Virology	28 Mar.1995-30 Jun.95
4) Mr. J. A. M. Brandful	Virology	Requested

2-2-4. Schistosomiasis

1) Ms. Irene Gyambiby	Parasitology	22 Mar.1992-18 Mar.93
2) Mr. J.R.K. Asigbe	Parasitology	(Third country)
3) Mr. Haruna Abdul	Parasitology	(Third country)
4) Mr. K. Harrison Kpo	Parasitology	(Third country)
5) Dr. K. M. Bosompem	Parasitology	01 Oct.1995-29 Dec.95

2-2-5. Administration

1) Mr. S. W. Opoku-Agyakwa	Administration	14 Nov.1994-12 Dec.95

2-2-6. Medical Equipment Maintenance

1) Mr. E. O. Lamptey	Maintenance	21 Mar.1995-28 Jun.95

ANNEX 3 (1)

PROVISION OF TECHNICAL EQUIPMENT

NOGUCHI MEMORIAL INSTITUTE PROJECT 2

FISCAL YEAR	NAME OF EQUIPMENT	MONTH OF ARRIVAL	C. I. F. Accra		Y	Total Y
			JAPAN	LOCAL	EXPERT	
FY1991/H3	Freezer etc.	H4/8	19,174,591			
	Spareparts for Electronic Microscope etc.	H4/9	3,167,985			
	Word Processor etc.	H4/3			296,873	
	Freezing container etc.	H4/3			70,761	
Sub-total			22,342,576	0	367,634	22,710,210
FY1992/H4	Measles virus HA antigen etc.	H5/4	3,679,504			
	Analysis balance etc.	H5/5	6,870,094			
	Cell Analysis etc.	H5/3	26,441,339			
	Microplate washer etc.	H5/6	14,693,263			
	Flasks etc.	H4/6			638,569	
	Filter Holder etc.	H4/8			2,032,423	
	Mouse	H4/8			199,327	
	Chart Paper etc.	H4/9			50,951	
	Catalogues for JICA Equipments	H4/10			126,892	
	Catalogues for JICA Equipments	H4/10			71,492	
	Rubber Boots	H4/10			130,169	
	Personal Computer etc.	H4/11			1,784,390	
	Books etc.	H4/12			166,275	
	Graduates Conical etc.	H5/1			898,907	
	Tranawab etc.	H5/2			274,489	
	Freezing Containers etc.	H5/2			129,697	
	Books etc.	H5/3			428,211	
Sub-total			51,684,200	0	6,931,792	58,615,992
FY1993/H5	Trifluoroacetic acid etc.	H6/7	5,311,759			
	Microplate reader etc.	H6/9	55,258,325			
	Disodium hydrogen phosphate etc.	H6/9	1,048,074			
	Lazer jet printer etc.	H6/12	559,564			
	Generator etc.	H5/11		5,600,000		
	Viecle etc.	H5/11		6,060,000		

ANNEX 3 (2)

	Flat File etc.	H5/5			3,172,499	
	Sorval Microtome Mt500 etc.	H5/5			466,359	
	Clothes etc.	H5/6			717,094	
	CIP etc.	H5/7			961,052	
	Microplate etc.	H5/7			1,161,719	
	Tool Set etc.	H5/7			570,108	
	Culture flask etc.	H5/8			809,659	
	Streptomycin Sulfate etc.	H5/9			34,841	
	Polaroid Camera etc.	H5/9			115,104	
	Membrane filter etc.	H5/9			1,549,780	
	Clean Rack	H5/11			3,061,234	
	Mouse	H5/11			166,847	
	Imobiron Membulen etc.	H5/11			2,091,083	
	Colist EIT etc.	H5/11			835,773	
	Parts for Hitachi Electro Microscope H600	H6/1			274,481	
	Electric Burner etc.	H6/3			450,375	
Sub-total			62,177,722	11,660,000	16,438,008	90,275,730
FY1994/H6	Anti-human IgG etc	H7/6	771,264			
	Matt super GOT GPT LDH etc.	H7/7	1,119,940			
	Rabbit cage etc.	H7/8	2,948,900			
	Disposable syringe with needle etc.	H7/9	40,425,734			
	Rat etc.	H7/9	673,358			
	Viecle, Reagents, LAN system etc.	H6/3		20,757,000		
	Serum Tube etc.	H6/7			2,405,131	
	Reagent for Analysis clinical Chemistry etc.	H6/9			1,867,099	
	Electrode etc.	H6/9			191,912	
	Parts for Microscope etc.	H6/10			394,080	
	Dialysis Membrane Tubing	H6/9			171,245	
	Dulbecco's PBS (-)	H7/1			193,272	
	Personal Computer etc.	H7/2			990,359	
	Vapor Shippers	H7/2			369,225	
	Localtalk Loching etc.	H7/3			187,614	
Sub-total			45,939,196	20,757,000	6,769,937	73,466,133

