P.A.C. No. 497

PUBLIC ACCOUNTS COMMITTEE (1975-76)

(FIFTH LOK SABHA)

TWO HUNDREDTH REPORT

FOREIGN PARTICIPATION OR COLLABORATION IN RESEARCH PROJECTS IN INDIA

MINISTRY OF HEALTH AND FAMILY PLANNING (DEPARTMENT OF HEALTH)

[Action taken by Government on the recommendations contained in the 167th Report (Fifth Lok Sabha)]

सत्यमेव जयते

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2461 LS—1.

INTRODUCTION

I, the Chairman of the Public Accounts Committee as authorised by the Committee, do present on their behalf this Two Hundredth Report on the action taken by Government on the recommendations of the Public Accounts Committee contained in their Hundred and Sixty-Seventh Report (Fifth Lok Sabha) on "Foreign Participation or Collaboration in Research Projects in India."

2. On the 3rd June, 1975, an Action Taken Sub-Committee consisting of the following Members was appointed to scrutinise the replies from Government in their earlier Reports:—

Shri H. N. Mukerjee—Chairman.

Shri V. B. Raju—Convener.

Shri Priya Ranjan Das Munshi — Member.

Shri Darbara Singh

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Shri Rabi Ray

Shri Raja Kulkarni

Dr. K. Mathew Kurian

3. The Action Taken Sub-Committee of the Public Accounts Committee (1975-76) considered and adopted this Report at their sitting held on the 27th February, 1976. The Report was finally adopted by the P.A.C. on the 8th March, 1976.

For facility of reference the conclusions|recommendations of the Committee have been printed in thick type in the body of the Report. For the sake of convenience, the recommendations|observations of the Committee have also been reproduced, in a consolidated form in Appendix VI to the Report.

5. For reasons that will be clear from a study of the contents. this Report is in many respects considerably different from a normal examination of Action Taken by Government on the Committee's recommendations. The original 167 Report (Fifth Lok Sabha) brought in matters whose connotation was variegated and in some respects of unique and earlier unsuspected significance. It was gratifying to note that interest in the Report was widespread

at home, and also abroad where, as in the case of the peculiar attention given to it by the noted British science journal 'Nature', certain doubtful dovecotes appear to have been fluttered. The Committee, therefore, had to prepare as it were a supplemental report based largely no doubt but not entirely, on the Action Taken Notes formally sent in by Government. This needs to be stated so that its formulations are given the truly serious attention which the Committee trust will be forthcoming.

6. The Committee place on record their appreciation of the assistance rendered to them in this matter by the Comptroller & Auditor General of India.

H. N. Mukerjee

NEW DELHI;
March 9, 1976.
Phalguna 19, 1897 (*S*).

H. N. MUKERJEE,
Chairman,
Public Accounts Committee.

CHAPTER I

PRELIMINARY OBSERVATIONS

1. *Preamble*

1.11. This Report of the Committee deals with the action taken by Government on the observations|recommendations of the Committee contained in their 167th Report (Fifth Lok Sabha) on 'Foreign Participation or Collaboration in Research Projects in India', which was presented to the Lok Sabha on 30th April, 1975.

1.1.2. The 167th Report of the Committee had focussed attention on certain issues of great importance, which had immediate as well as far-reaching implications in regard to the health of the people and the security of the country. The Report generated considerable interest in Parliament and in the Press, both Indian and foreign. The Committee had, accordingly, requested Government to furnish the Action Taken Notes on the observations/recommendations contained in the Report by 16th August, 1975, even though, under the procedure prescribed in this regard by the Committee in their 5th Report (Fourth Lok Sabha), the Action Taken Notes were to be made available within six months from the date of presentation of the Report to the House.

1.1.3. On 16th August, 1975, the Ministry of Health and Family Planning (Department of Health) furnished interim Action Taken Notes in respect of 7 of the 93 observations|recommendations contained in the Report (paragraphs 7.1.67, 7.1.74, 7.1.75, 7.1.76 and 7.1.87 to 7.1.89) and final Notes on the rest. With reference to the Committee's observations|recommendations contained in paragraphs 7.1.67 and 7.1.87 to 7.1.89, the final Action Taken Notes were furnished by the Department on 6th November, 1975, while in respect of the observations|recommendations contained in paragraphs 7.1.75 and 7.1.76, the Department informed the Committee that replies from the Ministry of Defence, who had been addressed in this regard, were still awaited. The Ministry of Defence had also been asked to furnish a note on the action taken by them on the observations of the Committee contained in paragraph 7.1.73. Relevant Action Taken Notes on all these observations|recommendations were still awaited from the Ministry of Defence|Department of Health at the time of finalisation of this Report. In this context, the Committee consider it pertinent to mention that a request made

by the Department of Health on 24th October, 1975, for an extension of time limit upto 30 November, 1975, for furnishing final Action Taken Notes on those observations|recommendations in respect of which only interim notes had been furnished earlier was not acceded to and the Department had been requested on 29th October, 1975 to furnish final replies to all the observations/recommendations immediately.

1.1.4 In the meantime, the attention of the Committee was drawn to press reports that the Director General, Indian Council of Medical Research had disclosed that the Genetic Control of Mosquitoes Unit (GCMU) (which had figured prominently in the Committee's Report), wound up on 30 June 1975, following the withdrawal of the World Health Organisation from the Project, would be continued under a new name, but in a state of suspense, pending a decision of the Government on the entire project, and that during this period of 'suspension', the Project, under the caption of the Vector Control Research Centre (VCRC), would function in two parts, one in Delhi and another in Pondicherry. Some other reports of a disquieting character about the Vector Control Research Centre and its intended activities had also been brought to the notice of the Committee, which have been discussed elsewhere in this Report.

1.1.5 The Committee, therefore, felt it ncessary to elicit further information from the Department of Health, by way of clarification of basic issues. Accordingly, a questionnaire was issued to the Department on 8 October 1975, with a request that the replies be furnished by 20 October 1975. Subsequently, the Committee acceded to a request made by the Department of Health, on 18 October 1975, for an extension of time upto 6th November, 1975 for furnishing the requisite information. The additional information called for by the Committee was made available by the Department on 6 November and 12 December, 1975.

1.1.6 Normally, the Notes indicating the action taken by Government on the observations/recommendations of the Committee are broadly categorised as follows:

(i) Recommendations/observations that have been accepted by Government;

(ii) Recommendations/observations which the Committee do not desire to pursue in the light of the replies from Govment;

(iii) Recommendations/observations replies to which have not been accepted by the Committee and which require reiteration; and

(iv) *Recommendations/observations in respect of which Government have furnished interim replies.*

The observations/recommendations contained in the 167th Report, which is somewhat singular in many respects have, however, to be viewed in their entirety and not in isolation. The Committee have, therefore, considered it essential to make a departure from past practice in this regard and examine all the Action Taken Notes in more detail and at greater depth than is usually called for in such exercises.

1.1.7 The Committee are unhappy at the delay in intimating the final action taken by Government on some of their observations/recommendations contained in the 167th Report (Fifth Lok Sabha). The Committee's anxiety in this regard, deriving from the special significance and urgency of the subject, does not appear to have been shared by Government. This is evident from the fact that the final Action Taken Notes on the Committee's observations/recommendations contained in paragraphs 7.1.73, 7.1.75 and 7.1.76 of the 167th Report are yet to be furnished even after the lapse of nearly nine months and despite a specific request of the Committee that these Notes be furnished to them by 16 August, 1975. Even in the normal course, in accordance with the time schedule prescribed in this regard by the Committee in their 5th Report (Fourth Lok Sabha), these Notes were due at the latest by 30 October, 1975. It is a matter for concern that Government have not been able to adhere even to this routine schedule. The Committee emphasise the crucial importance of quick decisions on such essential matters as had been raised in their Report, and would urge Government to act accordingly.

1.1.8 The Committee find, to begin with, that in regard to some of their observations, Government have remained content with just stating that they have 'no comments'. The Committee would like to presume that this implies acceptance of their observations by Government. The matter, however, cannot be left at that, since the Committee expect a positive and helpful reaction on the part of the administration. If their observations are not acceptable to Government, the reasons therefor should be made known to the Committee which could then have an opportunity to examine the position of Government. The Committee would, therefore, like to impress upon Government the need for a more purposeful approach towards their observations. The mere intimation of 'no comments', where positive action had been called for, renders virtually nugatory the entire purpose of parliamentary scrutiny on the basis of mutual exchange of facts and reasoned conclusions.

2. *Action taken by Government on the prefatory remarks of the Committee. (Paragraphs 7.1.1 to 7.1.3—Sl. Nos. 1 to 3).*

1.2.1 In paragraphs 7.1.1 to 7.1.3 of the 167th Report, the Committee had expressed concern over the manner in which the foreign-sponsored research projects examined by them had been initiated and approved and had made the following prefatory observations:

> "7.1.1 The examination by the Committee of some of the research projects in the country conducted in collaboration with foreign organisations raises a number of interesting questions. The Committee find that the Genetic Control of Mosquitoes Unit Project, the Bird Migration and arbovirus studies at the Bombay Natural History Society, the Ultra Low Volume Spray experiments for urban malaria control at Jodhpur, the Pantnagar Microbial Pesticides Project and some of the research projects undertaken in West Bengal and Narangwal in collaboration with the John Hopkins University establish beyond doubt a definite pattern. This is that agencies of foreign governments, in some cases explicity military agencies of those governments, (as in the case of collaboration between the Bombay Natural History Society and the Migratory Animal Pathological Survey-MAPS- of the United States Armed Forces Institute of Pathology), have been conducting basic research through Indian scientists and Indian scientific organisations. Even in cases where such research is carried out in collaboration with the philanthropic civilian organisations from abroad, the Committee find that some of these civilian organisations also have active liaison and communication at several levels with military agencies. No doubt, some of these research programmes have been shown as 'developmental' or 'basic research'. These projects, however, have been closely concerned with the collection of vital virological, epidemiological or ecological data, which are well capable of being used against the security of the country and that of our neighbouring countries. The utility of some of these projects to India, especially the Genetic Control of Mosquitoes Unit Project, seems to be only doubtful or potential, whereas the primary data obtained from these projects are likely to be of vital importance to foreign governments interested in developing techniques of chemical, biological, bacteriological, and anti-subversive warfare."

"7.1.2 As the evidence placed before the Committee, which has been discussed in the succeeding paragraphs would reveal, it would appear that these projects are not isolated instances of errors of judgement where, due to inaccurate assessment or a certain naivete on the part of officials and scientists, the Ministry of Health and its agencies initiated and approved projects which could be greatly inimical and extremely hazardous to the nation's well being and security. What causes surprise to the Committee, and this ought to be a matter of grave public concern also, is the lack of security consciousness in the Indian agencies involved in these projects and the casual attitude and indifference towards foreign supported research in India. The Committee also find that scientific projects in the country are dealt with by various Ministries and organisations and that there is little or no coordination between different wings of Government in this regard."

"7.1.3 The unsatisfactory features of some of the individual projects that have come to the notice of the Committee have been discussed in the succeeding paragraphs."

1.2.2 In their Action Taken Notes dated 16 August, 1975 on the above observations, the Ministry of Health and Family Planning (Department of Health) have stated as follows:

Paragraph 7.1.1

"During the first four years of existence of the Unit, the species to which maximum attention was paid, was *Culex fatigans*, the major vector of bancroftian filariasis. It is well known that filariasis is spreading in the country and in spite of vigorous efforts made under the National Filaria Control Programme over a decade, the impact on the incidence of the disease has not been significant. The other species on which research was undertaken was *Aedes aegypti*, the vector of dengue and chikungunya, which cause severe sickness. The dengue virus has assumed a sinister form in recent years in some South-east Asian countries and it would be fair not to be too complacent about its absence in India. For launching the scheme on genetic control of mosquitoes, considerable research data in regard to the particular species would be required and the collection of such data would take considerably long time. It was, therefore, decided that re-

search on *Culex fatigans* and *Aedes aegypti* about which research data were already available, should be started and the expertise thus developed could profitably be used for genetic control of *Anopheles stephensi*, which is a vector of malaria. Research on *Anopheles stephensi* had been in progress since 1970 and had been intensified since 1973. Investigations were carried out in the Unit to determine optimal conditions for the chemosterilisation of the species. The intention was to develop expertise in genetic engineering by utilising the knowledge already available and build up a competent inter-disciplinary team of ecologists, entomologists, virologists and geneticists for the control of mosquito-borne-diseases. This knowledge would be of considerable use in controlling malaria through genetic control of *Anopheles stephensi* particularly in urban areas. It will thus be seen that the data collected by the Unit and the research work done by it are of relevance to the important public health programmes of the country."

Paragraph 7.1.2.

"The project of GCMU was launched after due care and consideration in the best interest of the country and cannot be said to be hazardous to the nation's wellbeing. There was no lack of security consciousness.

The foreign supported research projects are always subjected to careful scrutiny by the concerned ministries departments and authorities. Schemes financed from PL-480 funds are screened by (i) a Committee of Indian Council of Medical Research in so far as medical and public health projects are concerned; (ii) the National Screening Committee of the Ministry of Education and Social Welfare located at the University Grants Commission in respect of projects undertaken by the universities and educational institutions. The former Committee is composed of representatives of the Ministries of Health, Home Affairs, External Affairs, Finance (Expenditure Division), Finance (Department of Economic Affairs), Planning Commission. The latter consists of the representatives of the Ministry of Finance, Education, External Affairs, University Grants Commission and two other members nominated by the Government of India. Careful scrutiny of the projects and coordination between different authorities were ensured by these Committees."

Paragraph 7.1.3

"No Comments."

1.2.3. The reply furnished by the Department of Health with reference to the Committee's preliminary observations contained in paragraph 7.1.1 of their 167th Report is surprisingly silent in regard to the Bird Migration and Arbovirus Studies at the Bombay Natural History Society, the Ultra Low Volume Spray Experiments for urban malaria control at Jodhpur, the Pantnagar Microbial Pesticides Project, etc. An attempt has, however, been made to justify the relevance of the research on genetic control methods undertaken by Genetic Control of Mosquitoes Unit (GCMU) from the public health point of view for the control of filariasis, dengue and chikungunya initially and for the control of urban malaria subsequently, by utilising the knowledge gained by the studies on *Culex fatigans* and *Aedes aegypti*, the vectors of bancroftian filariasis and dengue and chikungunya respectively.

1.2.4. As regards the claim made by the Department of Health and the research carried out by the Genetic Control of Mosquitoes Unit (GCMU), in the first four years of its existence, on Culex fatigans is of relevance to the National Filaria Control Programme, the Committee's attention had been drawn to an article which appeared in the September 1975 issue of 'Science Today' by Dr. C. G. Pandit entitled 'Filariasis, Yellow Fever and Genetic Control of Mosquitoes —A Rejoinder' in which the author has, *inter alia*, stated as follows:

> "In 1970, I was requested by the ICMR, at the instance of the Ministry of Health, Government of India, 'to review the National Filaria Programme and to assess the results obtained so far and to indicate the lines on which such control measures should continue to be adopted henceforth in order to achieve the desired objective'. In my Report, I reviewed the National Filaria Control Programme in all its aspects in the light of experience gained during the previous ten years and dealt with the possible role of controlling C. fatigans and other vectors of filariasis and came to the conclusion that *it was neither pratical nor economic to do so. The stress ought to be on the treatment of an individual harbouring microfilaria with suitable administrative methods and machinery.*" (Italics added)

1.2.5. In this context, the Committee have considered it pertinent to refer to the Report on the 'Assessment of the National Filaria Con-

trol Programme (India)—1961-1970' (Report of the Second Assessment Committee) of the Indian Council of Medical Research (Technical Report Series No. 10, 1971), cited by Dr. Pandit in his article Evaluating the relative advantages and disadvantages of the two methods of control of filariasis hitherto adopted by the National Filaria Control Programme, namely, control of the mosquito vector by the application of larvicides and treatment of the microfilaria carriers respectively, the Second Assessment Committee had observed:

> "Application of mosquito larvicidal oil if carried out properly under rigorous supervision and at the required intervals covering all the breeding places is an effective method of reducing the vector densities. Apart from the reduction in the vector density and the consequent reduction in the transmission, this method has a great advantage of controlling|eliminating mosquito nuisance—a step which is appreciated by the public. Larvicidal measures, however, have been known to be effective only as long as they are being continuously implemented and any break in the operations, however, brief it may be, sets the clock back with the resurgence and re-building of the mosquito density. So this approach to the control of the filariasis problem is a recurrent measure and has to be carried out unremittingly. When once the measures have been started in an area they have to be kept on with a high pitch of efficiency over a long number of years to produce any palpable results on the transmission index and the filariousness in the community. The cessation in the activity for whatever reason and whatever duration is resented by the public.
>
> Anti-larval measures just like any other measure aiming at the control of the vectors will not yield immediate results if it is implied to be an appreciable reduction in incidence of filarial infection or disease in the community. Persons who had already developed the infection or the disease would have to run through the normal course of the events in spite of the elimination or effective control of the transmitting agent. These control measures could only protect the non-infected section of the population and the newcomers. Under the circumstances any definite change in the proportion of infected and diseased persons in the community would require a lapse of several years'. (Iyengar, M.O.T. 1938 Indian Med Res Memoir No. 30).

The above statement would hold in the absence of any other control measure aimed at the elimination of the reservoir of infection in the community."[1]

On the utility of chemotherapy for the control of filariasis, the Report had, *inter alia*, observed:

'While chemotherapy as a mass control measure is not feasible, treatment of the parasite positive persons is an effective method of interrupting filaria transmission *even in the absence of any other measure.*"[1] (Italics added).

The Report goes on to state:

".....the drug administration has supreme advantage of the carriers of the infection and thereby effectively reducing/eliminating the reservoir of the infection in the community, *there can be no two opinions regarding the advisability of this method for effective interception of transmission.* In spite of the practical difficulties in the use of chemotherapeutic measures as a method of control, *the important place this measure has in the control of filariasis remains undisputed.* Apart from its utility as a public health measure, the drug also clear the person of the infection and ensures freedom from the infection taking a progressive course resulting in its inevitable sequelae. Unlike the antimosquito measures, which remain a continuing recurrent operation year in and year out, drug administration has to be carried out over a short period and would not need repetition for a long period, may be months or years. This aspect offers a very essential and useful field of research. The World Health Organisation in their Expert Committee Report No. 359 (1967) have recommended a modified schedule of treatment with diethylcarbamazine giving a total dose of 72 mg per kg. body weight in divided dosages at weekly or monthly intervals over a period of 12 weeks or 12 months respectively. According to this report such a schedule is free from any of the undesirable side reactions normally observed with larger dosages over shorter period and at the same time effectively clears the microfilariae in the individuals so treated.

It would be seen that treatment of the individual with the chemotherapeutics is cheaper, more effective in achieving

the purpose of control programme, is effective and quick in intercepting the transmission, gives relief to the actually ill person and the operation is to be carried out over a short period only."[1] (Italics added)

1.2.6. According to the ICMR Report, the attempt of dealing with filariasis will be of eradication and not control. The Report observes in this connection:

"In the present state of prevalence of filariasis in the country, the degree of insanitary condition that exist in most areas, the structure of health services in different States, the load of other urgent problems in the field of communicable diseases and the paucity of funds the ideal of eradication of filariasis which requires continuous effort over a long period can only remain an ideal not to be reached in any foreseeable future. To this, may be added the paucity of knowledge concerning the disease process itself. In view of the above considerations, *the only feasible method of control would be to reduce the transmission of infection by methods currently available and reduce the risk of infection to as minimum a level as practicable."*[1] (Italics added)

1.2.7. The observations of the Second Assessment Committee in regard to the research so far carried out on the disease process of filariasis are also significant in this context. The Committee, in its Report, pointed out that in spite of the fact that filariasis is a major health problem, with nearly 136 million people residing in endemic areas of filariasis in the country, over 12 million harbouring microfilariae in their blood and nearly 8 million having signs and symptoms of the disease, *'the disease does not seem to have evoked much enthusiasm in the minds of Indian medical scientists'*. (Italics added) and that 'the workers in this field have been few and far between and mostly those in one or two research institutes in this country'.[1] The Report also observes that while 'attempts in the past were directed mainly towards elucidating some aspects of the epidemiology of the disease, mapping out through surveys, areas of endemicity by ascertaining certain specific indices, such as microfilaria rates, diseases pattern and diseases rate in the communities, as well as gathering data relating to vector species, their densities, and infection and infectivity rates in them', *'very little attention has been paid to the disease and to the underlying physiopathological process resulting in the clinical manifestations of the disease'*.[1] (Italics added). Again, according to the Committee, 'Research in epidemiology of the disease has been conducted hitherto, more or

less, on conventional lines, particularly, through surveys to demarcate its areas of prevalence' and though there have been phenomenal advances in the field of immunology in recent years and the knowledge gained is being increasingly applied to the understanding of parasitological problems, particularly in elucidating the host-parasite relationships in these infections, 'reports on immunological aspect of human filariasis is scanty'.[1] The Committee has, therefore, stressed the importance of conducting epidemiological and immunological studies in the exoneration of the disease and has suggested certain areas of research which could be profitably pursued.

1.2.8. Even as recently as 16 October 1974, during a joint meeting of the Expert Committee on Virus and Arthropod Borne Diseases and geneticists from the Expert Committee on Human Genetics, Immunology and Allergy, an important consideration in regard to the genetic control methods had emerged 'that it was not intended to undertake control measures immediately, especially with regard to the control of filariasis in the country'. At this meeting, it was also stressed that the control of filariasis will have to be based on an 'Integrated approach, in which genetic control could conceivably be one aspect'.[4] With reference to these discussions, Dr. C. G. Pandit has stated as follows in his article in 'Science Today':

> "When this question came up for discussion at the 16 October meeting, I got the impression that in view of the non-availability of stable genetic or incompatible cytoplasmic strains of C. fatigans and density-dependent regulation of C. fatigans population..., *it was doubtful if genetic methods for control of C. fatigans at this stage were even available for use or were feasible for a vast country like India.*"[5]
>
> (Italics added).

1.2.9. As regards the 'vigorous efforts' claimed by the Department of Health to have been made under the National Filaria Control Programme for over a decade, despite which the impact on the incidence of filaria has not been 'significant', past failures of the Programme were not attributable so much to the methodology adopted for the control of filariasis but were attributable more to inadequacy of staff and supervision, breakdown in supplies of larvicidal oil, a lopsided approach of the Government to the problem of filariasis, etc. Evaluating the performance of the NFCP Units

in different States, the Second Assessment Committee of the ICMR had gone on record as follows:

> "... (the) programme was carried out mechanically, purely as matter of routine without any critical approach, without any concurrent assessment and without making any variations to suit local conditions, though the first Assessment Committee had envisaged that occasionally need might arise to do so. Again, there was evidence that no adequate coordination existed in the joint efforts of such organisations as the public health departments, the railways and the local bodies."[1]

1.2.10. The Public Accounts Committee had also had occasion to examine earlier the performance and achievements of the National Filaria Control Programme. Expressing their dissatisfaction with the slow progress in the implementation of the National Filaria Control Programme, launched in 1955-56, the Committee had regretted, in paragraph 1.125 of their 124th Report (Fifth Lok Sabha), that even after 18 long years, the filariasis surveys had not been completed. The Committee had found that Central subsidy for the establishment of Filaria Survey Units in the States had been made available only for two years, after the completion of which the survey work had been suspended in many States and the States had been requested to continue and complete the survey work from their own resources and were, therefore, constrained to make the following observations in paragraph 1.20 of their 138th Report (Fifth Lok Sabha):

> "Expressing their dissatisfaction with the extremely slow progress in the implementation of the National Filaria Control Programme, the previous Committee had expressed concern at the fact that the filariasis surveys had not been completed even after 18 long years. Incidentally it came to the notice of the present Committee that the authorities were more busy with US/WHO GCMU programme for reasons better known to them. Since the price for this serious lapse has to be paid in terms of human suffering, the Committee desired that drastic action be taken against those responsible. The Government in their reply have

taken shelter by stating that the survey work was not given up totally and the State Health Directorate and the staff of NICD continued to undertake sample surveys which is most unacceptable. While the survey for filariasis had been completed in 145 out of 260 districts in the endemic areas by 1970, delimitation in the remaining 115 unsurveyed districts is proposed to be completed during the Fifth Five Year Plan period. It is also seen from the reply of the Ministry that the initial two-year survey, launched as a large scale pilot programme, had been suspended on the completion of two years. As these surveys had revealed that the magnitude of the problem of filariasis had increased due to rapid industrialisation and unplanned urbanisation, the reasons for suspending the surveys and restricting the scope of these surveys to mere sample ones are not very clear. In fact, on the basis of the findings of the large scale pilot survey, the scope of the survey should have been expanded and completed expeditiously. The Committee are extremely dissatisfied with the perfunctory manner in which a health programme of this importance has been treated and reiterate the need for taking action against those responsible for this sorry state of affairs."

1.2.11. Again, commenting on the inadequate attention paid to the problem of rural filariasis, the Committee, in paragraph 1.131 of their 124th Report (Fifth Lok Sabha), had observed:

"The present control measures are mainly confined to the urban areas although the Second Assessment Committee (1971) opined that the problem of rural filariasis is of much greater magnitude than thought of previously. The Committee are not happy with the lopsided approach of Government to the problem. The Committee strongly suggest that the problem of rural filariasis should receive serious attention and it should be examined to what extent the programme for the Fifth Plan could be reoriented so as to make a serious beginning in the rural areas."

Dealing with the action taken by Government on these recommendations in their 138th Report (Fifth Lok Sabha), the Committee, in paragraph 1.27 of the Report, had observed:

"The Committee had expressed their extreme unhappiness at the lopsided approach of the Government to the problem

of filariasis. The control measures, strangely enough, were mainly confined to the urban areas even though the problem of rural filariasis was of a much greater magnitude. The Committee had stressed that this problem should receive serious attention and an examination conducted to determine to what extent the programme for the Fifth Plan could be reoriented so as to make a serious beginning in the rural areas. Government in their reply have stated that the steering group on Health of the Planning Commission had observed that the filaria control activities during the Fifth Five Year Plan should be confined mainly to urban areas. This is very astonishing. Besides, in the Fifth Five Year Plan the role of the Central Government is confined to assisting the States with material and equipment only and the Ministry have, therefore, stated that the programme may be extended to the rural areas by the State Government from their own resources. This is regrettable since the State Government do seriously lack in resources."

1.2.12. The Committee's observations on the financing of the National Filaria Control Programme contained in paragraph 1.34 of their 138th Report (Fifth Lok Sabha) are also relevant in this connection and are reproduced below:

"Commenting on the thinking in the Planning Commission that the Centre should not bear the cost of the Filaria Programme and keeping in view the difficulties in financing the Programme, the magnitude of the filaria problem and the failure to deal with this very important problem on an adequate scale in the past, the Committee had suggested that the matter should be carefully considered with a view to ensuring that the implementation of such limited programme as has been adopted also does not suffer. The Committee had also expressed the view that the Central Government ought to take full responsibility for the Programme. Government, in their reply, have stated that despite the justification for continuance of the Programme as a Centrally sponsored scheme, the Planning Commission have not included NFCP as a centrally sponsored programme in the Fifth Five Year Plan and that the States will have to provide the operational cost for the existing

set up and for the new targets. Though the National Filaria Control Programme had been launched two decades ago, in 1955-56, the implementation had been slow and the Programme has been fraught with failures and setbacks. The Centre absolving itself of the responsibility at this stage could only result in rendering more difficult the successful implementation of the programme hereafter. It is not at all unlikely that this Programme will die an unnatural death in this process. The Committee are deeply concerned over this state of affairs and would reemphasise the imperative need for giving this programme the highest possible priority, both in terms of finance and the subsequent implementation of a more intensive programme that needs to be adopted.

The Planning Commission should reconsider in the light of Committee's recommendation."

1.2.13. The relevance and utility of the research work on the Aedes aegypti mosquitoes for the eradication of dengue have been discussed in detail by the Committee in Chapter III.7 of their 167th Report (Fifth Lok Sabha) and the Committee's observations contained in paragraphs 7.1.34 and 7.1.39 to 7.1.43 of the Report are valid even to day. Besides, the earlier apprehensions of the Committee that the elimination of dengue might also result in the elimination of the protection now available against yellow fever are still to be set at rest satisfactorily. This has been discussed in detail in a subsequent section of this Report.

1.2.14. It has also been claimed by the Department of Health, in their Action Taken Note on the Committee's observations contained in paragraph 7.1.1, that the knowledge and expertise gained by the research on Culex fatigans and Aedes aegypti would be of considerable use in controlling malaria through genetic control of Anopheles stephansi, particularly in urban areas. The Committee, however, found that even the Expert Committee on Virus and Arthroped Borne Diseases and the geneticists from the Expert Committee on Human Genetics, Immunology and Allergy had admitted, in their joint meeting of 16 October 1974, that it was well known that 'the experience gained on any one species of the mosquito may not be readily applicable with regard to other species of public health importance'.2 This had also been confirmed by Dr. T. Ramachandra Rao, who had been appointed as an Officer on Special Duty in the Indian Council of Medical Research to oversee the technical work relating to the GCMU Project, during evidence tendered before the Public Accounts Committee (1974-75).

1.2.15. The Committee regret that the reply furnished by the Department of Health in response to their observations contained in paragraph 7.1.1 of the 167th Report (Fifth Lok Sabha) is not quite relevant to the basic issues raised by the Committee. The Committee, for instance, had felt that the Genetic Control of Mosquitoes Project, the Bird Migration and Arbovirus Studies at the Bombay Natural History Society, the Ultra Low Volume Spray experiments for Urban Malaria Control at Jodhpur, the Pantnagar Microbial Pesticides Project and some of the research projects undertaken in Calcutta and Narangwal in collaboration with the John Hopkins University set up a definite pattern and were closely linked with the collection of vital virological, epidemiological or ecological data, capable of use, in certain circumstances, against the security of the country and also of neighbouring countries. Apprehending that agencies of foreign governments, in some cases explicitly military agencies of these governments, or civilian institutions with known military connections had been conducting basic research, which could be of vital assistance to the development of biological and chemical warfare techniques, the Committee had expressed the view that the utility of soms of these projects to India appeared to be doubtful or remotely potential. The Department of Health have maintained a surprising silence on these vital issues raised by the Committee and have confined themselves to a justification of the relevance of the Genetic Control of Mosquitoes Unit Project. If this silence of the Department implies an acceptance of the biological warfare implications of these research projects, the Committee would like the Department to make their intentions clear rather than adopting a clearly evasive approach towards specific and important issues pending determination. The Committee are unhappy with this peculiar attitude of the Department and would ask for a more categorical response to their carefully thought out observations.

1.2.16. The Committee find that the Department's attempt to justify the relevance of the Genetic Control of Mosquitoes Unit to the important public health programmes of the country amounts to little more than laboured extenuation. An impression is sought to be conveyed that the Genetic Control of Mosquitoes Unit was established with a view to evolving and adopting genetic methods for the control and eradication of filariasis, dengue and chikungunya, and utilising later the expertise and techniques developed by the Unit for controlling malaria through genetic control of the vector Anopheles stephansi. The Committee, however, find from the agreement entered into between the World Health Organisation and the Government of India for a Collaborative Research Project on the Genetic

Control of Mosquitoes, that the control of any specific mosquito-borne disease had not been stated as an objective of the project.

1.2.17. As regards the claim of the Department of Health that the research on Culex fatigans' carried out by the Genetic Control of Mosquitoes Unit is of relevance to the National Filaria Control Programme, the Committee are of the view that expensive genetic methods for the control of the filarial vector are only of doubtful utility, especially when even the conventional methods of filaria control have failed to make any perceptible impact on the incidence of the disease, even after two decades of continued efforts under the National Filaria Control Programme. In this context, the Committee consider it pertinent to draw attention to the significant observations of the Second Assessment Committee of the Indian Council of Medical Research, which had assessed the Filaria Control Programme after the GCMU came into existence, that 'in the present state of prevalence of filariasis in the country, the degree of insanitary condition that exist in most areas, the structure of health services in different States, the load of other urgent problems in the field of communicable diseases and the paucity of funds, the ideal of eradication of filariasis which requires continuous effort over a long period can only remain an ideal not to be reached in any foreseeable future', and that 'the only feasible method of control would be to reduce the transmission of infection by methods currently available and reduce the risk of infection to as minimum a level as practicable'. It is significant that the Committee had not even considered genetic methods as a possible alternative to combat the problem of filariasis.

1.2.18. Even in more recent times, in October 1974, during the discussions at a joint meeting of the Expert Committee on Virus and Arthroped Borne Diseases and geneticists from the Expert Committee on Human Genetics, Immunology and Allergy, an important consideration appears to have emerged that it was not intended to undertake genetic control measures immediately, especially with regard to the control of filariasis in the country. This Group had also stressed that the control of filariasis would have to be based on an 'integrated approach', in which 'genetic control could conceivably be one aspect'. The observations of Dr. C. G. Pandit in the September 1975 issue of 'Science Today' with specific reference to these discussions that 'it was doubtful if genetic methods for control of C. fatigans at this stage were even available for use or were feasible for a vast country like India', are also of relevance in this regard.

1.2.19. The preoccupation of the Indian Council of Medical Research with research on genetic control methods is extremely difficult to justify, particularly in the context of the inadequate attention being paid to an on-going national programme for the control of filaria which has now been in operation for two decades. As has been pointed out by the Committee in their 138th Report (Fifth Lok Sabha), even the extent and magnitude of the filariasis problem in the country are yet to be properly surveyed and assessed and the performance and achievements of the National Filaria Control Programme tell a sad tale of failures and setbacks. The Committee had also expressed their dissatisfaction with the 'perfunctory manner' in which a health programme of this importance had been treated. The financing of the National Programme appears to have run into difficulties and its implementation has been largely left to the limited resources and devices of the State Governments. The Second Assessment Committee has also drawn pointed attention to the importance of conducting epidemiological and immunological studies in the exoneration of the disease and the paucity of knowledge concerning the disease process itself. In the circumstances, the Committee are unable to appreciate the rationale for the assertion of the Department of Health of the relevance of the GCMU for filaria control, particularly when many basic questions relating to filariasis still remain unanswered.

1.2.20. The argument that the control of 'Aedes aegypti' is of importance in the context of the outbreak of dengue in a 'sinister' form has already been discussed by the Committee in paragraph 7.1.34 of the 167th Report and the observations of the Committee contained therein still remain valid. Besides, the Committee's earlier apprehensions that the elimination of dengue might result also in the elimination of the protection at present available against yellow fever are still to be set at rest satisfactorily, as has been subsequently pointed out in Chapter II of this Report.

1.2.21. The other contention of the Department of Health that the knowledge and expertise gained from the research on 'Culex fatigans, and 'Aedes aegypti' would be of considerable use in controlling malaria, particularly in the urban areas, through the genetic control of Anopheres stephansi (the malarial vector), is also not tenable, in view of the fact that the specific details of the work relating to 'Culex fatigans' or 'Aedes aegypti' canont, as has been admitted during evidence tendered before the Committee and also by the ICMR's own expert committee, be applied to another species.

1.2.22. Besides, as pointed out in paragraph 7.1.57 of the 167th Report, the applicability of the genetic method is limited, since it can work only against an isolated mosquito population. The limitations of genetic methods of vector control have also been succinctly expounded by Dr. G. Davidson, in his book on 'Genetic Control of Insect Pests' (1974), wherein he states: "Passing from small pilot project to large scale application is largely wandering into the realm of the unknown at this stage in the development of genetic control methods. . .. To many people the extension of such techniques to the control of insects with a known high rate of increase is inconceivable, especially where such insects are spatially continuous over large areas."

1.2.23. All these observations and findings only serve to reinforce the earlier conclusion of the Committee that the utility of some of the foreign-sponsored projects, especially the Genetic Control of Mosquitoes Unit Project, seems to be doubtful and only very remotely potential. While the Committee are not unwilling to concede the importance of research efforts, the projects examined by them have revealed a rather casual attitude and indifference on the part of the authorities concerned towards foreign supported research in India and a number of deficiencies. The Committee would, therefore, reiterate the imperative need for the utmost care, caution and critical scrutiny before approving foreign sponsorship of research projects undertaken in India, particularly when such projects have military or quasi-military implications of an almost incalculable character.

1.2.24. The Department of Health claim in their Action Taken Note on the Committee's obvervations contained in paragraph 7.1.2 of the 167th Report that the Genetic Control of Mosquitoes Unit was launched after due care and consideration in the best interest of the country, that it cannot be said to be hazardous to the nation's well-being, and that there was no lack of security-consciousness. It saddens the Committee to find that their deep anxiety about the paramount importance of the maximum caution, in the world of today, over he scrutiny of scientific projects with likely security implications has not been reciprocated. The was not the occasion for Government to take recourse, as it were, to special pleading in defence of what appears to the Committee to be indefensible. If, as claimed, due care had been taken while launching the GCMU Project, there should have been no reason for the ICMR's own Governing Body to emphasise, in November 1974, the need for procedural modifications in the agreement between the Government of India and the World Health Organisation, envisaging a close direction and guidance of

the project by the Indian Council of Medical Research. Similarly, the ICMR Expert Committee set up after the debate on the project in Parliament, on 30 July 1974, had drawn attention to the inadequacy of the safety measures incorporated in the project and had stressed the need for taking into account the possibility, however, remote, that genetic manipulation might result in strains of mosquitoes with increased competence to transmit other diseases, and for screening genetically manipulated strains with respect to their competence to transmit viruses considered by the Expert Committee on Virus and Arthropod Borne Diseases to be of major importance and relevance and capable of posing public health hazards. Admittedly, as has been pointed out in paragraph 7.1.10 of the 167th Report, it was only after the publication of the 'Press Trust of India' article, followed by the discussion in Parliament and examination by the Public Accounts Committee that the Ministry of Health woke up to an awareness of the inadequacy of the existing administrative arrangements for the Project and set in motion a review of the technical and administrative control of the project by a committee nominated for the purpose.

1.2.25. Again, it is evident from the examination of the project by the Committee that while launching its programme against 'Aedes aegypti', no serious consideration appears to have been given by the Indian Council of Medical Research and the Health Ministry for more than three years to the warnings of Dr. C. G. Pandit on the possible dangers of eliminating dengue and to the question posed by him on the eradication of Aedes aegypti. The Committee expect that those who airily dismissed his forebodings as 'thoughts raised in a lecture' have now learnt better.

1.2.26. The statement of the Department of Health that 'there was no lack of security conciousness' while launching the Genetic Control of Mosquitoes Unit Project does not appear to be borne out by the facts. During their examination of the Project, the Committee found no evidence to show that the Ministry of Health or the Indian Council of Medical Research had taken all precautions to prevent the possible misuse of the GCMU experiments. The yellow fever threat and the biological warfare implications of the Project which, significantly enough, have not been disputed by the Ministry, came to be realised by the Ministry only after the enquiry by the Committee had been set in motion and it was then that certain safeguards were proposed. The Committee are, therefore, unable to accept Government's somewhat bland plea in this regard.

1.2.27. The 'careful scrutiny' of the projects and coordination between different wings of Government claimed to have been ensured

by the Screening Committee of the Indian Council of Medical Research, is also unconvincing, in view of the fact that the Ministry of Health and the Indian Council of Medical Research were found, during evidence, ignorant of the work done in the field of genetic control by the Defence scientists who had reservations about the techniques of chemosterlisation and the use of cytoplasmic incompatible strains and translocated chromosome strains, till the Committee brought it to their notice during their examination of the GCMU Project.

1.2.28. The lack of security consciousness in the Indian agencies involved in the initiation and approval of foreign-supported research in India is only too obvious in the BNHS-MAPS Bird Migration studies on which Government have maintained an inexplicable silence. Even though the Bombay Natural History Society was collaborating with an avowedly military organisation of the United States Government and the Military overtones of the project were more direct and explicit, the scrutiny by the Defence Ministry of the collaboration was confined only to a 'technical' point, namely, whether the Project involved visits of Indian and foreign nationals to forward or sensitive areas. The Committee need hardly point out that it did not require more than ordinary commonsense to realise that, under the Mansfield amendment to Section 203 of the US Act on 'Military Appropriation for Research and Development', no wing of the US Department of Defence would be interested in research which did not have a direct and apparent relationship to a specific military function or operation. Yet, strangely enough, the military implications of the Bird Migration studies had not been recognised by the Defence Ministry. The Ministry had also not appreciated fully the apparent risk involved in approving projects routed through the Advance Research Projects Agency (ARPA) of the United States.

1.2.29. The facts brought out by the Committee's enquiry clearly establish that the special vigilance, prudence and care normally expected in the scrutiny of foreign-sponsored scientific projects were sadly non-existent while some of the projects examined by the Committee were approved, and that the clearance of these projects had been left largely to routine bureaucratic devices. The Committee must, therefore, reiterate their earlier observations and would like to be informed of the nature and details of the 'careful scrutiny' and coordination claimed now to have been ensured by the various inter-Ministerial Screening Committees.

CHAPTER II

GENETIC CONTROL OF MOSQUITOES

1. *Background*

2.1.1. A research project for the control of mosquitoes through genetic methods had been launched by the Indian Council of Medical Research in 1969 in collaboration with the World Health Organisation. Though the Genetic Control of Mosquitoes Unit (GCMU) came into existence on the basis of an agreement between the WHO and the ICMR, the Unit was financed by PL-480 funds appropriated by the US Public Health Service and for this purpose, the World Health Organisation had entered into an agreement with the US Public Health Service, under which the latter not only approved the appointment of the project leaders of the Unit but also determined its activities and priorities.

2.1.2. Genetic control is the reduction or elimination of mosquitoes that can transmit different diseases, and their replacement by other strains which cannot do so through genetic techniques. The major methods of genetic control are:

A. *Sterile male technique* i.e., release into the natural environment of large numbers (carefully calculated) of laboratory-bred male mosquitoes sterilised either by radiation or chemicals (Chemosterilization).

B. *Cytoplasmic incompatibility* i.e., release of a strain of mosquito which is incompatible with the local strain.

C. *Genetic strain* i.e., release of a strain of mosquito, which is produced in the laboratory, with abnormal chromosomes (translocations).

2.1.3. The objective of the Genetic Control of Mosquitoes Unit, according to the information furnished to the Lok Sabha on 21 November, 1974 in reply to Starred Question No. 148, was to test the feasibility of applying these techniques for the control of mosquito populations through extensive laboratory and field experiments. The work of the Unit thus involved a study of the ecology of mosquitoes, the rearing and release of mosquitoes in the field and the mapping of towns and villages where they were to be released.

2.1.4. A report had been brought out by Dr. K. S. Jayaraman, Science Correspondent of the Press Trust of India in July 1974 on the serious concern expressed in sections of the Indian scientific community over some research projects being carried out in the country under the auspices of the World Health Organisation under conditions of total secrecy. The press report had, *inter alia*, pointed out that while the relevance of some of these projects to India was doubtful, the knowledge gained from such research projects could be of significance and importance in the field of biological warfare. A number of deficiencies in the handling of the Genetic Control of Mosquitoes Unit project had also been highlighted in the report which raised certain very valid and important questions about the real objectives of the project.

2.1.5. The thought-provoking PTI story naturally gave rise to apprehensions that the work carried out by the Genetic Control of Mosquitoes Unit may be connected with germ warfare experiments, detrimental to the interests of the country and generated considerable interest and discussion in Parliament. Since this was an urgent issue of public importance affecting both the health of the people and the security of the country, the Public Accounts Committee (1974-75) had decided to examine this project and other related issues in detail. The findings of the Committee are contained in their 167th Report (Fifth Lok Sabha).

2. *Administrative and technical arrangements for the project (Paragraphs 7.1.4 to 7.1.14—Sl. Nos. 4 to 14 and 65).*

2.2.1. According to the agreement entered into between the World Health Organisation and the Government of India, on 16th June 1969, for a collaborative research project for the genetic control of mosquitoes, the research was to be conducted under the technical and administrative responsibility of the World Health Organisation in collaboration with the Government of India through a Research Unit to be established by the former in India. The agreement had, *inter alia*, provided for the appointment of a Project Leader by the World Health Organisation who would be responsible for the technical and operational direction of the project in accordance with the research protocols referred to in the agreement and in consultation with a national counterpart to be nominated by the Government of India. The administration of the project was, however, to vest in the WHO Project Leader who was to control the finance, discipline and other administrative matters related to the project.

2.2.2. The Committee had, however, learnt during their examination of the project that in terms of another agreement entered into between the World Health Organisation and the United States of America, for the provision of PL-480 funds for the project, changes or substitutions of the Principal Investigators of the Project were to be made only with the written approval of the National Communicable Diseases Centre of the US Public Health Service.

2.2.3. Reviewing these arrangements, the Committee, in paragraph 7.1.4 of their 167th Report (Fifth Lok Sabha), had observed:

> "The Committee are unable to understand why the Ministry of Health and the Indian Council of Medical Research agreed to the administrative and technical control of the GCMU Project vesting in the Project Leader appointed by the World Health Organisation. What is even more intriguing is the fact that according to the agreement entered into between the World Health Organisation and the United States of America, as represented by the National Communicable Diseases Centre, Bureau of Disease Prevention and Environmental Control, Public Health Service, Department of Health, Education and Welfare, Atlanta, Georgia, USA for the provision of PL-480 funds for the GCMU Project, changes or substitutions of the Principal Investigators of the Project are to be made only with the written approval from the National Communicable Diseases Centre. It would be evident from this that the Project had been supported by the World Health Organisation only in a formal sense and the Project was ultimately controlled by an institution of the United States Government, who had financed it."

2.2.4. In their Action Taken Note dated 16th August 1975, the Department of Health have stated:

> "The GCMU Project was conceived by the World Health Organisation as a result of the success achieved by its Filariasis Research Unit in Rangoon in controlling the Vector Culex fatigans from the village Okpo in Burma. The then Director General of Health Services requested the World Health Organisation to locate the research Unit in India. This request was considered by the World Health Organisation who advised the National Institute of Communicable Diseases to submit an application for funds to the UNDP. Meanwhile, the National Institute of Communicable Diseases had approached the USDA for

PL-480 funds. The USDA passed the proposal to the US Public Health Service who agreed to fund the research programme. The WHO thereafter entered into an agreement with the US Government for the purpose and in accordance with the agreement, changes or substitutions of the Principal Investigators can be made only with the written approval from the National Communicable Diseases Centre. From this it cannot be concluded that the WHO supported the organisation only in the formal sense. The WHO conceived the project, helped in securing funds for it, and was fully represented on the technical planning and review committee of the project. The project leader and two professional staff were members of the staff of WHO and the administration of the project was the responsibility of the WHO project leader who acted in collaboration with the National counterpart. The WHO was thus in active charge of the project."