ANNEX 3 (3)

FY1995/H7	Central aircon. compressor etc.	H8/3		11,470,000		
	Matt super GOT GPT KDH. cotton, gauge	H8/3	1,820,483			
	Microsoft etc.	H7/5			808,119	
	Power Supply Unit of Personal Computer et	H7/7			1,133,813	
	Bio Kine I L6 Test Kit etc.	H7/8			428,158	
	Anti Human IGA Secretory Mono	H7/8			241,284	
	Elisa Leader etc.	H7/9			1,727,275	
	Assy Plate etc.	H7/7			578,623	
	Vet-Rpla etc.	H7/10			1,185,526	
	Catalog	H7/10			100,911	
	Test Reagent	H7/12			137,614	
	Soft Ware etc.	H7/12			653,755	
	Tonner Cartridge for Printer	H7/12			699,861	
	Serum Tube etc.	H8/1			321,400	
	Laser Printer	H8/2			200,432	
	Etec-Lt etc.	H8/2			1,058,844	
	Co2 Sensor Unit etc.	H8/3			64,040	
	Sodium Laulylsulfate etc.	H8/3			571,192	
Sub-total			1,820,483	11,470,000	9,910,847	23,201,330
FY1996/H8	Micro Bank etc.	H8/5			786,260	
	Requested/Reagents, spareparts etc.	H8/6	20,000,000			
Sub-total			20,000,000	0	786,260	20,786,260
TOTAL			203,964,177	43,887,000	41,204,478	289,055,655

SUMMARY OF THE PROJECT COST

ANNEX 4

NOGUCHI MEMORIAL INSTITUTE PROJECT (I

ITEMS	FY1991 (H3)	FY1992(H4)	FY1993 (H5)	FY1994 (H6)	FY1995 (H7)	FY1996 (H8)	TOTAL
JAPANESE SIDE Yen							
1.Provision of Equipment *1	22,710,210	58,615,992	90,275,730	73,466,133	23,201,330	786,260 '96/Apr-May *4	269,055,655
2.Local Activity Expenses *2	1,560,000	13,637,000	15,168,000	20,658,000	14,341,000	2,741,000 '96/Apr-Jun	68,105,000
*3							
	24,270,210	72,252,992	105,443,730	94,124,133	37,542,330	3,527,260	Y 337,160,655
GHANAIAN SIDE ¢ cedis							
1.Personal Services (salary,personnel)	107,153,564	140,600,973	157,970,186	234,824,667	319,744,841	190,263,591 '96/Jan-May	1,150,557,822
2.Research & Others Operating Expenses	25,431,881	41,004,483	51,146,999	65,966,834	59,850,340	38,188,813 '96/Jan-May	280,589,350
3.Capital Outlay Equipment Outlay	34,981,155						38,936,155
Building and Improvements		1,155,000	1,183,500	21,890,592	3,955,000		24,229,092
TOTAL ANNUAL COST	166,566,600	182,760,456	210,300,685	322,682,093	383,550,181	228,452,404	¢1,494,312,419

Note: *1 /includes equipments purchased both in Japan and locally and equipments for Japanese expert's activities.
*2 /includes expenses for research actitivities, administration and others.
*3 /includes dispatch of Japanese expert & Survey team and training programme in Japan.
*4 /FY1996 Equipments (Y 20,000,000) requested.

ANNEX 5 (1)

Area: Vaccine Preventable Diseases　T E N T A T I V E　S C H E D U L E　O F　I M P L E M E N T A T I O N

	10/1	1st year	2nd year	3rd year	4th year	5th year 9/30
	1991	1 9 9 2	1 9 9 3	1 9 9 4	1 9 9 5	1 9 9 6
1. Objectives To evaluate the quality, effectiveness of Vaccines and immune response to vaccines of the EPI						
2.Research Programs or Activities 1.DPT Vaccines To evaluate the effectiveness of DPT vaccines by epidemilogic and immunologic methods.		Community Interventional Study				
2.Measles vaccine To investigate the effectiveness of various measles vaccines and to determine the appropriate timing of v a c c i n a t i o n.		Community Interventional Study				
3.To evaluate the acquisition of immunity after administration of EPI vaccines in malnourished and immunocompromised children, and to determine the appropriate schedule of vaccination among both healthy and immunocompromised hosts.		Community Interventional Study				
4.To advise on the development of vaccine quality control system.		Community Study				
3. Counterpart Training in Japan . Immunology . Epidemiology						
4. Japanese Expert. Epidemiology . Epidemiology/ Immunology				FACS Scan expert		
5. Equipment		Necessary equipment for technology transfer				

ANNEX 5 (2)

Area: Diarrhoeal Diseases　TENTATIVE SCHEDULE OF IMPLEMENTATION

	10/1	1st year	2nd year	3rd year	4th year	5th year 9/30
	1991	1992	1993	1994	1995	1996
1.Objectives To establish the appropriate measures for the control of diarrhoeal diseases with special reference to persistent diarrhoea in childhood in Ghana.						
2.Research Programs or Activities						
1.To investigate the aetilogy of persistent diarrhoea in childhood (bacterial, viral and intestinal parasitic agents).		Community Based Investigation				
2.To evaluate contamination of water, weaning foods and markers of personal hygiene in relation to diarrhoeal diseases.		Community Based Investigation				
3.To observe infant feeding practice in relation t o incidence of diarrhoeal diseases.		Community Based Investigation				
4.To examine the relationship between persistent diarrhoeal diseases, nutritional and immunological status.		Community and Clinic Based Investigation				
5.To formulate and evaluate cereal based-ORS, and dietary management using fermented and non-fermented weaning foods.		Formulation and Lab. Evaluation	Clinic Based Evaluation	Community Based Evaluation		
3. Counterpart Training Japan Nutritional science Bacteriology						
4. Japanese Expert Nutritional science			Nutrition/Immunology			
5. Equipment		Necessary equipment for technology transfer				

ANNEX 5 (3)

Area: AIDS T E N T A T I V E S C H E D U L E O F I M P L E M E N T A T I O N

	10/1	1st year	2nd year	3rd year	4th year	5th year 9/30
	1991	1992	1993	1994	1995	1996
1.Objectives To establish and develop appropriate techniques for HIV 1,2 (and HTLV-1) and to study the epidemilogy of these infections						
2.Research Programs or Activities 1. To transfer diagnostic techniques for determination of HIV-1,2 (and HTLV-1) infections. (ELISA, Western blot) 2. Research on the epidemiology and transmission on HIV infections. 3. Virus isolation in Cell culture and characterization of the isolated Viruses.		Laboratory Based Study			Laboratory Based Study	
3. Counterpart Training in Japan Virology						
4. Japanese Expert Virology/ Epidemilogy						
5. Equipment	Necessary equipment for technology transfer					