2.2.5. The Committee are perturbed that Government is unwilling to concede that though the research on genetic control of mosquitoes was to be conducted in collaboration with the World Health Organisation, the ultimate control of the project vested neither with the Government of India nor the World Health Organisation but with an agency of the United States Government which had financed the project. No doubt, the World Health Organisation was the official sponsor of the project and had supplied the project leader and two of the professional staff, but the entire cost of the project had been allowed to be met by the National Communicable Diseases Centre of the United States Public Health Service, which, as a 'quid pro quo', retained an exclusive power of veto over the appointment of the principal investigators of the project. The reply furnished by the Department of Health appears to the Committee to be no more than very special pleading on behalf of the World Health Organisation and is by no means clarificatory of misgivings evoked about the entire operation.

Appointment of a National Counterpart:

2.2.6. As stated earlier, the agreement between the Government of India and the World Health Organisation had provided for the appointment of a national counterpart for the project to be nominated

by the Government of India. Dealing with the appointment of the national counterpart, the Committee, in paragraphs 7.1.5 and 7.1.6 of the 167th Report, had observed:

"7.1.5. The Committee find that the agreement between the Government of India and the World Health Organisation also provided for the appointment of a national counterpart to be nominated by the Government of India. Though the Director General of the Indian Council of Medical Research had been appointed as the Indian Counterpart Project Administrator, the Committee are surprised that the Director General apparently did not know that he was the national counterpart for the GCMU Project for he himself informed the Committee during evidence that Dr. T. Ramachandra Rao, an entomologist and former Director of the Virus Research Centre, Poona was the Officer Incharge of the Programme in the ICMR. It was only subsequently that the Department of Health informed the Committee that Dr. Rao had not been appointed as the Indian Counterpart Project Administrator but only as an Officer on Special Duty in the ICMR and that, in that capacity, he was looking after all the technical work relating to the GCMU Project under PL-480 schemes. This is a measure of the indifference of the Ministry of Health to the activities of the GCMU and the extent to which the Ministry had given a free hand to the foreigner Project Leaders of the GCMU and the WHO consultants."

"7.1.6. Apparently, there has also been a lack of purpose and seriousness on the part of the Ministry in appointing the Indian counterpart. The Committee understand that the present Director General of the ICMR is a nutritionist and the former Director General a cancer specialist. One would have expected the Ministry to appoint someone with the kind of experience nearer to the project he was expected to oversee. It is indeed amazing that persons with no genetic experience should have been entrusted with the task of overseeing a complex genetic experiment and ensuring that a vital health and security interest of the people of India was properly protected."

2.2.7. The Action Taken Notes furnished by the Department of Health on 16 August 1975 with reference to these observations of the Committee are reproduced below:

Paragraph 7.1.5

"Although the Director General, Indian Council of Medical Research was appointed as the national counterpart, in view of his multi-farious duties as the Director General, ICMR, Dr. T. Ramachandra Rao, an entomologist and former Director of Virus Research Centre, Poona was appointed as OSD to look after the work of the Genetic Control Unit. Dr. Rao, as long as he was OSD, was carrying out most of the functions of the national counterpart under the administrative control of the Director General, ICMR. This itself showed that the Ministry of Health was never indifferent to the activities of the GCMU but was very keen to ensure active participation of Indian scientists in all the activities of the Unit."

Paragraph 7.1.6

"The Director General, Indian Council of Medical Research is in overall charge of all bio-medical research in India. Obviously he cannot be expected to be an expert in all disciplines. He appoints experts in different fields to scrutinise schemes and proposals covering a wide range of bio-medical research and make recommendations to him. For this purpose only, Dr. T. Ramachandra Rao, an eminent entomologist and virologist was appointed as OSD in the Indian Council of Medical Research to help the Director General in the discharge of his duties as national counterpart of the project. The appointment of the OSD in addition to the national counterpart to oversee the project would itself show the importance attached by the Ministry for adequate and active participation in the work of the project by Indian scientists."

2.2.8. The reply to the Committee's pointed observations in regard to the appointment of a national counterpart for the project for the genetic control of mosquitoes is once again, unfortunately, unconvincing. It was clear during the evidence before the Committee, that the Director General of the Indian Council of Medical Research, who had been appointed as the Indian counterpart Pro-

ject Administrator, knew little, if anything, about the genetic control project. Dr. Ramachandra Rao, whose tenure as Officer on Special Duty in the ICMR had by then ended, had to be specially summoned to assist the Ministry in its evidence before the Committee. If, as stated by Government now, it was considered necessary to appoint an Officer on Special Duty to assist the Director General, already overburdened with 'multifarious duties', the Committee cannot appreciate why this arrangement was not continued after Dr. Ramachandra Rao severed his connections with the Indian Council of Medical Research.

2.2.9. Besides, if as stated by the Department of Health, the Director General of the Indian Council of Medical Research, with his many preoccupations required the assistance of an Officer on Special Duty, it stands to reason that in a major and complex scientific research project such as the Genetic Control of Mosquitoes Unit, Government ought to have appointed an exclusive national counterpart for the project with knowledge and experience of the techniques sought to be employed in the project. The Committee fear that the Director General, as the administrative head of the collaborating Indian agency, was automatically installed as the national counterpart in keeping with the normal conventions of Government in such matters without any serious examination of its implications. In these circumstances, the Committee reiterate their earlier observation that the Health Ministry had not been sufficiently mindful of the nature and implications of the Genetic Control of Mosquitoes Unit Project.

Presence of foreign scientists in the GCMU

2.2.10. In paragraphs 7.1.7 to 7.1.9 of the 167th Report, the Committee had observed:

> "7.1.7. On the other hand, a number of foreign experts and consultants had been inducted into the Project from time to time, despite the fact that, as has been admitted during evidence before the Committee, that the Indian scientists working in the Unit were some of the highest qualified and experienced people, on the ground that the Indian scientists did not have experience in genetic methods, although most of the techniques and instruments in the GCMU had been developed by Indian scientists. The Committee have also been informed that Indian entomologists are as good as any one else in the world."

"7.1.8. Under these circumstances, the Committee find it difficult to appreciate the rationale for permitting a large number of foreigners not only to participate in the research but also to determine and dictate its policies and programmes. Of the seven Project Leaders appointed by the WHO between January 1970 and July 1973, four were US nationals, one a Japanese and the other a British national. Only one Indian, Dr. Rajendra Pal, had been appointed as an acting Project Leader from August 1972 to November 1972. Even he was an employee of the World Health Organisation. In addition, as many as 37 short-term consultants and temporary advisers, 20 of whom were US nationals, have visited the GCMU in New Delhi since its inception, who have apparently been given free access to the primary data collected by the Unit."

"7.1.9. During evidence tendered before the Committee, Dr. Rao had justified the presence of foreign experts at the GCMU on the plea that though the Indian scientists had experience in one kind of mosquito research or the other, they did not have experience in genetic methods. The Committee, however, find that Dr. Gerald Dean Brooks, the present WHO Project Leader had obtained his Ph.D from North Carolina University only in 1973 when he joined the GCMU. Similarly, Dr. Yasuno, who was acting Project Leader from November 1972 to April 1973 was only an ecologist and not a geneticist. Dr. H. L. Mathis, one of the consultants had just a B.Sc. degree and Mr. J. E. Graham, another consultant, a M.S. degree. The Committee are, therefore, unable to accept the contention that the Indian scientists were not equipped to play the leading role in the project."

2.2.11. In their Action Taken Notes dated 16 August 1975 on the above observations, the Department of Health have stated:

Paragraph 7.1.7.

"There is no doubt that Indian entomologists are as good as any one else in the world. However, in the specialised field of genetic control techniques, entomologists with adequate experience are rare and had perforce to be assisted by foreign experts. This was particularly so when the project was started."

Paragraph 7.1.8.

"The project leaders were appointed by the World Health Organisation with the concurrence of the Government of India. They were those who had worked or had intimate knowledge of the type of work in progress at the Unit. There was nothing secret about the project and all the details about the work done in the project had always been published and given wide circulation. The short-term Consultants and Honorary advisers had also access to this information just like any other scientists interested in the working of the project."

Paragraph 7.1.9

"The contention of Dr. T. R. Rao that though Indian scientists had experience in one kind of mosquito research or the other, they did not have experience in genetic methods is valid. This project required expertise in genetic methods in mosquitoes and persons with that knowledge are scarce.

The consultants were selected on the basis of their internationally recognised experience in particular topics relevant to the Unit's work *e.g.* Mr. J. E. Graham had repeatedly visited Burma to advise on the maintenance of Culex fatigans control programme in the city of Rangoon and he came to advise the Unit on methods of establishing a zone free of Culex fatigans breeding.

It may not be always correct to correlate a scientist's professional knowledge with his degrees. There are many distinguished scientists who do not bother to get a degree although hundreds of students working under them have obtained Ph.Ds. and D.Scs. Also a person, who may be an ecologist, may be quite interested in actively working on genetics of mosquitoes, which was required for the project."

2.2.12. Though it has been claimed by the Department of Health that the project leaders were in fact appointed by the World Health Organisation with the concurrence of the Government of India, the Committee find that in the agreement entered into in this regard with the former, there was no provision for consultations with the Government of India on the question of appointment of the project leaders. Besides, if this had indeed been the position, there would

have been no occasion for the Committee appointed to review the technical and administrative control of the project to recommend, in October 1974, that the project leader should be appointed with the specific approval of the Government of India. In any case, even if such a provision did exist, the National Communicable Diseases Centre of the USPHS would, it is clear, have had the final say on this question in terms of its agreement with the World Health Organisation.

2.2.13. The Committee also find that many of the foreign personnel inducted into the project were not merely assisting the Indian scientists in the GCMU but were determining and directing the Unit's policies and programmes. While the Committee concede that it might have been necessary to rely on foreign experts in the initial phases of the project, they consider it strange that such experts should have been found necessary even as late as July 1974, despite the fact that most of the techniques and instruments in the GCMU had admittedly been developed by Indian scientists. It is also significant that though the Indian scientists had been entrusted with only a secondary role in the project on the ground that they did not have experience in genetic methods, only 10 out of the 37 consultants and temporary advisers to the project were geneticists. Again notwithstanding the fact that Indian entomologists are as good as their counterparts anywhere, as many as 11 foreign entomologists had been allowed to participate in the project. These are apparent anomalies which the Committee find difficult to reconcile.

Review of Administrative arrangements

2.2.14. Dealing further with the inadequacy of the existing administrative arrangements for the project, the Committee, in paragraphs 7.1.10 to 7.1.13 of the 167th Report, had observed:

> "7.1.10. The Committee consider it regrettable that it was only after the publication of the PTI article, followed by the discussion in Parliament and the examination by the Public Accounts Committee, the Ministry of Health showed some awareness of the inadequacy of the existing administrative arrangements for the Project and set in motion a review of the technical and administrative control of the project by a Committee nominated for the purpose. This Committee met on the 15th October 1974. It was only at this meeting that it was decided to examine whether, in accordance with the existing provisions of the agreement with the World Health Organisation, the effective functioning of the national counterpart in respect of various aspects of the project could be ensured and normal checks could be exercised by him. The Group, after discussions,

felt that even the existing agreement provided sufficient authority to the Director General, ICMR to exercise over-all control on the project. The Director General, ICMR was also asked to request the Project Leader to forward to the ICMR, a fortnightly or monthly report about the work done in the Unit and also to ensure that all communications in the nature of reports in regard to the research activities in the Unit are cleared by the Project Leader with the Director General, ICMR, before general circulation or transmission to other agencies."

"7.1.11 The Committee note that at this meeting it had also been agreed that efforts should be made to provide the following in the fresh agreement to be executed, after the expiry of the existing agreement in June 1975, at the time when proposals for the extensions of the project come up for consideration:

(i) the Director General, ICMR should be made over-all incharge of the Unit and the Unit functions under his administrative control and guidance;

(ii) the project leader should be appointed with the specific approval of the Government of India; and

(iii) the provisions of the agreement should be made more specific to remove any ambiguities."

"7.1.12. It is clear that the Indian Counterpart Administrator had hitherto exercised no control over the project. It is also evident that the ICMR had earlier been virtually at the mercy of the WHO Project Leader. That this should have been so, despite a clear provision in the agreement that the broad lines of policy upon which the work of the project would be based would be agreed upon between the representatives of the Government of India and the World Health Organisation, causes concern to the Committee. It would also appear that the Director General, ICMR had failed to exercise the authority vested in him for the over-all control of the project."

"7.1.13 It is not clear to the Committee how far this provision of the agreement that the broad lines of policy of the project would be agreed upon between the representatives of the Government of India and the World Health Organisation was actually observed and implemented."

2.2.15 In their Action Taken Notes dated 16 August 1975, the Department of Health have replied as follows:

Paragraph 7.1.10

"It is true that the Committee to review the technical and administrative control of the project was set up after the project attracted the attention of the Parliament, Press and Public Accounts Committee. However, all along detailed monthly reports about the working of the unit were being received by the Director General, Indian Council of Medical Research who was keeping himself abreast of the developments in the project through these reports and the proceedings of the Technical Planning and Review Committee."

Paragraph 7.1.11

"No comments."

Paragraph 7.1.12

"The conclusion drawn by the Public Accounts Committee is apparently based on the findings of the committee referred to in para 7.1.11. The Committee merely made certain suggestions for tightening the control of the Indian Council of Medical Research over the project. However, as already stated in reply to para 7.1.10, the D.G., ICMR had been getting the Unit's detailed monthly reports ever since the inception of the Unit and he had always participated in meetings and discussions where broad lines of policy were decided. The contention that the D.G., ICMR had failed to exercise the authority vested in him for the overall control of the project is not correct."

Paragraph 7.1.13

"The methods by which the provision of the agreement that the broad lines of the policy of the project agreed upon were actually observed and implemented as follows:

(i) The Director General, ICMR regularly attended the meetings of the Technical Planning and Review Group, of the Unit, which met regularly every six months.

(ii) Dr. T. R. Rao served as the representative of the Council and participated in the half-yearly meetings which re-

viewed the work done during the previous six months and planned the work for the next six months.

(iii) The report of the work done by the Unit was regularly placed before the meeting of the Expert Committee on Genetics of the ICMR and Scientific Advisory Board for its review and approval."

2.2.16. The Committee are concerned to observe a seeming reluctance on the part of the Department of Health to reciprocate their anxiety over the administrative and technical arrangements for the GCMU Project. The Committee's observations in this regard had been made after duly considering the recommendations of the review committee set up under the auspices of the Indian Council of Medical Research. It is clear that there was obvious concern in the review committee that the provision in the WHO-ICMR agreement regarding the consultative role of the national counterpart for assisting the project leader had not been hitherto taken seriously. This committee had also considered it necessary to suggest that the Indian involvement in the management of the project should be strengthened and that the provisions of the agreement be made more specific to remove any ambiguities. If, as has been claimed by the Department, the Director General of the Council had been receiving detailed monthly reports about the Unit and was 'keeping himself abreast' of the developments, the Committee see no reason for the review committee recommending, in October 1974, that he should be asked to request the Project Leader to forward to the ICMR a fortnightly or monthly report about the work done in the Unit and also to ensure that all communications in the nature of reports in regard to the research activities in the Unit are cleared by the Director General before general circulation or transmission to other agencies.

2.2.17 Despite all the protestations of the Department of Health, the evidence strongly suggests that the administrative and technical arrangements for the project left much to be desired and that the Director General of the Council had failed to exercise the authority vested in him for the overall control of the project. The Committee also find that the checks claimed to have been exercised by the Director General and by Dr. Ramachandra Rao through participation in the half-yearly meetings of the Technical Planning and Review Group were by no means significant. The Committee regret, thus, to have to reiterate their earlier observations in this regard.

2.2.18 The Committee, during their examination of the administrative arrangements for the project, had found that a former Di-

rector of the National Institute of Communicable Diseases had offered certain very valid comments on the project which prompted them to observe as follows in paragraph 7.1.14 of the 167th Report:

> "In his comments on the WHO Project furnished as early as 1968, the then Director, National Institute of Communicable Diseases had pointed out the need for a constant, concurrent evaluation of the programme and decision-making on-the-spot and follow-up thereafter and had emphasised that the authority for the responsibility must vest in a local organisation. Yet, strangely enough, the Ministry of Health had agreed to this authority vesting in the United States Public Health Service (with which its military organisations were closely connected) through the World Health Organisation. The Committee would very much like to know what considerations weighed with the Ministry in overlooking the very valid comments in this regard of the Director, National Institute of Communicable Diseases."

2.2.19 In their Action Taken Note dated 16 August 1975, the Department of Health have replied:

> "The comments and suggestions made by the Director, National Institute of Communicable Diseases were duly considered and it was agreed that it would meet the requirement if a national counterpart is appointed. To help him in the efficient discharge of his duties Dr. Rao who had vast knowledge in entomology and in virus diseases was appointed as Officer-on-Special Duty. Besides, the Director, NICD was always a member of the Technical Planning Review Group and was closely associated with all the deliberations of the Group."

2.2.20 The Committee are far from satisfied with the response of the Department of Health to their specific query regarding the considerations that had weighed with the Department of Health in overlooking the very valid comments of the Director of the National Institute of Communicable Diseases that the authority for a constant, concurrent evaluation of the programme and an on-the-spot decision-making must vest in a local organisation. The reply of the Department is, unfortunately, vague and almost evasive. The Technical Planning Review Group, which met only once every six months, cannot by any means be considered an agency for a 'constant, concurrent evaluation of the project. The fact remains that the

day-to-day administration of the project had been largely left to the WHO. Project Leader and all operational and technical responsibilities for the conduct of the project had remained only with the World Health Organisation. Peculiarly, the Project Leader in his turn was answerable to the National Communicable Diseases Centre of the US Public Health Service. The Committee are, therefore, unable to accept the reply now furnished and seek a more specific clarification in this rgard.

3. *Involvement of the United States of America.* (*Paragraphs* 7.1.15 *to* 7.1.19—*Sl. Nos.* 15 *to* 19).

2.3.1 Reviewing the arrangements made by the World Health Organisation for financing the GCMU Project through PL-480 funds to be provided by the Public Health Service of the United States of America, on the basis of agreements entered into between these two organisations, the Committee, in paragraphs 7.1.15 to 7.1.19 of the 167th Report, had observed as follows:

> "7.1.15 Another distressing feature of the project which has come to the notice of the Committee is the complacent attitude displayed by the Ministry of Health towards the agreement entered into between the World Health Organisation and the United States authorities for the provision of PL-480 funds for the project. As late as January 1975, the Ministry had been under the impression that there was only one agreement between the WHO and the NCDC, which would expire on 31st December 1974, while the agreement between the Government of India and WHO was to expire on 30th June 1975. It was only at the instance of the Committee that the Ministry made a reference to the World Health Organisation to ascertain the correct position of the agreement between the WHO and the US Government."

> "7.1.16 The Ministry have only now come to know that the initial agreement executed between the WHO and the US Government effective for a period of six years from 1st January, 1969 to 31st December, 1974 had actually been modified twice. The first modification was agreed upon on 3rd July, 1969, which amended the effective period of the agreement to three years, commencing from 1st April, 1969. A third agreement signed on the 3rd June, 1969 further amended the period of the proposed project from 3rd July, 1969 to 30th June, 1975, so as to coincide with the

expiry of the agreement between the World Health Organisation and the Government of India."

"7.1.17 Surprisingly enough, even before fresh proposals for the continuance of the project in India beyond 30th June, 1975 had been initiated by the World Health Organisation, the United States Government have already signed a fresh agreement with the World Health Organisation as early as 20th June 1974, extending the effective period of the GCMU Project upto 30th June, 1978. This, however, was not even known to the Health Secretary himself. This would only indicate the anxiety on the part of the US Government to continue the project beyond 30th June, 1975. The question that, therefore, arises is what could have prompted the US Government to extend the project on their own?"

"7.1.18 It is also strange that the Ministry of Health should have been aware of the existence only of the original agreement between the WHO and the US authorities. The Committee have been informed by the Ministry that the modified agreement had not been forwarded by the WHO to the Government of India. The Committee, however, find from the letter dated 23rd December, 1968, from the World Health Organisation to the Director General, Health Services, that the Government of India had been informed that the US Public Health Service had at that stage reserved funds only to support the first three years of work. This would imply that the Ministry of Health was aware at that time that while the agreement between the Government of India and the WHO covered the full six year period, the agreement between the WHO and the Government of the United States of America would only cover the first three years of the six year period. The Committee are of the view that this letter from the WHO should have set the Ministry thinking. In case, there was still any doubt about the status of the agreement with the US authorities, the Ministry should have sought a clarification at that stage itself. If this was not done, the Committee would like to know the reasons therefor. The Committee also desire that responsibility for this lapse should be fixed for appropriate action."

"7.1.19 The Committee are also unable to understand the reluctance on the part of the WHO to make available the

full texts of the agreements entered into with the US authorities and to keep the Government of India contemporaneously informed of the developments from time to time. The full texts of all the agreements entered into with the US authorities had been furnished by the WHO to the Government of India only on the 28th February, 1975. The Ministry of Health had taken action to obtain the copies of all these agreements only at the instance of the Committee. It would, therefore, appear that there has been a big communication gap between the WHO and the Government of India on the involvement of the United States of America in the GCMU Project."

2.3.2. In their Action Taken Notes on the above observations furnished on 16th August, 1975, the Department of Health have stated:

Paragraph 7.1.15

"The initial format of the agreement received from the WHO indicated a programme of work for a period of six years and the Ministry of Health naturally thought that WHO would fund the project for a total period of six years. The Government of India was not signatory to the agreement signed by the WHO with the US authorities."

Paragraph 7.1.16

"No comments."

Paragraph 7.1.17

"This is a matter between the WHO and the United States Government. It may, however, be pointed out that international agencies initiate action very much in advance on all proposals as several formalities have to be gone through before arriving at a decision. It is also relevant to point out that the financial year of the WHO starts on the 1st January and ends on 31st December whereas the financial year of United States starts on the 1st July and ends on 30th June each year. It was perhaps necessary for the WHO that the formalities for providing funds were completed well before the start of the financial year."

Paragraph 7.1.18

"The original format of the agreement clearly stipulated a programme of work for a period of six years and the

WHO were to provide funds for this period. But the agreement between the WHO and the USA Government provided for allocation of funds in two instalments of three years each and the Government of India could hardly have any say in the financial arrangements that were being entered into by the WHO with other international agencies and Governments."

Paragraph 7.1.19

"No comments."

2.3.3. The apparently lighthearted response of the Department of Health to the Committee's earlier observations on the involvement of the United States of America in the Genetic Control of Mosquitoes Unit Project aggravates the Committee's anxiety. While the Government of India was not a signatory to the agreement signed by the World Health Organisation with the US authorities, the Committee consider it strange that the Department of Health had not even considered it fit to keep themselves abreast of the developments in this regard from time to time till the enquiry by the Committee was set in motion.

2.3.4. The Committee cannot accept the plea now put forth by the Department of Health that Government could hardly have any say in the financial arrangements that were being entered into by the World Health Organisation with other international agencies and governments. Since the research project was to be conducted on Indian soil and the agreement entered into between the Government of India and the World Health Organisation had also specified that the project would be supported from PL-480 funds to be provided by the Department of Health, Education and Welfare of the US Government, the Committee are of the view that the Government of India ought to have examined the implications of this arrangement, so as to ensure that it would not in any way be detrimental to the interests of the country. It is significant in this context that as early as 1968, the then Director of the National Institute of Communicable Diseases had pointedly observed, in his comments on the original project proposals, that 'the policy of funding of PL-480 funds need to be looked into'. Yet, the Department of Health appears to have remained blissfully unaware of the various amendments made to the agreement between the World Health Organisation and the US Government as well as the execution of a fresh agreement as early as 20th June, 1974, extending the effective period of the GCMU project upto 30th June, 1978, on their own, without any consultations whatso-

ever with the Government of India. This is, in the Committee's view, a very strange way of exercising control over research projects in collaboration with foreign agencies.

2.3.5. It would appear from the evidence that the Department of Health was not as helpless in this matter as has been made out. As pointed out in paragraph 7.1.18 of the 167th Report, the Government of India had, in fact, been informed by the World Health Organisation on 23rd December, 1968 that the US Public Health Service had at that stage reserved funds only to support the first three years of work and that this communication at least should have set the Ministry thinking. The reply of the Department is, however, surprisingly silent on and quite irrelevant to the issues thus raised by the Committee. Immediate intimation of the specific action taken by the Director General Health Services on receipt of the letter dated 23rd December, 1968 from the World Health Organisation is, therefore required by the Committee. The other recommendation about fixation of responsibility for the lapse also remains unanswered and the Committee would like to know what action, if any, has been taken in this regard.

4. *Selection of Site* (*Paragraphs* 7.1.20 *to* 7.1.26—*Sl. Nos.* 20 *to* 26)

2.4.1. Commenting on the selection of sites for the field studies on Culex Fatigans and aedes aegypti, the Committee, in paragraphs 7.1.20 to 7.1.26 of the 167th Report, had observed:

> "7.1.20. The selection of Delhi for field studies on Culex Fatigans is also shrouded in mystery. The Committee find from the comments of the then Director, National Institute of Communicable Diseases, furnished in 1968, on the WHO proposal for the GCMU Project that the Director had observed that 'the criteria for the selection of the Delhi area are not known'. The officials who appeared before the Committee have also not been able to enlighten the Committee on the reasons for selecting the Delhi area for the experiments, though various theories and presumptions have been advanced by them in this regard. While the Director General, Health Services pleaded his ignorance about the reasons for selecting Delhi, the Director, National Institute of Communicable Diseases sought to justify the selection of Delhi on the ground of proximity to the ICMR and the NICD and the availability of the experts from elsewhere in Delhi. No convincing reason has, however, been furnished to the Committee for the

selection of Delhi. The various reasons advanced during evidence can at best be considered hypothetical and obscure. The Committee consider it regrettable that the authorities in the Ministry of Health and the Indian Council of Medical Research had not been associated with such a question of broad policy and planning as the selection of site for the studies."

"7.1.21. The Committee find that in his comments on the WHO proposal, the then Director, National Institute of Communicable Diseases, had also suggested that 'with regard to site selection it would be preferable to consult local institutions like the NICD, VRC, etc.', as they have rich local experience and abundant data in these contexts. The Committee would like to be informed of the action taken by the Ministry on this suggestion."

"7.1.22. Equally intriguing is the selection of Sonepat for the field studies on aedes aegypti. The Committee find from the comments of the then Director, National Institute of Communicable Diseases that the WHO team had considered the Delhi area as unsuitable for field studies on aedes aegypti and had felt that an area in the east coast of South India would be more suitable. In his comments, Dr. Ramachandra Rao had also suggested that 'studies on aedes aegypti should be carried out in South India with VRC as the main participant'. He had also pointed out that 'the entomology staff of the VRC are fully conversant with the problems of aedes aegypti and can contribute significantly to the study when it is organised'. Again, Dr. Elmo M. McCray, Jr. one of the WHO consultants, had also undertaken a survey of area around Madras and had concluded that an ample number of towns and villages within a 35—40 mile radius of Madras City would be suitable for further evaluation and possible use for field experiments."

"7.1.23. Yet, in disregard of all these suggestions, the Committee observe that Sonepat had been selected for the field experiments on aedes aegypti. What is even more interesting is the fact that according to conclusion No. 6 of the minutes of a meeting on the genetic control of culicine mosquitoes held on the 6th November, 1968, it had been decided that besides the Government of India and

the WHO, the Government of Haryana or any other State Government concerned would be a partner in the Project. The Haryana State Malariologist was also present in the meeting. Since this meeting had been held a year before the GCMU Project took final shape, it raises a very interesting question: Was Sonepat premarked for aedes aegypti studies by the US-WHO even before the ICMR came on the scene?"

"7.1.24. The Ministry of Health have justified the mention of the State Government of Haryana by name even before site selection on the ground that the scientists of the WHO had visited the area around Delhi to survey mosquito populations and suitable test sites. Several villages and townships to the South of Delhi appeared satisfactory for the proposed studies on Culex Fatigans. In view of this, the entire report of the World Health Organisation had been forwarded to the Government of Haryana in July 1968 for their comments. The Ministry have, therefore, stated that it had been mentioned in the minutes that the Government of Haryana or any other State Government, in which the experiments would be conducted, would be a partner in the Project."

"7.1.25. This explanation, in the opinion of the Committee, does not, by itself, provide any convincing reasons for the selection of Sonepat for the field studies on aedes aegypti. The survey conducted by the WHO had only considered villages and townships to the South of Delhi as suitable for studies on Culex Fatigans and not on aedes aegypti. In fact, as already pointed out in one of the preceding paragraphs, the WHO scientists themselves had considered the Delhi area as unsuitable for field studies on aedes aegypti. No other State Governments had also apparently been addressed in this regard. Under the circumstances, the Committee are unable to accept the explanation offered by the Ministry."

"7.1.26. The Committee, therefore, find a number of missing links in the selection of sites for the experiments which have not been explained satisfactorily. Considering the military potential of the studies on genetic control, the Committee would like to be satisfied that no extraneous considerations have influenced the selection of areas around

the capital for the studies, both on Culex Fatigans and aedes aegypti. The Committee desire that the various circumstances leading to the selection of sites for the studies on genetic control should be immediately investigated in detail by an authority entirely independent of the Ministry of Health and its associate organisations."

2.4.2. The relevant Action Taken Notes dated 16th August, 1975 on the above observations furnished by the Department of Health are reproduced below:

Paragraph 7.1.20

"New Delhi, because of its history of research on mosquitoes was considered to be the most suitable place for starting work. It has excellent facilities for laboratories, communications, irradiation sources, universities, scientific equipment, in addition to proximity to the National Institute of Communicable Diseases and Headquarters office of the ICMR. It was also envisaged that once the basic techniques had been decided, the large scale studies would be shifted to areas endemic for the disease.

It may also be added that in the selection of a site for preliminary release experiment with Culex Fatigans it was considered that any convenient centre with adequate wild Culex Fatigans populations would serve the purpose of testing the feasibility of genetic control. The ICMR and Director, NICD were fully involved in the selection of site as they were members of the Technical Planning and Review Group which took the decision."

Paragraph 7.1.21.

"The Director, NICD had always been a member of the Technical Planning and Review Group for the Unit and his advice was always available to the Group in planning and evaluating the work of the Unit. In the meeting held in the Ministry of Health on 6-11-1968, the then Director of National Institute of Communicable Diseases also participated in the discussions and the views expressed by him were duly taken into account before final decisions were arrived at. He was also a party to the decisions."

Paragraph 7.1.22

"The selection of Sonepat for the field studies on Aedes aegypti was made after surveys in Delhi, Rajasthan, Uttar Pradesh and Madras had been made and after the results of such surveys were considered in great detail at half a dozen meetings of the Technical Planning and Review Group held between March 1970 and November 1973. The report of Dr. Elmo M. Mccray Jr. was discussed at the Technical Planning and Review Group in March 1973, wherein it was stated that the Madras area was suitable for Aedes aegypti studies. Two additional areas, namely, Delhi and Rajasthan were also suggested at a meeting for investigation. The Group recommended that the requirements of the site included (i) adequate population of Aedes aegypti; (ii) satisfactory accommodation for visiting and permanent staff; (iii) availability of supplies and technical surveys; (iv) satisfactory transport; and (v) availability of adequate number of towns and villages of appropriate size for experimental work. The surveys made around Delhi were considered in various meetings of the Technical Planning and Review Group and the surveys made in July-August 1972 showed that there was a high incidence of Aedes aegypti in Sonepat where acute water shortage led to water storage in the houses. The breeding therefore occur all over the town in the storage containers and was independent of rainfall. For this reason Sonepat was considered suitable for study of population dynamica of Aedes aegypti. It was also found that there was a moderate density of Aedes aegypti and this population was isolated. It was, therefore, decided by the Group that this site presented an excellent opportunity for experiment to test the feasibility of Genetic Control of an urban mosquito population. The town was considered suitable because it was geographically large enough to demonstrate Genetic Control on an operational scale. Furthermore ecological study had been in progress during the past year and had shown that breeding occurs throughout the year in habitats typical of those towns in which Aedes aegypti was a vector problem. The wild population in the town seemed to be well isolated because of the lack of breeding in surrounding rural areas. For these reasons Sonepat was selected for the field studies on Aedes aegypti. The minutes of the meetings of the Technical Planning

and Review Group meetings have already been forwarded to the Public Accounts Committee earlier."

Paragraph 7.1.23

"In 1968, the possibility of the extension of Culex fatigans studies in Haryana was under consideration and this constituted the reason for the approaches made to the Haryana Government. It is not correct to say that Sonepat was pre-marked for Aedes aegypti studies by the US|WHO. It will be seen from the reply to 7.1.22 that it was only in July 1972 that Aedes aegypti population was discovered in Sonepat and Sonepat was selected after due consideration at the various meetings of the Technical Planning and Review Group."

Paragraph 7.1.24

"No comments."

Paragraph 7.1.25

"The position regarding selection of Sonepat for the field studies on Aedes aegypti has already been explained in detail in reply to 7.1.22."

Paragraph 7.1.26

"In reply to recommendation No. 7.1.22 the selection of Sonepat for the field experiments on Aedes aegypti has been explained in detail. No extraneous considerations had influenced the selection of areas around the Capital for the studies both on Culex fatigans and Aedes aegypti. The main considerations that led to the selection of site near the Capital were availability of excellent facilities for laboratories, communications, universities, scientific equipment, in addition to proximity to the NICD and the Headquarters Office of the ICMR. As the site had been selected after very careful consideration by the experts after analysing the results of the surveys made in various States, no *malafide* could be attributed to anyone in finally selecting Sonepat for field experiments. It is, therefore, not considered necessary to investigate in detail the circumstances leading to the selection of Sonepat for field studies."

2.4.3. The Committee have carefully considered the elaborate explanation now offered by the Department of Health for selecting the Delhi area and Sonepat for preliminary field experiments on Culex fatigans and Aedes aegypti, but the matter does not appear to be as simple as it is made out to be. It is difficult to understand why in the matter of site selection there was no consultation with other local institutions like the National Institute of Communicable Diseases, Virus Research Centre, etc., as had been suggested by the then Director, National Institute of Communicable Diseases, on the original proposal from the World Health Organisation, and no State Government other than that of Haryana had been addressed in this regard. The Committee have no intention of attributing 'malafide' to anyone, but they cannot appreciate the reluctance of the Department to agree to a principled investigation of the background to the selection of sites.

2.4.4. The Committee note that a high-powered committee appointed by Government to inquire into the objectives and working of the Genetic Control of Mosquitoes Unit, in pursuance of another recommendation contained in paragraph 7.1.67 of their Report, has been asked to consider the recommendations and observations relating to the selection of Sonepat for the field release of mosquitoes under the project and make recommendations thereon. The Committee trust that this would be done adequately and its findings intimated to them early. The selection of the Delhi area for the field trials on Culex fatigans should also be looked into thoroughly by this independent agency.

5. *Hazards of chemosterlisation (Paragraphs 7.1.27 to 7.1.31—Sl. Nos. 27 to 31)*

2.5.1. As has been stated earlier in paragraph 2.1.2, one of the major methods of genetic control is the 'sterile male technique' which involves the release into the natural environment of large numbers (carefully calculated) of laboratory-bred male mosquitoes sterilised either by radiation or chemosterilisation (use of chemicals). *The National Herald* Article of 11 February, 1972 and later the *Press Trust of India* Report, in July 1974, had drawn pointed attention to the risks involved in using the chemical Thiotepa for the chemosterilisation of mosquitoes and had expressed concern over the use of this potentially dangerous chemical in the environment.

2.5.2. Viewing with serious concern the use of Thiotepa for chemosterilisation, the Committee, in paragraphs 7.1.27 to 7.1.31 of the 167th Report, had observed:

"7.1.27. The Committee view with serious concern the use of a hazardous chemical, thiotepa, to sterilise mosquitoes

before releasing them in the environment without clearance from the Drug Controller. The Committee understand that thiotepa produces mutations, cancer and foetal deformities. According to a report of the Research Unit on the Genetic Control of Mosquitoes, published data had shown that spiders fed on thiotepa-treated mosquitoes have reduced fertility. The Committee also understand that the Canadian Government had decided that chemosterilants for the sterilisation of native population should not be used on large scale until less hazardous chemicals are produced or safer techniques are developed, while the United States Government have prohibited the use of thiotepa in field experiments. Dr. Ramachandra Rao has also informed the Committee that no government organisation has permitted this chemical to be used openly in nature except for experimental purposes. A number of experts have also warned against the use of thiotepa."

"7.1.28. Though the use of thiotepa in the GCMU experiments was considered to be absolutely safe for human beings by the WHO Expert Committee in November 1972, because of the manner in which it was being used, the Committee are not happy with the way in which this chemical had been used in wells in Delhi, thereby posing a potential health hazard. In fact, in India itself, Defence Scientists, who had also conducted mosquito control experiments and carried out a careful scrutiny of the relative merits and demerits of various genetic control methods, had come to the conclusion that hazardous chemicals like thiotepa, which is cytotoxic, used for chemosterilisation pose the danger of polluting the environment. They had also held that chemosterilisation does not completely sterilise the female mosquitoes, thus leaving such females released in the field to produce mutant progenies which could also be dangerous."

"7.1.29. Under these circumstances, the Committee cannot understand the reasons for the GCMU using thiotepa as a chemosterilant. The clearance of the Drug Controller had also not been obtained by the Unit on the ground that the public health hazard involved was considered to be negligible or non-existent. The Committee deprecate such a casual approach to this question and desire that the circumstances leading to the use of thiotepa in the GCMU should be thoroughly investigated. Responsibility for

permitting such use of a potentially dangerous chemical in the environment without clearance from the Drug Controller should also be fixed. Such negligence in matters affecting the health of the people, in the opinion of the Committee, deserves the most stringent punishment."

"7.1.30. It is also not clear to the Committee whether any independent examination of the use of thiotepa had taken place in the Ministry of Health. In view of the fact that the use of this chemical for field experiments is banned in other countries, the Committee desire that the Ministry of Health should examine this in detail, in all its aspects, also taking the benefit of the advice of the Defence scientists. Till such time as the theories about the use of thiotepa are proved wrong scientifically, the Committee would recommend that this potentially dangerous method of sterilisation of mosqitoes may be discontinued."

"7.1.31. The Committee are also surprised that the Ministry of Health should have been ignorant of the work done in this field by a Defence organisation and should have got to know of it only after the Committee raised the point. Such lack of coordination on important projects between different wings of Government is regrettable."

2.5.3. In their Action Taken Notes dated 16 August 1975, the Department of Health have stated:

Paragraph 7.1.27

"At the outset it may be pointed out that Thiotepa is used as a drug in the treatment of cancer in hospitals in India. A five-day course of injections of 10 mg. of Thiotepa per day is a recommended practice. This drug has been approved by the Drug Controller a long time back for use only as an anti-cancer drug in the form of injection. Thiotepa injection is being imported and marketed in India by M/s. Cynamid India Ltd., Bombay. This drug is also included in the list of life saving drugs which have been exempted by the Ministry of Finance from the levy of customs duty. The chemosterilant in adult aedes aegypti was measured and it was found that residue was one quarter of a million of a milligram (i.e. 0.25 nanogram). The recommended course of treatment for cancer

by Thiotepa is as will be seen from about 50 mgs. To acquire this dose from the residue for the adult mosquitoes prepared for release by the Unit, a person would have to consume 200 million of them. Gas liquid chromatography studies have shown that Thiotepa residue are rapidly destroyed in the bodies of mosquitoes.

No studies on spiders were carried out at the Unit. However, the studies made in Canada on spiders were not comparable to the advanced techniques used at the Unit because a higher dose of Thiotepa was used in Canada which leave fifteen times more residue of the chemosterilant in the mosquitoes. Besides, spiders were fed exclusively on treated mosquitoes in the Canadian experiment. The Canadian Government's prohibition of chemosterilants for the sterilisation of native population referred to in this recommendation presumably referred to the review article by Proverbs. What was stated in the review article was that one should not release chemosterilant into environment in an attempt to directly chemosterilise wild insects. This approach was never contemplated by the Unit. Attempt to chemosterilise native population must be clearly distinguished from the technique of releasing of laboratory reared chemosterilised insects as used by the Unit.

The use of Thiotepa and other chemosterilants is not prohibited in the USA, though for the large scale experiments specific approval of the Environmental Protection Agency is required under a regulation which came into force in 1974. Three experiments of Thiotepa sterilised mosquitoes have been carried out by the US Department of Agriculture. The largest field experiment in the USA with chemosterilant has been the US Department of Agriculture Pilot Project against the Cotton Boll Weevil over an area of about 25 miles radius in the town of Columbia. The chemosterilant busulfan was used for treatment of weevils for release and the releases were integrated with several other methods of Boll Weevils suppression. The extension of this work to an integrated programme designed to eradicate this species from the whole of the USA Cotton Belt is now under the active consideration of the US Government."

Paragraph 7.1.28

"At the outset it is pointed out that at no time of the experiments in Delhi, drinking water wells were used for release of chemosterilised mosquitoes. In only one of the preliminary experiments in 1971, Pupae were sterilised and washed in the laboratory and placed for emergence in floating containers in disused irrigation wells. After the first few days of this experiment, the pupae were placed in metal containers suspended above the water level of 6 to 10 feet in disused irrigation wells. The drinking water wells were never used for mosquitoes release by the unit. The question of any danger of polluting the environment therefore did not arise.

It is not correct to say that the female mosquitoes released will produce mutant progenies. It is true that chemosterilisation does not completely sterilise. In order to overcome this difficulty, the partially sterilised 0.2 per cent of the female mosquitoes which are released, females were held with sterilised males in cages for mating to take place. Female mosquitoes mate only once in their life time. Therefore mating with sterilised male will prevent them from producing mutant progenies."

Paragraph 7.1.29

"As already explained in reply to the recommendations 7.1.27 and 7.1.28, the concentration of Thiotepa in mosquitoes released was very insignificant and the adult mosquitoes sterilised by the Unit which were chemically analysed indicated no residue thereby showing that Thiotepa was not present at all in adult mosquitoes at the time of their release. Other analytical studies have shown that Thiotepa had rapidly metabolized in insects and in the environment. For many years certain chemosterilants had been only used in the Textile industries in quantities far greater than used in insects eradication studies. In view of all these factors no malafides could be attributed to anyone in using thiotepa in such a small scale for this experiment. As such it is not considered necessary to investigate further into this matter."

Paragraph 7.1.30

"No independent examination of the use of Thiotepa has taken place in the Ministry of Health. As already stated,

it is not correct to state that the use of this chemical for field experiment is banned in other countries. In addition to the work in USA mentioned in paragraph 7.1.28, the field experiments with chemosterilised house flies in Italy and with chemosterilised Anopheles albemanns in El-Salvador are noteworthy.

So far as this Unit was concerned, the water used for the third washing of the mosquitoes was collected and the content of the Thiotepa was estimated. If the concentration was above the permissible limit, the mosquitoes were not used. Estimations were regularly done on each batch of treated mosquitoes and complete records were maintained."

Paragraph 7.1.31

"Director, National Institute of Communicable Diseases is a member of the Scientific Advisory Committee, Armed Forces Medical Services. He has been attending meetings of Expert Group on Social and Preventive Medicine and Communicable Diseases, where progress of the research projects including the one on Genetic Control of mosquitoes and their future continuation are discussed. He has also been a member of the Technical Planning Review Group of ICMR/WHO Research Unit on Genetic Control of Mosquitoes and has been attending the meetings of this Group. Since he is a member of both the bodies, the liaison on the research work done by the two organisations has been maintained by him."

2.5.4. According to the minutes of the 8th Meeting of the Technical Planning and Review Group of the GCMU held from 13 to 19 November 1973, eight field experiments using radiation-sterilised and chemosterilised males were carried out in the villages around Delhi during 1971—73. The following table indicates the salient features of these eight experiments:

S. No.	Experimental village	Methods of sterilization	Stage of Mosquito released	Duration of releases
1	2	3	4	5
1	Sultanpur	R	Pupae	4 March—11 March 1971
2	Pochanpur	C	Pupae	3 May—17 July 1971
3	Dhulsira	C	Adults	28 July—30 August 1971

1	2	3	4	5
4	Pochanpur	R	Adults	14 September—10 October 1971
5	Bamnauli	C	Pupae	13 September—13 October 1971
6	Dhulsiras	C	Adults	2 March—26 October 1972
7	Bamnauli	C	Adults	7 July—29 September 1972
8	Dhulsiras	C	Adults	15 February—31 July 1973

C—Chemosterilized

R—Radiation=sterilized

2.5.5. The details of these experiments and their objectives were as follows:

"Two experiments were conducted with radiation-sterilized male and six experiments with chemosterilized males. In three experiments pupae were released; for the remaining five, adults were released. The release sites for the experiments 1—8 are listed below:

1. Sultanpur . Pupae were placed directly in two main drains.

2. Pochanpur Pupae were released in containers placed in the breeding wells located on the periphery of the village. Initially pupae were placed in floating containers subsequently, they were placed in containers hung one metre above the water surface.

3 Dhulsiras . Adults were released in 10 different cattle sheds or rooms equally spaced from each other.

4. Pochanpur . Adults were released at 10 different points in cattle sheds or rooms scattered over the village.

5. Bamnauli Pupae were placed in release containers and hung on walls in 25 cattle sheds scattered over the village.

6. Dhulsiras - Adults were released in 10 cattle sheds distributed over the village.

7. Bamnauli: Adults were released in 10 cattle sheds distributed over the village.

8. Dhulsiras Adults were released mainly in the breeding sites such as wells but later inside the cattle sheds or rooms also.

The first five experiments, carried out in 1971, were mainly directed towards the development of methodologies, such as techniques for separating the sexes, sterilization, handling of pupae and adults, transportation and release. These experiments also provided an opportunity to develop methods of evaluating sterility from the collection of suitable field data, *i.e.* sterility in egg rafts found in breeding

sites and or from ovitraps and sterility in egg rafts obtained from captured wild females. Concurrently, the methodology for detailed studies on the ecology of Culex fatigans, including measurements of absolute and relative mosquito densities, sex ratios, daily emergence rates and density—dependent factors, was also development and used.

The last three experiments conducted were extended trials, seeking more specifically to evaluate and measure the effects of the release of sterile males on the degree of sterility which could be induced in wild mosquito population."