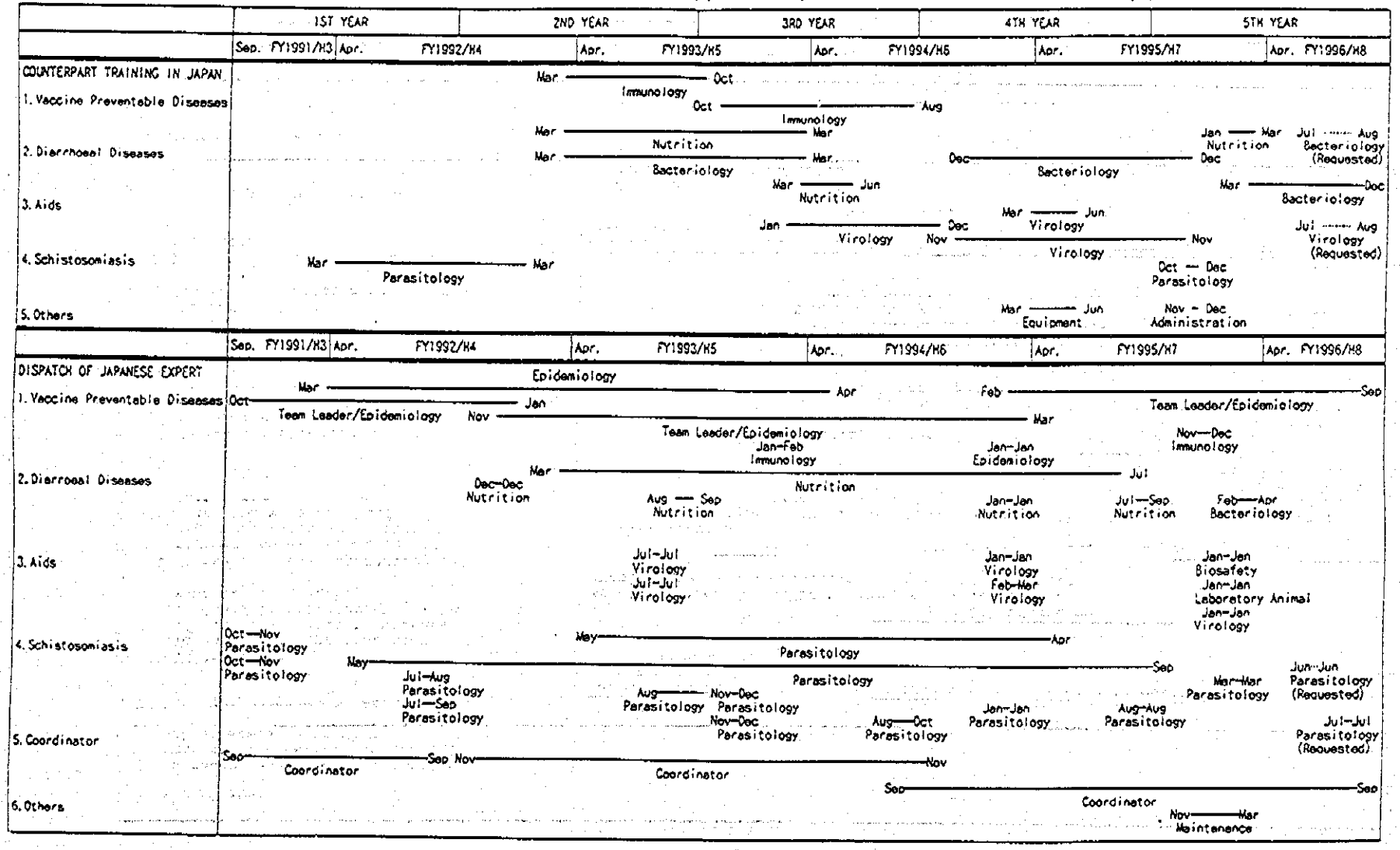
ANNEX 5 (4)