2.5.6. The Committee also found that as recently as April 1974, at the 9th Meeting of the Technical Planning and Review Group, the Director General of the Indian Council of Medical Research had, *inter alia*, raised the possibility of environmental pollution by the use of chemosterilised mosquitoes. The minutes of the discussions in regard to this question, which are of some relevance to the issues before the Committee, are reproduced below:

"With regard to environmental pollution by the use of chemosterilised mosquitoes, Dr. Pal stated that this matter was raised previously at the 6th meeting of the Technical Planning and Review Group and at a WHO Expert Committee on Insecticides—Safe Use of Pesticides—(World Health Organisation Technical Report Series, 1973, No. 513). The Expert Committee noted that the procedure followed at the WHO/ICMR Research Unit on the Genetics of Mosquitoes, New Delhi in chemosterilising Culex pipiens fatigans with thiotepa applied to the pupae did not result in the persistence of any detectable amounts of this alkylating agent in the adult mosquitoes at the time of their liberation into the field. More recently, Canadian workers have observed that the fertility of spiders fed on mosquitoes chemosterilized by pupal exposure to thiotepa was significantly reduced. Arrangements have been made with the USDA Laboratory in Gainesville, Florida, USA to retest the chemosterilized mosquitoes from this Unit for thiotepa residue, although earlier tests carried out in 1972 showed that adult mosquitoes that had been treated as pupae showed no detectable chemosterilants in their

tissue 24 hours after emergence from the pupae stage, (Bull Wld. Hlt. Org., 1972; 47, 675-679)."

At this meeting, the Technical Planning and Review Group had also observed as follows:

"Published data show that spiders fed on thiotepa—treated mosquitoes have reduced fertility and longevity. Studies should, therefore, be conducted on the persistence of thiotepa (and tepa, the O-analogue) in Aedes aegypti."

2.5.7. The Committee are unable to appreciate the strange logic of the Department of Health justifying the use of a 'potentially dangerous' chemical, Thiotepa, in the field experiments of the GCMU. Merely because the chemical is prescribed as an anti-cancer drug in Indian hospitals, it does not follow that it can also be used indiscriminately in the environment, thereby exposing the population to a potential health hazard. The Committee find that the Drug Controller had approved the use of Thiotepa 'only as an anti-cancer drug' in an injectable form and that his approval had not been obtained for using the chemical in field trials in the villages around Delhi on the ground that the concentration of Thiotepa in mosquitoes released was 'very insignificant' and that the public health hazard involved was 'negligible or non-existent'. While the Committee concede that no malafides could, perhaps, be attributed for using the chemical in the GCMU experiments, the manner in which this question had been handled does give the Committee an impression that there was a sheer lack of prudence and genuine concern for the people and the environment.

2.5.8. The Committee note from the Department's reply that no attempts had been made by the Unit to directly chemosterilise the wild mosquito population by releasing the chemosterilant in the environment and that the Unit had confined itself to the technique of releasing laboratory-reared chemosterilised insects, thereby minimising the risks involved. They, however, find from the minutes of the 8th Meeting of the Technical Planning and Review Group of the GCMU that, prior to the publication of the 'National Herald' article on 11 February 1972, all the field trials, where the chemosterilisation method had been employed, with the exception of the third experiment conducted in Dhulsiras village between 28 July and 30 August 1971, had been carried out not with adult mosquitoes chemosterilised in the laboratory but with pupae which were either placed directly in drains or in floating contrainers in the breeding

wells or in containers hung one metre above the water surface. There was, thus, the danger of some contamination of the water by the mosquitoes emerging from the pupae and falling into the water. Such a possibility, however remote, should have been adequately safeguarded against. It was only after the dangers of this method were exposed by the 'National Herald', in February 1972, that the World Health Organisation set up an expert committee which cleared the use of Thiotepa but conceded the criticism by suggesting the release of adult mosquitoes instead of pupae.

2.5.9. As regards the other contention of the Department of Health that at no time drinking water wells were used for the experiments but only disused irrigation wells, such a distinction, in the opinion of the Committee, is hardly valid in the Indian context. The average Indian peasant does not distinguish between irrigation wells and drinking water wells. It is not uncommon to find our peasants drawing water for drinking purposes from the irrigation channels and the so-called irrigation wells to quench their thirst while working in the fields. In these circumstances, the subtle distinction sought to be drawn by the Government of Health is far from convincing.

2.5.10. Yet another argument advanced by the Department of Health is that the concentration of Thiotepa in the adult Aedes aegypti mosquitoes released in the field was very insignificant, and in support of this much technical data have been produced. If the results of these studies, which significantly were undertaken only after the 'National Herald' exposure, were so conclusive as is now sought to be made out by the Department, the Committee see no reason for the Director General of the Indian Council of Medical Research raising doubts, as recently as in April 1974, about the possibility of environmental pollution by chemosterilised mosquitoes or for the Technical Planning and Review Group recommending that 'studies should be conducted on the persistence of thiotepa in Aedes aegypti'. It is also significant that whatever studies had been undertaken in this regard had been confined to Aedes aegypti whereas all the earlier field trials had been carried out with chemosterilised culex fatigans. The Committee are, therefore, unable to accept the somewhat laboured explanation in this regard.

2.5.11. It is distressing that while the United States Government had considered it fit to insist on special safeguards for the use of Thiotepa and other chemosterilants and to prescribe the specific approval of the Environmental Protection Agency as a pre-requisite

for its use, neither the Department of Health nor the Indian Council of Medical Research had paid adequate attention to the likely risks involved in permitting the use of Thiotepa in the GCMU experiments. The Committee understand that though Thiotepa had been used for chemosterilising mosquitoes in experiments in the United States, the thiotepa-treated mosquitoes were released not on the mainland but in Sea Horse Key, a small island off the coast of Florida, where the daily production was about 1,300 males. On the other hand, the Committee find that in one South Delhi experiment alone, an average of 150,000 to 300,000 chemosterilised males had been released daily in the village of Dhulsiras. Significantly, two GCMU scientists themselves had cautioned against the use of Thiotepa, and Dr. Laven, an outstanding scientist and a consultant to the GCMU, had labelled Thiotepa as 'potentially dangerous'.

2.5.12. The work done in this field by our own Defence scientists also raises serious doubts about the use of chemicals like Thiotepa, of which, the Department of Health, unfortunately, were ignorant. The contention that liaison on the research carried out in this sphere by the Defence scientists and the GCMU was maintained by the Director of the National Institute of Communicable Diseases as a member of the Scientific Advisory Committee, Armed Forces Medical Services as well as the Technical Planning and Review Group is, to say the least, entirely facile. If he did indeed maintain such a liaison, his ignorance before the Committee of what the Defence scientists had done in this field is inexplicable.

2.5.13. The Committee are, therefore, unhappy that the Department of Health do not appear to appreciate that on this important issue the Committee as well as eminent scientific experts have felt grave apprehensions about the country's interest and wellbeing. Admittedly, no independent examination of the use of Thiotepa had taken place in the Health Ministry. The Committee cannot also understand the reasons for the Health Ministry's reluctance to accede to their request that this should be thoroughly examined in consultation with our Defence scientists and that till such time as the theories about the use of Thiotepa are adequately clarified, this dubious method of sterilisation of mosquitoes may be discontinued. Stressing the seriousness of the issue, the Committee reiterate their earlier recommendations and earnestly urge Government to shed all complacency and move spiritedly in this issue which vitally affects the health of our people and the self-respect of our country.

6. *Release of Incompatible strains*

(Paragraphs 7.1.32 and 7.1.33—Sl. Nos. 32 and 33).

2.6.1. Besides chemosterilisation, the Genetic Control of Mosquitoes Research Unit was also conducting trials for controlling the local population of mosquitoes by releasing a strain of mosquito which is incompatible with the local strain (cytoplasmic incompatibility). During their examination of the project and its activities, the Committee's attention had been drawn to certain dangers involved in this method of genetic control and the Committee had been informed that a possible dangerous consequence of the release of genetic strains was that the existing strains of mosquitoes might be replaced by a more dangerous new strain.

2.6.2. Dealing with the possible hazards involved in the release of incompatible strains in the environment, the Committee in paragraphs 7.1.32 and 7.1.33 of the 167th Report, had observed:

> "7.1.32. The Committee also note with concern the hazards involved in the release of incompatible strains of mosquitoes in the field. It has been confirmed by Dr. Ramachandra Rao himself that a possible consequence of the release of genetic strains is that there is always a danger of replacement of the existing strains of mosquitoes with a new strain which may be more dangerous. The Expert Group of the Indian Council of Medical Research, which met in October 1974, had also come to the conclusion that the possibility however remote, that the genetic manipulation might result in strains of mosquitoes with increased competence to transmit other diseases, should be taken into account. The Group had pointed out that before releasing genetically manipulated mosquitoes, it would be essential to have data on some important aspects in order to ensure that such mosquitoes have not developed increased competence for transmission of other diseases."

> "7.1.33. There is also considerable published scientific evidence on the dangers of a new colony of mosquitoes being established as a result of genetic experiments. The Defence scientists had also pointed out that the use of cytoplasmic incompatible strains involves 'the introduction of alien strains of the species into the country giving rise to the danger of opening avenues of new diseases into the country with potential uncertainty and serious risk'. In

the face of such unknown hazards, the Committee are doubtful whether the decision to release genetic strains of mosquitoes in the environment was justified scientifically."

2.6.3. In their Action Taken Notes dated 16 August, 1975 to these observations, the Department of Health have stated:

Paragraph 7.1.32.

"In the preparation of incompatible strains for release it is the policy of the Unit to equip them with chromosomes of Indian origin. Since numerous studies have shown that disease susceptibility is under the control of chromosomal genes, it is highly improbable that such strains would differ in disease susceptibility from the local strain. It was, however, decided in the technical Planning and Review Group meetings in 1972 and 1973 that tests should be carried out. Tests were conducted on the Filaria susceptibility of the IS-31 B strain prior to its release in 1973 and as expected its susceptibility was found to be the same as that of the Delhi strain. Corresponding tests were decided upon in 1973 for genetically manipulated Aedes aegypti strains. An agreement was made with the Virus Research Centre, Poona for testing of the strains with respect to Dengue and Chikungunya virus. This subject was also discussed at length at the special meeting of the Geneticist, Entamologist and Virologist in October 1974. The Committee was of the unanimous view that the occurance of such dangers was very remote and could be effectively guarded against if the vectoral capacity of the genetically manipulated mosquitoes in relation to infection threshold and transmission potential is determined. The Monitoring Body which has been constituted by the ICMR will ensure that the vectoral capacity of the mosquitoes released are not altered before permitting their use in the field."

Paragraph 7.1.33.

"This subject was also discussed by the Committee at length. In order to protect against all such possible hazards, it was decided that the monitoring body will test the batches of mosquitoes to be released for the presence of bacterial, rickettisal, viral and fungal pathogens."

2.6.4. In an article reviewing the work of the WHO/ICMR Unit published in a special issue of the Journal of Communicable Diseases (June 1974), Dr. T. Ramachandra Rao had stated:

> "Two preliminary field experiments were undertaken in Delhi city to determine whether an alien genotype can be introduced into a natural local population. Using the suitable environment of two large tyre dumps, two laboratory strains of A. aegypti were released, one a strain with a silver marker and another with a chromosomal translocation. Both experiments were successful in demonstrating for the first time that such genetic strains were able to become incorporated into the local population and to produce recognisable offspring. In the case of the translocation strain there was also evidence that some degree of sterility was induced in the local population suggesting the feasibility of use of genetic control mechanisms for population control of A. aegypti."[5]

2.6.5. Listing out the major accomplishments of the Genetic Control of Mosquitoes Unit, the minutes of the 8th Meeting of the Technical Planning and Review Group, Part I (13 t o21 November 1973) state that twelve village-scale field trials had been made to test the practicability of genetic control methods under field conditions and of these three trials had been conducted with an integrated strain with a translocation on one trial with an incompatible strain.[6]

2.6.6. *Paragraph* 2.10 *of the minutes states:*

> "Strains of *Aedes aegypti* suitable for field experiments have been obtained from the WHO International Reference Centre at Notre Dame (USA). Three field experiments have been conducted as follows:
>
> (1) in a tyre dump in Shastri Nagar, Delhi;
>
> (2) in a tyre dump in Model Basti, Delhi; and
>
> (3) a domestic breeding situation in Sonepat town, Haryana State.
>
> In the first experiment, it was demonstrated that released mosquitoes with a silver marker could inject the character into the wild population. In the second experiment, a heterozygous translocated strain was released and a 40.9 per cent semi-sterility was observed in the wild inseminated females 16 days after the termination of re-

lease. In the third experiment at Sonepat, 13 per cent of the wild females were found to have been inseminated by the released translocated males. Pupae collected from cisterns and reared in the laboratory yielded adults, some of which were semi-sterile. These data are being analyzed."*

2.6.7. In regard to the Committee's apprehension, based on the evidence before them and other published scientific material, about the risks involved in the release of genetically manipulated strains of mosquitoes in the field, they have learnt that in the preparation of incompatible strains for release the policy of the GCMU had been to equip them with chromosomes of Indian origin. The Committee, however, find from the minutes of the 8th Meeting of the Technical Planning and Review Group, Part I (paragraph 2.10 of Anuexure I) that strains of 'Aedes aegypti' suitable for field experiments were not produced locally but were obtained from the WHO International Reference Centre at Notre Dame (USA). In an article published in the June 1974 Special Issue of 'The Journal of Communicable Diseases' on Genetic Control of Mosquitoes, Dr. Ramachandra Rao himself had stated that 'two preliminary field experiments were undertaken in Delhi city to determine whether an alien genotype could be introduced into a natural local population'. The Committee also understand that the strain of 'Culex fatigans' released in Delhi villages from March to June 1972 was also a foreign strain and that no back-crossing of the strain was done to replace the foreign genome by an Indian genome.

2.6.8. The Committee understand that the risk of the existing local strains of mosquitoes being replaced by more dangerous new strains with increased competence to transmit other diseases can be effectively guarded against if the vectoral capacity of the genetically manipulated mosquitoes in relation to infection threshold and transmission potential is determined. It appears, however, from the Report of the Joint Meeting of the Expert Committee on Virus and Arthropod Borne Diseases and Geneticists from the Expert Committee on Human Genetics, Immunology and Allergy convened on 16 October 1974, (reproduced in pages 51—58 of the 167th Report), that in the earlier experiments with genetically manipulated strains of 'Aedes aegypti', the Unit had onb arranged testing of the strains with respect to their competence to transmit dengue and chikungunya viruses. It is only now that the Monitoring Body proposes to test the batches of mosquitoes to be released for the presence of bacterial, rickettisal, viral and fungal pathogens, and ensure that

the vectoral capacity of the mosquitoes released are not altered before permitting their use in the field.

2.6.9. The Committee, therefore, fear that before these safeguards were decided upon, adequate attention had not been paid to this important question. Even if the possibility of such dangers was only 'remote', the Committee are of the view that before attempting to alter the environment by releasing alien strains of mosquitoes, the possible side-effects should have been examined in depth and all necessary safeguards taken in a scientific manner. That this was not done in an adequate measure is, indeed, regrettable.

2.6.10. The Committee would like to know whether at least after the October 1974 meeting of the Expert Committee the potential of the genetically manipulated strains to transmit other diseases has been determined scientifically. In the absence of a factual statement from the Department of Health that such a 'determination' was actually made by the Monitoring Body, the Committee's earlier fears remain valid.

7. *Control of Aedes aegypti*

(*Paragraphs* 7.1.34. *to* 7.1.43—*Sl. Nos.* 34 *to* 43)

2.7.1. With reference to the studies undertaken by the Genetic Control of Mosquitoes Unit on the Aedes aegypti species of mosquitoes which transmit dengue and chikungunya and the neglect of the malarial mosquito, Anepheles stephansi, the Committee in paragraphs 7.1.34 to 7.1.38 of the 167th Report, had observed:

> "7.1.34 The Committee are also unable to appreciate the preoccupation of the GCMU Project with the aedes aegypti species of mosquitoes. Aedes aegypti is said to be a vector of yellow fever and dengue. While the occasional outbreaks of dengue in haemorrhagic form in one or two cities in the country is, in the opinion of the Committee, fairly insignificant, yellow fever is a disease which is non-existent in India. From the summary of recorded outbreaks of dengue in the country furnished by the Ministry of Health, the Committee find that only sporadic or a small percentage of cases had haemorrhagic manifestations. The Committee are, therefore, not convinced with the explanation furnished by the Ministry that the appearance of dengue in a haemorrhagic form in Calcutta and Kanpur had increased the importance of a study of

aedes aegypti. It is also of interest to note that even the WHO had not stated, in their seminars held at Manila and Bangkok, that the eradication of dengue haemorrhagic fever could be achieved by the elimination of aedes aegypti by genetic control methods."

"7.1.35 On the other hand, the Committee find that the use of genetic techniques for anopheles stephansi, the malarial mosquito, has been given a lower priority in the GCMU, because of the limitations of manpower, finance, etc. Dr. Ramachandra Rao also justified the lesser emphasis laid on research on anopheles stephansi on the ground, that, in 1967-68, when these ideas were developed, malaria had practically, disappeared from the country and the urgency with regard to the malarial mosquito was not of that high order. The Ministry have also stated that while considerable research data was available in respect of culex fatigans and aedes aegypti, such data was lacking in the case of anopheles stephansi."

"7.1.36 These arguments are, to say the least, unconvincing. Considering the fact that malaria is resurging in every part of the country, the Committee cannot but view with serious concern, the misplaced emphasis of the GCMU experiments on aedes aegypti. The justification furnished by Dr. Ramachandra Rao is also not borne out by facts. According to the Report of the Consultative Committee of experts to determine alternative strategies under the National Malaria Eradication Programme, which met at New Delhi from 17th to 20th August 1974, large scale outbreaks of malaria which could not be liquidated by routine measures were detected during 1965 and 1966 and 12 million and 17 million people respectively were victims of the disease. After 1966, focal outbreaks, continued to occur in extending areas with consequent rise in the incidence of malaria in consolidation and maintenance areas. During 1968, areas having a population of 91 million had been reverted to attack phase from consolidation and maintenance phases."

"7.1.37. The incidence of malaria has also been steadily on the increase since 1965. From 1.00 lakh cases in 1965, it increased to 2.79 lakh cases and 2.75 lakh cases respectively in 1968 and 1969. The incidence from 1969 to 1973 was respectively 3.49 lakh cases, 6.95 lakh cases, 13.23 lakh

cases, 13.63 lakh cases and 14.98 lakh cases. The Consultative Committee, in their Report, had also noted the fact that research in malaria and its various aspects had not received adequate attention during the last ten years."

"7.1.38 In view of the above facts, the Committee are distressed at the indifference of the Ministry of Health towards a major health problem. If the GCMU was really justified, the Committee feel that the highest priority should have been accorded to work on the malarial mosquito. If the intention of the project was indeed to devise ways and means to eradicate mosquitoes, the very fact that adequate research data on anopheles stephansi was not available should have pointed to the importance and urgency of research efforts on this species and should have prompted the GCMU to pursue research on this species. Even if, as claimed by the Ministry, genetic strains of anopheles stephansi were not available, the Committee would like to know why chemosterilisation should not have been tried, especially since such a method was being tried in or work started on colonising anopheles stephansi and working on genetic strains."

2.7.2. The relevant Action Taken Notes dated 16 August, 1975 on these observations received from the Department of Health are reproduced below:

Paragraph 7.1.34

"It is not correct to say that the unit was pre-occupied with Aedes Aegypti. As already stated in reply to recommendation 7.1.1. during the first four years of the existence of the Unit, maximum attention was paid to Culex Fatigans, the major vector of filaria which is spreading all over the country. In 1974, however, increased emphasis was placed on the Aedes Aegypti in preparation of the Sonepat experiment which was planned as one phase of the Unit's long term programme to apply to the species Anopheles stephansi after the technique was perfected. There are no two opinions that malaria and filaria are more important than dengue and chikangunya. However, the following points are noteworthy:

(j) Dengue causes much misery even in its haemorrhagic form and detailed published studies have shown that it is endemic in parts of India;

(ii) recent reports of a large number of cases of the lethal haemorrhagic form of dengue in nearby South East Asian countries suggest that Aedes Aegypti control may soon become of vital importance in India.

As already stated in reply to 7.1.1 the research before launching a scheme of Genetic Control of Mosquitoes species, considerable research data on various aspects of the species would be required, and the collection of such data itself would take considerably long time. As such data were available in respect of Culex Fatigans and Aedes Aegypti, it would be prudent to launch an experiment on them and perfect the techniques so that these techniques could be applied to the species. A. Stephansi, the vector for malaria, the research data on which is being collected in the meantime.

It would obviously have been premature for Manila and Bangkok seminars to have concluded that the eradication of dengue haemorrhagic fever could be achieved by the elimination of Aedes Aegypti by genetic control method."

Paragraphs 7.1.35 *and* 7.1.36

"There can be no dispute that malaria and filaria are deserving of priority in public health programmes. As already explained in reply to recommendation 7.1.1 work in the GCMU could not straightaway start on A. Stephansi as research data in respect of this species of mosquitoes was inadequate and had to be developed by doing work on other species. However, in November 1973, administrative steps were initiated for the selection of a scientist study to A. Stephansi. At the Planning and Review Group in 1974 it was decided to put emphasis on this species in the research programme of the Unit. The strategy had been to perfect the technique of Genetic Control in respect of the species about which research data were available and then to apply to A. Stephansi. It is important to note that the equipment and methods developed in the Aedes aegypti release experiment would be of great assistance in future A. Stephansi release programme."

Paragraph 7.1.37

"India has contributed immensely in the field of control of malaria. Based on the sound knowledge gained through

researches, the National Malaria Control Programme and subsequently the National Malaria Eradication Programme were launched to eradicate malaria from this country. Through the National Malaria Eradication Programme, the malaria incidence went down drastically to the extent that about one lakh cases were reported with no deaths during 1965, as compared to 75 million cases a year with 8 lakhs deaths annually during the post-partition period.

It is not correct to state that the research activities were completely neglected during this period. The annual reports of the National Institute of Communicable Diseases as well as the various published documents indicated the quantum of research that has been carried out during this period. Some of the notable contributions in the field of malaria from 1958 are, detection of natural foci of simian malaria in South India, extensive laboratory research to detect the possible transmission of simian malaria to human being, inheritence of immunity against malaria to progeny in animals and studies on relapse mechanism in malaria.

In addition to the above, susceptibility studies of vector to different insecticides and bionomics of the vectors were also studied. However, when the programme suffered setbacks and some technical problems were encountered, research activities were geared up to meet the situation. Studies were undertaken to detect the susceptibility studies of malaria parasite to antimalarials and wherever resistance was detected, suitability of alternate antimalarial was studied."

Paragraph 7.1.38

"The Ministry of Health are always alive to the problem of malaria and have been taking all necessary measures to eradicate this disease. But this particular type of research, namely, Genetic Control of Species, A. Stephansi; the Vector of malaria, could be carried out only when preliminary data on various aspects of the species were available. There was technical difficulty in regard to this species. In laboratory the genetic manipulation of anopheles is difficult. After, however, considerable experimentation, the unit developed a method for the separation of pupae from larvae. However all attempts to separate effectively males from females by the 'grid' method used with Culex

and Aedes mosquitoes. have been unsuccessful. Recently, attempts are being made to harness the genes for dieldrin resistance and susceptibility to produce a strain in which all females can be selectively killed before release.

Since it had not so far been possible to effectively separate males and females, chemosterilisation could not be tried."

2.7.3. The following table indicates the outbreaks of dengue in India and the percentage of cases with haemerrhagic manifestations:

Year	Locality	Haemorrhagic manifestations
1963	Calcutta	36.5%
1964	Madras	5.8%
	Vellore	in 2 infants out of 11
	Pondicherry	—
	Visakhapatnam	21.5%
1965	Visakhapatnam	—
	Nagpur	+
	Madras	—
	Rajahmundry and Kakinada	—
	Saugar town	—
1966	Jabalpur	—
	Surat	—
1967	Madras	—
	Delhi	—
	Kanpur	+
	Asansol	—
1968	Kanpur	Small %age
	Vollore	+ (5 cases)
1969	Kanpur	Occasional
	Ajmer	Several cases
1970	Delhi	—
	Gwalior	—
	Bangalore	—

Year	Locality	Haemorrhagic manifestations
1971	Jaipur	—
	Madras	Several cases
1972-73	Bangalore	—
1973-74	Bangalore	—
1973	Asansol	
1974	Poona	

Source : Third Dr. P. V. Ghapure Oration on Arthropod-borne Virus Diseases in India delivered by Dr. N. P. Gupta, Virus Research Centre, Poona at the Haffkine Institute, Bombay on 27 January, 1976.

2.7.4. The Committee find that the reply of Government conveys an impression that the Genetic Control of Mosquitoes Unit was established with a view to evolving and adopting genetic methods for the control of dengue and chikungunya and utilising these techniques later for controlling malaria through the control of Anopheles stephansi. However, as pointed out in paragraph 1.2.16 of this Report, the control of any specific mosquito-borne disease had not been stated as an objective of the Genetic Control of Mosquitoes Unit in the WHO-Government of India agreement. Besides, the specific details of the work in the genetic field relating to Culex fatigans or Aedes aegypti cannot, admittedly, be applied to another species. It is, therefore, not clear to the Committee how the methods developed in the Ades aegypti release experiments can be considered to be of relevance to the future release programmes of Anopheles stephansi.

2.7.5. While the Committee concede that the availability of techniques for colonising, mass breeding, sterilisation, etc., are important factors in determining the fields in which research could be profitably undertaken, the very fact that adequate research data on Anopheles stephansi was not available should have prompted the GCMU to pursue research on this species on a top-priority basis. particularly in the context of the recrudescence of malaria, which Government thought had 'disappeared', in many parts of the country. On the other hand, dengue had manifested itself in the country in a haemorrhagic form in Calcutta and Visakhapatnam in 1963 and 1964 after which the haemorrhagic manifestation had been observed only in 1968 and 1969 in a sporadic manner in Kanpur, Ajmer

and Madras. In so far as control of Anopheles stephansi is concerned, the Committee find that it was only in November 1973 that some 'administrative steps were initiated' even for the selection of a scientist for studies on the malarial mosquito and a decision taken in 1974 by the Planning and Review Group to place emphasis on this species in the research programme of the Unit. It appears, therefore, that work on Anopheles stephansi by the GCMU started effectively only in 1974. The other claim of the Department that research activities on malaria had not been neglected during the period when malaria began to resurge in every part of the country is also not convincing. If this was indeed the position, it is not clear why the Consultative Committee of Experts to determine alternative strategies under the National Malaria Eradication Programme was constrained to observe, as recently as in August 1974, that research in malaria and its various aspects had not received adequate attention in the preceding ten years.

2.7.6. The Committee would, therefore, reiterate their earlier observations on the preoccupation of the GCMU Project with the Aedes aegypti species in preference to Anopheles stephansi. Government would do well to take serious notice of the recent resurgence of malaria in many parts of the country as a warning which underlines the Committee's apprehensions.

Dangers of eliminating denque.

(*Paragraphs* 7.1.39 *to* 7.1.43—*Sl. Nos.* 39—43)

2.7.7. Drawing attention to the views expressed by Dr. C. G. Pandit, one of the foremost authorities on yellow fever in the country and Max Theiler a Noble laureate for his work on yellow fever, on the dangers inherent in eliminating dengue, the Committee, in paragraphs 7.1.39 to 7.1.43 of the 167th Report, had observed:

> "7.1.39 What causes even greater concern to the Committee, in regard to the experiments on aedes aegypti, is the fact that the Ministry of Health have shown utter disregard to the warnings of eminent authorities on yellow fever on the dangers of eliminating dengue. There is enough published evidence to show that dengue offers protection against the more fatal yellow fever. In the first Gharpure Memorial Oration held as early as May 1971. Dr. C. G. Pandit, who, is one of the foremost authorities on yellow fever in the country, while discussing the causes for the absence of yellow fever in India had raised the ques-

tion whether we would loss the 'umbrella of protection' against yellow fever by succeeding in eradicating dengue. Dr. Pandit had further stated that 'previous exposure to the dengue fever virus, affords a varying degree of protection against Japanese B encephalitis, Murray Valley encephalitis, St. Louis encephalitis and probably against West Nile Virus infections'. Dr. Pandit, in other words, had warned that eradication of aedes aegypti might not eradicate the vector of yellow fever but only the beneficial dengue fever and once this natural protection is lost, it is not unlikely that other species of the aedes family like aedes albepictus and aedes vittatus might take up the role of spreading the yellow fever virus. Dr. Pandit had also pointed out that, in the event of eradication of aedes aegypti, even culex fatigans could assume the role of transmitter of the infection."

"7.1.40 The attention of the Committee has also been drawn by Shri Raghavan, Editor-in-Chief, Press Trust of India to even more authoritative and important evidence on cross protection offered by Dr. Max Theiler, a Noble laureate for his work on yellow fever, after exhaustive study in the Carribeans and Trinidad. According to Dr. Theiler ('Arthropod Borne Viruses in Vertebrates', 1973), there is experimental evidence to show that dengue fever offers protection against yellow fever. Dr. Theiler observes: 'The conclusion is inevitable that all group B infections (dengue belongs to Group B) in man lead to the development to a greater or lesser extent of antibodies capable of neutralising yellow fever'. Dr. Theiler further says: 'It has been shown conclusively that dengue immune sera have the capacity of neutralising yellow fever virus. It has been shown that all human sera containing group B antibodies from West Africa, Tanzania, Malawi, Sudan, Egypt, India, Malaya and Hongkong are all capable of neutralising yellow fever virus. It seems a general law that any group B infection in man leads to the development of antibodies capable of neutralising yellow fever virus'."

"7.1.41 The Committee regard both Dr. Pandit's views and Dr. Theiler's findings as extremely important for any programme for the control or eradication of aedes aegypti and dengue fever. The Committee are concerned to observe that while launching a major programme

against aedes aegypti, no serious consideration appears to have been given by the Ministry of Health or the Indian Council of Medical Research for more than three years to the questions posed by Dr. Pandit on the eradication of aedes aegypti. What is even more distressing is the fact that Dr. Pandit's views had been dismissed as 'thoughts raised in a lecture' and no attempts had been made by the Ministry to seriously examine this aspect. Such a casual approach to scientific problems is in the opinion of the Committee, a matter of serious concern."

"7.1.42 Though the Director General, Health Services stated during evidence that this subject had been discussed at length between various virologists, immunologists and Public health workers and he himself had discussed it with Dr. Pandit a number of times, the Committee have not been furnished with any documentary evidence to support this contention. In fact, the Ministry of Health themselves have admitted in a written note submitted to the Committee that consultation with other experts had not been considered as the thoughts raised by Dr. Pandit in his lecture were not to be construed as a warning against the programme."

"7.1.43 There is also no evidence on record to prove that Dr. Pandit's views were duly considered by the GCMU. The minutes of the review meetings contain no reference to this aspect. Even presuming that the 'cross protection' theory was only a hypothesis, the Committee feel that both the Indian Council of Medical Research and the Ministry of Health ought to have examined this in detail before proceeding with the field studies on aedes aegypti. That this was not done would lead the Committee to the conclusion that the approach to the aedes aegypti experiments were not scientific."

2.7.8. In their Action Taken Notes dated 16 August 1975, the Department of Health have stated:

Paragraphs 7.1.39 *to* 7.1.41

"It is not in dispute that dengue antibodies confer a degree of immunity to yellow fever. It does not however follow from this that suppression of the A. aegypti population in Sonepat would have created a risk of introduction of yel-

low fever into India. In order to accept this theory it is necessary also to assume that, after the removal of the only proved natural vector of urban yellow fever (A aegypti), other mosquitoes could maintain natural transmission of the virus.

The above hypothesis may be tested by examination of two situations that have long existed.

Almost immediately after Walter Reed's demonstration of the role of A. aegypti in transmission of yellow fever, control measures directed specifically against this mosquito were initiated in Havana, and later similar programmes were carried out in other parts of the Carribean area and in South America. Subsequently, there has been a decline to the point of virtual disappearance of the originally serious problems of urban yellow fever in these areas. There has been no sign of the increase in urban yellow fever incidence which would be expected on the above hypothesis.

The enquiry conducted by the NICD and ICMR confirmed that A. aegypti could not be found in many towns and almost all villages of India. These include 39 out of 42 West Coast towns surveyed, which are among the areas most likely to be exposed to the risk of the uncontrolled arrival of a yellow fever infected person from Africa and 21 of these towns have abundant A. albopictus populations. However, contrary to the above mentioned hypothesis, yellow fever has not established itself in these areas. Similarly, the eradication of A. aegypti, but not other Aedes species, from Poona after 1953 by insecticidal spraying was not followed by any untoward effects. The question of possible yellow fever risk has never been raised with respect to localised A. aegypti control programmes with insecticides which are routinely carried out in this country. As pointed by Shri Raghavan, Editor-in-Chief, Press Trust of India, Max Theiler and Downs in their book 'The arthropod-borne viruses of vertebrates' stated 'it seems a general law that any group B infection in man leads to be development of antibodies capable of neutralising yellow fever virus'. In other parts of the book, they produced experimental evidence to show that antibodies against West Nile and Japanese B Encephalitis also neutralise the yellow fever virus. They have also

made attempts to correlate the incidence of group B antibodies and the occurrence of epidemics of yellow fever. A major epidemic occurred in Ethopia in 1961-62 in which mortality was very high and the epidemic was most extensive and severe ever to be described in Africa. Several hundreds of sera from the epidemic were studied. According to the authors it was clear that an epidemic of yellow fever with a high mortality occurred only in those regions where the incidence of group B antibodies was low. Surprisingly, in Illubabor with a high group B antibody rate chiefly against West Nile, the epidemic failed to develop.

These experiments and field data indicate that not only antibodies against dengue but other group B arboviruses like West Nile, Japanese B encephalitis, could prevent infection against yellow fever, modify the severity of the disease and prevent its spread in a community. Surveys have shown the existence of antibodies against group B arboviruses like West Nile and Japanese B Encephalitis are widely prevalent as those against dengue viruses in India. In addition, it is well known that all group B arbovirus infections produce lasting immunity. Based on these data it may be easy to answer Dr. Pandit's speculations.

Elimination of A. aegypti may lead to suppression of active transmission of dengue, but the existing antibodies in the infected population against dengue will persist as they are long lasting. Even if we assume for a moment that antibodies against dengue completely disappeared, the widely prevalent antibodies against West Nile and Japanese B Encephalitis viruses, which are transmitted to Culicine mosquitoes, will continue to protect the population against yellow fever. For the same reasons, Aedes albopictus, A. vittatus as well as C. fatigans will not be able to spread the infection.

The Monitoring Body proposes to check the chemosterilised and irradiation sterilised mosquitoes for the presence of yellow fever antigen before they are released. The genetically manipulated A. aegypti will be tested for its vectorial capacity. These precautions should ensure that the work of the Unit on A. aegypti will not in any way be responsible for the introduction of yellow fever into the country."

Paragraph 7.1.42

"No Comments."

Paragraph 7.1.43

"The Experts who constituted the Technical Planning and Review Group and who had been considering the various aspects of the Project must have discussed the views expressed by Dr. Pandit and other scientists about the 'cross protection' theory, though there is nothing on record to confirm this."

2.7.9. As regards the reply furnished to their observations contained in paragraphs 7.1.39 to 7.1.41, the Committee found that similar views on the cross-protection theory' of Dr. Pandit and Max Theiler as have been advanced by the Department of Health had been offered also by Dr. N. Veeraraghavan of the Indian Council of Medical Research who had been appointed as the Chairman of the Monitoring Board of the GCMU Project in an article entitled 'Yellow Fever, Dengue and Aedes Aegypti' in the September 1975 issue of 'Science Today', which is reproduced in Appendix I. Extracts from the rejoinder of Dr. C. G. Pandit to this article which also appeared in the same publication are reproduced below:

"In my Gharpure Memorial Oration, I put forward the current hypotheses to explain the nature of the 'ecological barrier' which does not allow yellow fever to cross into India although conditions for its introduction and spread exist. My association with the yellow fever problem goes back to 1940. Many in India would not know that the proposal to control Aedes aegypti was often made in informal discussions at international gatherings for preventing the possible spread of yellow fever into India! This was the provocation which led me to speak the way I did in the Gharpure Oration.

On the question why this country should be free from yellow fever, it appears that Dr. Veeraraghavan accepts the role of group B antibodies as a possible factor. (I could not personally verify some of the statements in the article because no bibliography is listed). In the Gharpure Oration, I had made reference to the role of group B antibodies, but I had chosen to highlight the problem with dengue. It is true that group B antibodies occur as a result of infection by dengue, West Nile, Japanese encephalitis and

KFD viruses in the country. But it is also true that dengue viruses contribute significantly to high titre group B cross-reacting antibodies.

Now, if the protective role of group B antibodies is accepted as a possible factor, would not a natural corollary flow from it, that is, to replace group B infections with a sequential or a multiple antigen mass immunisation programme so that the protective cover remains while the group B infections disappear? I am not suggesting that this be done, but that research is urgently needed on this and related aspects before we rush into lopsided control programmes of this or that vector. The research aspect is important because despite the presence of group B antibodies in the Indian population (which may be a component of the 'ecological barrier'), the standard tests for neutralising antibodies to yellow fever virus had indicated absence of protective immunity to yellow fever among Indians in the two surveys carried out, one in the 1930s and the other in the 1950s.

The article rightly refers to the possible role of A. albopictus in the transmission of dengue viruses. However, I would like to refer to two statements in the report of the Technical Advisory Committee of WHO on haemorrhagic fevers (1975) *viz.* (i) 'On the mainland of Asia and the Indonesian archipelago, epidemics of haemorrhagic dengue coincide with the distribution of A. aegypti, but not A. albopictus'; (ii) 'It has been suggested that A. albopictus may also be involved in the transmission in some areas. Further investigations are needed'.

I find the conclusions of the section on 'Yellow fever, dengue and Aedes aegypti' rather surprising, especially the manner in which reference is made to the control of yellow fever in India, if it occurred. The article states that standard anti-aegypti measures will be adequate to meet the challenge. In fact, I partly agree with this. But then why the noise about genetic approach to control of Aedes? Have the standard methods failed? Let us not forget that yellow fever in many countries of Central and South America was brought under control by traditional and standard methods of control of Aedes aegypti.

Besides, the article treats the availability and the use of yellow fever vaccine rather lightly. It would be an enormous

task to produce and store enough vaccine to immunise the population of a vast country like India.

There is another contradiction: the article suggests elimination of C. fatigáns for controlling filariasis. Yet, it is known that this mosquito also transmits the West Nile virus, antibodies to which are sought to be retained!"

2.7.10. In the Committee's view, the detailed explanation now offered by the Department of Health on the hypotheses of Dr. C. G. Pandit and Max Thieler that the elimination of dengue by eradicating Aedes aegypti might result in the loss of the natural protection provided against yellow fever, appears to be an oversimplification of the apprehensions of leading authorities on yellow fever. As recently as September 1975, Dr. C. G. Pandit has once again disputed some of these very theories in a rejoinder published in 'Science Today'. While it is true that scientific theories are capable of being interpreted in different ways and reconciliation between two scientific views is sometimes difficult, it is wiser, in research activities affecting the health and well-being of the people, to proceed with abundant care and caution rather than treating lightly the risks involved, howsoever remote they may appear to be.

2.7.11. It is evident that while launching the programme against Aedes aegypti, no serious consideration was given by the Health Ministry or the Indian Council of Medical Research for more than three years to the relevant questions posed by Dr. Pandit, questions which were dismissed in superior fashion as 'thoughts raised in a lecture'. Only recently has the Monitoring Body proposed to check the chemosterilised and irradiation sterilised mosquitoes for the presence of yellow fever antigen before their release. The Committee would urge Government to exercise more caution and restraint before venturing into fields which are still largely unknown and to make sure that all apprehensions and fears are satisfactorily resolved on a scientific basis. Till the issue of the possible harmful effects of the eradication of Aedes aegypti is settled after a free and open exchange of ideas and views in the scientific community, the Committee consider it prudent to proceed particularly cautiously with the control of Aedes aegypti. Now that the GCMU Project has been kept in abeyance, pending an examination of the entire position by an expert body, this job should be taken on as a corollary.

8. *BW Implications of Mosquito Dispersal Studies and related issues.* (*Paragraphs* 7.1.44 *to* 7.1.67—*Sl. Nos.* 44—67)

2.8.1. The Press Trust of India report had posed the possibility of the genetic control experiments being used for the development of

biological warfare techniques. The Committee had also found a number of references in various publications to the use of mosquitoes in biological warfare. Dealing with the biological warfare implications of the mosquito dispersal studies, the Committee, in paragraphs 7.1.44 to 7.1.53 of the 167th Report, had observed as follows:

"7.1.44 A more serious question which arises out of the Genetic Control experiments is whether the GCMU Project itself is only a covert attempt by a foreign government to conduct research on techniques of biological warfare. The Unit has been primarily interested in the collection of data on the ecology and dispersal of Indian mosquitoes, particularly aedes aegypti, which is stated to be a vector of yellow fever. Enough published evidence exists to show that some of the methods tried out by the GCMU have definite implications in biological warfare."

"7.1.45 For instance, the Committee find from the Report of the Hearings of the US Congress House Committee on Foreign Affairs, which has been published under the title 'Chemical-Biological Warfare: U.S. Policies and International Effects', that 'mosquitoes and ticks are transmitters of disease and as vectors have to be looked upon as having potential military significance'. About the advantage of vector or entomological warfare, the Report says that 'unless transmitted by insects, bacteriological agents have little power to penetrate the intact skin'."

"7.1.46 The Committee also find a number of references to the use of mosquitoes in biological warfare in a report submitted to the United Nations Secretary General, U. Thant, in 1969 by a specially constituted group of consultant experts on chemical and biological warfare. This report points out that 'any country which resorted to bacteriological (biological) warfare would try to infect, with a single blow, a large proportion of an enemy population with an exotic agent to which they had not become immune through previous exposure. Such exotic agents would lead to the appearance of diseases which normally had not occurred before in a given geographical area, either because of the organism involved (*e.g.* Japanese or Venezuelan encephalitis in Europe, Rocky Mountain spotted fever in many countries). In addition, a disease which had been controlled or eradicated from any area (*e.g.* urban or classical yellow fever from many tropical and sub-

tropical countries, epidemic typhus from developed countries) might be reintroduced as a result of bacteriological (biological) warfare'."

"7.1.47 The report of the consultant experts further states that 'the gravity of these risks (from biological warfare) would depend on the extent to which the community or the species in the country attacked contained animals which were not only susceptible to infection but were living in so close a relationship to each other that the infection could become established. For example, not all mosquito species can be infected with yellow fever virus and if the disease is to become established those which can become vectors must feed frequently on mammals such as monkeys which are sufficiently susceptible to the infection. A natural focus of yellow fever is, therefore, very unlikely to become established in any area lacking an adequate population of suitable mosquitoes and monkeys'."

"7.1.48. The Committee observe that India has the desired combination of suitable aedes aegypti mosquitoes and monkeys. This would be too irresistable a combination for anyone who might want to introduce the virus of yellow fever into the country. The Director General, Health Services had also admitted that it was possible to spread a disease in virgin soil or in a country where the people had not been immunised. The Committee also find that despite the ideal conditions that exist in India, yellow fever has not struck India, probably because of the cross protection afforded by dengue. Under these circumstances, the experiments with aedes aegypti in Sonepat assume a menacing significance and cause serious concern to the Committee."

"7.1.49. There is also considerable published information on the interest of the United States of America in the yellow fever virus as a potential biological weapon. The Committee learn from the Report of the Stockholm International Peace Research Institute (SIPRI) on chemical and biological weapons, that the US Biological Warfare Laboratories had examined about 200 pathogens but the 'greatest BW interest has so far been attached to a few pathogens that include yellow fever virus'. The report

points out that this virus is 'a standardised BW Agent' and is known as 'Agent OJ'."

"7.1.50. The Committee have been informed as follows: (a) there are several advantages in the use of arthropods like mosquitoes as carriers of biological warfare agents like viruses; (b) biological warfare agents can be sprayed from aircraft but they have to be inhaled to be affective; (c) again, these agents may be destroyed by heat or rain and the sun's ultra-violet radiation and winds may throw them off target. These drawbacks, the Committee understand, can be remedied by using mosquitoes and other insects as carriers. The Committee also learn that as long as the virus is carried by the mosquito, heat or rain will not affect it; secondly, that as mosquitoes bite, the biological agent is capable of being inducted directly into the blood through the skin. The SIPRI Report also points out that 'the use of anthropod disease vectors such as infected mosquitoes' is one way of securing 'percutaneous effectiveness from bulk-dissemination of BW weapons'. According to this Report, arthropod disease vectors in biological warfare can increase area coverage because each 'infected arthropod is a minute self-dispersing weapon'."

"7.1.51. The Committee also find from the Report of the UN Consultant Experts that 'extraneous factors influence the behaviour of CB weapons to a far greater extent than they do any other kind of armament. Some such factors are wind and rain but these to an extent can be evaluated quantitatively. Others which reflect the general ecological situation and the living conditions of physiological state of the population exposed to the effects of the weapons are more difficult to define. This limitation applies particularly to bacteriological weapons. The natural course of infectious diseases shows they are governed by so many uncontrollable factors that the way they develop cannot as a rule be foreseen. This would also be probably true of pathogenic agents which were deliberately dispersed. On the other hand the knowledge gained through the study of the epidemiology and in the study of artificial dispersions of bacteriological agents both in the laboratory and in the field had shed some light on some of the factors concerned'."

"7.1.52. Since the use of mosquitoes in biological warfare would be possible only if their behaviour, habits, dispersal and ecology are known beforehand, the Committee are of the opinion that it is precisely this information that is becoming available to the US Government from the GCMU experiments. This has also been clearly brought out in the Report of the UN Consultant Experts. The Director General, Health Services has also admitted during evidence that the possibility is definitely there that the knowledge gained by genetic control—how the lease takes place, how far the mosquitoes go, how long they survive, what is their biological behaviour—this knowledge can certainly be used for putting virus into these mosquitoes and starting a focus of disease like yellow fever in that area."

"7.1.53. From the foregoing paragraphs, it would be evident that there is sufficient substance in the suspicions first raised by the PTI news item and the subsequent fears expressed in Parliament. The Committee feel that the connection between mosquito dispersal and biological warfare is far too obvious to be ignored."

2.8.2. The Department of Health while informing the Committee in their Action Taken Notes dated 16 August 1975, that they had 'no comments' to offer in respect of the Committee's observations contained in paragraphs 7.1.45 to 7.1.47 and 7.1.50 to 7.1.51, have stated as follows in regard to the other observations:

Paragraph 7.1.44

"The Genetic Control of Mosquitoes Unit was primarily meant for testing the feasibility of Genetic Control of Mosquitoes and perfecting the techniques for such control. Dispersal of mosquitoes was merely a stage in the development of these techniques. The facts are as follows:

'There were approximately ten scientists on the unit's staff for about 5 years and each scientist supervised a team of junior staff. One scientist only was concerned with Aedes aegypti ecology and this scientist with his team had carried out five experiments on dispersal of Aedes aegypti males occupying about seven days each. Thus roughly 0.3 per cent of the unit's research effort had been devoted to studies of Aedes aegypti dispersal. Dispersal of released males is of obvious relevance to genetic control. The sexes of mosquitoes are well known to behave differently

because females of the species are for blood feeding and egg laying while the males only biological function is the seeking of mates'."

Paragraph 7.1.48

"There is a distinction between (a) Jungle yellow fever which in South America and Africa is transmitted from monkey to monkey and occasionally to man by Haemagogus species and Aedes Africans respectively and (b) urban yellow fever which is transmitted from man to man by A. aegypti. Haemagogus species do not occur in India, therefore, the assumption that Jungle yellow fever cycle could be established in this country is far fetched. Probably, the Committee believe that the aim of Sonepat experiment was to remove A. aegypti so that the protection afforded by the dengue antibodies will disappear and hence at a later date yellow fever virus could be introduced. This belief is not based on correct facts as will be seen from the following:

1. The antibodies against dengue are long lasting.

2. The new generation will continue to have cross protection by infection with other group B arbovirus such as West Nile transmitted by Culex species."

Paragraph 7.1.49

"India may have the desired combination of A. aegypti and monkeys but as stated earlier, the population has extensive antibodies against group B arbovirus infection, such as dengue, West Nile and Japanese B Encephalitis."

Paragraph 7.1.52

"The knowledge that would be gained by the research on Genetic Control of Mosquitoes would be available not only to the US Government but also to the entire scientific community of the world who are interested in such research. The work done by the unit had been published and information is available to all interested scientists."

Paragraph 7.1.53

"As stated earlier the work done by the unit had been given wide publicity and there was nothing secret about it.

Only 0.3 per cent of the unit's research effort was devoted to studies of Aedes aegypti dispersal and the value for biological warfare of the unit's data and dispersal is practically 'nil'."

2.8.3. The Committee found that their earlier report had generated considerable interest in foreign scientific journals. 'Nature', a British scientific journal considered the Report important enough to devote a three-page lead article in its issue of July 31, 1975 (Volume 256, pages 355-357) though it chose to dismiss the Committee's Report as 'a fishing expedition'. Observing that the Committee's conclusions were based on a 'chain of logic tenuous to the extreme', the journal came out with a strong defence of the World Health Organisation and the Genetic Control of Mosquitoes project, offering also some gratuitous comments in the process.[8]

2.8.4. Another British scientific journal, 'New Scientist' also considered the Committee's Report to be of some significance and importance. In an article captioned 'Germ-war allegations force WHO out of Indian mosquito project' by Dr. Joseph Hanlon, its Technology Policy editor, which appeared in the issue of 9 October 1975, the journal pointed out that Committee's conclusions were 'far less ridiculous than their critics suggest'. With reference to the Committee's observations on the interest evinced by the US Biological Warfare laboratories on the yellow fever virus and the military significance of the Aedes aegypti experiments, the article cites 'a BW expert' observing that 'if one were intending a yellow fever attack on India, this information (collected by the GCMU) would be very useful'. The relevant extract from the article, which the Committee consider to be of significance to the questions raised by them is reproduced below:

"A BW expert argued that *'if one were intending a yellow fever attack on India, this information would be very useful'*. He went on to say that even though 'the BW people in the US Army thought big and tried to build an empire' he didn't think that they would have actually tried a field study in India.

They might have tried theoretical studies, however, in India. 'Were they doing a BW feasibility study, the central question would be why yellow fever didn't occur with the vectors and monkeys present'. *So the Indian data might have been useful.* And WHO's own BW study notes that dengue haemorrhagic fever could be used as a biological weapon.

The PAC suggestion that the US Army was preparing for a possible yellow fever attack on India seems unlikely. *But GCMRU's data on the genetics and ecology of Aedes aegypti could be of BW interest.* Thus, it is not unreasonable to suggest that Ft. Detrick staff, finding out about PHS plans for mosquito work in India, might have suggested the inclusion of Aedes aegypti just to build up more data on one of its standardised agents. As the PHS had been cooperating with Detrick and encouraged military support of projects it was doing anyway, the PHS would surely have agreed to the addition of a small study such as this."[7]

(Italics added)

2.8.5. It is distressing that the only response of the Government to some of the Committee's observations on the biological warfare implications of the mosquito dispersal studies, which were based on authoritative material published by reputed organisations like the Stockholm International Peace Research Institute, the United Nations and the US Congress House Committee on Foreign Affairs, is a noncommittal silence. Even where some points are made by the Department of Health, they are not relevant to the basic issues raised by the Committee. If Government, by its silence, accepts the seriousness of the questions posed by the Committee, the Committee would at least like to have some assurance of action to follow.

2.8.6. It may be that some of the fears expressed by the Committee in this regard appear to critics of their report to be exaggerated. This is not, however, a matter which can be treated lightly and the Committee would like to be satisfied that no risk, howsoever remote, to the security of the country is involved in the research conducted by the Genetic Control of Mosquitoes Unit, and would ask urgently for a more positive assurance that these studies would do no damage. Though it has been contended by the Department of Health that the value of the studies of Aedes aegypti dispersal and the data collected by the Unit for biological warfare is 'practically nil', the Committee find from authoritative published evidence that the connection between mosquito dispersal and biological warfare techniques is obvious. The earlier fears of the Committee are also reinforced by an article in the 'New Scientist' (9 October 1975) which cites a BW expert as stating that 'if one were intending a yellow fever attack on India, this information (collected by the GCMU) would be very useful'. The article further points out that the US Army, through the US Public Health Service, might have tried certain theoretical studies in India in this regard

and that the Unit's data on the genetics and ecology of aedes aegypti could be of biological warfare interest.

2.8.7. In the circumstances, the Committee would gravely urge Government to shed all complacency and examine the possible military overtones of the genetic control studies in a less inhibited manner. The Committee note that the knowledge that would be gained by the research project would be available not only to the US Government but to the entire scientific community of the world through information published by the Genetic Control of Mósquitoes Unit. A clear distinction will, however, have to be made between the publication of proper scientific research data and the access of foreign consultants and experts at the Unit to primary data which are 'sensitive' and, therefore, liable to misuse in wrong hands. The Committee are anxious to ensure that such primary data from research projects conducted in India are not freely made available to outsiders, as had happened, unfortunately, in the case of the GCMU Project where, under the agreement with the US Government, valuable primary data on the ecology and behaviour of mosquitoes were passed on to the United States of America.

2.8.8. Examining the steps and precautions taken by the Health Ministry and the Indian Council of Medical Research to prevent the possible misuse of the GCMU experiments and other related issues, the Committee, in paragraphs 7.1.54 to 7.1.67 of the 167th Report, had observed:

> "7.1.54. No doubt, it can be argued that the results of any scientific experiment can be used for both good and bad purposes. In reality, however, the Committee find no evidence to show that the Ministry of Health or the Indian Council of Medical Research had taken all precautions to prevent the possible misuse of the GCMU experiments. The Committee are extremely distressed to find that the yellow fever threat and the biological warfare implications of the GCMU Project had been realised by the Ministry of Health only after the enquiry by the Committee was set in motion. All the safeguards now proposed, like the establishment of an independent monitoring body, transfer of the administrative control of the project to the Director General, Indian Council of Medical Research, the appointment of the Project Leader only with the approval of the Government of India, etc. is tantamount to locking the stable after the horse has been stolen! The fact remains that, under the agreement,

during the six years when the project has been in existence, valuable primary data on the ecology and behaviour of mosquitoes have passed on to the United States."

"7.1.55. A further argument that could, perhaps, be advanced by the votaries of the Project, is that the GCMU experiment has been conducted only in collaboration with a premier international health organisation and the civilian Public Health Service of the United States. The Committee, however, are unable to accept this contention. As has been already pointed out earlier, the World Health Organisation was the collaborator only in a formal sense and the entire project has been financed by the United States of America. According to the agreement between the WHO and the National Communicable Diseases Centre of the United States Public Health Service, the patent rights of inventions or improvements arising out of the Project are to rest with the United States."

"7.1.56. There is also enough published evidence on the link between the United States Public Health Service and the US Biological Warfare Research Centre at Fort Detrick. According to the information furnished to the Committee by Shri Raghavan, the United States Public Health Service—the prime collaborator in the GCMU Project—cooperated in a study of experimental epidemiology of coccidioidomycossis, an infectious fungal disease. The USPHS is also stated to have received more than 380,000 dollars in funds transferred from the Army General Corps which, according to the SIPRI Report, has the responsibility for coordinating the chemical and biological warfare programme of the US Navy, Army and the Air Force. The Committee have also been informed by Shri Raghavan that the London Conference on CBW, in 1968, revealed that the USPHS maintains a close liaison with Fort Detrick. Under these circumstances, it is likely that the ultimate and only beneficiary of the GCMU experiments is the US military machine."

"7.1.57. The Committee cannot but feel that the entire GCMU Project has been ill-conceived and is of no utility whatsoever to India. The benefits, if any, that are likely to occur to India are also not immediate but only potential

On the contrary, the Project is of far greater importance to any country which might want to develop an effective Biological Warfare system. As has been pointed out by an entomologist, who wishes to remain anonymous, genetic control is not an alternative to insecticidal control of vectors. The entomologist also points out that the applicability of the genetic method is limited as it can work only against an isolated mosquito population. Dr. Rajendra Pal, the WHO Vector Biologist, himself has pointed out in an article that the genetic method will only be 'as an adjunct to other methods, *e.g.* to eliminate the few insects that remain after insecticidal application'."

"7.1.58. The opinions expressed by other experts in this regard are also revealing, Dr. G. Davidson, in his book on 'Genetic Control of Insect Pests' (1974) states: 'Passing from small pilot project to large scale application is largely wandering into the realms of the unknown at this stage in the development of genetic control methods... To many people the extension of such techniques to the control of insects with a known high rate of increase is inconceivable especially where such insects are spatially continuous over large areas'."

"7.1.59. According to Dr. R. G. Scholtens, 'we now know that field trials which test the effect of genetic factors on natural populations can be conducted only in isolated ecological localities if they are to provide data on the effect of releases on population densities. And we know that the value of genetic control of mosquitoes is large but still only potential'."

"7.1.60. The Committee observe that Dr. Ramachandra Rao himself has demolished the much publicised thesis behind the Sonepat experiment of the GCMU for the control of aedes aegypti. Dr. Rao had stated during evidence that 'if we develop a genetic control technique specifically for an island, it has no practical importance' and that 'if genetic control is to be applicable to India', it should not be done in 'isolated islands'. The fact, however, remains that Sonepat is an 'isolated island' since the Committee have been informed in the sense that aedes aegypti from Sonepat do not leave the town nor are there surrounding colonies of aedes that can migrate to Sonepat. This isolation of the species was the reasons given by the GCMU

for the choice of Sonepat. The Committee, therefore, find that by Dr. Rao's own yardstick, the Sonepat experiment will not be applicable to India as a whole."

"7.1.61. The Committee note that Dr. Rao had also stated that the specific details of work in connection with the particular species (aedes aegypti) cannot be applied to another species. He had also stated that the findings of a study on how a mosquito behaves in one locality cannot be used for areas just 15 miles away. Under these circumstances, the Committee are unable to understand the rationale for the genetic control experiments in India. What causes greater concern to the Committee is the fact that the Ministry of Health and the Indian Council of Medical Research should be expending their energies in a project of little or no utility, disregarding the more urgent problem of controlling malaria, whose incidence is once again alarmingly on the increase, and filaria, in respect of which even surveys have not been completed during the past 19 years, by more practical measures."

"7.1.62. The final picture that emerges from the foregoing narration is frightening in its implications. The Committee view with serious concern the fact that India had been chosen for experiments that have a vital and direct bearing on biological warfare, which have been banned in other countries. The Committee find that small scale studies on genetic control of mosquitoes in an isolated small village, Okpa, in Burma had been discontinued. The Committee also understand that a similar unit on aedes aegypti had been expelled from Tanzania within a few months. The Committee are unable to understand why the Ministry did not investigate the reasons for the discontinuance of the project in these places."

"7.1.63. The Committee find that Dr. Ramachandra Rao, who initially voiced his concern over the administrative and technical aspects of the GCMU changed his view on being appointed as WHO consultant. The Committee note that Dr. Rao had been paid a tax-free salary of US Dollars 1200 per month plus a daily allowance of US Dollars 20 for the first 60 days and about Rs. 107 per day subsequently, during his tenure as a WHO short-term consultant. It is also significant to note that no other officer had been appointed as Officer on Special Duty after Dr. Rao."

"7.1.64. The Committee are also surprised to note that expenditure on the meeting of a Consultative Committee appointed by the Government of India to consider revised strategies in the malaria programme had been incurred by the World Health Organisation. The Committee are unable to accept the explanation offered by the Ministry for the WHO financing the Conference and consider this an unhealthy practice in view of the fact that it might place Indian officials in an embarrassing and compromising position and show them in a poor light. The Committee desire that this should be discontinued forthwith."

"7.1.65. After an examination of various aspects of the GCMU Project, the Committee cannot help coming to the conclusion that the manner in which the entire project has been handled by the Indian authorities is thoroughly unsatisfactory. As has been recommended in a subsequent paragraph, the Committee desire that the part played by the various officials in the administration of the Project should be thoroughly investigated by an independent commission."

"7.1.66. The Committee are of the view that the answers to a number of intriguing questions about the GCMU Project could, perhaps, be available with Dr. Rajendra Pal of the World Health Organisation who has been associated with the Project since its inception. It is surprising that the Government of India are not aware how he had been selected for the WHO assignment. Yet his appointment in the WHO had been approved by the Government. The Committee also understand that his lien in the Government of India had also been retained for as long as twelve years. Since the placement of Indian Government officials in foreign organisations must be governed by well-defined rules and policies, if there had been any deviations in the case of Dr. Rajendra Pal, the Committee would like to know the detailed justification therefor. What is even more distressing to the Committee is the information given by Shri Raghavan that Dr. Pal had been permitted to resign his Government of India post in October 1974. The Ministry have neither confirmed nor denied this. The Committee would await a further detailed report in this regard."

"7.1.67. In view of the far-reaching implications of the Genetic Control of Mosquitoes Project and the number of interesting possibilities that have been opened during the course of examination by the Committee, the Committee recommend that the Government should appoint a Commission, consisting of experts drawn from the various scientific fields, unconnected either with the Ministry of Health or the Indian Council of Medical Research, to enquire immediately into the working and objectives of the GCMU. Officials of military intelligence should also be associated with the enquiry. Meanwhile, the project should be held in abeyance. In any case, the agreement that expires on 30th June, 1975 should not be renewed."

2.8.9. Stating in their relevant Action Taken Notes dated 16th August, 1975 that they had "no comments" in respect of the Committee's observations contained in paragraphs 7.1.58 and 7.1.59, the Department of Health have, however, observed as follows in respect of the other observations of the Committee:

Paragraph 7.1.54

"The possible misuse of the information gathered as a result of the study undertaken by the GCMU had been raised and discussed in the Ministry of Health right from the very beginning. The DG, ICMR, the Director NICD and some other Indian experts had given their advice and suggestions on this matter from time to time. Apart from this, the Technical Review Committee on which both the DG, ICMR and the Director, NICD were Members had also reviewed the progress of the project from time to time. The Expert Committee of the ICMR had also reviewed the progress of this scheme. All the information that was available was the property of the ICMR and the conclusions reached were published and were made available to the scientific community. Even if the US officials were not involved in this project, the data which was published would have become available to them for any use they may have liked to make of it."

Paragraph 7.1.55

"As already stated earlier, the GCMU Project was conceived by the WHO as a result of the success achieved by its filariasis research unit in Rangoon in eradicating the vector Culex fatigans from the village Ikpo in Burma.

The WHO also helped in securing funds for the project and was fully represented on the Technical Planning and Review Committee of the Project. The Project Leader and the two professional staff, 3 members of the staff of the WHO and the administration of the Project was the responsibility of the WHO Project Leader who acted in collaboration with the national counterpart. From this it will be seen that the WHO was in active charge of the Project and not the collaborator in a formal sense.

The Government of India was not a signatory to the Agreement between the WHO and the USA. The patent clause existed in that Agreement. The patent right as a result of research done in a country would be subject to the laws of the land."

Paragraph 7.1.56

"As already stated earlier, the results of the GCMU experiments are published and are available to the entire scientific community of the world."

Paragraph 7.1.57

"The GCMU was conceived with a view to determining the feasibility of Genetic Control of Mosquitoes and to perfecting the technique of genetic control on the species of mosquitoes about which research data were already available. The strategy was to perfect this technique on the species about which data were already known and to apply the technique with such modifications as might be necessary to the species Anopheles stephansi after the data on this species had become available. It is true that like all research projects, the benefits of this project were potential to start with, but when the research develops, the utility of the experiment would become more and more practical. It is not denied that any country would make use of the scientific data which is freely published for any purposes other than control of diseases."

Paragraph 7.1.60

"Aedes aegypti, which is present in most of our cities and urban areas, is always localised. Its flight range is extremely limited, its seasonal prevalence is most marked and its association with man is almost total. In these cir-

cumstances, it is the most suited mosquito for control by genetic method. If the methods employed proved successful, they could be used with advantage in controlling Aedes aegypti in other cities."

Paragraph 7.1.61

"The rationale for the genetic control of mosquitoes in India is, as already explained, to test the feasibilities of genetic control of mosquitoes about which data are already available, perfecting the techniques and then apply them to other mosquitoes with the ultimate aim of controlling and eradicating the mosquito borne diseases. The Government of India never disregarded the problem of controlling malaria or tackling the problem of filaria. The National Malaria Eradication Programme had been in existence for a number of years and all steps were being taken to eradicate this disease. Similarly, attention was also paid to the control of filaria through the National Filaria Control Programme. It is only to augment the endeavour to control or eradicate malaria or filaria and to evolve an additional strategy the GCMU experiments were started in India."

Paragraph 7.1.62

"Studies on genetic control of mosquitoes in an isolated small village Ikpo in Burma were planned on a small scale basis and were discontinued when it was proved that the genetic methods were feasible for control of mosquito populations.

In regard to the Project in Tanzania, the project was not on genetic control but on the conventional chemical control of Aedes aegypti. The original three year agreement with the Government of Tanzania 1968—70 was extended for another two years, 1971—73."

Paragraph 7.1.63

"When the proposals for a pilot project on the genetic control of Culex and other mosquitoes in India was forwarded by the D.G., ICMR to Dr. T. R. Rao, Director, Virus Research Centre for his comments, Dr. Rao in his letter

dated 20th July, 1968 stated that he had carefully gone through the Memo and considered that the project, if successfully executed would become a landmark in the history of vector control. He stated that while the studies on the Culex fatigans could be carried out in Delhi with NICD as main participant, the studies on Aedes aegypti should be carried out in South India with the VRC as the main participant. It is seen from this and also from the reply he gave to the PAC that he did not reverse his stand. While he welcomed the scheme, he only made suggestions for its actual implementation. This could not be construed as change in the stand.

Dr. Rao is a distinguished entomologist, who as the Chief Entomologist of the former Bombay State was the pioneer in the programme for the eradication of malaria in the country. His contributions to research on arboviruses are well recognised all over the world. The remuneration paid to him as WHO short-term consultant referred to in this paragraph is that which is given to any short-term consultant by the WHO. No special favour was shown to Dr. Rao in this respect.

In view of the interest evinced on this project, the Indian Council of Medical Research decided to call for a special meeting of the geneticists, entomologists and virologists in the country to seek their advice and decide what should be done. Based on their recommendations, the Council constituted a Monitoring Body and appointed a Chairman who actually controls the scientific activities of the project."

Paragraph 7.1.64

"The Government of India make an annual contribution of about one crore of rupees to WHO and are in return entitled to receive assistance from them like any other member countries in the form of fellowships, technical assistance and equipment, seminars and conferences and workshop etc. Under the Project India-0153, the World Health Organisation provide assistance to National Malaria Eradication Programme for training of personnel, supplies of equipment for the programme and for holding seminars and conferences. The assistance so provided is of great value to the programme, as large number of per-

sonnel could be trained and useful seminars and conferences could be arranged. The annual conference of Malaria Workers is also financed under this WHO assistance. This Conference is highly beneficial to the programme, where decision is taken about the strategy to be followed during the year as well as opportunities availed to remove administrative and operational bottlenecks encountered by the field staff.

The Consultative Committee of Experts, who met during August 1974, discussed in detail about the programme, while recommending the future strategy."

Paragraph 7.1.65

"As already explained the various aspects of the project were scrutinised carefully by the experts and considered by them at various meetings of the Expert groups. The Technical Planning and Review Group, which was charged with the task of reviewing the project and assessing its progress had, DG, ICMR and Director, NICD as its permanent members. The DG, ICMR was also assisted by a full time officer on special duty who was expert in the field. The question whether an independent Commission should be set up to thoroughly investigate into the part played by various officers is separately under consideration."

Paragraph 7.1.66

"The facts of the case regarding Dr. Rajendra Pal are given below:

The Director General of the World Health Organisation in his letter dated the 11th January, 1962, addressed to the Minister of Health, Government of India stated that the Senior Staff Selection Committee of the World Health Organisation had selected for the post of Scientist (Biologist) in the Division of Environmental Health (Vector Control) Dr. Rajendra Pal, Deputy Director, National Malaria Eradication Programme, Malaria Institute of India, New Delhi, considering that he would be eminently suitable for this post. The initial appointment was for a period of two years. The Director General, WHO, requested the Ministry of Health whether it would

be possible for them to consider the release of Dr. Rajendra Pal so that he might be able to undertake this important post. The Director General of Health Services, the Ministry of External Affairs and the Ministry of Finance agreed to the release of Dr. Rajendra Pal for taking up this appointment. The Director General, World Health Organisation was informed on the 15th of February, 1962 that the Government of India had no objection to the services of Dr. Rajendra Pal being placed at the disposal of the World Health Organisation for a period of two years. In consultation with the Ministry of Finance, the terms and conditions of the foreign service of Dr. Rajendra Pal with the World Health Organisation were conveyed to the Director General of the World Health Organisation on the 27th March, 1962. Subsequently, at the instance of the World Health Organisation and with the concurrence of the Ministry of Finance, the conditions relating to insurance and pension fund mentioned in this Ministry's letter dated the 27th March, 1962 were modified. Dr. Rajendra Pal was released from the post of Deputy Director, National Malaria Eradication Programme, Delhi on the afternoon of the 9th April, 1962 for joining his assignment under the World Health Organisation.

In his letter dated the 24th September, 1963, the Director General of the World Health Organisation, wrote to the Minister for Health that the contract of appointment of Dr. Rajendra Pal was due to expire on the 30th April, 1964 and that since joining World Health Organisation, Dr. Pal had proved himself a valuable staff member and that he had made an important contribution to the work of the Environmental Health Programme, which was about to embark on a number of new phases, such as the Genetic of Vector Control and insecticides, the resistance of the development of the new insecticides for vector control. The Director General stated that it would be in the interest of the Organisation if Dr. Pal's services could be retained to bring about continuity in this work. He, therefore, enquired whether it would be possible for this Ministry to consent to his release for a further period of five years with effect from 1.5.1964. He further added that Dr. Pal himself had intimated that he would be prepared to accept such an extension of his contract, if the Ministry of Health agreed. The Director General of

Health Services agreed to the extension of deputation of Dr. Rajendra Pal for another period of five years as requested by the WHO as he felt that it was in the larger interest towards the promotion of global malaria eradication and that it would be in the interest of the country's programme, if Dr. Pal, an Indian national be on deputation at the World Health Organisation at Geneva. The Ministry of Finance who were consulted in the matter expressed the view that if Dr. Pal were allowed an extension on foreign service for five years it would result in the officer's remaining under the WHO for a period of seven years and that would result in his earning two separate pensions in respect of the same service as in accordance with the United Nations Organisation regulations, a Government employee who served on the Organisation for a period of five years or more would have to participate in the United Nations Pension Scheme. The Ministry of Finance therefore suggested that Dr. Pal might be allowed an extension of foreign service for two years only for the present, i.e. upto 9-4-1966. The Ministry of External Affairs agreed with the Ministry of Finance and the World Health Organisation was informed of this decision.

While at Geneva, the Director General of Health Services was given to understand by the Assistant Director General of the WHO, during informal discussions, that in case Dr. Rajendra Pal was not given extension for five years, the vacancy created, on the expiry of his term, would not go to an Indian because the representation of experts from India with World Health Organisation was already very high. The work of Dr. Rajendra Pal had been very much appreciated by the authorities of the WHO and they were therefore anxious to have his services made available to them for the entire period of five years and they were not likely to ask for another expert in his place from India. It was felt that it would be entirely in the national interest to let Dr. Pal continue for the full five years term as requested for by the WHO. The Ministry of External Affairs were therefore requested by this Ministry to reconsider their decision and agree to the extension of the term of deputation of Dr. Pal for full five years. The Ministry of Finance were also approached for their concurrence in the aforesaid proposal. The Ministry of External Affairs and the Ministry of Finance there-

upon agreed to this proposal subject to the conditions that he would not be permitted to join the United Nations Pension Fund as a full member. The Director General of World Health Organisation was accordingly informed on the 12th of August, 1964 of the Government of India's agreement to the extension of the period of deputation of foreign service of Dr. Rajendra Pal under the WHO for the full period of five years, subject to the condition that he should not be permitted to join the United Nations Pension Fund as a full member. The WHO in their letter dated the 16th September, 1964 informed the Ministry of Health that under the Organisation staff Regulations and Rules, a staff member who had been serving on fixed term contracts of one year or more but less than five years and whose contract had been extended to or beyond five years was required compulsorily to participate in the United Nations Pension Fund as a full participant by making the necessary contribution himself. Such participation assures the staff members certain minimum benefits. They, therefore, stated that Organisation could not deviate from its normal policy in the matter, and that normal regulations and rules must apply to all staff members including those who are on deputation from different national administrations.

Dr. Rajendra Pal in his letter dated the September 5, 1966 to Secretary, Ministry of Health and Family Planning stated that the post he was holding under the WHO had been included in the regular budget of the organisation from January 1966 and that his case had been put up for a career service appointment with the Organisation. He stated that he was likely to be offered career service on the expiry of the minimum qualifying period of five years i.e. early 1967. He therefore, requested that in accordance with the policy of the Government of India, in the national interest, to encourage Indian nationals to serve in various capacities in International Agencies, especially those connected with the United Nations, he might be permitted to retire from service with the Government of India on which he held a lien to enable him to accept permanent appointment in the World Health Organisation. He also stated that he understood that the

Government of India, Ministry of Finance had already under consideration the general case of Indian officers of the Government employed in the United Nations and specialised Agencies for being permitted to retire from service, without losing the pensionary and other benefits earned by them for service rendered under the Government. The request of Dr. Pal was examined in the light of the orders issued by the Ministry of Finance, Department of Expenditure, in their Office Memorandum No. F. 1(16)E. III(B)/66 dated the 5th November, 1966, and in consultation with the Ministry of Finance. The Ministry of Finance clarified that 'the aforesaid orders apply to officers deputed on foreign service to U.N. Secretariat and other U.N. Bodies who had been permitted to join U.N. Staff Pension Fund as full members. They also stated that during the period of foreign Service, no payment of Pension contributions would be made to the Government by or on behalf of the officer. As a sequel, this period of foreign service would not count for the purpose of pension under the Government. As the Government servant is assured of his pensionary benefits for the period of his service in the Government of India while serving the U.N. in terms of orders dated 5th November, 1966 there is no need for a Government servant to ask for premature retirement. He could continue in the U.N. and retire from Government service in the normal course. This is what is contemplated in our Office Memorandum dated 5th November, 1966'. The Ministry of Finance agreed that Dr. Pal might be allowed permanent absorption in the WHO and the pension in lieu of the service rendered by Dr. Pal under the Government of India would be admissible to him when he retires from the WHO and that the amount of pension, D. C. Gratuity admissible to him might be calculated now and kept ready though the payment would take place at the time of retirement from the United Nations. This decision was reconsidered by the Ministry of Finance subsequently and it was further decided that retirement benefits should be paid to Dr. Pal not earlier than the date on which he would have been eligible thereto had he continued under the Government of India. In other words, this would be either on his reaching the age of 55 years or completing 30 years of qualifying service whichever would be earlier. Dr. Rajendra Pal attained the age of 55 years

on the afternoon of 9th October, 1974, his date of birth being 10th October, 1919. He was deemed to have retired from Government service on the afternoon of 9th October, 1974."

Paragraph 7.1.67

"The question of appointment of a Commission as suggested by the Public Accounts Committee is under consideration separately. The project has already been held in abeyance after the agreement with the World Health Organisation ended on the 30th June, 1975. The Indian Council of Medical Research has taken over from the WHO all the equipment, supplies and vehicles of the Unit as on 30th June, 1975."

2.8.10. Since the agreement with the World Health Organisation was scheduled to expire on 30th June, 1975 and the Committee had recommended, *inter alia*, in paragraph 7.1.67 of the 167th Report that pending an enquiry, recommended by them, by a commission of experts, unconnected either with the Health Ministry or the Indian Council of Medical Research, into the working and objectives of the GCMU, the project should be held in abeyance and that the agreement with the World Health Organisation should not be renewed, the Secretary, Ministry of Health & Family Planning, was requested by the Committee, on 13 June, 1975, to indicate the decision, if any, taken on these recommendations and the precise action taken by Government in this regard. On 25 June, 1975, the Committee were informed by the Department of Health as follows:

"The question of appointing a commission to enquire into the working of the GCMU Project, as recommended by the Committee, is at present under active consideration.

The project has already been held in abeyance and the agreement with the World Health Organisation, which expires on the 30th June, 1975, will lapse."

2.8.11. The Committee's attention was drawn to a *Press Trust of India* Report appearing, in certain sections of the Indian Press on 4 July, 1975 that the Genetic Control of Mosquitoes Unit, wound up on 30 June, 1975, following the withdrawal of the World Health Organisation from the Project, was to be continued under a new name, Vector Control Research Centre (VCRC). The news agency

Report, which is reproduced in Appendix II, *inter alia*, pointed out the following:

(i) That the Director General, Indian Council of Medical Research had disclosed that the GCMU, wound up on 30 June 1975, was to be continued under a new name, but in a state of suspense, pending the decision of the Government on the entire project and that during the interim period of 'suspension', the project would be called the Vector Control Research Centre (VCRC), which would function in two parts, one in Delhi and another in Pondicherry.

(ii) While the laboratory division of the new project would be located in Delhi temporarily at the National Institute of Communicable Diseases and would be moved later to Pondicherry, the field division would be stationed at Pondicherry.

(iii) While the Government itself was to take a decision in this regard, the staff of the Unit had all received orders transferring them to one or the other of the two divisions.

(iv) The Director General, Indian Council of Medical Research was reported to have clarified that the continuance of the GCMU Project under a new name was only an interim step to keep the project in suspense and continuance with the scientists pending a Government decision.

(v) During the period of suspense, the project would cost Rs. 1 lakh a month.

2.8.12. A copy of the Press Trust of India Report was also received by the Committee from Shri Raghavan, Editor-in-Chief of the news agency who had earlier assisted the Committee in their examination of the project along with a letter dated 11 July 1975 containing, *inter alia*, the following additional information on the Virus Control Research Centre:

"(i) The work plan of the new unit was actually drawn up much before the PAC report was presented to Parliament on April 30. The plan was drawn up, after the ICMR Governing Council meeting in November-December 1974, and another in February or March 1975, earlier to the PAC Report. The work plan was drawn up by the WHO consultants (US National Brooks and British National Curtis).

This original plan is now sought to be pushed through under the guise of the new name of the unit.

(ii) Though theoretically the ICMR has severed connections with WHO for this work, in fact WHO has made a provision of US Dollars 100,000 to provide consultants for the project in its own budget. The WHO, in turning over the GCMU to the ICMR has in fact written to them offering its consultancy, whenever ICMR wants it. The ICMR has replied to this offer, neither rejecting this nor accepting it but keeping it pending. This is our information from Geneva. It would appear the hope is that soon the PAC report will be forgotten, and after shifting the unit to Pondicherry, old links can be re-established.

(iii) In October-November 1974, when the PAC was still investigating this project, but articles had begun to appear particularly in the National Herald and Patriot, the GCMU sent two of its experts (Dr. Brooks and Dr. Rajagopalan) to tour South India to pick up suitable centres there for field work etc. Pondicherry was one of the sites inspected and REJECTED by this group for technical reasons."

2.8.13. In view of the rather disquieting nature of the press reports and the subsequent information, the Chairman, Public Accounts Committee, considered it necessary to invite the personal attention of the Minister of Health & Family Planning to the report and related issues arising therefrom. The correspondence exchanged in this regard between the Chairman, Public Accounts Committee and the Minister of Health & Family Planning are reproduced in Appendix III. The Committee also decided to seek certain additional clarification from the Department of Health on the Action Taken Notes furnished by them and the issues raised by Shri Raghavan in his letter dated 11 July 1975 and the information furnished by the Department in this regard is discussed in the succeeding paragraphs.

2.8.14. At the instance of the Committee, the Department of Health furnished a note* indicating the circumstances leading to the establishment of the Vector Control Research Centre, which is reproduced below:

"With the expiry of the agreement with the WHO on the 30th June 1975, a number of vehicles and other sophisticated

*Not vetted in Audit.

and costly equipment had been transferred to the ICMR by the WHO. After the expiry of the lease with the WHO, the rented premises where the project was housed in Delhi, had to be vacated. Since some accommodation was available in the National Institute of Communicable Diseases, Delhi, the laboratory staff was housed there, and the field staff was sent to Pondicherry and located in the accommodation available in the premises of the Jawaharlal Institute of Post-graduate Medical Education and Research.

(A note* furnished by the Department, in this connection, on the organisation and functions of the Vector Control Research Centre is reproduced in Appendix IV). The Centre is a purely interim arrangement pending final decision of the future set up. The estimated expenditure during 1975-76 is approximately Rs. 10.60 lakhs.

As early as 1973 the Scientific Advisory Board of the Council had decided to establish a Unit for Research on Vector Biology and Genetics for continuing the research activities of the Genetic Control Unit, after the expiry of the agreement with the World Health Organisation in 1975. The relevant extract from the minutes of the meeting of the Board is reproduced below:

'The Board considered the proposal made by the Director General, ICMR for establishing from January 1976 a Unit to take over the research activities of the WHO/ICMR Research Unit on Genetic Control of Mosquitoes in New Delhi. The Board noted that the Research Unit would be completing four years of work by the end of 1973 and would be entering upon the final two-year phase from January 1974. The Board was very appreciative of the progress of the work done hitherto both in the laboratory and in the field, the proposals for the work in 1974-75, and the probable lines of further research needed, including increased attention to biological control. Recognising the great importance of these studies for developing alternative methods of control of vectors of diseases in order to lessen the dependence on the use of chemical insecticides, the Board approved in principle the proposal to establish an ICMR Unit for Research on Vector Biology and Genetics and recommended that the details of the proposal be worked out'.

*Not vetted in Audit.

At its meeting held on 1st March 1975, the Scientific Advisory Board recommended that the present Unit 'could logically become the nucleus of a Vector Control Research Centre of the ICMR'.

The above recommendation of the Scientific Advisory Board was approved by the Governing Body of the Council at their meetings held on 27-3-1974 and 25-3-1975 respectively.

The project is in abeyance and is not being continued under another name."

To another question whether Government's prior approval had been obtained before locating the VCRC at Pondicherry, the Department replied in the affirmative. (This reply had, however, not been vetted by Audit).

2.8.15. The relevant extract in this regard from the Proceedings of the 42nd Annual Meeting of the Governing Body of the Indian Council of Medical Research held on 25 March 1975, which were furnished to the Committee by the Department is reproduced below:

"The Chairman explained the circumstances leading to the decision not to go ahead with the release of mosquitoes at Sonepat. He also said that the question of continuing the project for a further period of 3 years was under the consideration of the Government of India and the draft agreement to be entered into between Government of India and WHO was also under examination. It was also decided to shift the project to Jawaharlal Institute of Post-graduate Medical Education and Research, Pondicherry if it was extended, since most of the field operations connected with the Project will be taking place around that region."

2.8.16. The Committee desired to know whether it was a fact that the Work Plan for the Vector Control Research Centre had been actually drawn up much before the Committee's 167th Report was presented to Parliament on 30 April 1975, by two consultants, Dr. Brooks and Dr. Curtis, of the World Health Organisation. In a note, the Department of Health stated* :

"The two consultants *i.e.* Dr. Brooks and Dr. Curtis of the 'WHO did not prepare the work plan of the Vector Control Research Centre. A note on the organisation, functions of

*Ministry's reply not vetted by Audit.

the Centre was prepared jointly in September 1975 by the Director General, Indian Council of Medical Research and the Director, National Institute of Communicable Diseases."

2.8.17. In a letter addressed to 'Nature', a representative of the World Health Organisation had, *inter alia*, had stated as follows in regard to the statement made by the journal that the World Health Orgnisation had 'pulled out' of the Genetic Control project:

> "The original agreement between the government of India and the WHO establishing the research unit was for a period of six years, which expired on June 30, 1975. The unit developed much essential methodology, carried out several small scale field trials and assisted in the creation of a core group of Indian scientists fully conversant with all the aspects of the research. What is left to be done is to carry out large scale feasibility studies of new vector control methodology in areas of southern India endemic for mosquito borne diseases, which does not require the assistance of full-time WHO staff members. It is anticipated that the work will be carried out under Indian leadership now that the WHO has handed over the unit to the Indian Council of Medical Research on the appointed date, with continued WHO technical advice and assistance if requested."*

In his letter to the Committee, Shri Raghavan had also pointed out that the World Health Organisation had made a provision of US Dollars 100,000 in its budget to provide consultants for the Virus Control Research Centre. Upon enquiries made by the Committee in this regard, the Department of Health stated:

> "The WHO is not participating in the project which is in abeyance. The WHO had, however, expressed their willingness to:
>
> (a) transfer to the ICMR all supplies, vehicles and equipment that the Research Unit had on 30th June 1975,
>
> (b) investigate the possibility to assist ICMR in carrying out its programmes of research by reimbursing the ICMR part of the running costs up to Indian Rupees 2.50,000|- per month from 1st July 1975 to March 1976.
>
> (c) provision of technical expertise.

*Ministry's reply not vetted by Audit.

The WHO was informed that the ICMR will be glad to receive supplies, vehicles and equipment that the Research Unit had on 30th June, 1975 and also the financial assistance offered. Further correspondence with regard to the financial assistance offered is going on with the WHO and no final decision has been taken. The supplies, vehicles etc. have been taken over. The WHO have also been informed that no consultants would be needed."

The position had not, however, been verified in Audit.

2.8.18. A note* furnished by the Department of Health, at the instance of the Committee, indicating the reasons for selecting Pondicherry for locating the Vector Control Research Centre, especially in the light of the statement made by Shri Raghavan that Pondicherry was one of the sites inspected and rejected for technical reasons by two of the GCMU experts deputed, in October-November 1974, to tour South India to select suitable centres there for field work, is reproduced below:

"The idea of shifting the venue of the activities of the project to other areas in the country, after the preliminary studies were completed in Delhi, had always been envisaged. The Technical Planning & Review Group of the GCMU, at its meeting in May 1973 had suggested that a survey of the suitable places may be initiated. Accordingly a list of suitable places was prepared and the Project Leader and Dr. Rajagopalan visited several areas in South India and Maharashtra. This report was placed before the Technical Planning and Review Group which met in November 1974.

Pondicherry had not been rejected but was given second preference among five areas considered by the team. Pondicherry has many advantages. It has a large centrally administered Medical Post-graduate Research Institute and excellent facilities for research work. Apart from Pondicherry itself, it has within easy access many suitable towns and villages in Tamil Nadu State for field work. Pondicherry was, therefore, considered the most suitable site for location of the Unit."

2.8.19. The Department also furnished in this connection a copy of the minutes of the relevant meeting of the Technical Planning

*Not vetted in Audit.

and Review Group which met in November 1974. The criteria to be considered for the selection of the study site were set at this meeting and included:

1. degree of isolation.

2. known microfilaria rates above 5 per cent.

3. population size 40,000-200,000 (towns with populations slightly smaller than 40,000 need not be rejected if otherwise found suitable).

4. proximity to airport (except Pondicherry, which has other advantages).

5. facilities of communications, living accommodations and for establishing laboratories.

6. occurrence of Aedes aegypti and/or Anopheles stephansi in addition to Culex fatigans.

The Group had also considered situation on the sea coast to hold an additional advantage, as infiltration would be automatically reduced due to a water barrier on one side. The Group had further noted that 'ecological requirements should be given first consideration during site selection'.

2.8.20. According to the minutes of this meeting, a preliminary analysis of data gathered on towns with a population range of 40,000-200,000 located in filaria endemic areas in the States of Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Pondicherry; Maharashtra, Gujarat, Madhya Pradesh and Orissa was made and three areas were suggested which merited further consideration. The following list was then presented to the 9th Technical and Planning Review Group meeting:

Tamil Nadu (including Pondicherry Union Territory)	8 towns near Madras City: Pondicherry, Arkonam, Kanchipuram, Arni, Tindivanam, Chingelpet, Ranipet, Arcot.
Maharashtra	4 towns near Nagpur: Wardha, Hinganghat, Umrer, Bhandara.
Gujarat	3 towns (possibly 4) in Saurashtra area: Porbander, Mangrel, Veraval-Paton, and Junagadh.

The following towns were also suggested as worth considering:

Bassein in Maharashtra and Kasargod, Cannanore, and Tellicherry in Kerala.

2.8.21. The Group further noted the following:

"Peliminary visits were made to these areas (except Gujarat) after lines of communication were established between the Director General of ICMR, the Project Leader and the Director of Health Services of the respective States. The objectives of the visits were: (i) to establish contact with local authorities; (ii) to assess the facilities for establishing field laboratories and (iii) carry out a cursory examination of ecology of the C. fatigans in the suggested areas.

With few exceptions, all sites visited, fulfilled the criteria set forth in the recommendations. As a consideration for reducing administrative difficulties, sites were clumped into Units of 3 towns in accordance with their geographical locations. These units were as follows:

Tamil Nadu:

Chinglepet, Arkonam and Kanchipuram; (Unit I) Vellore (Katpadi), Arni, Arcot and Ranipet (Unit II) Pondicherry Union Territory, Tindivanam, Cudalore and Chidambaram; (Unit III)

Maharashtra:

Nagpur, Bhandara, Umrer and Wardha; (Unit IV)

Kerala:

Kozhikode (Calicut), Tellicherry, Cannanore and Kasargod (Unit V).

2.8.22. The relevant observations of the Group in regard to the Pondicherry area were as follows:

Pondicherry Union Territory: Unit III:

In Pondicherry Union Territory, access is less direct than to sites in Tamil Nadu. Many of the problems *i.e.* power, water are common with the latter since the territory is contiguous with that State. Pondicherry Union Territory itself provides only one town, meeting the criteria for the

work, however, nearby towns in Tamil Nadu were considered for possible comparison areas. Contacts with the Union Territory officials were excellent and cooperation assured personally by the Lt. Governor of the Territory. No administrative problems would be anticipated. As the unit would have to be headquartered in Pondicherry town, finding facilities may present a problem as available space is at a premium in the town.

Unit III: The towns of Pondicherry, Cuddalore, Chidambaram and Tindivanam are located on the coastal plains of South India. Whereas the former three are on the sea coast (Pondicherry is also a port), Tindivanam is located about 20 kms. interior. Because of sandy soil, coconut and casuarina plantations abound throughout the area. Rice paddy is cultivated in patches, depends entirely on the rain water. In the Pondicherry region, there are a few brackish swamps and the estuary of the river is flooded with sea water during high tides. Drain breeding is extensive in all these towns.

Four towns in the Pondicherry area, have adequate population size and microfilaria rates of over 5 per cent. Aedes aegypti was present in all towns except Chidambaram. No A. stephansi was found. Among these, Chidambaram and Tindivanam only appear to be compact towns, which appear to be isolated and are on the sea coast. Pondicherry has large drains with profuse breeding, but the town is too congested. Laboratory facilities and staff accommodation could be obtained because of the excellent cooperation of Government and Medical Institute authorities."

2.8.23. Considering various aspects of site selection, the Group had finally recommended:

"Based on the information gathered on the various test sites in primary contacts and on data collected from surveys of certain of the area, the site of preference for the establishment of a substation and future studies is Unit No. II (*i.e.* Vellore, Arcot, Arni, Ranipet and Gudiyattam); Unit No. III (Pondicherry, Cuddalore, Chidambaram and Tindivanam), Unit No. IV (Nagpur, Bhandara, Umrer and Wardha), Unit No. I (Madras, Arkonam, Chingelpet and Kanchipuram), and Unit No. V (Calicut, Cannanore, Tellicherry and Kasargod)."

2.8.24. The Committee were informed by the Department of Health that the scientists allotted to the units of the Vector Control Research Centre at Delhi and Pondicherry have no connections with the foreign agencies and that no foreign expert was working with the Centre in either of its units.

2.8.25. Since the Virus Research Centre at Poona already possessed the technical expertise in virus research and had also done some work in the field of viruses, mosquitoes and other vectors, the Committee desired to know whether the question of locating the Virus Research Control Centre under the control of the Research Centre at Poona had been considered and the reaction of Government to such a proposal. In a note,* the Department of Health stated:

> "The activities of the Vector Control Research Centre involves expertise in entomology, genetics, ecology, parasitology and virology. As such virology forms only one small facet of the multifaceted activities of the Vector Control Research Centre. Virus Research Centre has been engaged during the last 20 years in researches on various aspects of virus diseases in the country. Their major area of interest is related to Arboviruses. It was, therefore, considered necessary to set up a separate centre for research in vector control for malaria and filariasis thereby utilising the trained manpower and equipment available from the WHO Unit. The Scientific Advisory Committee of the Virus Reseach Centre had in fact recommended that the Centre has to take up work on other viruses of National importance like infective hepatitis and these programmes have yet to get under way. Under these circumstances, to have merged a multi-faced research for Vector Control with the Virus Centre would have seriously distracted and hampered the future development of that Institute as a national centre for many different viruses."