Field: Schistosomiasis **TENTATIVE SCHEDULE OF IMPLEMENTATION**

	10/1	1st year	2nd year	3rd year	4th year	5th year 9/30
	1991	1992	1993	1994	1995	1996
1. Objectives To establish the most effective and feasible measure to control schistosomiasis in Ghana.						
2. Research Programs or Activities						
Field Research 1.To analyse the present status of schistosomiasis prevalence in Ghana in collaboration with Ministry of Health.	Studies on the distribution of Schisto.heamatobium in Ghana.		Mass drug treatment with Praziquantel			
			Health Education Randomly selected children from primary schools are examined for schistosomiasis and helminth infections.			
2.To examine basic epidemilogical, socio-cultural, economic and behaviour factors associated with schistosomiasis in defined communities.		Evaluation of	Settlement of study area, census & mapping. Request for supply of safe water to the study area			
3.To examine effectiveness of combined control measures of schistosomiasis.			1.Urine(egg)examination for all villagers + Kato-Katz technique 2.Study on morbidity macroscopic haematuria macroscopic haematuria 1. and 2.are supposed to be done in 1992 & 1993.Then, the incidence is obtained. 3.KAP(knowledge,attitude,practices)study 4.Production on materials for health education 5.Snail survey 6.Immune responses		combination of mass-treatment, health education and water supply. methods of evaluation 1.incidence 2.snail infection rate 3.KAP 4.morbidity (hematuria) 5.immune responses	
Laboratory Research 1.To develop effective molluscicides	Studies on mollucides resistance		Studies on immunodiagnosis	Analysis on immune responses	Studies on to reinfection	
2.To study different strains of S. haematobium	Studies on the different strains of S.haematobium					
3.To develop immunodiagnosis						
3.Counterpart Training in Japan/Kenya Parasitology						
4. Japanese Expert Parasitology/ Epidemiology		(3)	(3)			
5. Equipment	Necessary equipment for technology transfer					

ANNEX 6. (1)

ACTUAL IMPLEMENTATION OF THE NOGUCHI MEMORIAL INSTITUTE PROJECT (II)



ANNEX 6. (2) ACTUAL IMPLEMENTATION OF THE NOGUCHI MEMORIAL INSTITUTE PROJECT II

	1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	5TH YEAR
	Sep. FY1991/H3 | Apr. FY1992/H4	Apr. FY1993/H5	Apr. FY1994/H6	Apr. FY1995/H7	Apr. FY1996/H8
PROVISION OF TECHNICAL EQUIPMENT	FY91/H3 Aug; FY91/H3 Sep; FY92/H4 Mar; FY92/H4 May; FY92/H4 Apr; FY92/H4 Jun; FY93/H5 Jul; FY93/H5 Dec; FY94/H6 Jun; FY94/H6 Sep; FY94/H6 Mar; FY96/H8 May (requested); FY93/H5 Sep; FY94/H6 Mar (local); FY94/H6 Jul; FY95/H7 Mar (local); Fy93/H5 Sep; Fy94/H6 Aug; FY84/H6 Sep				
	Sep. FY1991/H3 | Apr. FY1992/H4	Apr. FY1993/H5	Apr. FY1994/H6	Apr. FY1995/H7	Apr. FY1996/H8
SEMINAR	Dec—Dec Seminar on Child Nutrition and Survival		Jan— Seminar on Schistosomiasis and EPI Vaccine Trial in Ghana; Jun— Seminar on Persistent Diarrhoea and Immune Dysfunction in ghana		
TECHNICAL EXCHANGE PROGRAMME	Jun—Jun Kenya; Sep—Oct Kenya	Aug—Aug Zambia	Oct—Oct Kenya; Feb—Feb Kenya		
DISPATCH OF MISSION	Sep—Sep Implementation	Dec—Dec Planning/Adjustment; Jan—Jan Advising Team; Sep—Sep Jan—Jan Equipment Repair Survey	Jan—Jan Advising Team		Jun—Jun Evaluation
MEETING ON PROJECT JICA	Jan—feb Team Leader	Jan—Feb Team Leader; Jan—Feb Team Leader	Jan—Feb Team Leader	Jan—Feb Team Leader	Jan—feb Team Leader
MEETING ON PROJECT NMIMR	Nov—Nov Coordinator	Dec— Coordinating Committee; Oct—Nov Jan— Coordinator Coordinating Committee	Jan— Coordinating Committee	Oct—Nov Coordinator	
REMARKS Publication			Jan——Jun Noguchi News Vol.1 No:1; July——Dec Noguchi News Vol. 1 No:2		