2.8.26. Since it had been stated in the Action Taken Note on the Committee's recommendation contained in paragraph 7.1.67 that the question of appointment of a commission of experts to enquire into the working and objectives of the GCMU was 'under consideration' separately, the Committee enquired whether any final decision had been taken in this regard. In a note* furnished on 6 November 1975, the Department of Health informed the Committee as follows:

*Not vetted in Audit.

"A group of Ministers has been asked to look into the GCMU Projects. This group has appointed a High-powered committee consisting of Shri H. C. Sarin as Chairman, Dr. M. G. K. Menon and Dr. M. S. Swaminathan to examine the matter and report to them. The report of the group is awaited."

2.8.27 The Committee desired to know when this 'High-powered committee' had been appointed and its terms of reference and also called for a copy of the Government orders appointing the committee. In their letter dated 19 January 1976, the Department of Health furnished in this connection a copy of a letter dated 15 September 1975 from the Secretary, Ministry of Health & Family Planning addressed to Shri H. C. Sarin, which is reproduced below:

"The Cabinet Committee at its meeting held on Saturday the 6th September 1975, constituted a High-powered Committee consisting of yourself as the Chairman and Prof. M. G. K. Menon and Dr. Swaminathan as Members to examine and report on the points raised by the Public Accounts Committee regarding the Genetic Control of Mosquitoes Unit Project.

The terms of reference of the Committee are as follows:

To consider the recommendations of the Public Accounts Committee relating to:

(a) the enquiry into objectives and working of the Genetic Control of Mosquitoes Unit (para 7.1.67 of the PAC Report);

(b) investigation into the part played by the various officials in the administration of the Project (para 7.1.65 of the PAC Report), and

(c) selection of Sonepat for field release of mosquitoes under the Project (paras 7.1.22 to 7.1.26 of the PAC Report); and make recommendations thereon.

The necessary papers on the subject have already been forwarded to you separately. If you need any further information or assistance in the matter, kindly let me know."

2.8.28 The attention of the Prime Minister had also been drawn by the Chairman, Public Accounts Committee to the 167th Report.

The correspondence exchanged in this regard are reproduced in Appendix V.

2.8.29 In paragraph 7.1.56 of the 167th Report, the Committee had drawn pointed attention to published evidence on the connections between the United States Public Health Service and the US Army's Biological Warfare Research Centre at Fort Detrick. Dr. Joseph Hanlon's article in the 'New Scientist', referred to in paragraph 2.8.4 above throws further light on the involvement of the former with the chemical and biological warfare research of the US Army. The relevant extract from the article is reproduced below:

> "The extensive links between the PHS and the US BW establishment, especially at Fort Detrick, revealed in Science in 1967 (vol. 155, p. 178) become important Science noted that 'the PHS says that it does not take Army money to conduct research that it would not otherwise undertake, but only to bolster on going projects in fields in which it has an independent interest'.
>
> The PAC cites the Science article, as well as New Scientist, in its report. But more information has come out since then on PHS CBW involvement. *Last month, the PHS admitted that it was deeply involved in the production of shell-fish toxin for the Central Intelligence Agency.* John Blamphin, a PHS spokesman, told a Senate Committee that 'this would be an improper role for the Public Health Service in 1975. *But at the time we were involved, National Policy recognised the development of chemical and biological weaponry and as a Federal Agency we had a role'.*
>
> *(New York Times, 18 September)"*
>
> (Italics added)

The article further states:

> "The problem, as the BW expert stressed, is that 'BW and public health interests are totally inextricable, and perfectly acceptable civilian work often has military implications'. Indeed, those diseases which have BW potential are often precisely those which are already public health problems. *The choice on whether or not to permit a project should ultimately be a political choice based on the country's relations with the US.* 'Because of the real public

health issue, I would be pleased to see the GCMRU study, despite the clear BW implications', he concluded."*

(Italics added)

2.8.30. The Committee are unhappy that the Department of Health appears not to appreciate their anxiety over the links that have been found to exist between the United States Public Health Service and the US Biological Warfare Research Centre at Fort Detrick and the possible risks involved in our having allowed an unimpeded access to the former to the primary data on the ecology and behaviour of mosquitoes collected by the GCMU. The fears expressed earlier by the Committee that such data could be misused for feasibility studies on biological warfare techniques are reinforced by more recent information on the involvement of the United States Public Health Service with the chemical and biological warfare research of the US Army. According to the 'New Scientist' article referred to earlier in this Report, the US Public Health Service is reported to have admitted that it was 'deeply involved' in the production of shellfish toxin for the Central Intelligence Agency. The article cites a 'New York Times' (September 18, 1975) report that John Blamphin, a spokesman of the US Public Health Service, while admitting before a Senate Committee that 'this would be an improper role for the Public Health Service in 1975', had, however, stated that 'at the time we (USPHS) were involved, national policy recognised the development of chemical and biological weaponry and as a federal agency we had a role'.

2.8.31. The said 'New Scientist' article also points out that the data on the genetics and ecology of Aedes aegypti collected by the Genetic Control Unit could be of biological warfare interest and observes: "Thus, it is not unreasonable to suggest that Fort Detrick staff finding out about PHS plans for mosquitoe work in India, might have suggested the inclusion of Aedes aegypti just to build up more data on one of its standardised agents. As the PHS had been cooperating with Detrick and encouraged military support of projects it was doing anyway, the PHS would surely have agreed to the addition of a small study such as this."

2.8.32. It would thus appear that the interest evinced by an agency of the US Government in the GCMU Project was by no means as innocuous and innocent as some might imagine. The Committee trust that Government would realise the position and its implications and not feel called upon to defend what might have been done without careful forethought.

2.8.33. The Committee are glad that the Department of Health has at least conceded that the benefits likely to accrue from the

GCMU Project were, to begin with, only potential. The Committee do not deny that the project, if properly conducted, may be of some practical utility at some distant date. A basic question, however, arises whether, in view of the apparent limitations of genetic control methods, a subject which has been discussed in some detail in the Committee's earlier Report, it would be advisable for a developing country like ours, with its inherent limitations, to expend its energies on this particular research which in any case has no immediately ascertainable benefits, while many more urgent problems remain to be tackled effectively. The Committee, are therefore, of the view that it would be better to concentrate on our immediate requirements in the field of public health rather than placing an excessive emphasis on sophisticated research like genetic control methods which are best left to countries which can afford such experimentations.

2.8.34. The Committee note that in pursuance of their recommendation contained in paragraph 7.1.67 of the 167th Report, the agreement with the World Health Organisation, which expired on 30th June, 1975, has not been renewed and that the GCMU Project has also been kept in abeyance. The Committee cannot, however, help expressing a feeling of disquiet over the establishment of another research agency, the Vector Control Research Centre, with its field unit located at Pondicherry, ostensibly to concentrate on studies on genetic and biological control methods against arthropods of medical importance and the transfer of the Indian personnel and equipment of the erstwhile GCMU Project to this Centre. Though the Committee have been informed by Government that the Centre is 'a purely interim arrangement' pending a final decision on its future set-up, they find that detailed plans on its organisation and functions are already on the anvil and that the Centre had had its genesis as early as in 1973 as a possible extension of the GCMU studies. Apparently, the 'foreign experts' at the GCMU had also had some say in the location of the field operations connected with the Project. It is also seen from the proceedings of the 42nd Annual Meeting of the Governing Body of the Indian Council of Medical Research (25 March 1975) that the question of continuing the GCMU Project for a further period of three years had reached an advanced stage of consideration with the draft agreement to be entered into in this regard with the World Health Organisation being under examination and that it had been tentatively decided to shift the project to the Jawaharlal Institute of Post-graduate Medical Education and Research, Pondicherry, on the ground that most of the field operations connected with the project would be taking place around that region. Since many doubts regarding the GCMU

Project have been raised earilier by the Committee, and a link appears to exist between the erstwhile GCMU and the newly-established Vector Control Research Centre, they would ask for a re-assurance from Government that no potential dangers would be involved in the activities of the Vector Control Research Centre, and that the Centre at Pondicherry would not come to be utilised now or in the future for the same objectives and aims as the erst-while project.

2.8.35. While the Committee appreciate Government's anxiety to utilise the services and experience of the Indian personnel of the erstwhile GCMU Project, they would like Government to take good care to ensure that the activities of the Vector Control Research Centre in which their talents are proposed to be utilised, would in no way be prejudicial to the health and security of the country and that the expenditure on the Centre would be commensurate with the research benefit to be derived. The Committee would like some clarification on this issue as well as on how these personnel are at present employed in the Centre pending Government's dcision on the GCMU Project.

2 8.36. The Committee note that a group of Ministers who had been asked to 'look into' the GCMU Project has appointed a high-powered committee to examine the objectives and working of the Unit and related issues raised by the Committee in their earlier Report. While of the view that it would perhaps have been better if this investigation had been entrusted to a commission of experts with the assistance of officials of military intelligence as recommended by them in paragraph 7.1.67 of the 167th Report, the Committee hope that the group of Ministers, assisted by the high-powered committee, would examine thoroughly all the implications and military overtones of the project and adequately evaluate them at some depth so as to set at rest all doubts that have arisen. Even a limited scrutiny of the project by the Committee has disclosed almost sinister ramifications and given rise to suspicion which needs to be allayed. The Committee would urge the Group to complete its investigation very soon and apprise them of its outcome.

2.8.37. In view of the links between the various projects examined by them in their earlier Report, the Committee also consider it desirable that the Group conducts a careful probe into (i) the Bird Migration studies conducted by the Bombay Natural History Society in collaboration with the Migratory Animal Pathological Survey of the US Armed Forces Institute of Pathology and the Smithsonian Institution, (ii) the WHO-sponsored Ultra Low Volume Spray Experiments for urban malaria control at Jodhpur and

(iii) the PL-480 financed study on Microbial Insecticides at the G. B. Pant University of Agriculture and Technology, Pantnagar which had also figured prominently in the Committee's examination. This is a task which, in the Committee's view, necessarily follows from what the said Group has already undertaken.

CHAPTER III

BIRD MIGRATION STUDIES

1. *Background*

3.1.1. Another foreign-sponsored research project which had caused serious concern to the Committee was the Bird Migration Studies conducted by the Bombay Natural History Society, earlier in collaboration with the World Health Organisation and later with the Migratory Animal Pathological Survey (MAPS) of the United States Armed Forces Institute of Pathology, an explicitly military organisation, and the Smithsonian Institution, which, though a civilian organisation, was known to have worked for the United States Army in identifying suitable areas for chemical and biological warfare tests.

3.1.2. As has been pointed out in Chapter IV of the Committee's 167th Report (Fifth Lok Sabha), the bird migration studies had been conducted from 1959 to 1967 in collaboration with the World Health Organisation and those studies aimed at determining the role of migratory birds in the spread of virus diseases. The blood specimens, ticks and actoparasites collected during these investigations were studied by the KS Institute of Poliomyelitis and Virus Encephalitis (Institute of Diseases with Natural Foci) at Omsk, USSR and the Virus Research Centre at Poona. It was also significant that during this period, the Virus Research Centre at Poona had been managed by the Rockfeller Foundation. Copies of the BNHS-WHO Report on the migration studies, which were not available with the Government of India; were alleged to have been sent by the World Health Organisation to MAPS.

3.1.3. Since 1967, the bird migration studies had been sponsored by the Migratory Animal Pathological Survey and the Smithsonian Institution. The major aims of the project then were stated to be as follows:

(i) To plot accurately the migratory routes of the hundreds of migratory species coming into India during winter and to calculate their period of stay in the winter quarters, study the alterations in the plumage, their relationship with the resident birds, the food and feeding habits in the winter areas.

(ii) Resident birds were banded by the Society to know more about them and their distribution. Their measurements, plumage variations and information in regard to sex ratio and weights were being incorporated in works on the birds of India.

(iii) To investigate the possibilities of birds being carriers of certain virus diseases. For this purpose, blood samples were taken from birds and sent to 'experts' in laboratories where they can be tested.

(iv) To collect various ectoparasites found on birds, identify them and study their importance from the pathological point of view. Scientists from the United States, through the MAPS, were assisting the Society with this research.

3.1.4. During their examination of this Project, the Committee had reasons to conclude that in the BNHS-WHO-Rockfeller Foundation-Smithsonian-MAPS collaboration, the Bombay Natural History Society had apparently been nothing more than a local intermediary, with control of the studies being vested in the foreign collaborators and all the primary data, namely, blood samples, sera and ectoparasites being sent to institutes abroad for analysis and study. Significantly enough the Commitee learnt that no files containing primary data relating to the studies or their analysis existed in India and that Dr. Dillon Ripley, Chief of the Smithsonian Institution, who had earlier worked in the Office of Strategic Services (OSS), a precursor to the Central Intelligence Agency, had also been associated with Dr. Salim Ali of the Bombay Natural History Society in publishing works on the birds of India and Southern Asia.

3.1.5. All these facts naturally gave rise to serious doubts in the mind of the Committee of the real objectives of these studies, especially in view of the military significance of migratory birds and their likely abuse for biological warfare research.

3.1.6. The Committee will now proceed to deal with the action taken by Government on the observations/recommendations relating to these studies which have been impressively designated as 'Studies on the possibilities of dissemination of arthropod borne viruses by migratory birds'.

2. *General observations (Paragraph 7.1.68—Sl. No. 68)*

3.2.1. In paragraph 7.1.68 of the 167th Report, the Committee had observed:

> "Yet another research project that has caused a serious concern to the Committee is the study on the possibilities

of dissemination of arthropod borne viruses by migratory birds conducted by the Bombay Natural History Society in collaboration with an explicitly military organisation of the United States of America, the Migratory Animal Pathological Survey (MAPS) and the Smithsonian Institution, which has also worked for the US Army in identifying suitable areas for chemical and biological warfare tests."

3.2.2. In their Action Taken Note dated 16 August 1975, the Ministry of Health & Family Planning (Department of Health) have stated:

"The Department of Agriculture who was consulted has replied as follows:

'The World Health Organisation financed Bird Migratory Study of Bombay Natural History Society during 1959 to 1967 and thereafter the funding of the project was done by the Migratory Animals Pathological Survey of the U.S. Army Medical Research Department and the Smithsonian Foreign Currency Programme upto 1971 by the use of PL-480 funds under the PL-480 grant programme. The project was initially approved by the Screening Committee of the Ministry of Education and Social Welfare. During 1972-73, since the Ministry of Finance did not clear the grant due to Government's ban on the use of PL-480 grants, the Ministry of Agriculture sanctioned financial assistance for the years 1972-73 and 1973-74'."

3.2.3. The Committee feel perturbed by the almost casual response of the Ministry of Agriculture. The reply now furnished is nothing more than a chronological narration of the financial arrangements for the bird migration studies and has little relevance to the Committee's analysis and observations on the collaboration of the Bombay Natural History Society with the Migratory Animal Pathological Survey of the United States Armed Forces Institute of Pathology, an avowedly military organisation, and the Smithsonian Institution, which is widely known to have worked for the US Army in identifying suitable areas for chemical and biological warfare tests.

3.2.4. The Committee note that the collaboration project with the Migratory Animal Pathological Survey and the Smithsonian Institution had been approved by the Screening Committee of the Minis-

try of Education and Social Welfare which, according to the reply furnished by the Department of Health to the Committee's observations contained in paragraph 7.1.2. of the 167th Report, had been entrusted with the scrutiny of projects financed from PL-480 funds and undertaken by universities and educational institutions. It is not clear to the Committee how the Ministry of Education and Social Welfare had been considered the appropriate agency for according approval to a collaborative project with a foreign military organisation, especially when the collaborating Indian organisation was neither a university nor an educational institution. It is also significant that the Ministry of Defence which could have, perhaps, scrutinised the project a little more carefully, with reference particularly to the possible military implications, was not represented on this Committee, and even the scrutiny made by it had been confined only to a 'technical' point. All this help to reinforce the Committee's fear that projects which could be hazardous to the nation's well-being had been approved with only a desultory, routine assessment of their implications. The Committee would very much like to be informed in some detail of the nature of the scrutiny exercised by the aforesaid Screening Committee before the collaboration between the Bombay Natural History Society and the Migratory Animal Pathological Survey and the Smithsonian Institution was approved.

3. *BW Implications of the bird migration studies.* (*Paragraphs* 7-1-69 *to* 7-1-71—*Sl. Nos.* 69 to 71).

3.3.1. Dealing with the biological warfare implications of the BNHS Bird Migration Study, the Committee, in paragraphs 7.1.69 to 7.1.71 of the Report, had observed:

> "7.1.69. The implications of the BNHS Bird Migration Study for the development of a biological warfare system are far more direct and evident than the GCMU. In this case, the Committee find that the Bombay Natural History Society had directly signed an agreement with MAPS, a wing of the US Army. It has also been admitted by the Ministry of Health that blood smears on slides had been sent by the Society to MAPS in Bangkok during 1967-68. The Committee also find, from the Interim Report on the activities of the Bombay Natural History Society's Bird Migration Study Project from 1969 to 1972, that the majority of blood samples and ectoparasites were sent to MAPS for study. In one of his letters dated 17th October 1969 to Dr. Ramachandra Rao of the Virus Research Centre, Poona, Dr. Salim Ali of the BNHS had also admitted that the techni-

cal results of the work conducted in collaboration with MAPS were not available with the Society and that in so far as the Society was concerned, once the ectoparasites collected from birds had been sent to MAPS, it was 'usually the last' they 'hear of the material'. This, in the opinion of the Committee, is a shocking state of affairs in view of the far-reaching implications of the Bird Migration Study for biological warfare."

"7.1.70. Dr. Jayaraman of the Press Trust of India informed the Committee that the military significance of migratory birds lies in the fact that they take predictable routes and arrived at predictable times at predictable places, and that birds can carry viruses in their blood or on the mites and ticks that harbour themselves on the birds."

"7.1.71. The Committee also observe from the SIPRI Report that 'the various Army and medical research units of the Navy studying bird migrations and local infectious diseases in the Middle East and Far East' have contributed to the chemical and biological warfare research and development programme. The SIPRI Report also points out that when the US Army tested their BW weapons in the Pacific in the 1960, the Army conducted, with the help of Fort Detrick, preliminary studies to find out if migratory birds would carry the BW agents away from the test zones into populated areas."

3.3.2. In response to all these observations, the Ministry of Health & Family Planning (Department of Health) have, in their Action Taken Notes dated 16th August, 1975, stated:

"No comments."

3.3.3. The article which had appeared in the 9 October 1975 issue of 'New Scientist', under the caption 'Germ-war allegations force WHO out of Indian Mosquito Project' which, though primarily concerned with the Genetic Control of Mosquitoes Unit and related CBW topics, also sites an 'intriguing alternative' of the BW implications of the bird migration studies suggested by a 'BW expert'. The article states:

"Because the birds flew over the USSR and China, some would fly over both the BW test station suspected in the USSR and over nuclear test sites. Thus, the birds might pick up

organisms or radioactive particles that might tell something about weapons tests." [7]

3.3.4. It is not clear to the Committee what the Department of Health seeks to convey by its laconic response of 'No comments' to some of their important observations relating to the military significance of the bird migration studies. While the Committee concede that the Department of Health, not being directly involved with these studies, has been placed in the anomalous position of having to answer for some other wing of Government, the Committee would have been able to appreciate it if the Department had at least reacted in a more positive manner to their observations and given some indication of the action, if any, that it proposed to take to safeguard against the possibility of such instances repeating themselves in scientific projects cleared by the agencies under its administrative control, especially in view of the fact that the research projects examined by the Committee apparently established a definite pattern. If, on the other hand, the absence of an adequate response signifies an acceptance of their observations, the Committee would like to be told so in categorical terms.

3.3.5. The 'intriguing alternative' of the military significance of the bird migration studies now suggested by a BW expert in the 9 October 1975 issue of 'New Scientist' that since the migratory bird flew over the suspected BW station and nuclear tests in the USSR, these birds might pick up organisms for radioactive particles that might reveal something about weapons tests, serves only to fortify the deduction that the bird migration studies could conceivably be exploited by foreign governments possessing the requisite wherewithal, and to that extent confirms the Committee's earlier fears and doubts about the wide military implications of this project The Committee, therefore, desire that the Ministry of Defence should immediately examine all the ramifications of the bird migration studies, with a view to ensuring that the country does not unwittingly become involved in the stratagems of foreign governments with their own motivations in the power political arena of the world today.

4. *Collaboration between BNHS and WHO on Bird Migration Studies.* (*Paragraph* 7.1.72—*Sl. No.* 72) .

3.4.1. Commenting on the earlier collaboration from 1959 to 1967 between the Bombay Natural History Society and the World Health Organisation, the Committee, in paragraph 7.1.72 of the 167th Report had observed:

"Earlier collaborations between the Bombay Natural History Society and the World Health Organisation, Virus Re-

search Centre, Poona and the Smithsonian Institution give rise to serious doubts about the objectives of such research sponsored by foreign institutions. The Bird Migration Project had been carried out in collaboration with the World Health Organisation from 1959 to 1967. The Committee learn from Shri Raghavan of the Press Trust of India that the World Health Organisation had sent four copies of the BNHS—WHO report on the bird migration studies to MAPS. It has also been stated that Dr. Jayaraman himself had seen a copy of a letter addressed in this regard by the Geneva headquarters of the WHO to Elliot Mclure of MAPS. The Ministry of Health have also admitted that they do not have a copy of the BNHS—WHO study."

3.4.2. In their Action Taken Note dated 16 August 1975, the Department of Health have stated:

"No comments."

3.4.3. The Committee are distressed at the inadequate response of Government to the serious doubts raised by them in regard to collaborations on the Bird Migration Studies between the Bombay Natural History Society and the World Health Organisation. During evidence tendered before the Committee, it had been alleged that the World Health Organisation had sent four copies of the BNHS—WHO report on the bird migration studies to the Migratory Animal Pathological Survey of the US Armed Forces Institute of Pathology, while the report had not even been available to Government of India's own Health Ministry and had posed a serious question whether the World Health Organisation had joined hands with the Bombay Natural History Society because of the U.S. Army's interest in virus transport to India through migratory birds. Another allegation made was that though the Virus Research Centre, Poona had also collaborated in these studies, the papers relating to the research conducted on viruses of migratory birds had 'disappeared' with the Rockfeller scientists who had worked there. Admittedly, the ectoparasites from birds submitted by the Bombay Natural History Society had only been identified by the Virus Centre at Poona and not tested. Since some of the allegations are extremely serious, the Committee would urge Government to investigate and take specific action. Since the Committee have been constrained to call Government's attitude somewhat casual in this matter, Government should also intimate early the action they have taken.

3.4.4. The Screening Committee of the Ministry of Education and Social Welfare had apparently 'approved' this collaborative venture between the Society and the World Health Organisation. The Committee feel that at least that Ministry should be in a position to explain whether they had considered any safeguards against the possible misuse of these studies and intimate accordingly to the Committee.

5. *Approval by the Defence Ministry of the BNHS—MAPS collaboration (Paragraph 7.1.73 to 7.1.75—Sl. Nos. 73—75)*

3.5.1. With reference to the clearance given by the Ministry of Defence to the collaborative project on bird migration studies between the Bombay Natural History Society and the Migratory Animal Pathological Survey of the US Army, the Committee, in paragraph 7.1.73 of the 167th Report, had observed:

> "Even though the military overtones in the BNHS project were explicit, the Committee are concerned to note that the Ministry of Defence had cleared the collaborative project with MAPS in 1967, merely on a 'technical point' and had not considered it necessary to examine and evaluate why the US Army and its wing MAPS were interested, in the bird migration project. Apparently, the Ministry had not realised that any grant from any Wing of the US Department of Defence is always provided only with a military objective. This policy has also been admitted by the United States Department of Defence itself as is evident from the Mansfield Amendment to Section 203 of the Act on 'Military Appropriation for Research and Development', according to which 'none of the funds authorised by this Act' may be used to carry out any research project or study unless such project or study has a direct and apparent relationship to a specific military function or operation."

3.5.2. While the Department of Health, in their Action Taken Note dated 16 August 1975, have stated that they had 'No comments', reply from the Ministry of Defence to these observations, who had also been specifically addressed in this regard by the Committee, had not been received till the finalisation of this Report.

3.5.3. While the Committee can understand the inability of the Department of Health to furnish any comments on their observations in regard to the clearance given to the bird migration studies by another wing of Government, they would emphasise that there are

valuable lessons to be gleaned from this incident by the Health Ministry also, in view of the fact that some of its own agencies appear to have entered into collaborations in biomedical research with foreign, particularly U.S., military organisations. Since no wing of the US Department of Defence would be interested in research which does not serve US military objectives, the Committee would urge the Department of Health, as well as other Government and quasi-Government organisations of the Government of India to be wary of such collaborative ventures, however innocuous and harmless they may appear. Projects of apparently scientific cooperation should not result in developing countries turning out to be the testing ground for new techniques and chemicals that bring no good either to them or to the world community. Happily, the Prime Minister herself in her recent address to the 25th Pugwash Conference on Science and World Affairs at Madras has sharply and powerfully pilloried the idea of countries like ours being treated as "guinea-pigs" in the name of collaborative scientific research.

3.5.4. The Committee are unhappy that the reply from the Ministry of Defence to some important observations of theirs is yet to be received, even after the lapse of nearly nine months. The Defence Secretary himself had been requested on 13 May 1975, to make available the relevant Action Taken Note by 16 August 1975 at the latest. Three months are not a small stretch of time and the Committee are constrained to deplore this delay when serious issues required to be clarified promptly. The Ministry should explain to the Committee why such delay, detrimental to the country's interest, could have taken place.

3.5.5. In paragraph 7.1.74 of the earlier Report, the Committee had recommended as follows:

> "The Committee, therefore, desire that the existing procedures should be thoroughly reviewed and tightened up with a view to ensuring that all such projects which are conducted in collaboration with foreign military or para military organisations are thoroughly evaluated, and screened for possible threats to the country's security before they are cleared."

3.5.6. In their Action Taken Note dated 16 August 1975, the Department of Health have stated:

> "This question is at present under consideration."

3.5.7. The Committee are concerned over the tardy manner in which a fairly simple, though important, suggestion of theirs for

tightening up the existing procedures for the scrutiny of scientific projects conducted in collaboration with foreign military or para military organisations, is being implemented. It should not be difficult for Government to initiate action on this recommendation. The Committee desire that this recommendation of theirs should be processed without further loss of time and the final action taken intimated within a month.

3.5.8. Referring to the understanding that any projects referred from the Advanced Research Projects Agency (ARPA) of the United States should go through, the Committee, in paragraph 7.1.75 of the 167th Report, had observed:

> "The Committee also observe that according to an understanding with several governmental agencies at the time the BNHS-MAPS Project was cleared by the Ministry of Defence, any project which had any defence sensitivity should be channelled through the Ministry of Defence. The understanding in this particular case was that any project that was referred from the United States ARPA—Advanced Research Projects Agency—of the United States should go through. The Committee would like to know if this arrangement still continues. ARPA, according to 'New Scientist' (August 8, 1974) is 'an elite group of civilian scientists conducting high risk research and development of a revolutionary nature in areas where defence technology in the US appears to be falling behind or in areas where the US cannot afford the risk of falling behind'. The Committee, therefore, desire that the Ministry of Defence should review whether any risks are involved in the projects being routed through ARPA. The Committee consider this to be important since they understand that ARPA had financed a GCMU-like Project in Burma in 1967 and had been responsible for evolving a herbicide warfare programme under the guise of food technology research. The Committee have also been informed that within ARPA is a project called 'AGILE' which is a counter-insurgency research programme responsible for opening up limited warfare technologies."

3.5.9. In their Action Taken Note dated 16 August 1975, the Department of Health have stated:

> "The Ministry of Defence has been addressed in the matter. Their reply is awaited."

The Committee have not heard anything further in the matter.

3.5.10. The sheer passivity of the Ministry of Defence in meeting the desire of the Committee that it should review whether any risks were involved in approving scientific projects routed through the Advanced Research Projects Agency (ARPA) of the United States appears to the Committee to be not only untenable but positively disconcerting. Since ARPA, admittedly, is responsible for the support of research projects with the US Department of Defence Funds, which in turn, under the Mansfield Amendment, can be utilised only on projects having a direct and apparent relationship to a specific military function or operation, the Committee would again urge the Ministry of Defence to implement their recommendation immediately. Pending the completion of the review suggested, this arrangement should be held in abeyance, in case it has not already been done. The Committee would await a further precise report of the action taken in this regard.

6. *Investigation of the Project.* (*Paragraph* 7.1.76—*Sl. No.* 76).

3.6.1. Since the examination by the Committee of the bird migration studies gave rise to doubts about the real objectives of the project, the Committee, in paragraph 7.1.76 of the 167th Report, had recommended:

> "In view of the biological warfare implications of the bird migration studies brought out in the foregoing paragraphs and considering the fact that a similar MAPS-sponsored bird migration study in Brazil had been brought to an end by exposure in the American press, the Committee desire that the Ministry of Defence should investigate this project in detail immediately with a view to ensuring that no malafides are involved."

3.6.2. In their Action Taken Note dated 16 August 1975 on the above recommendation, the Department of Health have stated:

> "The Ministry of Defence has been addressed in the matter. Their reply is awaited."

3.6.3. This is yet another brazen instance of failure to take action on the recommendations of the Committee. Though the military significance of the Bird Migration Studies is fairly obvious and it is evident that the entire project has been handled ineptly, if not

worse, by the Indian authorities, concrete action is yet to be taken to investigate the project, in spite of much time having elapsed. What is more distressing is that the Public Accounts Committee and through it, the Parliament are yet to be told what action Government propose to take in pursuance of the Committee's observations. The Committee gravely deplore this state of affairs and desire that the reasons for this delay should be investigated with a view to fixing responsibility.

7. *Testing of blood samples of migratory birds at the IDNF, Omsk, USSR (Paragraph 7.1.77—Sl. No. 77).*

3.7.1. Since the Committee had been informed that the blood samples obtained from the migratory birds between 1959 and 1966 had been sent to the Institute of Diseases with Natural Foci, Omsk, USSR, they had observed as follows in paragraph 7.1.77 of the 167th Report:

> "The Committee also note that blood samples of migratory birds had also been sent by the BNHS to the Institute of Diseases with National Foci, Omsk, USSR, upto 1966. The Committee would like to know whether the results of the study of the blood samples had been made available to the Government of India and the nature of the collaboration between the BNHS and the IDNF, Omsk and its objectives."

3.7.2. In their Action Taken Note dated 16 August 1975, the Department of Health have stated:

> "The President of the Bombay Natural History Society informed this Ministry that the ticks and blood smears obtained from birds were studied by the Virus Research Centre at Poona and Institute of Diseases with Natural Foci at Omsk, USSR respectively and that no satisfactory evidence of birds involvement in the transmission of the virus was obtained."

3.7.3. The Public Accounts Committee (1974-75) had, however, been informed in this regard by the Department of Health as follows:

> "It is a fact that since the discovery of KFD virus in 1957, the VRC has been interested in the possible dissemination of this virus through various ectoparasites including those

found on birds. The studies from 1959 to 1969 were largely connected with identification of ectoparasites submitted to VRC by the BNHS during the course of the latter's study on migratory birds. The ectoparasites were not tested by the VRC."[10]

3.7.4. The Committee find something of a contradiction in the reply now furnished by the President of the Bombay Natural History Society and what had been stated earlier by the Department of Health in regard to the testing of the ticks collected from the migratory birds by the Virus Research Centre, Poona. The Committee had been informed earlier that the studies conducted by the Virus Research Centre from 1959 to 1969 were largely connected only with the identification of the ectoparasites and that the ectoparasites had not been tested by the Centre. The Committee would like the discrepancy in the two replies to be reconciled and the correct position clarified, especially in view of the allegations that the papers relating to the research conducted on viruses of migratory birds had disappeared with the Rockfeller scientists who had worked at the Centre.

3.7.5. The reply of the Department of Health is also silent on the nature of the collaboration which the Committee wanted to know, between the Bombay Natural History Society and the Institute of Diseases with Natural Foci, Omsk, USSR. The Committee would like a specific reply in this regard.

CHAPTER IV

ULV SPRAY EXPERIMENTS AND MICROBIAL PESTICIDE RESEARCH

1. *Introduction (Paragraph 7.1.78—Sl No. 78)*

4.1.1. The Committee had found that two other projects--the Ultra Low Volume Spray (ULV) Project at Jodhpur and the Microbial Pesticides Project at the Pantnagar Agricultural University—carried out in the country with foreign collaboration could also conceivably be misused for such deleterious objectives as the furtherance of chemical and biological warfare techniques. While the former project is sponsored by the World Health Organisation, the latter is a programme financed by PL-480 funds. The Committee, in paragraph 7.1.78 of the 167th Report, had observed:

> "Two other foreign-sponsored projects which have come to the notice of the Committee also merit notice in view of their importance in biological warfare techniques. The first is the WHO sponsored Ultra Low Volume (ULV) Spray experiments for urban malaria control being conducted at Jodhpur and the second is the PL-480 financed study on Microbial Insecticides at the G. B. Pant University of Agriculture and Technology, Pantnagar."

4.1.2. In their Action Taken Note dated 16 August 1975, the Department of Health have stated:

> "No comments."

4.1.3. The Committee presume that the Department's reply of 'No comments' implies an acceptance of the special significance of the ULV Spray Experiments at Jodhpur and of the study on Microbial Insecticides at Pantnagar in relation to the development of knowledge about biological warfare techniques. This needs to be clarified and confirmed.

2. *BW implications of the ULV Spray Experiments. (Paragraphs 7.1.79 to 7.1.81.—Sl. Nos. 79 to 81).*

4.2.1. Dealing with the biological warfare implications of the ULV Spray Experiments, the Committee, in paragraphs 7.1.79 and 7.1.80

of the 167th Report, had stated:

"7.1.79. The Committee find that an ULV Spray machine obtained from the US under PL-480 funds is being used to spray malathion insecticide for malaria control. The Committee understand that the ULV technique is an acknowledged method of spraying aerosols of biological warfare agents. According to the SIPRI Report, 'improvements in agent dissemination technology have a high, perhaps the highest priority in CBW programme'."

"7.1.80. The SIPRI Report goes on to say that 'weather is critical to the performance of many types of CB weapons. Maximum effectiveness thus depends on ability to predict or measure prevailing weather conditions and to exploit the air streams occurring over the target. The particle size in which the payload of the CB weapon is disseminated is also critical. Efforts to improve aerosol generating techniques are presumably a prominent feature of the large area incapacitating weapon systems'. The Committee find that the UN Consultant experts on CBW had also observed that most pathogenic agents are highly vulnerable to environmental stress such as temperature, solar radiation, humidity, etc. and that 'the inactivation process of BW agents which is governed by several factors are now the subject of aerobiological research'."

4.2.2. The relevant Action Taken Notes dated 16 August, 1975 on the above observations of the Committee furnished by the Department of Health are reproduced below:

Paragraph 7.1.79 ..

"Although microbial agents can be dispersed through aerosol spraying, the ULV trial undertaken was for spraying technical malathion for control of Urban Malaria. The work was done by the officials of the Government of Rajasthan under the supervision of an officer of the Directorate of National Malaria Eradication Programme."

Paragraph 7.1.80

"No comments."

4.2.3. In view of the possibility of the misuse of these experiments, the Committee, in paragraph 7.1.81 of the Report, had recommended:

> "The Director General, Health Services had stated during evidence that 'theoretically the possibility of using the ULV machine for purposes other than the spraying of insecticides, for which it is primarily meant as an aerosol for spreading virus or bacterial infection is definitely yes'. The Committee, therefore, desire that, in view of the possibility of the misuse of the experiments, the project should be critically scrutinised and evaluated in all its aspects and necessary safeguards adopted."

4.2.4. In their Action Taken Note dated 16 August, 1975, the Department of Health have replied:

> "The ULV trial in Jodhpur as stated earlier was carried out by the regular officers and staff of the Rajasthan Government under the supervision of the Assistant Director (Urban Malaria) of NMEP Directorate. The effectiveness was evaluated regularly. Thus there was no scope of the possible misuse of the experiment."

4.2.5. The Committee note that the ULV Spray trials for urban malaria control at Jodhpur had been carried out by the officials of the Government of Rajasthan under the supervision of an officer of the Directorate of the National Malaria Eradication Programme and that the effectiveness of the experiments was evaluated regularly. However, when the Committee asked for a critical scrutiny of the project, it was on account of its biological warfare overtones and a certain potentially perilous relationship among the different foreign-sponsored projects examined by them. Government should, therefore, find out the links that exist between the different scientific projects carried out in the country under the aegis of foreign sponsors and make sure that India's own scientific talent is not exploited to the detriment of the interests of the country. The various projects examined by the Committee have thus to be viewed in their entirety and not in isolation. The Committee, thus, would reiterate their earlier recommendation that the projects should be scrutinised on a principled basis and in all its aspects. The Committee would also like to know how the primary data collected by the Unit have been used and whether the World Health Organisation had been given access to such data.

3. *Selection of sites for the ULV spray trials.*

(*Paragraphs* 7.1.82 *and* 7.1.83—*Sl. Nos.* 82 *and* 83).

4.3.1. Dealing with the selection of sites for the ULV spray experiments, the Committee, in paragraphs 7.1.82 and 7.1.83 of the Report, had observed:

> "7.1.82. The Committee also find that Jodhpur had been selected for the ULV spray experiments out of Kota, Bikaner, Ajmer, Jodhpur, Ahmedabad, Baroda and Broach considered for trial, as it had the highest incidence of malaria and the State Government had also agreed to provide the manpower and transport facilities. It is not however, clear to the Committee why only seven towns in Gujarat and Rajasthan had been considered for the trials. The Committee would like to know whether other State Governments had been approached for affording the facilities."

> "7.1.83. The Committee have been informed that it is now proposed to shift the experiments from Jodhpur to Ajmer. The Committee are unable to understand the rationale for this especially in view of the fact that the incidence of malaria in Ajmer in 1974 was only 864 cases as against 35,979 cases in Ahmedabad. The Committee would, therefore, like to be informed of the circumstances leading to the selection of Ajmer for the experiment and on what considerations this decision has been taken."

4.3.2. In their Action Taken Notes dated 16 August, 1975, the Department of Health have stated:

Paragraph 7.1.82

> "As the trial was to be conducted under the supervision of an officer of NMEP Directorate, the proximity of the site of the experiment to Delhi was essential. This was tried as an experimental measure and only one place was selected. No other State Government was therefore approached."

Paragraph 7.1.83

> "The trials on ULV at Jodhpur were concluded on 31st December, 1974. The Government of Rajasthan had requested to undertake similar trial in the town of Ajmer. The Special Working Committee on NMEP at its meeting held

on 17th March, 1975 discussed the matter and decided that further trials should be undertaken at places where vector-borne diseases like malaria, dengue and filariasis are prevalent. Ajmer town has high incidence of malaria and also had experienced outbreak of dengue fever during the previous years. Anyhow no decision has been taken yet in this matter."

4. *Studies on Microbial Pesticides*

(*Paragraph* 7.1.84—*Sl. No.* 84).

4.4.1. With reference to the Microbial Pesticides Project conducted at the G. B. Pant University of Agriculture and Technology, Pantnagar, the Committee, in paragraph 7.1.84 of the 167th Report had recommended:

"The object of the studies on microbial pesticides at Pantnagar is to experiment on biological control of insects and pests through parasites and predators. The Committee understand that the microbial pesticides require microcapsules for encapsulating the viruses and, according to the SIPRI Report, micro-encapsulation is a technique for wrapping microscopic particles in individual protective coatings. This technique is used by germ warfare experts to protect the BW agents from sunlight, etc. and to preserve the viruses in an easily usable form for a long time. In this context, the SIPRI Report points out that microbial pesticide research 'provides information on the feasibility of disseminating microencapsulated BW agents'. The Report states that 'pesticide research is likely to continue providing impetus to the CB weapon programme' and adds that 'the possibilities of spin off into CB technology from such activities are obvious enough'.

The Committee desire that this project should also be evaluated immediately by an expert body. Such an evaluation, in the opinion of the Committee, is absolutely necessary in view of the revelations brought out in the GCMU Project and the BNHS Bird Migration Studies."

4.4.2. In their Action Taken Note dated 16 August, 1975, the Department of Health have stated:

"The Department of Agricultural Research and Education has proposed that a Scientific Committee consisting of the Deputy Director General (Crops Sciences), Indian Coun-

cil of Agricultural Research, Plant Protection Adviser to the Government of India, Department of Agriculture and a scientist nominated by the Defence Science Adviser may evaluate the Project of Microbial Pesticides for Progress at Pantnagar with PL-480 funds."

4.4.3. The Committee are happy that the Department of Agricultural Research and Education have now woken up to some awareness of the conceivable risks in the Microbial Pesticides Project at Pantnagar and agreed to the evaluation of the project by a competent scientific committee. The Committee would like to know the detailed Terms of Reference of the evaluation committee and also if this committee has commenced its work. The proposed evaluation should be completed and the findings intimated to the Committee without delay.

4.4.4. Incidentally, the Committee find that several other institutions are also conducting research on bacteria and protozoa as parasites for the biological control of agricultural pests. Though these studies have not been, according to the information furnished to the Committee earlier, financed by PL-480 funds, it is not unlikely that they may also have other foreign sponsors and collaborators. In view of the Committee's findings, even after a limited enquiry, it would be, in the Committee's view, desirable to evaluate these research projects also.

CHAPTER V

OTHER BIOMEDICAL RESEARCH PROJECTS

1. *Introduction*

5.1.1 During their examination of the Bird Migration studies conducted by the Bombay Natural History Society in collaboration with the Migratory Animal Pathological Survey, a military agency of the United States, the Committee had desired to know whether it was a normal practice for Government or private organisations in the country to collaborate with foreign military organisations on scientific projects. The Committee had been then informed that while the Council of Scientific and Industrial Research, Indian Council for Agricultural Research, Defence Research and Development Organisation, Indian Council of Medical Research, All India Institute of Medical Sciences, Postgraduate Institute of Medical Education and Research (Chandigarh) and the Department of Agriculture do not normally collaborate on any of their scientific research with any foreign military organisation, the Indian Council of Medical Research had, however, approved the following biomedical collaborative research ventures with US military agencies:

(i) 'Human Biology studies on Differential Tissue', under Dr. G. P. Talwar, Professor of Biochemistry, All India Institute of Medical Sciences, New Delhi in collaboration with the Office of Naval Research, USA; and

(ii) 'Coordinated study on Infectious Hepatitis in India', under the Director General, Indian Council of Medical Research again sponsored by the Office of Naval Research, USA.

5.1.2. Besides, the Committee had also been informed that a grant for the purchase of equipment and laboratory supplies which are not available in India, for a project on 'The Relative Role of Cardiac Afferents in the Regulation of Cardiovascular Functions under Physiological and Experimental Conditions' in the Vallabhbhai Patel Chest Institute, under Dr. P. D. Gupta, had been made available by the US Air Force through the European Office of Aerospace Research, Brussels.

2. *Other collaborative ventures with military organisations.* (*Paragraph* 7.1.85—*Sl. No.* 85)

5.2.1. Commenting on these biomedical research projects conducted in collaboration with or sponsored by US military organisations, the Committee, in paragraph 7.1.85 of the 167th Report, had observed:

> "From the information furnished by the Ministry of Health, the Committee find that the Indian Council of Medical Research has two other projects—'Human Biology Studies on Differential Tissue' and 'Conducted Study on Infective Hepatitis in India'—which have again been sponsored by the Office of Naval Research, USA. Similarly, a grant for the purchase of equipment and laboratory supplies, which are not available in India, for a project on 'the Relative Role of Cardiac Effects in the Regulation of Cardiovascular Functions' in the Vallabhbhai Patel Chest Institute, has been given by the US Air Force, through the European Office of the Aerospace Research, Brussels, Belgium. The Committee fail to understand why such collaborations with the US Navy and Air Force in these studies have been permitted."

5.2.2. In their Action Taken Note dated 16 August, 1975, the Department of Health have stated:

> "The facts regarding the three Projects mentioned in this paragraph are given below:—
>
> (a) *Human Studies on Differential Tissue*:—In June 1967 the Indian Council of Medical Research forwarded to the Ministry of Health and Family Planning for consideration the proposals of grants from PL—480 Funds, received by them in regard to Collaborative Programme in human biology (India) under Dr. G. P. Talwar at the All India Institute of Medical Sciences, New Delhi in collaboration with Dr. Melvin Cohn of the Salk Institute for Biological Studies, California (USA). The ICMR has approved the scheme technically and accorded it the highest priority. With the concurrence of the Ministry of Finance (Department of Economic Affairs), the proposal of the ICMR was approved by this Ministry and the USA Embassy in New Delhi was requested on

the 19th of October 1967 to process the scheme for assistance under PL—480 Funds. On the 29th of January 1970, the National Institute of Health's Science Representative in the US Embassy in New Delhi informed that Ministry of Health and Family Planning that the Embassy referred the research proposals to the various US Agencies, which had been authorised to support bio-medical research in India and that due to lack of fund, only one agency, namely Office of Naval Research, Department of Navy, U.S. Department of Defence had offered to sponsor the study exactly on the same basis as approved by the Government of India with a reduced budget provision. In consultation with the Ministries of External Affairs, Finance (Department of Economic Affairs) and Defence the Science Representative, National Institute of Health, American Embassy, New Delhi was informed on the 22nd August, 1970 that the Government of India agreed to the proposed amendment for reduction in the expenditure for the research project and also its being sponsored by the US Department of Defence. Because of the delay in sanctioning the funds, the project started very late and Dr. Talwar requested that the duration of the scheme might be continued till the 31st March, 1975. Recently, however, he requested that the project might be continued upto December, 1975 with additional funds. This had been agreed to by the Indian Council of Medical Research.

(b) *Coordinated Study on Infectious Hepatitis in India*:— The scheme on Infectious Heptatitis in India was placed before the ICMR's Screening Committee which consisted of representatives from the Ministry of Health and Family Planning, DGHS, Planning Commission, Ministry of Finance (Department of Economic Affairs). The Screening Committee approved the proposal. The Principal Investigator of the scheme is the Director General, ICMR. The studies will be carried out at the following places:

(1) All-India Institute of Medical Sciences, New Delhi.