ANNEX 7

LIST OF PUBLICATION

EPI

1. A randomized controlled trial of two acellular pertussis-diphtheria-tetanus vaccines in Ghana.
   H. Hori, E. A. Afari, B. Akanmori et al.
   Annals of Tropical Paediatrics 14: 91-96, 1994.

2. Randomized controlled trail of acellular pertussis-diphtheria-tetanus vaccines in southern Ghana.
   E. A. Afari, Y. Kamiya, F.K. Nkrumah, S.K. Dunyo, P.Akpedonu, H. Kamiya and F. Fukai.
   Annals of Tropical Paediatrics 16: 39-48, 1996.

3. Immunological unresponsiveness and apoptotic cell death of T cells in measles virus infection.
   M.M. Addae, Y.Komada, Xao-Li Zhang and M. Sakurai
   Acta Paediatric Japonica 37: 308-314, 1995.

DIARRHOEA

1. Carbohydrate and electrolyte content of some home-available fluids used for oral rehydration in Ghana.
   J. Yartey, E. K. Harisson, L.A. Brakohiapa and F.K. Nkrumah
   Journal of Tropical Paediatrics 39: 234-237, 1993

2. Clinical trial of fermented maize-based oral rehydration solution in the management of acute diarrhoea in children.
   J. Yartey, F.K. Nkrumah, H. Hori, K. Harrison and D. Armar
   Annals of Tropical Paediatrics 15: 61-68, 1995.

AIDS

1. Serological, virological and polymerase chain reaction studies of HIV type 1 HIV type 2 infections in Ghanaian patients with AIDS and AIDS-related complex.
   N. K. Ayisi, M. Mensah, K. Ishikawa and T. Sata
   AIDS Research and Human Retroviruses 11: 319-321, 1995.

2. A study of the evolution of coxsackie A24 variant in Ghana by viral RNA fingerprinting analysis. 1991. Res. Virol. 142: 1; 57-65.
Brandful JAM, Takeda N, Yoshii T, Miyamura K et al.

3. Differential reactivities of antibodies to HIV and HTLV-1 in sera of suspected AIDS and ARC patients. West Afr. Med. J. 1994. 13: 3; 150-151
Aidoo M, Nishiwaki O, Akari H, Brandful JAM et al.

4. Isolation of simian immunodeficiency viruses from two sooty mangabeys in Cote d'Ivoire: virological and genetic characterization and relationship to other HIV type 2 and SIV $_{sm/mac}$ STRAINS. AIDS Res. and Human Retroviruses. 1994 10: 10; 1294
Peeters M, Janssens W, Fransen K, Brandul JAM ET AL.

5. Serological, survey of HIUV-1 and Human T-cell leukemia virus type 1 for suspected AIDS cases in Ghana. 1994. AIDS 8: 1257-1261.
Hishida O, Ayisi NK, Aidoo M, Brandful JAM et al.

6. Randomized, controlled trail of trivalent oral poliovirus vaccine (Sabin) starting at birth in Ghana. 1995. Bull. WHO. 73: 1; 41-46
Osei-Kwasi, M, Afari EA, Mimura K, Obeng-Ansah I et al.

SCHISTOSOMIASIS

1. Distribution of schistosomiasis host snails in Three (defined) rural areas in Southern Ghana.
M.E. Aryeetey, Y. Wagatsuma, G.Mensah and S. Kojima.
Submitted.

2. Epidemiological studies and morbidity assessment of Urinary Schistosomiasis in three defined rural areas in Southern Ghana.
M.E. Aryeetey, Y. Wagatsuma, G.Mensah, F.K.Nkrumah, S. Kojima and K. Koram.
Manuscript ready for submission.