(2) Indian Registry of Pathology, Safdarjang Hospital, New Delhi.

(3) National Institute of Communicable Diseases, Delhi.

(4) Madras Medical College, Madras.

(5) Institute of Child Health, Madras.

Since infectious hepatitis is an important problem in India, it was given high priority by the experts of the ICMR and was also approved by the Screening Committee. The Ministry of Health and Family Planning also approved the scheme. Although the scheme is funded by Office of Naval Research, results of this study will be available only to the ICMR and not directly to any foreign organisation. The progress report briefly indicating the work done and edited by the Director General, ICMR will be sent to the US Naval Authorities every year.

(c) *The Relative Role of Cardiac Afferents in the Regulation of Cardiovascular Functions under Physiological and Experimental Conditions*:—Dr. P. D. Gupta, Senior Scientific Officer, V. P. Chest Institute, Delhi University, submitted a proposal to the European Office of Aerospace Research, Brussels, Belgium, in August 1967 through the Vice-Chancellor, Delhi University for financial assistance. The European Office of Aerospace Research approved the grant of $22,375 to enable Dr. Gupta to undertake this study. The grant was proposed to be paid in dollars without any rupee component and did not involve any foreign exchange. The grant was mainly for the purchase of equipment which was not available in India. The University Grants Commission had no objection to the proposed assistance being received by Dr. Gupta from educational angle. The University Grants Commission forwarded the proposal to the Ministry of Education for obtaining necessary clearance of the Government of India in this behalf. The Ministry of Education in consultation with the Ministries of External Affairs, Defence and Finance (Department of Economic Affairs) informed the Secretary, University Grants Commission on the 29th June, 1968 that the Government of India had no objection to Dr. Gupta, Senior Research Officer, V. P. Chest Institute accepting the grant of $22,375 offered by the US Air Force and through the European Office of Aerospace Research, Brussels, Belgium to undertake the study. The Director, V. P. Chest Institute had stated that it was not a normal practice for the Institute to collaborate with foreign military

organisations but that he made an exception in the case of Dr. Gupta because, firstly it was an equipment grant and secondly no foreign collaboration was involved as in the case of PL-480 grants. The results of the research performed with equipment received from the aforesaid grant are submitted to the scientific journals in India or abroad for publication. Dr. Gupta is completely free to submit the results of research to any journal of his choosing. The source of financial support is however duly acknowledged in the paper submitted for publication.

A further grant of $15,000 was offered by the same organisation to enable Dr. Gupta to undertake study entitled 'Neuro-Humoral Control Mechanism in the regulation of Cardio-Vascular functions and fluid electrolyte balance'. This grant was an extension of early grant of $22,375. The University Grants Commission had no objection to the proposed assistance being received by Dr. Gupta from educational angle. They forwarded the proposal to the Ministry of Education for getting the necessary Government's clearance. The Ministry of Education in consultation with the Ministry of Finance (Department of Economic Affairs), Ministry of Defence and the Ministry of External Affairs cleared the proposal and informed the University Grants Commission on the 30th June, 1971 that the Government of India had no objection to the acceptance of a further grant of $15,000 by the V.P. Chest Institute, Delhi for enabling Dr. Gupta to undertake research work on the project mentioned above.

The research project was extended upto the end of September 1976 by the University Grants Commission on a no cost extension basis subject to the condition that the concurrence of the US sponsoring authority of the project was obtained and that no additional grant is accepted for this purpose."

5.2.3. The Committee fear that the Office of Naval Research, Department of Navy, US Department of Defence, coming on to the scene to sponsor the PL-480 financed 'Human Studies on Differential Tissue' at the All India Institute of Medical Sciences, New Delhi gives rise to grave misgivings which need to be allayed. In this case, the studies were originally to be conducted in collaboration

with Dr. Melvin Cohn of the Salk Institute for Biological Studies, California (USA) and subsequently, on account, allegedly, of 'lack of funds' with various US Agencies, only the Office of Naval Research came forward to sponsor the study. It is significant that the initial proposal of the Indian Council of Medical Research for collaboration with Dr. Melvin Cohn had been approved by the Ministry of Health with the concurrence of Department of Economic Affairs, and though the US Embassy in New Delhi had been requested as early as October 1967 to process this scheme for assistance under PL-480 funds, it was only in January 1970, after more than two years had elapsed, that the plea of paucity of funds with other US agencies was put forth and an alternate sponsor offered by the US Authorities. The Committee would insist that the sponsoring of a seemingly harmless bio-medical research project by a foreign and explicitly military agency cannot be countenanced unless over-riding reasons acceptable to a self-respecting country are clearly expounded. The Committee would like the Ministry of Defence, in particular, thoroughly to examine the implications of this project and intimate the result.

5.2.4 The Committee find that the collaboration with the Office of Naval Research had been agreed to by the Government of India, in consultation, among others, with the Ministry of Defence. In view of the rather unsavoury situation that arose out of inadequate scrutiny by the Ministry of Defence in the case of the Bird Migration Studies, where the scrutiny had been confined only to a 'technical point', the Committee would very much like to know the nature and extent of the checks exercised by the Ministry in the present case and whether the project had been examined by the Ministry in all its aspects, with a view to ensuring that no security risks whatever were involved in the project.

5.2.5 While the collaboration with a known military organisation had at least been cleared by the Ministry of Defence in this case, the Committee are concerned to find that the 'Coordinated Study on Infectious Hepatitis in India', again sponsored by the Office of Naval Research, USA, does not appear to have been referred to the Ministry of Defence for clearance. This seems a serious anomaly and the Committee would like to be informed of the reasons for the deviation in this case.

5.2.6. The procedure followed in this case reinforces the Committee's earlier concern over the lack of firm security-consciousness in

the Indian agencies involved in such projects and the absence of any explicit policy frame or uniform guidelines for approving collaborative projects sponsored by foreign agencies, particularly foreign military organisations. This is a thoroughly unsatisfactory state of affairs. Now that a high-level committee has been, at long last, constituted by Government to finally evaluate and approve research projects involving foreign collaboration, the Committee trust that there would be in future a greater alertness on the part of the authorities concerned.

CHAPTER VI

SUMMING UP

1. *Remedial Measures (Paragraphs 7.1.86 to 7.1.89—Sl. Nos. 86 to 89)*

6.1.1 The Committee, after examining various foreign sponsored collaborative research projects, had recommended as follows in paragraphs 7.1.86 to 7.1.89 of their 167th Report:

"7.1.86. The various projects that have been examined by the Committee in the foregoing paragraphs raise the basic question about the way scientific activities and related research are sponsored and run in the country. What causes great concern to the Committee is the absence of any explicit policy frame and a well-defined institutional mechanism within the Government for reviewing projects, in sensitive areas and fields, of high scientific or technological content, promoted and/or actively participated in by foreign agencies. The Committee use the term 'sensitive areas or fields' not merely in the narrow sense involving military installations or military information, but in an all-embracing sense. The Committee, therefore, recommend that the following urgent steps should be taken by Government:

7.1.87 Government should identify a set of scientific or operational areas in which investigations by foreigners or by foreign assisted programmes should be subjected to the most careful and comprehensive scrutiny on a case-by-case basis before government approval is given for the initiation of the project. The scientific areas selected at a particular point of time would need to be defined in the context of the prevalent international situation and advances in science and technology."

"7.1.88 To start with the Committee would suggest the following areas:

(a) any and all aspects of oceanography and research related to ocean resources and our coastal areas;

(b) any and all aspects relating to meteorology and weather, specially weather modification projects;

(c) remote sensing by aircraft and satellites, particularly for the assessment of natural resources;

(d) areas in biology, such as micribiology, epidemiology (how diseases arise, are propagated and diffused), ecology and virology;

(e) all aspects of toxicology, whether of drugs, pesticides and other chemicals;

(f) the propagation of radio waves, including studies aimed at collecting information about the ionosphere and other upper atmospheric layers over our country;

(g) any and all scientific investigations in border areas such as 'Himalayan Geology'."

"7.1.89 Government should decide that all proposals for scientific investigations proposed to be undertaken in these defined areas with the help of or in any association with foreign organisations or with foreign monies from any source should be sent by the Ministry, Agency, Laboratory or private institution concerned to a nodal point within the government for a comprehensive review and clearance. This nodal point should be a high power committee of Scientists headed by the Scientific Adviser to the Ministry of Defence but can include, and perhaps ought to include, other high security agencies of Government. The Committee desire that once this mechanism has been set up, it should also review all existing projects of the types mentioned in the preceding paragraph."

6.1.2 While stating that they had 'no comments' in regard to the observations of the Committee contained in paragraph 7.1.86, the Department of Health informed the Committee, in their Action Taken Notes dated 16 August, 1975, that the recommendations contained in paragraphs 7.1.87 to 7.1.89 were 'separately under consideration'.

6.1.3 In his letter dated 3 June, 1975 to the Prime Minister (reproduced in Appendix V), the Chairman of the Committee had also, *inter alia*, drawn attention to the above recommendations of the

Committee. For facility of ready reference, the relevant extract from the letter is reproduced below:

> "Irrespective of any future decisions about the research schemes, the present G.C.M.U., run under the auspices of the I.C.M.R. by the WHO and financed by the United States, should be ended when the agreement with the WHO runs out on 30th June, 1975. All foreign links in this and other dubious projects like the Bombay Natural History Society's Bird Migration Studies etc. should also be ended. Simultaneously, honest—let me add also patriotic—screening should be properly done of whatever has emerged out of the projects in the past and currently. In this connection, I should invite your attention especially to the recommendations in paras 7.1.86—88 of the PAC Report."

This letter had also been followed up by another communication on 10 September 1975 (*vide* Appendix V), in reply to which the Prime Minister stated, *inter alia*, as follows in her letter dated 12 September, 1975 (Appendix V):

> "An important recommendation of the Committee is that there should be a nodal point in Government to examine these proposals from an overall national point of view. The Group of Ministers is looking into the details of the arrangements necessary to implement this recommendation."

6.1.4 On 8 October 1975, the Department of Health was again addressed by the Committee and requested to intimate the decision, if any, taken in regard to the setting up of a nodal point for the review and clearance of foreign-sponsored research projects. In their reply dated 6 November 1975*, the Department informed the Committee as follows:

> "The matter has been considered at the highest level and the decisions taken are:
>
> (a) The initial scrutiny and screening of research projects in the field of science and technology involving foreign collaboration by way of use of foreign personnel/money and exchange of the information/data should be done

*Not vettedin Audit.

by the Secretary of the Administrative department concerned, keeping in view factors like relevance of the project to our country, the expected national gain, the possible uses and abuses of the facilities to be given by us for the project, etc.

(b) Brief notes on such projects should be submitted to a high-level committee for final evaluation and clearance. The composition of this committee may be as follows:

(1) Cabinet Secretary—Chairman

(2) Scientific Adviser to the Minister of Defence.

(3) Secretary (Science and Technology).

(4) Secretary to the Administrative department concerned.

As regards research schemes financed out of PL-480 funds, though their number is large, their value both individually and in the aggregate is small. The amount does not exceed Rs. 2 crores. These schemes should first be screened by the Committee set up by the Department of Economic Affairs which examines the desirability or otherwise of posing such schemes for financing under PL-480 funds and determining their *inter se* priority. Thereafter, a copy of each of the schemes cleared by this committee may go to Scientific Adviser to the Minister of Defence, Secretary, Science and Technology and the Cabinet Secretary. The Committee mentioned above will consider these schemes and suggest which of them should be financed out of our own funds and which may be posed for financing out of PL-480 funds.

(c) Subject to the sensitive and security aspects being adequately taken care of there should be no hesitation in accepting foreign collaboration whether on a bilateral or multi-lateral basis if the national interests so require.

(d) The primary responsibility for examining the sensitive and security aspects should rest with the administrative ministry concerned and its technical advisers who must be fully involved in the scrutiny. The second sheck by the High-level Committee should be based on know-

ledge available to it from diverse sources to which the administrative ministry can ordinarily not be expected to have access. In cases of doubt, the High-level Committee should obtain the orders of the Political Affairs Committee.

(e) Meeting of the High Level Committee should be attended by the Technical Officers of the administrative ministry concerned also. The Committee may co-opt other members as necessary.

(f) Based on experience gained in screening the first few proposals, guidelines should be formulated by the High Level Committee to assist the Administrative ministries in examining the proposals from the security angle.

(g) A review of the functioning of the system should be undertaken at the end of six months. Care should be taken in the meanwhile to see that no bottlenecks develop."

6.1.5 The Committee note that Government have taken certain decisions aimed at ensuring a more careful evaluation and approval of projects in the field of science and technology involving foreign collaboration or participation, after the Report of the Committee had brought to light a number of deficiencies and drawbacks in the manner in which such projects had hitherto been scrutinised and approved. This is, however, only a beginning and the mechanism now evolved for reviewing research projects has to be refined and perfected on the basis of actual experience. The Committee wish godspeed to this evaluation machinery and would like to be apprised of the results of the review of the system to be undertaken at the end of six months. The proposed guidelines should also be evolved soon. During the interim period, when the system would be on trial, so to speak, its functioning should be constantly monitored by the proposed high-level committee and steps promptly taken to remedy deficiencies as soon as they are found.

6.1.6 The Committee note the stipulation that subject to the sensitive and security aspects being adequately taken care of, 'there should be no hesitation in accepting foreign collaboration whether on a bi-lateral or multi-lateral basis if the national interests so require'. The Committee concede that scientific work often requires international cooperation and some of the collaborative projects conducted

in India under the aegis of foreign sponsors have, perhaps, genuinely served the cause of national development. In the context of what their inquiry has revealed, the Committee, however, consider it imperative to urge Government to be particularly wary of collaborative research projects whose utility to India may be only speculative or at best potential in a long-term view. Situated as our country is, we must make sure that we do not unwittingly become victims of or abettors in crafty programmes with military significance conducted under the apparently innocent guise of developmental and basic research with foreign assistance. As already pointed out in paragraph 7.1.86 of the 167th Report (Fifth Lok Sabha), the scrutiny of the 'sensitive and security aspects' of research projects should not be viewed in a narrow formal sense, involving only military installations or military information, but more comprehensively, and with a special eye on their inter-connected connotations. The Committee reiterate this observation of theirs since the casual way in which the Defence Ministry had cleared the BNHS-MAPS collaborative study on bird migration on a 'technical point' is still fresh in their minds and a repetition of such episodes must be avoided.

6.1.7 Before accepting foreign collaboration in research projects, particularly those involving participation by foreign personnel, the possibility of conducting such research through our own scientists, who are as good as their compeers elsewhere, should be explored thoroughly. India today has a scientific and technological base of high quality. Some of our scientists are among the best anywhere, and our academies turn out an increasing number of eager, young scientists and technicians who, if only offered the requisite opportunity and resources, could perform wonders. The Committee stress this aspect particularly because of what has been characterised authoritatively as 'the continuing craze in our country for foreign collaboration'.

6.1.8 Foreign participation and personnel could, therefore, be inducted into our research projects only after the most careful scrutiny, and as the exception rather than the rule. The area of operations of foreign personnel should also be clearly defined and their activities strictly supervised. Scientific espionage in developing countries can be conducted in plausibly hidden ways, and thus it would be better to err on the side of abundant caution in this matter.

6.1.9 Where it is inevitable or unavoidable, the Committee would suggest that the evaluation machinery now set up for collaborative

research ventures should ensure the following:

(a) that such ventures are not only of potential value for the country but are of immediate, productive utility;

(b) that the objectives of the projects are clearly spelt out and the research plans are notified in advance so as to avoid any ambiguity;

(c) that the collaborating Indian agency or institution has personnel with the requisite qualification and equipment to concurrently evaluate and monitor the progress of the research;

(d) that the technical and administrative control of the projects and determination of policies vest only with the Indian agencies and personnel concerned;

(e) that all data and materials collected are shared with the Indian collaborators;

(f) that any kind of secrecy in the conduct of research is eschewed and that the results of the research are made public; and

(g) that all research is conducted in accordance not only with the country's own environmental standards but with international environmental standards as well.

Above all, as has so rightly been pointed out at the 25th Pugwash Conference on Science and World Affairs, when the results of the collaborative research can be commercially exploited, the right of our country to utilise the results first must be ensured. These guidelines, which suggest themselves immediately to the Committee are, however, only illustrative and not exhaustive and it would be necessary to constantly review their adequacy in the light of actual experience.

6.1.10 The Committee are of the view that Government should also evolve expeditiously a clear-cut policy in regard to foreign collaboration or participation in research projects in India which should be placed before Parliament as early as possible. The aforesaid high-level committee for the evaluation and clearance of research projects should undertake an objective and independent assessment of all such projects and should regulate and coordinate basic scientific research in consonance with the policy directives. The policy to be evolved in this regard should ensure that scientific and technological practices serve the national cause and contribute towards the identification of environmentally sound alternatives for the production and use of resources, goods and services.

6.1.11. While all these are largely measures for the future, the Committee find that Government's reply is silent on the action proposed to be taken in regard to another recommendation of theirs, namely, that once the nodal point is set up, it should also review all existing research projects of the types enumerated in paragraph 7.1.88 of their 167th Report. The Committee attach a great deal of importance to such a review and desire that this should be undertaken urgently in case the process has not already begun.

2. *General observations.* (*Paragraphs* 7.1.90 *to* 7.1.93—*Sl. Nos.* 90 *to* 93).

6.2.1 In paragraphs 7.1.90 to 7.1.93 of their 167th Report, the Committee had observed as follows:

> "7.1.90 The Committee would like to place on record their deep appreciation of the signal service rendered by Shri Raghavan, Editor-in-Chief and Dr. Jayaraman, Science Correspondent, Press Trust of India by drawing attention to the potential danger to the security and health of the country inherent in research projects carried out in the country in which foreign institutions, especially foreign military organisations, have evinced substantial interest. The Committee are happy to find that both Dr. Jayaraman, who wrote the article on foreign participation in research projects in India, and Shri Raghavan have displayed exemplary courage and dedication to the interests of the country in exposing the possible intentions of the collaborating agencies in these research projects, which are capable of causing havoc by their relentless work. The Committee have also been informed that it was Dr. Jayaraman who had written the article on the import of worm-infested hop plants, which had been examined by the Public Accounts Committee in their 136th Report (Fifth Lok Sabha), and brought into focus the defects in the licensing procedure for the import of plant materials."
>
> "7.1.91 Equally praiseworthy is the contribution of the 'Scientific Worker' who wrote the first article in the National Herald, in February 1972, on the Genetic Control of Mosquitoes Unit Project. The Committee congratulate the writer of this article also for his fearless reporting on issues which are vitally important to the country. The Committee also appreciate the foresight of the Editor of National Herald in allowing publication of such a vital information."

"7.1.92 What causes deep concern to the Committee is the alleged uncooperative attitude displayed by the Ministry of Health, Indian Council of Medical Research, Director of Malaria Eradication Programme and the representative of the World Health Organisation, Dr. Rajendra Pal, who considered the project 'sensitive to the Indian Press', towards the investigations of Dr. Jayaraman and their reluctance to give an opportunity to the Press Trust of India to clear their doubts and suspicions arising out of the information gathered by them on various research projects of doubtful utility conducted in the country under the aegis of foreign organisations. After an examination of the mass of material made available both by the Ministry and the Press Trust of India, the Committee find that Dr. Jayaraman's article was not a figment of his imagination, but the result of a pains-taking research and intensive study of authoritative published works, reports, etc. In fact, it is also significant that it was the publication of this article which set in motion the discussions on the subject in Parliament and galvanised the Government into action to evaluate the Genetic Control of Mosquitoes Unit Project and consider suitable safeguards."

"7.1.93 The Committee also note with interest the view expressed by Shri Raghavan that even after twenty eight years of independence, 'any person with a brown or black skin gets nowhere', but 'a white skin has an automatic entre.' If this is true, it is indeed a sad comment. The Committee are also surprised to find that while there had been a refusal to discuss the project with the Indian press, the Director General of the Indian Council of Medical Research had all the same talked to a correspondent of the 'Washington Post'. The Committee hope that all authorities concerned would extend proper cooperation to the Fourth Estate in such vital issues in future."

6.2.2 In their relevant Action Taken Notes dated 16th August, 1975 on the above observations of the Committee, the Department of Health have stated:

Paragraph 7.1.90

"No comments."

Paragraph 7.1.91.

"No comments."

Paragraph 7.1.92

"The research findings of the project were given wide circulation and are available to all scientists and journalists interested in the project. Several journalists visited the Unit and reported on it including Dr. K. S. Jayaraman who in 1973 published an article truthfully portraying the activities of the Unit in the field. On the 3rd May, 1974 at about 9.00 A.M. when Dr. Pal arrived at the office of the Project Leader (Dr. Brooks), Mr. Jayaraman, the press reported who had interviewed Dr. Brooks and Dr. Rajagopalan less than three months previously was waiting for him. He had made no appointment and Dr. Pal was due to leave for Geneva the same day. Nevertheless, all cooperation was extended to him in spite of the fact that Dr. Pal had an appointment with Dr. N. G. S. Raghavan at that time. Dr. Pal explained to Mr. Jayaraman that in WHO, press statements were normally issued by the Public Information Officer (PIO). Besides, the projects was under the ICMR and he should contact the Director General, ICMR, for any information he wanted. Dr. Pal then telephone the PIO/SEARO and the DG, ICMR. The P.I.O./SEARO was absent from the office that day, but Dr. Gopalan agreed to see the reporter straightaway. He was even provided transport to go to the ICMR headquarters.

Mr. Jayaraman met Dr. Gopalan and arrangements were made to organise a joint press conference under Dr. Gopalan's Chairmanship at 4.45 P.M. that day at the ICMR to be attended also by Dr. M. I. D. Sharma, Director, National Institute of Communicable Diseases, Dr. Brooks, WHO Project Leader, and Dr. Pal.

Dr. Gopalan welcomed Mr. Jayaraman and explained to him that neither Dr. Sharma nor Dr. Pal would be in a position to give a press statement as both had to have clearance from their respective organisations. He, however, said that he was free to give an interview as the ICMR was an autonomous body and he would be very glad to help him write an article on the genetic control unit. Dr. Gopalan then requested the reporter to give him a few more weeks as he had just taken over as Director General, ICMR, and had started to make a review of all the projects in which the ICMR was involved. Furthermore, a special issue of the Indian Journal of Communicable Diseases, giving the results of all investi-

gations carried out by the genetic control unit during the past four years was in press. Dr. Gopalan volunteered to answer any questions he might have after reading the special issue in consultation with WHO and NICD. Dr. Pal added that the PIO/SEARO and WHO/HQ would also be glad to assist him in every way.

The reporter replied that he wished to publish the article in the Sunday newspaper, *i.e.*, 5th May 1974. Dr. Gopalan of fered to go through the text to verify the facts and add the necessary information there and then, but the reporter replied that he could not show his article to anyone other than his editor. Dr. Gopalan again reiterated that the group would like to assist him in every possible way but Mr. Jayaraman apparently wanted to interview only for WHO Officers and not the DG. ICMR. The meeting ended at this point."

Paragraph 7.1.93

The facts are as follows:

"The Director General. Indian Council of Medical Research has very cordial relations with a number of Indian correspondents. When the correspondent from the *Washington Post* rang up the Director General. ICMR and enquired whether the setting up of the National Monitoring Body in connection with the Genetic Control Unit was not politically motivated, as Director General, ICMR and as an Indian. he had to rebut the allegation made by him. He told the correspondent that any Government would take legitimate safeguards and other governments would not perhaps have waited for so long. This statement was quoted in the article published in the *Washington Post*.

The fact that the Director General, Indian Council of Medical Research has in fact maintained cordial relations with many Indian correspondents will be obvious by the several instances of publication of his articles in the Indian Press."

6.2.3 The Committee prefer not to comment on the somewhat significant silence of Government in regard to the role in this inquiry of Indian journalists whose intrepidity and knowledgeability

have been of high patriotic merit, at a point of time, particularly, when the Prime Minister has come out strongly against the excessive reliance on foreign collaboration in our scientific and technological pursuits.

6.2.4 The Committee are glad to be informed that the Director General, ICMR and presumably also other high officials have 'very cordial relations with a number of Indian correspondents'. Shri Raghavan's anguish, however, is accounted for by such facts as that the 'Washington Post' could have the ear of Authority much more easily than the Indian press. The Committee trust that such discriminatory practices, perhaps, if any, will be sternly avoided.

6.25. The Committee have given very careful thought to the grave issues that came up before them as their inquiry proceeded, especially because of certain deeply disturbing implications of the subject which the country cannot just afford to ignore. It is gratifying that our scientific community appears well aware to the imperative need of the utmost vigilance against the garb of research being worn by ill-motivated foreign interests still avid for domination over countries like ours. The third Gharpure Oration by the Director, Virus Research Centre, Poona (Dr. N. P. Gupta), delivered on 27th January, 1976 at Haffkine Institute on 'Anthropodborne Virus Diseases in India', warns against the recent development by some countries of biological weapons against man, cattle and crops, through research on arboviruses, which 'can be used against countries with poorly developed health services' not only during war 'but also for subversion and destabilisation'. When scientists, devoted to precision and averse to hyperbole, are so profoundly stirred, it is the duty of Government to remain sternly on guard against every likely onslaught, even though remote and hypothetical, on our hard-earned freedom. The Committee trust that their earnestness on this subject will be concretely reciprocated by the adoption of whatever precautionary safeguards are called for.

NEW DELHI;
March 9, 1976
Phalguna 19, 1897 (S)

H. N. MUKERJEE,
Chairman,
Public Accounts Committee.

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APPENDIX I

Article on the GCMU Unit by Dr. N. Veeraraghavan which appeared in the September, 1975 issue of 'Science Today'

(*Vide* para 2.7.9)

WHO/ICMR UNIT ON GENETIC CONTROL OF MOSQUITOES

In India, as in many other tropical countries of the world, mosquitoes are agents of transmission (called vectors) of some important and widespread human diseases. Predominant among them are malaria (transmitted by several species of *Anopheles* mosquitoes), fialariasis (transmitted by culicine mosquitoes, chiefly *Culex fatigans* and *Mansonia uniforms*), dengue and chikungunya fevers (transmitted by *Aedes aegypti*). Other mosquito-borne viral diseases which occur in India are Japanese encephalitis, West Nile, etc.

The successful use of genetic control methods would greatly minimise the dependence on chemicals for control of insect vectors of diseases thereby reducing greatly at least one important source of environmental pollution which is among the great challenges of the modern world. Genetic control would help in overcoming the hazards posed by the development of insecticide-resistance in vectors.

The basic principle of genetic control of insects is to convert the insect itself into an "autocidal biological control agent", that is, an agent which, when present in the environment, becomes inimical to the propagation of its own kind. The promising lines of approach are:

(*i*) *Sterile male technique*: Large numbers of insects are reared in the laboratory. The males are sterilised by radiation or by chemicals and released in adequate numbers. When the sterile males mate with the wild females, they make them sterile for life.

(*ii*) *Cytoplasmic incompatibility*: Strains of insects from different regions are found to be mutually incompatible. When males of a strain incompatible to the local strain are released in sufficient numbers, they induce sterility in the local wild females.

(*iii*) *Chromosome translocation*: Insects can be irradiated and their chromosomes altered by breakage and recombination.

Strains developed with such translocations can mate with local strains and insect sterility in the wild population.

Other promising lines under development in the laboratory include such techniques as hybrid sterility, conditional lethal genes and gene replacement. Genetic control methods may be employed either to reduce or eliminate an existing population or to replace such a population or to replace such a population with strains which are not vectors.

The fundamental prerequisite to the use of any of these genetic approaches, however, is the basic understanding of the ecology and behaviour of the particular vector species. Then follows the technical development of procedures for mass rearing, sterilisation, release, manipulation of the genes, study of dynamics of the insect population, etc. It is, however, recognised that in their present stage of development genetic control offers the most promise when applied in conjunction with other methods.

The WHO/ICMR Unit on Genetic Control of Mosquitoes has been the largest and most comprehensive in the world and since its inception in 1969 has accomplished a great deal. The three species chosen for study were: (i) *Culex fatigans*, the ubiquitous nuisance mosquito of the sub-continent and the proven vector of filariasis in large parts of India; (ii) *Aedes aegypti*, the preeminently urban mosquito prevalent in most cities of India and the vector of dengue and chikungunya viruses; and (iii) *Anopheles stephensi*, one of the vectors of malaria in India, particularly in urban areas, which has become resistant to DDT and many other insecticides.

During the first four years, the Unit concentrated its work on *C. fatigans*. Among the important results are: standardisation of methods of mass rearing with a capacity to produce 3 to 5 million adult mosquitoes per week; perfection of methods of radiation sterilisation and chemo-sterilisation; standardisation of methods for separating male from female pupae; development of new genetic strains such as D3, a cytoplasmically incompatible strain, and IS-31B, an integrated strain with 100 per cent cytoplasmic incompatibility with respect to the Delhi Population and 65—70 per cent sterility of matings within the strain; studies in great depth on the habits of the mosquito species, particularly as regards population size, dispersal, etc.; conducting laboratory and cage experiments to determine feasibility of population suppression; and carrying out 12 large village-scale field experiments which showed that a high degree of sterility can be injected into the local mosquito population (except where massive infiltration occurs from outside, as seen near Delhi).

The studies on *A. aegypti,* in general, followed the same lines of investigation as those used with *C. fatigans.* These included studies on the ecology of *A. aegypti* in Sonepat; colonisation of the local Sonepat strain and standardisation of mass breeding techniques; development of $T_1 T_{,,}$ a double translocation heterozygote strain of *A. aegypti,* the progeny of which inherit either the T_1 or the T_3 translocation and are, therefore, 50 per cent sterile; development of a $D^1 T_1 T_3$ strain with Indian genetic background giving 62 per cent egg sterility and 13:1 sex ratio in favour of males.

The studies on *A. stephensi* included colonisation of *A. stephensi,* development of a method for the separation of pupae from larvae, and attempts to develop a genetic sexing technique helpful in separating males from females.

A mattter of priorities

There has been considerable criticism that the priorities of the Unit were misplaced. It should be realised that in any explanatory work of this nature, the availability of techniques for colonising, mass breeding, sterilisation, etc are not only important but decisive. These were available in respect of *C. fatigans* and *A. aegypti.*

Filaria is a serious problem in our country. Present estimates place the population at risk at 136 million, of which 51 million live in urban areas and 85 million in rural areas. Of the total, about 12 million carry miscrofilariae in their blood and 8 million have various types of disease manifestations. This is the reason why work on *C. fatigans* was started first and carried out for four years. Methods of mass breeding, chemo-sterilisation, sterilisation by irradiation,genetic manipulation, etc were intensively studied and village-scale release experiments were carried out. The difficulties like immigration likely to be encountered have been identified and the Unit is in a position to undertake population suppression experiments in urban areas.

One objection that has been raised is that the work has been done around Delhi where there is no filariasis. But the point is, studies undertaken so far were entirely entomological and exploratory in nature and were designed to evolve and standardise techniques. It was easier for them to be carried out at Delhi where all facilities existed. The Unit had selected different places in the country in filaria-endemic areas and was planning to start work there whn it was engulfed in the present controversy.

A. aegypti presents peculiar problems somewhat different from those of *C. fatigans*. Its flight range is extremely limited, its seasonal prevalence is most marked and its association with man is almost total. It is easy to mass breed in the laboratory and is readily amenable to genetic manipulation. For these reasons, it was considered most suited for experimental evaluation of techniques. Further, it is responsible for the transmission of dengue fever which of late has shown a tendency for haemorrhagic manifestations with considerable mortality.

When the Unit started in 1969, malaria was under control and the number of cases reported were relatively small compared with present figures. Nevertheless, the Unit, since its inception, has been continuously working on *A. stephensi* which is a vector for malaria in urban areas. The progress, however, has been slow because of the technical difficulties encountered in separating males from females. Also, the *Anopheles* mosquitoes responsible for rural malaria, which is our main problem, are difficult to colonsie in the laboratory. Now, in view of the resurgence of malaria in the country, work in this area is gaining top priority.

It is worth reiterating that the programmes and activities of the Unit in the beginning were entirely of a research nature. The aim of the Unit was to make careful observations by actually testing the methods under various conditions and against different species of mosquitoes and to evaluate results. There are obviously situations where genetic control cannot work, but it is equally obvious that it would be practical utility in certain others.

Thiotepa

There has been considerable discussion that thiotepa, the chemical used for sterilising the mosquitoes, is a carcinogen (causes cancer) and that it could pollute the environment and constitute a health hazard. The argument has been advanced that its use has been banned in the US and other Wetsern countries. This may not be a tenable argument as the use of DDT, which is also a mutagen, is banned in the US and other countries. But DDT is still being used extensively in our country and there are proposals to build new factories to augment its production and supply. Besides, in sterilisation with thiotepa, the male mosquitoes are treated with the minimum required concentration and are then washed thrice to remove the chemostrilant. To ensure that the washing has been done properly, the concentration of chemosterilant in the last washing is estimated. It has been found by liquid gas chromatography (a sensitive method of

analysis) that the residual amount of thiotepa on each treated mosquito is one-fourth of a millionth of a milligram. This obviously cannot constitute a serious hazard in a country using tons and tons of DDT and other insecticides.

It must be mentioned that the Unit has been trying to replace thiotepa by other less toxic chemosterilants and has already found one.

Geneic manipulation

The Unit has done extensive investigations in this field. It has developed the D_3 strain which is cytoplasmically incompatible with *C. fatigans* mosquitoes in the Delhi area as well as the integrated IS-31B strain with 100 per cent cytoplasmic incompatibility (with the Delhi population) and 65—70 per cent sterility of mating within the strain.

Release of the integrated strain in a largescale field trial was made for the first time in the genetic control of mosquitoes. Maximum levels of sterility of 50—68 per cent were achieved among egg rafts laid by wild females. There was evidence that the level of sterility accelerated the seasonal decline in the village population.

There is much published work indicating that genes can be selected in culicine mosquitoes which make them insusceptible to filaria. Efforts by the Unit to select such a strain have been inconclusive so far.

The Unit has established a double translocation heterozygote in *A. aegypti*, the progeny of which inherit either the T_1 or the T_2 translocation and are, therefore, 50 per cent sterile. They have also developed a DT_1D_3 strain with Indian genetic background giving 62 per cent egg sterility and 13:1 ratio in favour of males.

It has been argued that the use of cytoplasmically incompatible or translocated strains leads to the risk of introduction of alien strains with enhanced susceptibility to disease transmission. In this connection, it is worth emphasising that it was the policy of the Unit in the preparation of genetic strains for release from material of foreign origin, to backcross at least five times to the Indian strain. At each backcross, the proportion of foreign genes is approximately halved, so that at the end of the backcrossing programme, virtually all the chromosomal genes of the strain are of Indian origin. Numerous studies have shown that the susceptibility to pathogens is under the control of the chromosomal genes. Moreover, the translocations used in *C. fatigans* and the sex ratio distorter in *A. aegypti* are of the type which are passed from father to son and, therefore, do not enter the disease-transmitting sex.

The possibility that the vectorial capacity of the genetically manipulated mosquitoes (as judged by infection threshold and transmission potential) may be increased, resulting in a rapid spread of the infections which they ordinarily transmit, was discussed at length at the special meeting of geneticists, entomologists and virologists convened by the ICMR in October 1974 (in which Dr. C. G. Pandit participated). The consensus was that the danger, though remote, could be averted by prior testing of the gentically controlled mosquitoes proposed to be released for alterations in their vectoral capacity. The meeting also recommended the constitution of a Monitoring Body to continuously monitor the programme. The function of the Monitoring Body would be to ensure that no pathogenic bacteria, rickettsiae, viruses and fungi are present in the batches of mosquitoes to be released; to ensure that the genetically manipulated mosquitoes have not altered in their vectorial capacity; and to independently evaluate the results in the field.

During 1971—1973, thirteen field studies were carried out with radiation-sterilised, chemosterilised and genetically manipulated strains. The fact that no epidemic due to any of the pathogenic agents transmitted by these mosquitoes has occurred is proof that the Unit had taken adequate precautions and that the techniques employed were safe.

Sonepat experiment

Sonepat was selected for a largescale field experiment at it contained an isolated *A. aegypti* population very near Delhi where the Unit is situated and facilities for mass breeding of mosquitoes were available. The programme was to release mosquitoes about the middle of February when the *A. aegypti* population was minimal. The mosquitoes to be released were the local Sonepat strain. They were to be chemosterilised and where rot genetically manipulated. As a result, there was no danger of any alteration in their vectorial capacity. It was to be ensured that 99.8 per cent of them were males, which do not bite. The remaining 0.2 per cent of females were to be held in cages with the sterile males for a short period for mating to occur in order that they do not have any progeny after release. As is well known, it is only the female mosquitoes that bite and they mate only once in their life-time. This experiment, which was meticulously planned and on which the Unit had worked hard for over two years, would have been a classical one and given valuable data as to whether such a technique is feasible in our country. It had to be abandoned as it was felt that there was some scare among the public following reports in the press.

Biological warfare

It would be only natural to worry about the possibility of yellow fever virus, as well as viruses to which migratory birds are susceptible, being used in biological warfare. But the way to meet these possibilities is not by closing the Unit. It should be expanded into a Vector Control Research Centre which, in addition to mosquitoes, will cover all other vectors like ticks, mites, lice, etc. which are known to transmit diseases like Kyasanur Forest Disease (KFD), typhus fever, etc. which are all potential candidates for biological warfare. The Centre should study all these highly pathogenic agents in depth and understand methods which could be used for growing them in bulk, stepping up their virulence, adapting them to unnatural vectors, stabilising them and delivering them to target areas. Only when our workers have this knowledge will they be in a position to devise suitable measures to combat them if and when they are used.

Recently, a subtle suggestion has been circulating that research in genetics is dangerous and should not be undertaken by developing countries. It would be unfortunate if India fell into this line of thinking. There is urgent need for concentrated research on those aspects of genetics which will prove to be of immediate benefit to the country in the fields of agriculture and public health.

Another allegation that has been made is that the work of the Unit was shrouded in secrecy. This is not correct. The work of the Unit has been as open as that of any other established research unit in the country. It is documented in the annual reports which are submitted to the Indian Council of Medical Research regularly. The important results have been published in scientific periodicals in India and abroad. A special issue of the *Indian Journal of Communicable Diseases* was brought out in 1974 highlighting the work done by the Unit.

What about the allegation of too much foreign participation? Well, except for two foreigners, all the staff are Indian. The Unit has a band of dedicated entomologists and geneticists. In a short period of five years, they have accomplished a great deal. The quality of the work done by the Unit can be assessed by the fact that in the article entitled. "The operational feasibility of genetic methods for control of insects of medical and veterinary importance", published in the Annual Review of Entomology (1974), most of the examples cited throughout the text are from the work of the Unit. It is sad that the Unit which occupied such a preeminent place in innovative research and was buzzing with activity has becomme paralysed. The workers feel frustrated and what has hurt

them most is the implied suspicion that they could be serving as stooges in anti-national activity.

YELLOW FEVER, DENGUE AND AEDES AEGYPTI

The main criticism against the (GCM) Unit has been that its work might lead to the introduction of yellow fever in the country. The argument advanced was that the elimination of *A. aegypti* would lead to cessation in the transmission of dengue, and the consequent absence of antibodies against dengue might result in the susceptibility of the population to yellow fever.

Why India should be free from yellow fever has always been a subject of much speculation. The vulnerability of the Gujarat region, which has always had a sizeable maritime traffic with the East coast of Africa, to the introduction of yellow fever is well recognised. Also, preventive public health measures are almost non-existent. If, in spite of this, the disease has not visited India the reasons have to be sought elsewhere.

In this connection the speculations made by Dr. C. G. Pandit in the first Gharpure Memorial Oration are often quoted. Dr. Pandit is the doyen of virologists in the country and has been actively interested in the problem of yellow fever since 1940. The following are the relevant excerpts from his oration:

> "And finally, before I close, let me share with you another thought. Today, because of the danger of dengue fever epidemics, we are advocating eradication of *A. aegypti* mosquito from our midst. If we succeed, would be lose the umbrella of protection against yellow fever which we have today? It may be argued that in that case the danger of the introduction of yellow fever would also recede. It is, however, necessary to remember that we have *A. albopictus* and *A. vittatus* which are prevalent all over the country and transmit the infection. We have had no occasion also to examine the susceptibility of other species of mosquitoes to yellow fever infection. Let us also not forget that *C. fatigans* can assume the role of a transmitter of infection even though it is regarded as an inefficient vector...
>
> "Again, would control of dengue fever pave the way for emergence of other viral agents as originators of epidemics, *e.g.* Japanese Bencephalitis?
>
> "I have taken full advantage of the privileges associated with the delivery of an oration and have dealt with it philoso-

phically. I hope I have not given you the impression that I believe that the introduction of yellow fever in India is imminent ! I am not an alarmist. I have tried to be deliberately provocative to create an awareness about it."

It is worth examining his speculations put forward in 1971 in the light of recent work on yellow fever.

Sabin in 1952 was the first to suggest the possible interference between dengue fever virus and yellow fever because of a peculiarity in the epidemiology of yellow fever in that it had spared many parts of the world like India, Indonesia, etc. where dengue has been endemic. Theiler and Downs (1973) in their book. *The Arthropod-borne Viruses of Vertebrates* have discussed this problem at length. They found that when dengue-immune rhesus monkeys were infected with a highly virulent Asibi or French strain of yellow fever virus, the disease produced was greatly modified, the mortality was reduced and the titre of the circulating virus was markedly lower than that seen in the normal controls, both in animals that die and those that survive.

The authors also found that the protective action was particularly marked with West Nile antibodies and to a lesser extent with those against Japanese B encephalitis.

By the use of the Asibi-serum virus and the intraperitoneal inoculation of infant mice it has been shown in numerous experiments that the majority of human sera, immune to a variety of group B agents, has the capacity to neutralise yellow fever. In these studies. dengue immune sera from Trinidad, Jamaica, Puerto Rico, Tobago and Greece, all showed a market protective action. Ilheus immune sera from the Amazon, St. Louis immune sera from Jamaica, West Nile immune sera from Egypt and KFD (Kyasanur Forest Disease) immune sera from India likewise showed a protective action.

In an extension of these studies to other parts of the world, it has been shown that all human sera containing group B antibodies behave like dengue immune sera. Thus, sera containing Group B antibodies from West Africa, Tanzania, Malawi, Sudan, Egypt, India, Malayasia and Hong Kong are capable of neutralising yellow fever virus.

Theiler and Downs state: "The conclusion is inevitable that all group B virus infections in man lead to the development, to a

greater or lesser extent, of antibodies capable of neutralising yellow fever virus."

They have also made attempts to correlate the incidence of group B antibodies and the occurrence of epidemics of yellow fever. In the history of yellow fever in Trinidad during the present century. One fact that stands out is that no major epidemics occurred in Port of Spain, in spite of the fact that conditions seemed to be favourable and yellow fever was often introduced there. According to the classical theory of the epidemiology of urban yellow fever, Port of Spain should have suffered devastating epidemics. Yet, it has been found that 80 per cent of the population of Port of Spain was immune to dengue. It follows, therefore, that 80 per cent of the population likewise contained antibodies capable of neutralising yellow fever virus. The complete absence of epidemics of yellow fever in Port of Spain would indicate that in spite of the frequent introduction of yellow fever. the local *A. aegypti* mosquito rarely became infected.

The incidence of group B antibodies in West Africa is remarkably high. In many regions in Nigeria, the Cameroons, Ghana and Libya, the incidence approaches 100 per cent in the adult population. This may be the reason for the rarity of epidemics and the scarcity of fatal cases of yellow fever in the region.

A severe epidemic of yellow fever occurred in the south-western part of Ethiopia beginning late in 1960 and continuing into 1962. The mortality was very high and the epidemic was the most extensive and severe ever to be described in Africa. A large number of sera were received from the province of Kaffa where the epidemic was raging. Examination of the sera indicated clearly that in the Kaffa province, the other group B antibody besides yellow fever was only zika and that the incidence of the latter was low. Here thus was an epidemic of yellow fever in an African population virtually free from group B antibodies. Essentially the same serological findings were observed with human sera from Wallaga and Gambeta provinces.

However, in marked contrast to the above observations were the findings in the province of Ilubabar. This province in the western part of Ethiopia is contiguous to the Sudan. Of the 144 sera tested, 98 per cent had group B antibodies. In many, the highest titres were obtained with West Nile antigen, suggesting that West Nile virus was one of the group B antigens responsible for the antibodies. All 70 sera tested neutralised the West Nile virus in a

standard neutralisation test. These results are consistent with the hypothesis that infections with West Nile virus are highly prevalent in the Ilubabar district. It is important to note that in Ilubabar with a high group B antibody, predominantly due to West Nile virus infection, the epidemic failed to develop.

Based on these findings, Theiler and Downs conclude: "It seems a general law that any group B infection in man leads to the development of antibodies capable of neutralising yellow fever virus."

These experimental and field data indicate that not only antibodies against dengue but other group B arboviruses like Ilheus, West Nile, Japanese encephalitis could prevent infection, modify the severity of the disease and prevent its spread in a community.

Surveys have shown that in India, the incidence of antibodies against group B arboviruses like West Nile and Japanese encephalitis is as widely prevalent as those against dengue. In addition, it is well-known that all group B arbovirus infections produce lasting immunity. Based on these data it may be easy to answer Dr. Pandit's speculations.

Actually, elimination of A. aegypti is not likely to lead to the suppression of active transmission of dengue as A. albopictus has been shown to be an equally efficient vector of dengue. Theiler and Downs have found that antibodies against dengue persist for at least 30 years. Therefore, even if the active transmission of dengue ceases, the existing antibodies in the infected population will persist for a long time.

Even if we assume for a moment that the antibodies against dengue completely disappear, the widely prevalent antibodies against West Nile and Japanese encephalitis viruses, which are transmitted by culicine mosquitoes, will continue to protect the population against yellow fever. In this context, it is to be noted that the only group B virus present in Egypt is West Nile and antibodies against this virus are widely prevalent in the population. Egypt has always been free from yellow fever infection indicating the role of antibodies against West Nile virus.

For the same reason A. albopictus, A. vitattus, as well as C. fatigans, will not be able to spread the infection. Also, the antibodies against West Nile and dengue viruses will, in all likelihood, prevent the possibility of the spread of Japanese encephalitis.

It is well recognised that yellow fever is one of the vehicles for biological warfare. In case it should be introduced, it is unlikely to spread in the community for reasons given above. Even if it should, there is no need for panic as it should be possible to control it effectively by prompt mass vaccination and anti-aegpypti measures, which are the standard methods of fighting an epidemic of yellow fever. Fortunately, India produces yellow fever vaccine, and all that is required is to stockpile the vaccine.

APPENDIX II

News Agency Report dated 3 July 1975

(*Vide* para 2.8.11)

GCMU suspended, given New Name

The Genetic Control of Mosquito Unit (GCMU), wound up on Monday following withdrawal of the World Health Organisation (WHO) from the project, is to be continued under a new name, but in a state of suspense, pending the decision of the Government on the entire project.

This was disclosed here today by the Director-General of the Indian Council of Medical Research (ICMR) Dr. C. Gopalan.

During the interim period of "'suspension", the project will be called "the Vector Control Research Centre (VCRC) and will function in two parts, one in Delhi and another in Pondicherry. The laboratory division will be located in Delhi while the field station will be in Podicherry.

While the Government itself is yet to take a decision, the staff of the unit have all received orders transferring them to one or the other of the two divisions.

The Public Accounts Committee (PAC) of Parliament, after investigating the GCMU and some other foreign financed research projects, had recommended in a report on April 30 this year, that in view of the "far reacing implications of the GCMU project," the Government should appoint a commission of experts unconnected with the ICMR or the Health Ministry, "to enquire immediately into the working and objectives of the GCMU." The PAC said: "In the meantime the project should be held in abeyance," and that in any case the agreement with WHO "should not be renewed."

Dr. Gopalan clarified that continuance of the project under a new name was only an interim step to keep the project in suspense and continuance with the scientists pending a Government decision.

During the period of "suspense," the project would cost Rs. 100,000 a month.

After the PAC report, the WHO, which had been running the project in India, had announced that it was withdrawing from the project and handing it over to the ICMR. The project and all the assets were handed over to the ICMR on June 30.

Dr. Gopalan said the building and premises occupied were being returned to the owners. In order to accommodate the scientists during the interim period, research laboratory was being located in Delhi at the National Institute of Communicable diseases and the field station at Pondicherry.

This was, however, an interim step to keep the scientists employed pending Government decision, he said.

However, circular memorandum given to the staff on June 24 said that the Council (ICMR) "has decided to set up a Vector Control Research Centre with following two divisions from July 1, 1975 (1) a laboratory division and (2) a field division. The laboratory division will be temporarily located at the National Institute of Communicable Diseases, Delhi, but will be moved at a later date to Pondicherry. The field division will be stationed at Pondicherry."

APPENDIX III

Correspondence exchanged between the Chairman, Public Accounts Committee and the Minister of Health and Family Planning

(*vide* para 2.8.13)

(1)

Copy of letter dated 5th July, 1975 from the Chairman, Public Accounts Committee to the Minister of Health and Family Planning.

You will please recall that the Public Accounts Committee (1974-75) had enquired into some research projects and had raised a number of important issues affecting the health and security of the country, in their 167th Report (Fifth Lok Sabha).

In paragraph 7.1.67 of the Report, the Committee had, *inter alia*, recommended that the Government should appoint a Commission, consisting of experts drawn from various scientific fields, unconnected either with the Ministry of Health or the Indian Council of Medical Research to go immediately into the working of the GCMU Project The Committee had also recommended that pending the enquiry, the Project should be held in abeyance and, in any case, the agreement with the World Health Organisation which expires on 30th June, 1975. should not be renewed.

We had requested your Ministry to inform us of the decision, if any, taken by Government on the question of extension of the agreement with the World Health Organisation beyond 30th June, 1975 and the appointment of a Commission of Inquiry and we have been informed by your Additional Secretary, Shri Kartar Singh, in his D.O. letter No. G. 25015/4/75-PP&R dated the 25th June, 1975, that the question of appointing a Commission to enquire into the working of the GCMU Project, as recommended by the Committee, is at present under active consideration and that the Project has already been held in abeyance and the agreement with the World Health Organisation would lapse on the 30th June, 1975.

I am however, concerned to see reports in certain sections of the Press yesterday that the Genetic Control of Mosquitoes Unit, wound up on 30th June, 1975 following the withdrawal of the World Health Organisation from the Project, is to be continued under a new name,

Vector Control Research Centre (VCRC) which will function in two parts—one in Delhi and another in Pondicherry. It would, therefore, appear that taking advantage of the present confused political situation and the multitude of special pre-occupations of the Government, certain vested interests in the Health Ministry and the Indian Council of Medical Research are going ahead with plans to continue the activities of the GCMU, meanwhile creating a smoke-screen of compliance with the recommendations of the Public Accounts Committee. It would also appear that after the closure of the Sonepat Project became inevitable in the wake of the repeated criticism in the Press and the presentation of the PAC Report, some amount of window-dressing is perhaps being done by changing the name of the Project spliting it up into two or more units and dispersing them around the country, away, as it were, from the prying gaze of the capital's Press corps or the P.A.C. and Parliament. Perhaps the objectives, the aims and even the *modus vivendi* of the research would continue to be the same.

In the circumstances, I fear that such a step would not only be a deplorable attempt to bypass Parliament but would be a grave anti-patriotic proceeding, since what is seriously involved is the health and security of the people of this country. You will, I am sure, agree with me that until the objectives of the working of the Project are thoroughly investigated by a scientific commission of experts, the entire Project should be kept in abeyance as demanded by the Public Accounts Committee.

I shall be grateful if you would please look into this matter personally and inform the Committee of the present status of the Project so that the apprehensions caused by the Press reports are set at rest.

(2)

Copy of letter dated 18th July, 1975 from the Minister of Health and Family Planning to the Chairman, Public Accounts Committee

Thank you for your letter No. 2/1/14/6/74-PAC dated the 5th July 1975. At the outset, I want to assure you that I will be the last person to acquiesce in any scheme or project that will even remotely jeopardise the health of the people or the security of the nation. There is no question of any vested interest in the Health Ministry or in the Indian Council of Medical Research embarking on any venture which will not be in the interest of our national health programmes, and I am pained that you should even envisage such a possibility.

The GCMU Project has been held in abeyance after the agreement with the World Health Organisation ended on the 30th June, 1975. The Indian Council of Medical Research has taken over from the

WHO all the equipment, supplies and vehicles of the Unit as on 30th June 1975. The buildings and other premises rented by the Unit are being vacated. The services of about 80 employees of the Project have already been terminated. There are, however, still about 90 highly qualified and experienced scientific personnel of the Project who have acquired expertise in various research techniquest which, I think, we should not lose. Pending a final decision by the Government, the ICMR has decided to re-locate the remaining personnel, equipment and the supplies in two places where some accommodation at no extra cost is available, namely, the National Institute of Communicable Diseases at Delhi and the Jawaharlal Institute of Postgraduate Medical Education and Research at Pondicherry.

I can assure you that we have no intention whatsoever of bypassing the Parliament or the PAC. My sole desire is to ensure that the scientific talent in the country is not wasted and that maximum use is made of it and of the considerable quantity of sophisticated equipment available by employing them in the national interest. I am sure you will appreciate the position.

(3)

Copy of letter dated 29th July, 1975 from the Chairman, Public Accounts Committee to the Minister of Health and Family Planning

I write to thank you for your D.O. letter No. G-25015/4/75-PP&R, dated 18th July, 1975.

I know you are not the person ever to acquiesce in any scheme or project which will even remotely jeopardise the health of our people and the security of our country. I can understand, therefore, the feeling of being somewhat hurt which can be read between the lines in your letter. You are a sensitive person and even the hint of a serious allegation against your Ministry wounded you. Knowing you as I do, however, and claiming an elder's prerogative, I wish and am sure that especially as an intellectual in public life and in administrative authority, you will take an impersonal and yet nationally appropriate view of the complicated and challenging task of cleaning up the mess which the GCMU project has apparently run into. This is indeed why I have been writing to you personally and seeking prompt and effective action.

I am particularly anxious to know what has happened to the PAC recommendation re: appointment of a high level Committee (consisting of experts drawn from various scientific disciplines and unconnected either with the Health Ministry or the Indian Council of Medical Research) to make a thorough inquiry into the working and objective of the GCMU Projects and set at rest all doubts that have ari-

sen. Except for an interim reply from your Additional Secretary dated 25th June, 1975, we have heard nothing more about it. Please have this expedited and let us know.

I appreciate your anxiety to retain the services of some "90 highly qualified and experiences personnel" of the erstwhile GCMU Project. I presume you have taken every care to see that the project on which their talents are to be utilized would in no way be prejudicial to the health and security of the country and the expenditure on them would be commensurate with the research benefit to be derived. Some information on this issue will be welcome.

Your letter, besides, does not indicate the precise project on which the afore-mentioned personnel are to be employed, but if by any chance these or any other personnel on Govt's pay roll are going to be engaged in the setting up of Vector Control Research Centre, than I have to draw your pointed attention to the news which appeared widely in the Press on the subject on 4th July, 1975. I give a gist of these and the points that arise therefrom in an Annexure to this letter.

I am sure you would look into the matter personally and assure yourself and the Committee that the Vector Control Research Centre at Pondicherry would not come to be utilised now or in the future for the same objectives and aims as that of the erstwhile GCMU Project.

I am arranging to circulate the correspondence that we have exchanged on the subject to the Members of the Public Accounts Committee so that they are kept contemporaneously informed.

Annexure to letter dated 29th July, 1975 from the Chairman, Public Accounts Committee to the Minister of Health and Family Planning

I. *P.T.I. News Story which appeared in the Press on 4th July, 1975.*

1. It has been reported that Dr. C. Gopalan, Director General, ICMR, had disclosed that the GCMU, wound up on 30th June, 1975 following withdrawal of the World Health Organisation from the Project, was to be continued under a new name, but in a state of suspense, pending the decision of the Government on the entire project and that during the interim period of 'suspension' the project will be called the Vector Control Research Centre (VCRC) and will function in two parts, one in Delhi and another in Pondicherry.

2. While the laboratory division of the new project would be located in Delhi temporarily at the National Institute of Communicable Diseases but would be moved at a later date to Pondicherry, the field division will be stationed at Pondicherry.

3. While the Government itself is to take a decision in this regard, the staff of the unit have all received orders transferring them to one or other of the two divisions.

4. Dr. Gopalan is reported to have clarified that continuance of the GCMU Project under a new name was only an interim step to keep the project in suspense and continuance with the scientists pending a Government decision.

5. During the period of 'suspense', the project would cost Rs. 1 lakh a month.

II. Other Points

1. It is understood that the work plan of the Vector Control Research Centre was actually drawn up much before the P.A.C. Report was presented to Parliament on 30th April, 1975 by two consultants of the World Health Organisation (Dr. Brooks and Dr. Curtis) and that the new Centre had its genesis in the ICMR Governing Council Meeting held in November-December, 1974 and February-March, 1975.

2. It is also understood that though, theoretically, the ICMR has severed connections with the World Health Organisation for this work, the World Health Organisation has, however, made a provision of US Dollars 100,000 in its own budget to provide consultants to the VCRC and that while handling over the GCMU to the ICMR, had also written offering its consultancy services whenever the ICMR may require them. Perhaps, this is a veiled attempt to reestablish the old links with the passage of time.

3. It is learnt that when the P.A.C. was still investigating the GCMU Project, the GCMU had sent two of its experts (Dr. Brooks and Dr. Rajagopalan) on a tour of South India to select suitable centres there for field work etc. and that Pondicherry was one of the sites inspected and rejected by this team. In these circumstances, the reasons for establishing the field division of the new VCRC at Pondicherry are not clear and appear dubious, particularly in view of the fact that a number of U.S. consultants are reported to be already engaged in research activities in the Jawaharlal Nehru Institute of Postgraduate Medical Education and Research and in view also of the interest shown by the United states public Health Service in the activities of the erstwhile GCMU Project.

APPENDIX IV

A Note on the Organisation and Functions of Proposed "Vector Control Research Centre"

(*Vide* para 2.8.14)

From 1970 to 1973. WHO/ICMR Research unit on the Genetic control of mosquitoes carried out studies on the feasibility of genetic control of mosquitoes. In the course of these studies, the unit developed and perfected various techniques for large scale application of genetic control techniques for the control of *Culex fatigans* and Aedes aegypti mosquitoes and also conducted some valuable investigations on other related aspects. Limited work was also carried out on malaria vector. *A. Stephansi.*

As early as 1973 the ICMR had envisaged that on the expiry of the Agreement with WHO regarding the Genetic Control Unit in 1975 the staff trained therein should become the nucleus of a centre for research in vector genetics and biology and that such a centre should concentrate on studies on genetic and biological control methods (including hormones and phermones, etc.) against arthropods of medical importance.

It is eminently desirable that the expertise built in the Genetic Control Unit for a period of more than five years, is used to develop an integrated approach for control of vector of diseases, not only in humans but also in animals and plants so that excessive dependence on pesticides could be reduced. It will indeed be a pity to fritter away the valuable assets so far generated by the project, without following it to its logical conclusion in national interests. The promises and possibilities of genetic engineering are truly immense and the country should make full use of the fine inter disciplinary team which has been developed in the project.

It is in recognition of these considerations that at its annual meeting in 1973, the Scientific Advisory Board of the Indian Council of Medical Research expressed its appreciation of the work done by the Research Unit on Genetic Control of Mosquitoes. Recognising the great importance of these studies for developing alternatice methods of control of vectors of diseases, and with a view to lessen the dependence on the use of chemical insecticides, the Board approved in principle the proposal to establish an ICMR

unit for research on vector biology and genetics. In 1974, the Scientific Advisory Board recommended that the Genetic Control Unit could logically become the nucleus of a Vectors control Research Centre of the ICMR. The Governing Body of the Indian Council of Medical Research at its meeting held on 25th March, 1975 approved of this proposal.

The need for evolving a possible supplementary strategy to control mosquito-borne diseases has been engaging the attention of scientists not only in India but also abroad. The Government of India had set up a Task Force on Biological Control of Pests in 1972 and the report of the Task Force has emphasised the need for developing alternative strategies for the past control.

It is, therefore, proposed that the expertise gathered by the project on Genetic Control of Mosquitoes be used as a nucleus for the establishment of a Vector Control Research centre under the ICMR. The functions of this centre should be complementary and not a duplication of those of other institutes, such as the NICD, Delhi and VRC, Poona.

The proposed centre should take up research in a variety of biological and chemical vector control systems including genetic control, so that an integrated approach to vector control could become feasible. More attention should be given to biological control and the studies should include (i) predators (vertebrates and invertebrates), (ii) parasites (mainly Hymanopterous insects) and (iii) pathogens (fungi, nematodoa, protozoa, bactaria, rickettsial and viruses). It is further suggested that though in the initial stages, the main emphasis in the work may be on anopheles and culex mosquitoes, eventually the work in the centre should not be restricted only to mosquitoes (vector of malaria, filaria and arboviruses). It should also carry out studies for the control of other vectors of medical importance such as Phlebotomus spp. (vectors of sandfly fever, kala-azar and oriental sore) housefly and cockroaches (carriers of pathogenic organism of dysentery, typhoid and cholera etc.), and ticks and mites (vectors of protozoan, rickettsial, spirechaetal and viral infections of man and animals).

The Centre should concentrate mainly on basic research on these vectors and develop techniques for their effective control. The centre may also undertake pilot field trials in order to develop field techniques and to evaluate, under field conditions, the practical feasibility of approaches developed in the laboratories. However, large-scale field trials should be the responsibility of the NICD which has branches all over India and has the required know-how

and expertise for such operations. The staff of the VCRC should however be associated with all such large-scale field trials carried out by NICD as well. These recommendations are similar to those contained in the report of the "Task Force on Genetic and Biological control of Pests" (1973) constituted by the Government of India.

It will thus be clear that there should be the closest co-operation between the proposed VCRC and the NICD.

As the proposed studies to be taken up by the centre necessarily have to be long term and are of developmental nature, it would be in the fitness of things if the centre could be given the status of a permanent Centre of the I.C.M.R. on the pattern of existing ICMR Centres *viz.* Virus Research Centre, Poona, Cholera Research Centre, Calcutta, etc. This will enable the Centre to function uninterruptedly, efficiently and effectively. There are also several other advantages in such an arrangement. If the VCRC is to carry out work on the lines mentioned above then some of the sections will be field oriented and others laboratory oriented. Till such time as a building to house the proposed VCRC can be constructed in a suitable location, it will be desirable, on practical and administrative considerations that the field oriented sections, (designated as the field division) of the centre, are located at Pondicherry and the other sections, (designated as the laboratory division) are located at NICD. This will facilitate the laboratory division of the VCRC to have gainful collaboration with the various divisions of the NICD such as medical Entomology and the vector control zoonasis, Epidemiology, Microbiology, Biochemistry, Malaria and Filaria to develop control techniques for vectors of human diseases.

Most of the expertise required for various fields mentioned above can be met from the staff of the present Genetic Control Unit. Some senior officers of the Unit have worked in various fields earlier and with their vast experience they can easily switch on to the new but allied fields of research. Others can be retrained and some new staff can be recruited when required. However, some screening of the staff will have to be done keeping in view the proposed activities of the centre and those found clearly unsuitable for the programme may have to be retrenched and where necessary fresh staff recruited.

A Scientific Advisory Committee may be constituted to formulate the research programme and to periodically review the work of the centre. This arrangement will be in keeping with the policy

followed by ICMR with respect to its permanent institutes/centres. The Scientific Advisory Committee for this centre may consist of:—

1. Director General, ICMR—*Chairman.*
2. Dr. M. I. D. Sharma, *Director, N.I.C.D., Delhi.*
3. Dr. N. P. Gupta,—*Director, Virus Research Centre Poona.*
4. Dr. V. N. Rao,—*Director of Health Services, Andhra Pradesh.*
5. Gen. B. D. P. Rao,—*Officer-Commandant, Armed Forces Medical College, Poona.*
6. Director, Jawaharlal Institute of Post Graduate Medical Education and Research, Pondicherry.
7. Dr. M. K. K. Pillai,—*Reader in Zoology, University of Delhi (Entomologist).*
8. Dr. Sarat Chandra, *Prof. of Genetics, Institute of Science, Bangalore.*
9. Director,—Vector Control Research Centre.

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APPENDIX V

Correspondence exchanged between the Chairman, Public Accounts Committee and the Prime Minister of India

(*Vide* Paras 2.8.28 and 6.1.3)

Copy of the letter dated 3rd July, 1975 from the Chairman, Public Accounts Committee to the Prime Minister of India

I fear I have to intrude on your time urgently, though I know you have many major preoccupations.

In the Public Accounts Committee's 167th Report, laid on the Table of the House on April 30, 1975 ('Foreign Participation or Collaboration in Research Projects in India), I find the text of a letter to you dated 31st January, 1975 (p. 225), from Shri Jyotirmoy Bosu, then Chairman of the PAC, requesting "a thorough probe.....by the most competent intelligence agency at your command" into the extremely serious state of things which the P.A.C., with its limited resources, had been able to unravel. You will please refer back to this letter which, as far as I have been able to ascertain, remains unanswered. I learn also that communications to your Secretariat from some responsible pressmen on this issue have elicited no response.

Meanwhile you must have noticed how the said P.A.C. report has created commotion and anxiety in the country. Shri C. Raghavan, Editor-in-Chief, P.T.I., whom you know, and P.T.I's Science Correspondent, Dr. K. S. Jayaraman, had with courage and a sense of patriotic duty, told the public of nefarious goings-on in the name of research projects under cover of the World Health Organisation. Taking the cue from their revelations and investigating to the extent possible, the P.A.C. has produced a report which has roused not only widespread interest but also anxiety for our country's interests.

In the routine way P.A.C. will receive replies from Government on action taken or not taken about its recommendations, but that is a long process, and delay today might be dangerous.

I have heard a vague report that the Health Ministry has appointed a Committee to look into the matter. This, I regret to say, is the exact opposite of what Government should do. Before, and during

the P.A.C. investigation, the Health Ministry's role in this matter has been pitiful. It was either ignorant or negligent or both—in the circumstances, a truly serious default. Its spokesmen in Parliament and before the P.A.C. tried to whitewash things till it just could not be done. Being themselves somewhat in the dock, the Health Ministry cannot be trusted to deal with the complicated and dangerous points involved.

C. Raghavan himself has written on this issue in 'Mainstream' Weekly, 17th May, 1975. I have seen another capable journalist G. N. Acharya writing an agonised article in "BLITZ" (10th and 17th May, 1975). Many editorial comments and feature articles have appeared in other papers, "National Herald" and "Patriot" among them. By and large, Big Money newspapers have tried to turn a blind eye—for obvious reasons. But there is no doubt that the country is perturbed and there is real danger if things are allowed to drift.

Irrespective of any future decisions about the research schemes, the present G.C.M.U., run under the auspices of the I.C.M.R. by the W.H.O. and financed by the United States, should be ended when the agreement with the W.H.O. runs out on 30th June, 1975. All foreign links in this and other dubious projects like the Bombay Natural History Society's Bird Migration Studies etc. should also be ended. Simultaneously, honest—let me add also patriotic—screening should be properly done of whatever has emerged out of the projects in the past and currently. In this connection, I should invite your attention especially to the recommendations in paras 7.1.86-88 of the P.A.C. Report.

Let me earnestly ask you to appoint immediately a truly high-level investigation team to thrash out this matter. Several of your Ministries—External Affairs, Defence, Home, Finance, Agriculture apart from Health are involved. Parliament and its P.A.C. should not be made to wait and watch helplessly till routine answers come to the P.A.C. after months and are then examined and again reported on.

As the Health Ministry is directly implicated, I am having a copy of this letter sent to the Health Minister.

Copy of letter dated 10th September, 1975 from the Chairman, Public Accounts Committee to the Prime Minister of India.

I hate to intrude on your time when you have a million things to do, but it is a matter of principle that I wish you to set right.

On 3rd June, 1975, soon after taking over as Chairman of the Public Accounts Committee, I wrote you a letter requesting urgent deci-

sion on the recommendation (167th Report, "Foreign Participation or Collaboration in Research Projects in India") that a truly high-level and non-partisan inquiry should be held at once in the matter. There were a few other points also in the letter, but this was the main issue.

I had enclosed a copy of a letter to you from my predecessor in office who, even before the Report was presented to Parliament, had written to you to initiate such an inquiry. This letter actually appears in an appendix to the 167th Report of P.A.C.

Since then, I have had some correspondence with the Minister of Health and Family Planning, who was good enough to reply to my communication. P.A.C. Secretariat has also received some information from Government about action taken in regard to the Report. The matter of setting up the kind of inquiry wanted by P.A.C. is, I learn, under Government's consideration.

I am not happy about this, because I fear the issue is very serious and much avoidable delay has taken place. Anyway, it is for Government to decide, and it is not for me to lay down the line for it to follow. I wish only to communicate my disquiet that, perhaps in the overwhelming atmosphere of preoccupation, Government has found itself unable to act vigorously in this matter.

Apart from this, what worries me is the fact that successive Chairmen of P.A.C. have failed to elicit from you (or even your Secretariat) a reply (or even an acknowledgement) to letters sent. I can well understand the load you carry, but your *aides* should at least see to it that communications (at least from Parliamentary Committees) should be acknowledged, and to the extent possible, replied.

If I may slip in a personal note, this experience is one reason why I have found recently many things seething in my mind which I wanted to share with you but I have desisted.

Perhaps this is a trivial matter on which I should not have bothered you. But I would like to have the principle of the matter straightened out.

Copy of letter dated 12th September, 1975 from the Prime Minister, to the Chairman, Public Accounts Committee.

I have your letter dated September 10, 1975 regarding the Report of the P.A.C. on "Foreign Participation or collaboration in Research Projects in India." I had not read the Report when your letter of

June 3, 1975 arrived. That is why I asked the Health Minister to send a reply.

Since then Government has considered the Report carefully and a Group of Ministers, has been asked to look into this matter thoroughly with the help of a few eminent scientists unconnected with the earlier I.C.M.R. project.

An important recommendation of the Committee is that there should be a nodal point in Government to examine these proposals from an overall national point of view. The Group of Ministers is looking into the details of the arrangements necessary to implement this recommendation.

Copy of letter dated the 29th October, 1975 from the Chairman, Public Accounts Committee to the Prime Minister of India.

Please refer to your kind reply dated 12th September, 75 which came promptly to my letter of 10th September, 75, regarding the 167th Report of the P.A.C. ('Foreign Participation or Collaboration in Research Projects in India'). Incidentally, your observations yesterday before a scientific audience (which I read this morning) about our scientists having to be careful about foreign sponsoring, etc. were very heartening.

It is good to know from your reply that a group of Ministers has been asked to look into the Genetic Control of Mosquitoes Unit (GCMU) Project, with the help of a few eminent scientists unconnected with the earlier ICMR Scheme. I fear, however, that our Ministers are, for very good reason, overwhelmingly preoccupied, and perhaps it would have been better if you had entrusted the investigation to a Commission of experts with the assistance of military intelligence officials as the P.A.C. had recommended in para 7.1.67 of their report.

Let me hope, anyway, that the Group of Ministers would carefully examine all the implications of the subject and critically evaluate them at some depth. I say so because even a cursory study of the Report reveals ramifications that appear almost sinister and gives rise to not unwarranted suspicion of mala fide intentions at least on the part of some in authority.

Please ensure that the Group conducts a careful probe into three other projects also figuring prominently in the same P.A.C. Report. These are:—(i) the Bird Migration Studies conducted by Bombay Natural History Society in collaboration with the Migratory Animal Pathological Survey (MAPS) which is an admittedly military out-

fit of the United States of America and the Smithsonian Institution which, I learn, has also worked for the U.S. Army in identifying suitable areas for chemical and biological warfare tests; (ii) the WHO—sponsored Ultra Low Volume (ULV) spray experiments for urban malaria control being conducted at Jodhpur; and (iii) the PL—480 financed study on Microbial Insecticides at the G. B. Pant University of Agriculture & Technology, Pantnagar.

The WHO's role in forwarding to MAPS at SEATO head-quarters in Bangkok, reports of the Bombay Natural History Society's study that are not available in our country even today, has been extraordinary. You will see in the P.A.C.'s 167th Report (page 205) the BNHS's confession that they were sending blood samples and slides abroad and that it was "usually the last" they "hear of the material". Serious fears of misuse by foreign agencies of the results of experiments conducted here, with implications derogatory, even disastrous, to the security of this country and its ethical, internationalist stand in the world, have to be clearly dispelled.

I appreciate what you write in the third paragraph of your letter re: the setting up of a central nodal point in Government for screening and clearing foreign-sponsored or financed scientific schemes from an over-all national angle. This means acceptance in principle of one of the basic recommendations of the P.A.C. I trust there will be provision, without delay, for the most careful scrutiny of *all* Projects of scientific/technological connotation and of a sensitive nature promoted and/or participated in or financed by foreign agencies, either directly from sources abroad or indirectly through the instrumentality of our own organisations.

Let me end on a personal note. It warmed my heart the other day when I read in the newspapers that when the Australian broadcasting people had the temerity to ask you to give a "firm pledge" about the emergency not becoming a "permanent fixture", you sharply put them in their place by saying that you were "certainly not going to give a pledge to a foreign agency, a foreigner". It is the sort of thing that in an unhappy world, keeps me happy for some days.

APPENDIX VI

Conclusions and Recommendations

S. No.	Para No.	Ministry/Department concerned	Conclusions/Recommendations
(1)	(2)	(3)	(4)
1	1.1.7	Department of Health Ministry of Defence	The Committee are unhappy at the delay in intimating the final action taken by Government on some of their observations/recommendations contained in the 167th Report (Fifth Lok Sabha). The Committee's anxiety in this regard, deriving from the special significance and urgency of the subject, does not appear to have been shared by Government. This is evident from the fact that the final Action Taken Notes on the Committee's observations/recommendations contained in paragraphs 7.1.73, 7.1.75 and 7.1.76 of the 167th Report are yet to be furnished even after the lapse of nearly nine months and despite a specific request of the Committee that these Notes be furnished to them by 16 August, 1975. Even in the normal course, in accordance with the time schedule prescribed in this regard by the Committee in their 5th Report (Fourth Lok Sabha), these Notes were due at the latest by 30 October, 1975, it is a matter for concern that Government have not been able to adhere even to this routine schedule. The Committee emphasise the crucial im-

(1)	(2)	(3)	(4)
			portance of quick decisions on such essential matters as had been raised in their Report, and would urge Government to act accordingly.
2	1.1.8	Deptt. of Health	The Committee find, to begin with, that in regard to some of their observations, Government have remained content with just stating that they have 'no comments'. The Committee would like to presume that this implies acceptance of their observations by Government. The matter, however, cannot be left at that, since the Committee expect a positive and helpful reaction on the part of the administration. If their observations are not acceptable to Government, the reasons therefor should be made known to the Committee which could then have an opportunity to examine the position of Government. The Committee would, therefore, like to impress upon Government the need for a more purposeful approach towards their observations. The mere intimation of 'No comments', where positive action had been called for, renders virtually nugatory the entire purpose of parliamentary scrutiny on the basis of mutual exchange of facts and reasoned conclusions.
3	1.2.15	—do—	The Committee regret that the reply furnished by the Department of Health in response to their observations contained in paragraph 7.1.1 of the 167th Report (Fifth Lok Sabha) is not quite relevant to the basic issues raised by the Committee. The Com-

mittee, for instance, had felt that the Genetic Control of Mosquitoes Project, the bird migration and arbovirus studies at the Bombay Natural History Society, the Ultra Low Volume Spray experiments for Urban Malaria Control at Jodhpur, the Pantnagar Microbial Pesticides Project and some of the research projects undertaken in Calcutta and Narangwal in collaboration with the John Hopkins University set up a definite pattern and were closely linked with the collection of vital virological, epidemiological or ecological data, capable of use, in certain circumstances, against the security of the country and also of neighbouring countries. Apprehending that agencies of foreign governments, in some cases explicitly military agencies of these governments, or civilian institutions with known military connections had been conducting basic research, which could be of vital assistance to the development of biological and chemical warfare techniques, the Committee had expressed the view that the utility of some of these projects to India appeared to be doubtful or remotely potential. The Department of Health have maintained a surprising silence on these vital issues raised by the Committee and have confined themselves to a justification of the relevance of the Genetic Control of Mosquitoes Unit Project. If the silence of the Department implies an acceptance of the biological warfare implications of these research projects, the Committee would like the Department to make their intentions clear rather than adopting a clearly evasive approach towards specific and important issues pending determination. The Committee are unhappy with this peculiar attitude of the Department and would ask for a more categorical response to their carefully thought out observations.

(1)	(2)	(3)	(4)
4	1.2.16	Department of Health	The Committee find that the Department's attempt to justify the relevance of the Genetic Control of Mosquitoes Unit to the important public health programmes of the country amounts to little more than laboured extenuation. An impression is sought to be conveyed that the Genetic Control of Mosquitoes Unit was established with a view to evolving and adopting genetic methods for the control and eradication of filariasis, dengue and chikungunya, and utilising later the expertise and techniques developed by the Unit for controlling malaria through genetic control of the vector Anopheles stephansi. The Committee, however, find from the agreement entered into between the World Health Organisation and the Government of India for a Collaborative Research Project on the Genetic Control of Mosquitoes, that the control of any specific mosquito-borne disease had not been stated as an objective of the project.
5	1.2.17	—do—	As regards the claim of the Department of Health that the research on 'Culex fatigans' carried out by the Genetic Control of Mosquitoes Unit is of relevance to the National Filaria Control Programme, the Committee are of the view that expensive genetic methods for the control of the filarial vector are only of doubtful utility, especially when even the conventional methods of filaria control have failed to make any perceptible impact on the incidence of the disease, even after two decades of continued efforts under the National Filaria Control Programme. In this context, the Committee

consider it pertinent to draw attention to the significant observations of the Second Assessment Committee of the India Council of Medical Research, which had assessed the Filaria Control Programme after the GCMU came into existence, that 'in the present state of prevalence of filariasis in the country, the degree of insanitary condition that exist in most areas, the structure of health services in different States, the load of other urgent problems in the field of communicable diseases and the paucity of funds, the ideal of eradication of filariasis which requires continuous effort over a long period can only remain an ideal not to be reached in any foreseeable future', and that 'the only feasible method of control would be to reduce the transmission of infection by methods currently available and reduce the risk of infection to as minimum a level as practicable'. It is significant that the Committee had not even considered genetic methods as a possible alternative to combat the problem of filariasis.

6 1.2.18 —Ic—

Even in more recent times, in October 1974, during the discussions at a joint meeting of the Expert Committee on Virus and Arthropod Borne Diseases and geneticists from the Expert Committee on Human Genetics, Immunology and Allergy, an important consideration appears to have emerged that it was not intended to undertake genetic control measures immediately, especially with regard to the control of filariasis in the country. This Group had also stressed that the control of fiariasis would have to be based on an 'integrated approach', in which 'genetic control could conceivably be one aspect'. The observations of Dr. C. G. Pandit in the Sep-

(1)	(2)	(3)	(4)
			tember 1975 issue of 'Science Today' with specific reference to these discussions that 'it was doubtful if genetic methods for control of C. fatigans at this stage were even available for use or were feasible for a vast country like India', are also of relevance in this regard.
7	1.2.19	Department of Health	The preoccupation of the Indian Council of Medical Research with research on genetic control methods is extremely difficult to justify, particularly in the context of the inadequate attention being paid to an on-going national programme for the control of filaria which has now been in operation for two decades. As has been pointed out by the Committee in their 138th Report (Fifth Lok Sabha), even the extent and magnitude of the filariasis problem in the country are yet to be properly surveyed and assessed and the performance and achievements of the National Filaria Control Programme tell a sad tale of failures and setbacks. The Committee had also expressed their dissatisfaction with the 'perfunctory manner' in which a health programme of this importance had been treated. The financing of the National Programme appears to have run into difficulties and its implementation has been largely left to the limited resources and devices of the State Governments. The Second Assessment Committee has also drawn pointed attention to the importance of conducting epidemiological and immunological studies in the exoneration of the disease and the paucity of knowledge concerning the disease process itself. In these circumstances, the Committee are unable to appreciate the rationale for the assertion of the Department of Health of the relevance of the GCMU for

			filaria control, particularly when many basic questions relating to filariasis still remain unanswered.
8	1.2.20	—do—	The argument that the control of 'Aedes aegypti is of importance in the context of the outbreak of dengue in a 'sinister' form has already been discussed by the Committee in paragraph 7.1.34 of the 167th Report and the observations of the Committee contained therein still remain valid. Besides, the Committee's earlier apprehensions that the elimination of dengue might result also in the elimination of the protection at present available against yellow fever are still to be set at rest satisfactorily, as has been subsequently pointed out in Chapter II of this Report.
9	1.2.21	—do—	The other contention of the Department of Health that the knowledge and expertise gained from the research on 'Culex fatigans'. and 'Aedes aegypti' would be of considerable use in controlling malaria, particularly in the urban areas, through the genetic control of Anopheles stephansi (the malarial vector), is also not tenable, in view of the fact that the specific details of the work relating to 'Culex fatigans' or 'Aedes aegypti' cannot, as has been admitted during evidence tc 'ered before the Committee and also by the ICMR's own expert comi tees, be applied to another species.
10	1.2.22	—do—	Besides, as pointed out in paragraph 7.1.57 of the 167th Report, the applicability of the genetic method is limited, since it can work only against an isolated mosquito population. The limitations of genetic methods of vector control have also been succinctly

(1)	(2)	(3)	(4)
			expounded by Dr. G. Davidson, in his book on 'Genetic Control of Insect Pests' (1974), wherein he states: "Passing from small pilot project to large scale application is largely wandering into the realms of the unknown at this stage in the development of genetic control methods....To many people the extension of such techniques to the control of insects with a known high rate of increase is inconceivable, especially where such insects are spatially continuous over large areas."
11	1.2.23	Department of Health	All these observations and findings only serve to reinforce the earlier conclusion of the Committee that the utility of some of the foreign-sponsored projects, especially the Genetic Control of Mosquitoes Unit Project, seems to be doubtful and only very remotely potential. While the Committee are not unwilling to concede the importance of research efforts, the projects examined my them have revealed a rather casual attitude and indifference on the part of the authorities concerned towards foreign supported research in India and a number of deficiencies. The Committee would, therefore, reiterate the imperative need for the utmost care, caution and critical scrutiny before approving foreign sponsorship of research projects undertaken in India, particularly when such projects have military or quasi-military implications of an almost incalculable character.

12.	1.2.24	—do—	The Department of Health claim in their Action Taken Note on the Committee's observations contained in paragraph 7.1.2 of the 167th Report that the Genetic Control of Mosquitoes Unit was launched after due care and consideration in the best interest of the country, that it cannot be said to be hazardous to the nation's well-being, and that there was no lack of security-consciousness. It saddens the Committee to find that their deep anxiety about the paramount importance of the maximum caution, in the world of today, over the scrutiny of scientific projects with likely security implications has not been reciprocated. This was not the occasion for Government to take recourse, as it were, to special pleading in defence of what appears to the Committee to be indefensible. If, as claimed, due care had been taken while launching the GCMU Project, there should have been no reason for the ICMR's own Governing Body to emphasise, in November 1974, the need for procedural modifications in the agreement between the Government of India and the World Health Organisation, envisaging a closer direction and guidance of the project by the Indian Council of Medical Research. Similarly, the ICMR Expert Committee set up after the debate on the project in Parliament, on 30 July, 1974, had drawn attention to the inadequacy of the safety measures incorporated in the project and had stressed the need for taking into account the possibility, however remote, that genetic manipulation might result in strains of mosquitoes with increased competence to transmit other diseases, and for screening genetically manipulated strains with respect to their competence to transmit viruses considered by the Expert Com-

(1)	(2)	(3)	(4)
			mittee on Virus and Arthropod Borne Diseases to be of major importance and relevance and capable of posing public health hazards. Admittedly, as has been pointed out in paragraph 7.1.10 of the 167th Report, it was only after the publication of the 'Press Trust of India' article, followed by the discussion in Parliament and examination by the Public Accounts Committee that the Ministry of Health woke up to an awareness of the inadequacy of the existing administrative arrangements for the Project and set in motion a review of the technical and administrative control of the project by a Committee nominated for the purpose.
13.	1.2.25	Department of Health	Again, it is evident from the examination of the project by the Committee that while launching its programme against 'Aedes aegypti', no serious consideration appears to have been given by the Indian Council of Medical Research and the Health Ministry for more than three years to the warnings of Dr. C. G. Pandit on the possible dangers of eliminating dengue and to the question posed by him on the eradication of Aedes aegypti. The Committee expect that those who airily dismissed his forebodings as 'thoughts raised in a lecture' have now learnt better.
14.	1.2.26	—do—	The statement of the Department of Health that 'there was no lack of security consciousness' while launching the Genetic Control of Mosquitoes Unit Project does not appear to be borne out by the

			facts. During their examination of the Project, the Committee found no evidence to show that the Ministry of Health or the Indian Council of Medical Research had taken all pre-autions to prevent the possible misuse of the GCMU experiments. The yellow fever threat and the biological warfare implications of the Project which, significantly enough, have not been disputed by the Ministry, came to be realised by the Ministry only after the enquiry by the Committee had been set in motion and it was then that certain safeguards were proposed. The Committee are, therefore, unable to accept Government's somewhat bland plea in this regard.
15.	1.2.27	—do—	The 'careful scrutiny' of the projects and coordination between different wings of Government claimed to have been ensured by the Screening Committee of the Indian Council of Medical Research, is also unconvincing, in view of the fact that the Ministry of Health and the Indian Council of Medical Research were found, during evidence, ignorant of the work done in the field of genetic control by the Defence scientists who had reservations about the techniques of chemosterilisation and the use of cytoplasmic incompatible strains and translocated chromosome strains, till the Committee brought it to their notice during their examination of the GCMU Project.
16.	1.2.28	Department of Health Ministry of Defence	The lack of security consciousness in the Indian agencies involved in the initiation and approval of foreign-supported research in India is only too obvious in the BNHS-MAPS Bird Migration studies on which Government have maintained an inexplicable silence. Even

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			though the Bombay Natural History Society was collaborating with an avowedly military organisation of the United States Government and the military over-tones of the project were more direct and explicit, the scrutiny by the Defence Ministry of the collaboration was confined only to a 'technical' point, namely, whether the Project involved visits of Indian and foreign nationals to forward or sensitive areas. The Committee need hardly point out that it did not require more than ordinary commonsense to realise that, under the Mansfield amendment to Section 203 of the US Act on 'Military Appropriation for Research and Development', no wing of the US Department of Defence would be interested in research which did not have a direct and apparent relationship to a specific military function or operation. Yet, strangely enough, the military implications of the Bird Migration studies had not been recognised by the Defence Ministry. The Ministry had also not appreciated fully the apparent risk involved in approving projects routed through the Advance Research Projects Agency (ARPA) of the United States.
17.	1.2.29	Department of Health Ministry of Defence	The facts brought out by the Committee's enquiry clearly establish that the special vigilance, prudence and care normally expected in the scrutiny of foreign-sponsored scientific projects were sadly non-existent while some of the projects examined by the Committee were approved, and that the clearance of these projects had been left largely to routine bureaucratic devices. The Committee

			must, therefore, reiterate their earlier observations and would like to be informed of the nature and details of the 'careful scrutiny' and coordination claimed now to have been ensured by the various inter-Ministerial Screening Committees.
18.	2.2.5	Department of Health	The Committee are perturbed that Government is unwilling to concede that though the research on genetic control of mosquitoes was to be conducted in collaboration with the World Health Organisation, the ultimate control of the project vested neither with the Government of India nor the World Health Organisation but with an agency of the United States Government which had financed the project. No doubt, the World Health Organisation was the official sponsor of the project and had supplied the project leader and two of the professional staff, but the entire cost of the project had been allowed to be met by the National Communicable Diseases Centre of the United States Public Health Service, which, as a '*quid pro quo*', retained an exclusive power of veto over the appointment of the principal investigators of the project. The reply furnished by the Department of Health appears to the Committee to be no more than very special pleading on behalf of the World Health Organisation and is by no means clarificatory of misgivings evoked about the entire operation.
19.	2.2.8	—do—	The reply to the Committee's pointed observations in regard to the appointment of a national counterpart for the project for the genetic control of mosquitoes is once again, unfortunately, uncon-

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			vincing. It was clear during the evidence before the Committee, that the Director General of the Indian Council of Medical Research, who had been appointed as the Indian counterpart Project Administrator, knew little, if anything, about the genetic control project Dr. Ramachandra Rao, whose tenure as Officer on Special Duty in the ICMR had by then ended, had to be specially summoned to assist the Ministry in its evidence before the Committee. If, as stated by Government now, it was considered necessary to appoint an Officer on Special Duty to assist the Director General, already overburdened with 'multifarious duties', the Committee cannot appreciate why this arrangement was not continued after Dr. Ramachandra Rao severed his connections with the Indian Council of Medical Research.
20.	2.2.9	Department of Health	Besides, if as stated by the Department of Health, the Director General of the Indian Council of Medical Research, with his many preoccupations required the assistance of an Officer on Special Duty, it stands to reason that in a major and complex scientific research project such as the Genetic Control of Mosquitoes Unit, Government ought to have appointed an exclusive national counterpart for the project with knowledge and experience of the techniques sought to be employed in the project. The Committee fear that the Director General, as the administrative head of the collaborating Indian agency, was automatically installed as the national counterpart in

keeping with the normal conventions of Government in such matters without any serious examination of its implications. In these circumstances, the Committee reiterate their earlier observation that the Health Ministry had not been sufficiently mindful of the nature and implications of the Genetic Control of Mosquitoes Unit Project.

21. 2.2.12 —do— Though it has been claimed by the Department of Health that the project leaders were in fact appointed by the World Health Organisation with the concurrence of the Government of India, the Committee find that in the agreement entered into in this regard with the former, there was no provision for consultations with the Government of India on the question of appointment of the project leaders. Besides, if this had indeed been the position, there would have been no occasion for the Committee appointed to review the technical and administrative control of the project to recommend, in October 1974, that the project leader should be appointed with the specific approval of the Government of India. In any case, even if such a provision did exist, the National Communicable Diseases Centre of the USPHS would, it is clear, have had the final say on this question in terms of its agreement with the World Health Organisation.

22. 2.2.13 —do— The Committee also find that many of the foreign personnel inducted into the project were not merely assisting the Indian scientists in the GCMU but were determining and directing the Unit's policies and programmes. While the Committee concede that it might

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			have been necessary to rely on foreign experts in the initial phases of the project, they consider it strange that such experts should have been found necessary even as late as July 1974, despite the fact that most of the techniques and instruments in the GCMU had admittedly been developed by Indian scientists. It is also significant that though the Indian scientists had been entrusted with only a secondary role in the project on the ground that they did not have experience in genetic methods, only 10 out of the 37 consultants and temporary advisers, to the project were genetics. Again notwithstanding the fact that Indian entomologists are as good as their counterparts anywhere, as many as 11 foreign entomologists had been allowed to participate in the project. These are apparent anomalies which the Committee find difficult to reconcile.
23.	2.2.16	Department of Health	The Committee are concerned to observe a seeming reductance on the part of the Department of Health to reciprocate their anxiety over the administrative and technical arrangements for the GCMU Project. The Committee's observations in this regard had been made after duly considering the recommendations of the review committee set up under the auspices of the Indian Council of Medical Research. It is clear that there was obvious concern in the review Committee that the provision in the WHO-ICMR agreement regarding the consultative role of the national counterpart for assisting the project leader had not been hitherto taken seriously. This Com-

			mittee had also considered it necessary to suggest that the Indian involvement in the management of the project should be strengthened and that the provisions of the agreement be made more specific to remove any ambiguities. If, as has been claimed by the Department, the Director General of the Council had been receiving detailed monthly reports about the Unit and was 'keeping himself abreast' of the developments, the Committee see no reason for the review committee recommending, in October 1974, that he should be asked to request the Project Leader to forward to the ICMR a fortnightly or monthly report about the work done in the Unit and also to ensure that all communications in the nature of reports in regard to the research activities in the Unit are cleared by the Director General before general circulation or transmission to other agencies.
24	2.2.17	-do-	Despite all the protestations of the Department of Health, the evidence strongly suggests that the administrative and technical arrangements for the project left much to be desired and that the Director General of the Council had failed to exercise the authority vested in him for the overall control of the project. The Committee also find that the checks claimed to have been exercised by the Director General and by Dr. Ramachandra Rao through participation in the half-yearly meetings of the Technical Planning and Review Group were by no means significant. The Committee regret, thus, to have to reiterate their earlier observations in this regard.