3. Characterization of monclonal antibodies that detect *Schistosoma haematobium* soluble egg and infected human urine antigens.
Amanor, J.D, Bosompem, K.M., Arishima, T.,Assoku, R.K.G. and S. Kojima.
Hybridoma (in press).

4. Extraction of Schistosoma haematobium antigens from infected human urine and generation of potential diagnostic monoclonal antibodies to urinary antigens.
Bosompem, K.M., Arishima, Yamashita, T., Ayi, I., Amanor D.J. and S. Kojima.

Acta Tropica, (in press).

5. Purification of *Schistosoma haematobium* antigens from the urine of infected humans. This paper was submitted for publication in the proceedings of the Symposium on Epidemiology and Control of Schistosomiasis . October 11 -12, 1994, Nairobi, Kenya. K.M. Bosompem, T. Arishima, T. Yamashita, M.E. Aryeetey, Y. Wagatsuma, F.K. Nkrumah and S. Kojima.

6. A new monoclonal antibody-based dipstick assay for specific diagnosis of urinary schistosomiasis. Submitted K.M. Bosompem, I.Ayi, K.W. Anyan, F.K. Nkrumah and S. Kojima.

7. Limited field evaluation of a rapid monoclonal antibody-based dipstick assay for urinary schistosomiasis. Submitted K. M. Bosompem, I.Ayi, K.W. Anyan, F.K. Nkrumah and S. Kojima.

Abstracts

1. T. Arishima, K.M. Bosompem, T.Yamashita, M.E. Aryeetey and S. Kojima.
   Anti-paramyosin antibodies and natural immunity to schistosomiasis. 15th African Health Sciences Conference, Nairobi, Kenya, 7th to 11th February 1994 (Abstract no. P.36/94).

2. K.M. Bosompem, T. Arishima, M.E. Aryeetey, Y. Wagatsuma, F. K. Nkrumah and S. Kojima.
   Extraction of *Schistosoma haematobium* antigens from infected infected human urine. 9th Japan International Health Conference, Kagoshima, Japan, 30-31 July 1994 (Abstract no.).

3. K.M. Bosompem, T. Arishima, M.E. Aryeetey, Y. Wagatsuma, F. K. Nkrumah and S. Kojima.
   A dot-immunobinding assay for detection of *Schistosoma haematobium* antigens in infected human urine. 16th African Health Sciences Congress, Nairobi, Kenya, 6-10th February, 1994 (Abstract no. Ab.40/95)

4. K.M. Bosompem, T. Arishima, J.D. Amanor, I. Ayi, T. Yamashita, M. E. Aryeetey, F. K. Nkrumah and S. Kojima.
   Investigations into specific diagnosis of urinary schistosomiasis using monoclonal antibodies. Seminar on Schistosomiasis and EPI vaccine trails in Ghana, Accra, Ghana, 10th January, 1995.

5. T. Arishima, K.M. Bosompem, T.Nara, M.E. Aryeetey, G.Mensah, D. Akapko, W. Anyan, I. Ayi, F.K. Nkrumah and S. Kojima.
   The role of different immunoglobulin classes and specific immunoglobulins to paramyosin in protection against *S. haematobium* infection. Seminar on Schistosomiasis and EPI vaccine trials in Ghana, Accra, Ghana, 10th January, 1995.

6. M.E. Aryeetey, Y. Wagatsuma, G. Mensah, F.K. Nkrumah and S. Kojima.
Epidemiological studies of urinary schistosomiasis in three defined rural areas in Southern Ghana. Seminar on Schistosomiasis and EPI vaccine trials in Ghana, Accra, Ghana, 10th January, 1995.

Thesis

F.K. Anto: Studies of the mollusicicidal activity of some saponifying plants, Sapindaceae, on schistosome hosts snails in Ghana under laboratory conditions. M. Phil thesis, to be submitted to the University of Ghana, Legon