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25	2.2.20	Department of Health	The Committee are far from satisfied with the response of the Department of Health to their specific query regarding the considerations that had weighed with the Department of Health in overlooking the very valid comments of the Director of the National Institute of Communicable Diseases that the authority for a constant, concurrent evaluation of the programme and an on-the-spot decision-making must vest in a local organisation. The reply of the Department is, unfortunately, vague and almost evasive. The Technical Planning Review Group, which met only once every six months, cannot by any means be considered an agency for a 'constant, concurrent evaluation' of the project. The fact remains that the day-to-day administration of the project had been largely left to the WHO Project Leader and all operational and technical responsibilities for the conduct of the project had remained only with the World Health Organisation. Peculiarly, the Project Leader in his turn was answerable to the National Communicable Diseases Centre of the US Public Health Service. The Committee are, therefore, unable to accept the reply now furnished and seek a more specific clarification in this regard.
26	2.3.3	-do-	The apparently lighthearted response of the Department of Health to the Committee's earlier observations on the involvement of the United States of America in the Genetic Control of Mosquitoes Unit Project aggravates the Committee's anxiety. While the Gov-

			ernment of India was not a signatory to the agreement signed by the World Health Organisation with the US authorities, the Committee consider it strange that the Department of Health had not even considered it fit to keep themselves abreast of the developments in this regard from time to time till the enquiry by the Committee was set in motion.
27	2.3.4	-do-	The Committee cannot accept the plea now put forth by the Department of Health that Government could hardly have any say in the financial arrangements that were being entered into by the World Health Organisation with other international agencies and governments. Since the research project was to be conducted on Indian soil and the agreement entered into between the Government of India and the World Health Organisation had also specified that the project would be supported from PL-480 funds to be provided by the Department of Health, Education and Welfare of the US Government, the Committee are of the view that the Government of India ought to have examined the implications of this arrangement, so as to ensure that it would not in any way be detrimental to the interests of the country. It is significant in this context that as early as 1968, the then Director of the National Institute of Communicable Diseases had pointedly observed, in his comments on the original project proposals, that 'the policy of funding of PL-480 funds need to be looked into'. Yet, the Department of Health appears to have remained blissfully unaware of the various amendments made to the agreement between the World Health Organisation and the US

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			Government as well as the execution of a fresh agreement as early as 20 June 1974, extending the effective period of the GCMU project upto 30 June 1978, on their own, without any consultations whatsoever with the Government of India. This is, in the Committee's view, a very strange way of exercising control over research projects in collaboration with foreign agencies.
28	2.3.5	Department of Health	It would appear from the evidence that the Department of Health was not as helpless in this matter as has been made out. As pointed out in paragraph 7.1.18 of the 167th Report, the Government of India had, in fact, been informed by the World Health Organisation on 23 December 1968 that the US Public Health Service had at that stage reserved funds only to support the first three years of work and that this communication at least should have set the Ministry thinking. The reply of the Department is, however, surprisingly silent on and quite irrelevant to the issues thus raised by the Committee. Immediate intimation of the specific action taken by the Director General, Health Services on receipt of the letter dated 28 December 1968 from the World Health Organisation is, therefore, required by the Committee. The other recommendation about fixation of responsibility for the lapse also remains unanswered and the Committee would like to know what action, if any, has been taken in this regard.
29	2.4.3	-do-	The Committee have carefully considered the elaborate explanation now offered by the Department of Health for selecting

			the Delhi area and Sonepat for preliminary field experiments on Culex fatigans and Aades aegypti, but the matter does not appear to be as simple as it is made out to be. It is difficult to understand why in the matter of site selection there was no consultation with other local institutions like the National Institute of Communicable Diseases, Virus Research Centre, etc., as had been suggested by the then Director, National Institute of Communicable Diseases, on the original proposal from the World Health Organisation, and no State Government other than that of Haryana had been addressed in this regard. The Committee have no intention of attributing 'mala fide to anyone, but they cannot appreciate the reluctance of the Department to agree to a principled investigation of the background to the selection of sites.
30	2.4.4	-do-	The Committee note that a high-powered committee appointed by the Government to inquire into the objectives and working of the Genetic Control of Mosquitoes Unit, in pursuance of another recommendation contained in paragraph 7.1.67 of their Report, has been asked to consider the recommendations and observations relating to the selection of Sonepat for the field release of mosquitoes under the project and make recommendations thereon. The Committee trust that this would be done adequately and its findings intimated to them early. The selection of the Delhi area for the field trials on Culex fatigans should also be looked into thoroughly by this independent agency.
31	2.5.7	-do-	The Committee are unable to appreciate the strange logic of the Department of Health justifying the use of a 'potentially

(1)	(2)	(3)	(4)
			dangerous' chemical, Thiotepa, in the field experiments of the GCMU. Merely because the chemical is prescribed as an anti-cancer drug in Indian hospitals, it does not follow that it can also be used indiscriminately in the environment, thereby exposing the population to a potential health hazard. The Committee find that the Drug Controller had approved the use of Thiotepa 'only as an anti-cancer drug' in an injectable form and that his approval had not been obtained for using the chemical in field trials in the villages around Delhi on the ground that the concentration of Thiotepa in mosquitoes released was 'very insignificant' and that the public health hazard involved was 'negligible or non-existent'. While the Committee concede that no *malafides* could, perhaps, be attributed for using the chemical in the GCMU experiments, the manner in which this question had been handled does give the Committee an impression that there was a sheer lack of prudence and genuine concern for the people and the environment
32	2.5.8	Department of Health	The Committee note from the Department's reply that no attempts had been made by the Unit to directly chemosterilise the wild mosquito population by releasing the chemosterilant in the environment and that the Unit had confined itself to the technique of releasing laboratory-reared chemosterilised insects, thereby minimising the risks involved. They, however, find from the minutes of the 8th Meeting of the Technical Planning and Review Group of the GCMU that, prior to the publication of the 'National Herald'

			article on 11 February 1972, all the field trials, where the chemosterilisation method had been employed, with the exception of the third experiment conducted in Dhulsiras village between 28 July and 30 August 1971, had been carried out not with adult mosquitoes chemosterilised in the laboratory but with pupae which were either placed directly in drains or in floating containers in the breeding wells or in containers hung one metre above the water surface. There was, thus, the danger of some contamination of the water by the mosquitoes emerging from the pupae and falling into the water. Such a possibility, however remote, should have been adequately safeguarded against. It was only after the dangers of this method were exposed by the 'National Herald', in February 1972, that the World Health Organisation set up an expert committee which cleared the use of Thiotepa but conceded the criticism by suggesting the release of adult mosquitoes instead of pupae.
33'	2.5.9	-do-	As regards the other contention of the Department of Health that at no time drinking water wells were used for the experiments but only disused irrigation wells, such a distinction, in the opinion of the Committee, is hardly valid in the Indian context. The average Indian peasant does not distinguish between irrigation wells and drinking water wells. It is not uncommon to find our peasants drawing water for drinking purposes from the irrigation channels and the so-called irrigation wells to quench their thirst while working in the fields. In these circumstances, the subtle distinction sought to be drawn by the Department of Health is far from convincing.

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34.	2.5.10	Department of Health	Yet another argument advanced by the Department of Health is that the concentration of Thiotepa in the adult Aedes aegypti mosquitoes released in the field was very insignificant, and in support of this much technical data have been produced. If the results of these studies, which significantly were undertaken only after the 'National Herald' exposure, were so conclusive as is now sought to be made out by the Department, the Committee see no reason for the Director General of the Indian Council of Medical Research raising doubts, as recently as in April 1974, about the possibility of environmental pollution by chemosterilised mosquitoes or for the Technical Planning and Review Group recommending that 'studies should be conducted on the persistence of thiotepa in Aedes aegypti'. It is also significant that whatever studies had been undertaken in this regard had been confined to Aedes aegypti whereas all the earlier field trials had been carried out with chemosterilised Culex fatigans. The Committee are, therefore, unable to accept the somewhat laboured explanation in this regard.
35.	2.5.11	-do-	It is distressing that while the United States Government had considered it fit to insist on special safeguards for the use of Thiotepa and other chemosterilants and to prescribe the specific approval of the Environmental Protection Agency as a pre-requisite for its use, neither the Department of Health nor the Indian Council

of Medical Research had paid adequate attention to the likely risks involved in permitting the use of Thiotepa in the GCMU experiments. The Committee understand that though Thiotepa had been used for chemosterilising mosquitoes in experiments in the United States, the thiotepa-treated mosquitoes were released not on the mainland but in Sea Horse Key, a small island off the coast of Florida, where the daily production was about 1,300 males. On the other hand, the Committee find that in one South Delhi experiment alone, an average of 150,000 to 300,000 chemosterilised males had been released daily in the village of Dhulsiras. Significantly, two GCMU scientists themselves had cautioned against the use of Thiotepa, and Dr. Laven, an outstanding scientist and a consultant to the GCMU, had labelled Thiotepa as 'potentially dangerous'.

36	2.5.12	—do—	The work done in this field by our own Defence scientists also raises serious doubts about the use of chemicals like Thiotepa, of which, the Department of Health, unfortunately, were ignorant. The contention that liaison on the research carried out in this sphere by the Defence scientists and the GCMU was maintained by the Director of the National Institute of Communicable Diseases as a member of the Scientific Advisory Committee, Armed Forces Medical Services as well as the Technical Planning and Review Group is, to say the least, entirely facile. If he did indeed maintain such a liaison, his ignorance before the Committee of what the Defence scientists had done in this field is inexplicable.

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37	2.5.13	Department of Health	The Committee are, therefore, unhappy that the Department of Health do not appear to appreciate that on this important issue the Committee as well as eminent scientific experts have felt grave apprehensions about the country's interest and wellbeing. Admittedly, no independent examination of the use of Thiotepa had taken place in the Health Ministry. The Committee cannot also understand the reasons for the Health Ministry's reluctance to accede to their request that this should be thoroughly examined in consultation with our Defence scientists and that till such time as the theories about the use of Thiotepa are adequately clarified, this dubious method of sterilisation of mosquitoes may be discontinued. Stressing the seriousness of the issue, the Committee reiterate their earlier recommendations and earnestly urge Government to shed all complacency and move spiritedly in this issue which vitally affects the health of our people and the self-respect of our country.
38	2.6.7	—do—	In regard to the Committee's apprehension, based on the evidence before them and other published scientific material, about the risks involved in the release of genetically manipulated strains of mosquitoes in the field, they have learnt that in the preparation of incompatible strains for release the policy of the GCMU had been to equip them with chromosomes of Indian origin. The Committee, however, find from the minutes of the 8th Meeting of the Technical Planning and Review Group, Part I (paragraph 2.10 of Annexure

			I) that strains of 'Aedes aegypti' suitable for field experiments were not produced locally but were obtained from the WHO International Reference Centre at Notre Dame (USA). In an article published in the June 1974, Special Issue of 'The Journal of Communicable Diseases' on Genetic Control of Mosquitoes, Dr. Ramachandra Rao himself had stated that 'two preliminary field experiments were undertaken in Delhi city to determine whether an alien genotype could be introduced into a natural local population'. The Committee also understand that the strain of 'Culex Fatigans' released in Delhi villages from March to June 1972 was also a foreign strain and that no back-crossing of the strain was done to replace the foreign genome by an Indian genome.
39	2.6.8	—do—	The Committee understand that the risk of the existing local strains of mosquitoes being replaced by more dangerous new strains with increased competence to transmit other diseases can be effectively guarded against if the vectoral capacity of the genetically manipulated mosquitoes in relation to infection threshold and transmission potential is determined. It appears, however, from the Report of the Joint Meeting of the Expert Committee on Virus and Arthropod Borne Diseases and Geneticists from the Expert Committee on Human Genetics, Immunology and Allergy convened on 16 October 1974, (reproduced in pages 51—58 of the 167th Report), that in the earlier experiments with genetically manipulated strains of 'Aedes aegypti', the Unit had only arranged testing of the strains with respect to their competence to transmit dengue and chikun-

(1)	(2)	(3)	(4)
			gunya viruses. It is only now that the Monitoring Body proposes to test the batches of mosquitoes to be released for the presence of bacterial, rickettisal, viral and fungal pathogens, and ensure that the vectoral capacity of the mosquitoes released are not altered before permitting their use in the field.
40	2.6.9	Department of Health	The Committee, therefore, fear that before these safeguards were decided upon, adequate attention had not been paid to this important question. Even if the possibility of such dangers was only 'remote', the Committee are of the view that before attempting to alter the environment by releasing alien strains of mosquitoes, the possible side-effects should have been examined in depth and all necessary safeguards taken in a scientific manner. That this was not done in an adequate measure is, indeed, regrettable.
41	2.6.10	—do—	The Committee would like to know whether at least after the October 1974 meeting of the Expert Committee the potential of the genetically manipulated strains to transmit other diseases has been determined scientifically. In the absence of a factual statement from the Department of Health that such a 'determination' was actually made by the Monitoring Body, the Committee's earlier fears remain valid.
42	2.7.4	—do—	The Committee find that the reply of Government conveys an impression that the Genetic Control of Mosquitoes Unit was establish-

ed with a view to evolving and adopting genetic methods for the control of dengue and chikungunya and utilising these techniques later for controlling malaria through the control of Anopheles stephansi. However, as pointed out in paragraph 1.2.16 of this Report, the control of any specific mosquitoborne disease had not been stated as an objective of the Genetic Control of Mosquitoes Unit in the WHO-Government of India agreement. Besides, the specific details of the work in the genetic field relating to Culex fatigans or Aedes aegypti cannot, admittedly, be applied to another species. It is, therefore, not clear to the Committee how the methods developed in the Aedes aegypti release experiments can be considered to be of relevance to the future release programmes of Anopheles stephansi.

43	2.7.5	—do—	While the Committee concede that the availability of techniques for colonising, mass breeding, sterilisation, etc. are important factors in determining the fields in which research could be profitably undertaken, the very fact that adequate research data on Anopheles stephansi was not available should have prompted the GCMU to pursue research on this species on a top-priority basis, particularly in the context of the recrudescence of malaria, which Government thought had 'disappeared', in many parts of the country. On the other hand, dengue had manifested itself in the country in a haemorrhagic form in Calcutta and Visakhapatnam in 1963 and 1964 after which the haemorrhagic manifestation had been observed only in 1968 and 1969 in a sporadic manner in Kanpur, Ajmer and Madras. In so far as control of Anopheles stephansi

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			is concerned, the Committee find that it was only in November 1973 that some 'administrative steps were initiated' even for the selection of a scientist for studies on the malarial mosquito and a decision taken in 1974 by the Planning and Review Group to place emphasis on this species in the research programme of the Unit. It appears, therefore, that work on Anopheles stephansi by the GCMU started effectively only in 1974. The other claim of the Department that research activities on malaria had not been neglected during the period when malaria began to resurge in every part of the country is also not convincing. If this was indeed the position, it is not clear why the Consultative Committee of Experts to determine alternative strategies under the National Malaria Eradication Programme was constrained to observe, as recently as in August 1974, that research in malaria and its various aspects had not received adequate attention in the preceding ten years.
44	2.7.6	Department of Health	The Committee would, therefore, reiterate their earlier observations on the preoccupation of the GCMU Project with the Aedes-aegypti species in preference to Anopheles stephansi. Government would do well to take serious notice of the recent resurgence of malaria in many parts of the country as a warning which underlines the Committee's apprehensions.
45	2.7.10	—do—	In the Committee's view, the detailed explanation now offered by the Department of Health on the hypotheses of Dr. C. G. Pandit

and Max Thieler that the elimination of dengue by eradicating Aedes aegypti might result in the loss of the natural protection provided against yellow fever, appears to be an oversimplification of the apprehensions of leading authorities on yellow fever. As recently as September 1975, Dr. C. G. Pandit has once again disputed some of these very theories in a rejoinder published in 'Science Today'. While it is true that scientific theories are capable of being interpreted in different ways and reconciliation between two scientific views is sometimes difficult, it is wiser, in research activities affecting the health and well-being of the people, to proceed with abundant care and caution rather than treating lightly the risks involved, howsoever remote they may appear to be.

46	2.7.11	—do—	It is evident that while launching the programme against Aedes aegypti, no serious consideration was given by the Health Ministry or the Indian Council of Medical Research for more than three years to the relevant questions posed by Dr. Pandit, questions which were dismissed in superior fashion as 'thoughts raised in a lecture'. Only recently has the Monitoring Body proposed to check the chemosterilised and irradiation sterilised mosquitoes for the presence of yellow fever antigen before their release. The Committee would urge Government to exercise more caution and restraint before venturing into fields which are still largely unknown and to make sure that all apprehensions and fears are satisfactorily resolved on a scientific basis. Till the issue of the possible harmful effects of the eradication of Aedes aegypti is settled after a free and open exchange of ideas and views in the scientific community,

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			the Committee consider it prudent to proceed particularly cautiously with the control of Aedes aegypti. Now that the GCMU Project has been kept in abeyance, pending an examination of the entire position by an expert body, this job should be taken on as a corollary.
47	2.8.5	Department of Health (Ministry of Defence)	It is distressing that the only response of the Government to some of the Committee's observations on the biological warfare implications of the mosquito dispersal studies, which were based on authoritative material published by reputed organisations like the Stockholm International Peace Research Institute, the United Nations and the US Congress House Committee on Foreign Affairs, is a non-committal silence. Even where some points are made by the Department of Health, they are not relevant to the basic issues raised by the Committee. If Government, by its silence, accepts the seriousness of the questions posed by the Committee, the Committee would at least like to have some assurance of action to follow.
48	2.8.6	—do—	It may be that some of the fears expressed by the Committee in this regard appear to critics of their report to be exaggerated. This is not, however, a matter which can be treated lightly and the Committee would like to be satisfied that no risk, howsoever remote, to the security of the country is involved in the research conducted by the Genetic Control of Mosquitoes Unit, and would

ask urgently for a more positive assurance that these studies would do no damage. Though it has been contended by the Department of Health that the value of the studies of Aedes aegypti dispersal and the data collected by the Unit for biological warfare is 'practically nil', the Committee find from authoritative published evidence that the connection between mosquito dispersal and biological warfare techniques is obvious. The earlier fears of the Committee are also reinforced by an article in the 'New Scientist' (9 October 1975) which cites a BW expert as stating that 'if one were intending a yellow fever attack on India, this information (collected by the GCMU) would be very useful'. The article further points out that the US Army, through the US Public Health Service, might have tried certain theoretical studies in India in this regard and that the Unit's data on the genetics and ecology of Aedes aegypti could be of biological warfare interest.

49	2.8.7	-do-	In the circumstances, the Committee would gravely urge Government to shed all complacency and examine the possible military overtones of the genetic control studies in a less inhibited manner. The Committee note that the knowledge that would be gained by the research project would be available not only to the US Government but to the entire scientific community of the world through information published by the Genetic Control of Mosquitoes Unit. A clear distinction will, however, have to be made between the publication of proper scientific research data and the access of foreign consultants and experts at the Unit to primary data which

(1)	(2)	(3)	(4)
			are 'sensitive' and, therefore, liable to misuse in wrong hands. The Committee are anxious to ensure that such primary data from research projects conducted in India are not freely made available to outsiders, as had happened, unfortunately, in the case of the GCMU project where, under the agreement with the US Government, valuable primary data on the ecology and behaviour of mosquitoes were passed on to the United States of America.
50	2.8.30	Department of Health 'Ministry of Defence	The Committee are unhappy that the Department of Health appears not to appreciate their anxiety over the links that have been found to exist between the United States Public Health Service and the US Biological Warfare Research Centre at Fort Detrick and the possible risks involved in our having allowed an unimpeded access to the former to the primary data on the ecology and behaviour of mosquitoes collected by the GCMU. The fears expressed earlier by the Committee that such data could be misused for feasibility studies on biological warfare techniques are reinforced by more recent information on the involvement of the United States Public Health Service with the Chemical and biological warfare research of the US Army. According to the 'New Scientist' article referred to earlier in this Report, the US Public Health Service is reported to have admitted that it was 'deeply involved' in the production of shellfish toxin for the Central Intelligence Agency. The article cites a 'New York Times' (September 18, 1975)

			report that John Blamphin, a spokesman of the US Public Health Service, while admitting before a Senate Committee that 'this would be an improper role for the Public Health Service in 1975', had, however, stated that 'at the time we (USPHS) were involved, national policy recognised the development chemical and biological weaponry and as a federal agency we had a role'.
51	2.8.31	o-	The said 'New Scientist' article also points out that the data on the genetics and ecology of Aedes aegypti collected by the Genetic Control Unit could be of biological warfare interest and observes: "Thus, it is not unreasonable to suggest that Ft. Detrick staff, finding out about PHS plans for mosquito work in India, might have suggested the inclusion of Aedes aegypti just to build up more data on one of its standardised agents. As the PHS had been co-operating with Detrick and encouraged military support of projects it was doing anyway, the PHS would surely have agreed to the addition of a small study such as this."
52	2.8.32	-do-	It would thus appear that the interest evinced by an agency of the US Government in the GCMU Project was by no means as innocuous and innocent as some might imagine. The Committee trust that Government would realise the position and its implications and not feel called upon to defend what might have been done without careful forethought.
53	2.8.33	Department of Health	The Committee are glad that the Department of Health has at least conceded that the benefits likely to accrue from the GCMU

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			Project were, to begin with, only potential. The Committee do not deny that the project, if properly conducted, may be of some practical utility at some distant date. A basic question, however, arises whether, in view of the apparent limitations of genetic control methods, a subject which has been discussed in some detail in the Committee's earlier Report, it would be advisable for a developing country like ours, with its inherent limitations, to expend its energies on this particular research which in any case has no immediately ascertainable benefits, while many more urgent problems remain to be tackled effectively. The Committee, are, therefore, of the view that it would be better to concentrate on our immediate requirements in the field of public health rather than placing an excessive emphasis on sophisticated research like genetic control methods which are best left to countries which can afford such experimentations.
54	2.8.34	Department of Health	The Committee note that in pursuance of their recommendation contained in paragraph 7.1.67 of the 167th Report, the agreement with the World Health Organisation, which expired on 30th June 1975, has not been renewed and that the GCMU Project has also been kept in abeyance. The Committee cannot, however, help expressing a feeling of disquiet over the establishment of another research agency, the Vector Control Research Centre, with its field unit located at Pondicherry, ostensibly to concentrate on studies on genetic and biological control methods against arthropods of medical importance

and the transfer of the Indian personnel and equipment of the erstwhile GCMU Project to this Centre. Though the Committee have been informed by Government that the Centre is 'a purely interim arrangement' pending a final decision on its future set-up, they find that detailed plans on its organisation and functions are already on the anvil and that the Centre had had its genesis as early as in 1973 as a possible extension of the GCMU studies. Apparently, the 'foreign experts' at the GCMU had also had some say in the location of the field operations connected with the Project. It is also seen from the proceedings of the 42nd Annual Meeting of the Governing Body of the Indian Council of Medical Research (25 March 1975) that the question of continuing the GCMU Project for a further period of three years had reached an advanced stage of consideration with the draft agreement to be entered into in this regard with the World Health Organisation being under examination and that it had been tentatively decided to shift the project to the Jawaharlal Institute of Post-graduate Medical Education and Research, Pondicherry, on the ground that most of the field operations connected with the project would be taking place around that region. Since many doubts regarding the GCMU Project have been raised earlier by the Committee, and a link appears to exist between the erstwhile GCMU and the newly-established Vector Control Research Centre, they would ask for a reassurance from Government that no potential dangers would be involved in the activities of the Vector Control Research Centre and that the Centre at Pondicherry would not come to be utilised now or in the future for the same objectives and aims as the erstwhile project.

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55	2.8.35	Department of Health	While the Committee appreciate Government's anxiety to utilise the services and experience of the Indian personnel of the erstwhile GCMU Project, they would like Government to take good care to ensure that the activities of the Vector Control Research Centre in which their talents are proposed to be utilised, would in no way be prejudicial to the health and security of the country and that the expenditure on the Centre would be commensurate with the research benefit to be derived. The Committee would like some clarification on this issue as well as on how these personnel are at present employed in the Centre pending Government's decision on the GCMU Project.
56	2.8.36	Department of Health Ministry of Defence	The Committee note that a group of Ministers who had been asked to 'look into' the GCMU Project has appointed a high-powered committee to examine the objectives and working of the Unit and related issues raised by the Committee in their earlier Report. While of the view that it would perhaps have been better if this investigation had been entrusted to a commission of experts with the assistance of officials of military intelligence as recommended by them in paragraph 7.1.67 of the 167th Report, the Committee hope that the group of Ministers, assisted by the high-powered committee, would examine thoroughly all the implications and military overtones of the project and adequately evaluate them at some depth so as to set at rest all doubts that have arisen. Even a limited scrutiny of the project by

			the Committee has disclosed almost sinister ramifications and given rise to suspicion which needs to be allayed. The Committee would urge the Group to complete its investigation very soon and apprise them of its outcome.
57	2.8.37	Department of Health Ministry of Defence Ministry of Agriculture	In view of the links between the various projects examined by them in their earlier Report, the Committee also consider it desirable that the Group conducts a careful probe into (i) the Bird Migration studies conducted by the Bombay Natural History Society in collaboration with the Migratory Animal Pathological Survey of the US Armed Forces Institute of Pathology and the Smithsonian Institution, (ii) the WHO-sponsored Ultra Low Volume Spray Experiments for urban malaria control at Jodhpur and (iii) the PL-480 financed study on Microbial Insecticides at the G. B. Pant University of Agriculture and Technology, Pantnagar which had also figured prominently in the Committee's examination. This is a task which, in the Committee's view, necessarily follows from' what the said Group has already undertaken.
58	3.2.3	Ministry of Agriculture	The Committee feel perturbed by the almost casual response of the Ministry of Agriculture. The reply now furnished is nothing more than a chronological narration of the financial arrangements for the bird migration studies and has little relevance to the Committee's analysis and observations on the collaboration of the Bombay Natural History Society with the Migratory Animal Pathological Survey of the United States Armed Forces Institute of Pathology, an

(1)	(2)	(3)	(4)
			avowedly military organisation, and the Smithsonian Institution, which is widely known to have worked for the US Army in identifying suitable areas for chemical and biological warfare tests.
59	3.2.4	Ministry of Agriculture Ministry of Education and Social Welfare Ministry of Defence	The Committee note that the collaboration project with the Migratory Animal Pathological Survey and the Smithsonian Institution had been approved by the Screening Committee of the Ministry of Education and Social Welfare which, according to the reply furnished by the Department of Health to the Committee's observations contained in paragraph 7.1.2 of the 167th Report, had been entrusted with the scrutiny of projects financed from PL-480 funds and undertaken by universities and educational institutions. It is not clear to the Committee how the Ministry of Education and Social Welfare had been considered the appropriate agency for according approval to a collaborative project with a foreign military organisation, especially when the collaborating Indian organisation was neither a university nor an educational institution. It is also significant that the Ministry of Defence which could have, perhaps, scrutinised the project a little more carefully, with reference particularly to the possible military implications, was not represented on this Committee, and even the scrutiny made by it had been confined only to a 'technical' point. All this helps to reinforce the Committee's fear that projects which could be hazardous to the nation's well-being had been approved with

only a desultory, routine assessment of their implications. The Committee would very much like to be informed in some detail of the nature of the scrutiny exercised by the aforesaid Screening Committee before the collaboration between the Bombay Natural History Society and the Migratory Animal Pathological Survey and the Smithsonian Institution was approved.

60	3.3.4	Department of Health	It is not clear to the Committee what the Department of Health seeks to convey by its laconic response of 'No comments' to some of their important observations relating to the military significance of the bird migration studies. While the Committee concede that the Department of Health, not being directly involved with these studies, has been placed in the anomalous position of having to answer for some other wing of Government, the Committee would have been able to appreciate it if the Department had at least reacted in a more positive manner to their observations and given some indication of the action, if any, that it proposed to take to safeguard against the possibility of such instances repeating themselves in scientific projects cleared by the agencies under its administrative control, especially in view of the fact that the research projects examined by the Committee apparently established a definite pattern. If, on the other hand, the absence of an adequate response signifies an acceptance of their observations, the Committee would like to be told so in categorical terms.

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61	3.3.5	Ministry of Defence	The 'intriguing alternative' of the military significance of the bird migration studies now suggested by a BW expert in the 9 October 1975 issue of 'New Scientist' that since the migratory birds flew over the suspected BW station and nuclear tests in the USSR, these birds might pick up organisms or radioactive particles that might reveal something about weapons tests serves only to fortify the deduction that the bird migration studies could conceivably be exploited by foreign governments possessing the requisite wherewithal, and to that extent confirms the Committee's earlier fears and doubts about the wide military implications of this project. The Committee, therefore, desire that the Ministry of Defence should immediately examine all the ramifications of the bird migration studies, with a view to ensuring that the country does not unwittingly become involved in the stratagems of foreign governments with their own motivations in the power political arena of the world today.
62	3.4.3	Department of Health Min. of Agriculture Min. of Defence	The Committee are distressed at the inadequate response of Government to the serious doubts raised by them in regard to collaborations on the Bird Migration Studies between the Bombay Natural History Society and the World Health Organisation. During evidence tendered before the Committee, it had been alleged that the World Health Organisation had sent four copies of the BNHS-WHO report on the bird migration studies to the Migratory Animal Patho-

logical Survey of the US Armed Forces Institute of Pathology, while the report had not even been available to Government of India's own Health Ministry and had posed a serious question whether the World Health Organisation had joined hands with the Bombay Natural History Society because of the US Army's interest in virus transport to India through migratory birds. Another allegation made was that though the Virus Research Centre, Poona had also collaborated in these studies, the papers relating to the research conducted on viruses of migratory birds had 'disappeared' with the Rockfeller scientists who had worked there. Admittedly, the ecto-parasites from birds submitted by the Bombay Natural History Society had only been identified by the Virus Centre at Poona and not tested. Since some of the allegations are extremely serious, the Committee would urge Government to investigate and take specific action. Since the Committee have been constrained to call Government's attitude somewhat casual in this matter, Government should also intimate early the action they have taken.

63	3.4.4	Min. of Education and Social Welfare	The Screening Committee of the Ministry of Education and Social Welfare had apparently 'approved' this collaborative venture between the Society and the World Health Organisation. The Committee feel that at least that Ministry should be in a position to explain whether they had considered any safeguards against the possible misuse of these studies and intimate accordingly to the Committee.

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64	3.5.3	Department of Health Min. of Agriculture Min. of Education and Social Welfare Min. of Defence	While the Committee can understand the inability of the Department of Health to furnish any comments on their observations in regard to the clearance given to the bird migration studies by another wing of Government, they would emphasise that there are valuable lessons to be gleaned from this incident by the Health Ministry also, in view of the fact that some of its own agencies appear to have entered into collaborations in biomedical research with foreign, particularly U.S., military organisations. Since no wing of the US Department of Defence would be interested in research which does not serve US military objectives, the Committee would urge the Department of Health, as well as other Government and quasi-Government organisations of the Government of India to be wary of such collaborative ventures, however innocuous and harmless they may appear. Projects of apparently scientific cooperation should not result in developing countries turning out to be the testing ground for new techniques and chemicals that bring no good either to them or to the world community. Happily, the Prime Minister herself in her recent address to the 25th Pugwash Conference on Science and World Affairs at Madras has sharply and powerfully pilloried the idea of countries like ours being treated as "guinea-pigs" in the name of collaborative scientific research.
65	3.5.4	Min. of Defence	The Committee are unhappy that the reply from the Ministry of Defence to some important observations of theirs is yet to be receiv-

			ed, even after the lapse of nearly nine months. The Defence Secretary himself had been requested on 13 May, 1975, to make available the relevant Action Taken Note by 16 August, 1975 at the latest. Three months are not a small stretch of time and the Committee are constrained to deplore this delay when serious issues required to be clarified promptly. The Ministry should explain to the Committee why such delay, detrimental to the country's interest, could have taken place.
66	3.5.7	Department of Health Ministry of Agriculture Min. of Education and Social Welfare Min. of Defence	The Committee are concerned over the tardy manner in which a fairly simple, though important, suggestion of theirs for tightening up the existing procedures for the scrutiny of scientific projects conducted in collaboration with foreign military or para military organisations, is being implemented. It should not be difficult for Government to initiate action on this recommendation. The Committee desire that this recommendation of theirs should be processed without further loss of time and the final action taken intimated within a month.
67	3.5.10	Ministry of Defence	The sheer passivity of the Ministry of Defence in meeting the desire of the Committee that it should review whether any risks were involved in approving scientific projects routed through the Advanced Research Projects Agency (ARPA) of the United States appears to the Committee to be not only untenable but positively disconcerting. Since ARPA, admittedly is responsible for the support of research projects with the US Department of Defence Funds,

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			which in turn, under the Mansfield Amendment, can be utilised only on projects having a direct and apparent relationship to a specific military function or operation, the Committee would again urge the Ministry of Defence to implement their recommendation immediately. Pending the completion of the review suggested, this arrangement should be held in abeyance, in case it has not already been done. The Committee would await a further precise report of the action taken in this regard.
68	3.6.3	Depa ment of Health Ministry of Agriculture Ministry of Defence	This is yet another brazen instance of failure to take action on the recommendations of the Committee. Though the military significance of the Bird Migration Studies is fairly obvious and it is evident that the entire project has been handled ineptly, if not worse, by the Indian authorities, concrete action is yet to be taken to investigate the project, in spite of much time having elapsed. What is more distressing is that the Public Accounts Committee and, through it, the Parliament are yet to be told what action Government propose to take in pursuance of the Committee's observations. The Committee gravely deplore this state of affairs and desire that the reasons for this delay should be investigated with a view to fixing responsibility.
69	3.7.4	—do—	The Committee find something of a contradiction in the reply now furnished by the President of the Bombay Natural History

			Society and what had been stated earlier by the Department of Health in regard to the testing of the ticks collected from the migratory birds by the Virus Research Centre, Poona. The Committee had been informed earlier that the studies conducted by the Virus Research Centre from 1959 to 1969 were largely connected only with the identification of the ectoparasites and that the ectoparasites had not been tested by the Centre. The Committee would like the discrepancy in the two replies to be reconciled and the correct position clarified, especially in view of the allegations that the papers relating to the research conducted on viruses of migratory birds had disappeared with the Rockefeller scientists who had worked at the Centre.
70	3.7.5	Department of Health Ministry of Agriculture	The reply of the Department of Health is also silent on the nature of the collaboration which the Committee wanted to know, between the Bombay Natural History Society and the Institute of Diseases with Natural Foci, Omsk, USSR. The Committee would like a specific reply in this regard.
71	4.1.3	Department of Health	The Committee presume that the Department's reply of 'No comments' implies an acceptance of the special significance of the ULV Spray Experiments at Jodhpur and of the study on Microbial Insecticides at Pantnagar in relation to the development of knowledge about biological warfare techniques. This needs to be clarified and confirmed.

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72	4.2.5	Department of Health	The Committee note that the ULV Spray trials for urban malaria control at Jodhpur had been carried out by the officials of the Government of Rajasthan under the supervision of an officer of the Directorate of the National Malaria Eradication Programme and that the effectiveness of the experiments was evaluated regularly. However, when the Committee asked for a critical scrutiny of the project, it was on account of its biological warfare overtones and a certain potentially perilous relationship among the different foreign-sponsored projects examined by them. Government should, therefore, find out the links that exist between the different scientific projects carried out in the country under the aegis of foreign sponsors and make sure that India's own scientific talent is not exploited to the detriment of the interests of the country. The various projects examined by the Committee have thus to be viewed in their entirety and not in isolation. The Committee, thus, would reiterate their earlier recommendation that the project should be scrutinised on a principled basis and in all its aspects. The Committee would also like to know how the primary data collected by the Unit have been used and whether the World Health Organisation had been given access to such data.
73	4.4.3	Ministry of Agriculture	The Committee are happy that the Department of Agricultural Research and Education have now woken up to some awareness of

			the conceivable risks in the Microbial Pesticides Project at Pant Nagar and agreed to the evalution of the project by a competent scientific committee. The Committee would like to know the detailed Terms of Reference of the evaluation committee and also if this Committee has commenced its work. The proposed evaluation should be completed and the findings intimated to the Committee without delay.
74	4.4.3	—do—	Incidentally, the Committee find that several other institutions are also conducting research on bacteria and protozoa as parasites for the biological control of agricultural pests. Though these studies have not been, according to the information furnished to the Committee earlier, financed by PL-840 funds, it is not unlikely that they may also have other foreign sponsors and collaborators. In view of the Committee's findings, even after a limited enquiry, it would be, in the Committee's view, desirable to evaluate these research projects also.
75	5.2.3	Department of Health Ministry of Defence	The Committee fear that the Office of Naval Research, Department of Navy, US Department of Defence, coming on to the scene to sponsor the PL-480 financed 'Human Studies on Differential Tissue' at the All India Institute of Medical Sciences, New Delhi gives rise to grave misgivings which need to be allayed. In this case, the studies were originally to be conducted in collaboration with Dr. Melvin Cohn of the Salk Institute for Biological Studies. California (USA) and subsequently, on account, allegedly, of 'lack of funds'

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			with various US Agencies, only the Office of Naval Research came forward to sponsor the study. It is significant that the initial proposal of the Indian Council of Medical Research for collaboration with Dr. Melvin Cohn had been approved by the Ministry of Health with the concurrence of Department of Economic Affairs, and though the US Embassy in New Delhi had been requested as early as October 1967 to process this scheme for assistance under PL-480 funds, it was only in January 1970, after more than two years had elapsed, that the plea of paucity of funds with other US agencies was put forth and an alternate sponsor offered by the US authorities. The Committee would insist that the sponsoring of a seemingly harmless bio-medical research project by a foreign and explicitly military agency cannot be countenanced unless over-riding reasons acceptable to a self-respecting country are clearly expounded. The Committee would like the Ministry of Defence, in particular, thoroughly to examine the implications of this project and intimate the result.
76	5.2.4	Ministry of Defence	The Committee find that the collaboration with the Office of Naval Research had been agreed to by the Government of India, in consultation, among others with the Ministry of Defence. In view of the rather unsavoury situation that arose out of inadequate scrutiny by the Ministry of Defence in the case of the Bird Migration Studies, where the scrutiny had been confined only to a 'technical point', the Commit-

			tee would very much like to know the nature and extent of the checks exercised by the Ministry in the present case and whether the project had been examined by the Ministry in all its aspects, with a view to ensuring that no security risks whatever were involved in the project.
77	5.2.6	Department of Health Ministry of Defence	While the collaboration with a known military organisation had at least been cleared by the Ministry of Defence in this case, the Committee are concerned to find that the 'Coordinated Study on Infectious Hepatitis in India', again sponsored by the Office of Naval Research, USA, does not appear to have been referred to the Ministry of Defence for clearance. This seems a serious anomaly and the Committee would like to be informed of the reasons for the deviation in this case.
78	5.2.6	Cabinet Secretariat Department of Health Ministry of Defence	The procedure followed in this case reinforces the Committee's earlier concern over the lack of firm security-consciousness in the Indian agencies involved in such projects and the absence of any explicit policy frame or uniform guidelines for approving collaborative projects sponsored by foreign agencies, particularly foreign military organisations. This is a thoroughly unsatisfactory state of affairs. Now that a high-level committee has been, at long last, constituted by Government to finally evaluate and approve research projects involving foreign collaboration, the Committee trust that there would be in future a greater alterness on the part of the authorities concerned.

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79	6.1.5	Cabinet Secretariat Ministry of Defence Min. of Science & Tecgy. Department of Health	The Committee note that Government have taken certain decisions aimed at ensuring a more careful evaluation and approval of projects in the field of science and technology involving foreign collaboration or participation, after the Report of the Committee had brought to light a number of deficiencies and drawbacks in the manner in which such projects had hitherto been scrutinised and approved. This is, however, only a beginning and the mechanism now evolved for reviewing research projects has to be refined and perfected on the basis of actual experience. The Committee wish godspeed to this evalution machinery and would like to be apprised of the results of the review of the system to be undertaken at the end of six months. The proposed guidelines should also be evolved soon. During the interim period, when the system would be on trial, so to speak, its functioning should be constantly monitored by the proposed high-level committee and steps promptly taken to remedy deficiencies as soon as they are found.
80	6.1.6	—do—	The Committee note the stipulation that subject to the sensitive and security aspects being adequately taken care of, 'there should be no hesitation in accepting foreign collaboration whether on a bi-lateral or multi-lateral basis if the national interests so require'. The Committee concede that scientific work often requires international cooperation and some of the collaborative projects conducted in India under the aegis of foreign sponsors have, perhaps, genuinely served

the cause of national development. In the context of what their inquiry has revealed, the Committee, however, consider it imperative to urge Government to be particularly wary of collaborative research projects whose utility to India may be only speculative or at best potential in a long-term view. Situated as our country is, we must make sure that we do not unwittingly become victims of or abettors in crafty programmes with military significance conducted under the apparently innocent guise of developmental and basic research with foreign assistance. As already pointed out in paragraph 7.1.86 of the 167th Report (Fifth Lok Sabha), the scrutiny of the 'sensitive and security aspects' of research projects should not be viewed in a narrow formal sense, involving only military installations or military information, but more comprehensively, and, with a special eye on their inter-connected connotations. The Committee reiterate this observation of theirs since the casual way in which the Defence Ministry had cleared the BNHS-MAFS collaborative study on bird migration on a 'technical point' is still fresh in their minds and a repetition of such episodes must be avoided.

81 6.1.7 —do— Before accepting foreign collaboration in research projects, particularly those involving participation by foreign personnel, the possibility of conducting such research through our own scientists, who are as good as their compeers elsewhere, should be explored thoroughly. India to day has a scientific and technological base of high quality. Some of our scientists are among the best anywhere, and our academies turn out an increasing number of eager, young scientists and technicians who, if only offered the requisite opportunity

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			and resources, could perform wonders. The Committee stress this aspect particularly because of what has been characterised authoritatively as 'the continuing craze in our country for foreign collaboration'.
82	6.1.8	Cabinet Secretaria Ministry of Defence Min. of Science & Tecgy Department of Health	Foreign participation and personnel could, therefore, be inducted into our research projects only after the most careful scrutiny, and as the exception rather than the rule. The area of operations of foreign personnel should also be clearly defined and their activities strictly supervised. Scientific esplonage in developing countries can be conducted in plausibly hidden ways, and thus it would be better to err on the side of abundant caution in this matter.
83	6.1.9	—do—	Where it is inevitable or unavoidable, the Committee would suggest that the evaluation machinery now set up for collaborative research ventures should ensure the following: (a) that such ventures are not only of potential value for the country but are of immediate, productive utility; (b) that the objectives of the projects are clearly spelt out and the research plans are notified in advance so as to avoid any ambiguity; (c) that the collaborating Indian agency or institution has personnel with the requisite qualification and equipment

to concurrently evaluate and monitor the progress of the research;

(d) that the technical and administrative control of the projects and determination of policies vest only with the Indian agencies and personnel concerned;

(e) that all data and materials collected are shared with the Indian collaborators;

(f) that any kind of secrecy in the conduct of research is eschewed and that the results of the research are made public; and

(g) that all research is conducted in accordance not only with the country's own environmental standards but with international environmental standards as well.

Above all, as has so rightly been pointed out at the 25th Pugwash Conference on Science and World Affairs, when the results of the collaborative research can be commercially exploited, the right of our country to utilise the results first must be ensured. These guidelines, which suggest themselves immediately to the Committee are, however, only illustrative and not exhaustive and it would be necessary to constantly review their adequacy in the light of actual experience.

84	6.1.10	—do—	The Committee are of the view that Government should also evolve expeditiously a clear-cut policy in regard to foreign collaboration or

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			participation in research projects in India which should be placed before Parliament as early as possible. The aforesaid high-level committee for the evaluation and clearance of research projects should undertake an objective and independent assessment of all such projects and should regulate and coordinate basic scientific research in consonance with the policy-directives. The policy to be evolved in this regard should ensure that scientific and technological practices serve the national cause and contribute towards the identification of environmentally sound alternatives for the production and use of resources, goods and services.
85	6.1.11	Cabinet Secretariat Ministry of Defence Min. of Science & Tecgy. Department of Health	While all these are largely measures for the future, the Committee find that Government's reply is silent on the action proposed to be taken in regard to another recommendation of theirs, namely, that once the nodal point is set up, it should also review all existing research projects of the types enumerated in paragraph 7.1.88 of their 167th Report. The Committee attach a great deal of importance to such a review and desire that this should be undertaken urgently in case the process has not already begun.
86	6.2.3	Department of Health	The Committee prefer not to comment on the somewhat significant silence of Government in regard to the role in this inquiry of Indian journalists whose intrepidity and knowledgeability have been of high patriotic merit, at a point of time, particularly, when

			the Prime Minister has come out strongly against the excessive reliance on foreign collaboration in our scientific and technological pursuits.
87	6.2.4	—do—	The Committee are glad to be informed that the Director General, ICMR and presumably also other high officials have 'very cordial relations with a number of Indian correspondents'. Shri Raghavan's anguish, however, is accounted for by such facts as that the '*Washington Post*' could have the ear of Authority much more easily than the Indian press. The Committee trust that such discriminatory practices, perhaps, if any, will be sternly avoided.
88	6.2.5	Cabinet Secretariat Department of Health Ministry of Defence	The Committee have given very careful thought to the grave issues that came up before them as their inquiry proceeded, especially because of certain deeply disturbing implications of the subject which the country cannot just afford to ignore. It is gratifying that our scientific community appears well awake to the imperative need of the utmost vigilance against the garb of research being worn by ill-motivated foreign interests still avid for domination over countries like ours. The third Gharpure Oration by the Director, Virus Research Centre, Poona (Dr. N. P. Gupta), delivered on 27 January 1976 at Haffkine Institute on 'Arthropod-borne Virus Diseases in India', warns against the recent development by some countries of biological weapons against man, cattle and crops, through research on arboviruses, which 'can be used against countries with poorly developed health services' not only during war 'but also for subver-

(1)	(2)	(3)	(4)
			sion and destabilisation'. When scientists, devoted to precision and averse to hyperbole, are so profoundly stirred, it is the duty of Government to remain sternly on guard against every likely onslaught, even though remote and hypothetical, on our hard-earned freedom. The Committee trust that their earnestness on this subject will be concretely reciprocated by the adoption of whatever precautionary safeguards are called for.

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