Establishing a Malaria Demonstration Control Program in IRAN

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A description of Iran, its flora and fauna, is included in the report prepared by Dr. Justin M. Andrews (pages 1-24). This report will, therefore, deal directly with the problems encountered in carrying out the objectives of the assignment, i.e., (A) the training of spray crew foremen; (B) the training of the technical field supervisor; (C) getting the residual spray program actually under way; and (D) securing the cooperation of other agencies in the nation-wide malaria control program.

A. Pezeshkiars Show Aptitude, Intelligence. In obtaining the first objective it was found that considerable delay was experienced in assembling the pezeshkiars (assistant doctors) who were called in from the ostans for training. These students drifted into Tehran over a period of 10 days. The delays were caused primarily by difficulties in communication and transportation. Once assembled the pezeshkiars showed a considerable degree of aptitude and intelligence in assimilating the material presented. They quickly grasped the basic material and after very short field experience demonstrated their ability not only to apply residual spray themselves but to supervise crews of fellow students in the spraying of relatively large areas. As part of the training, the class sprayed all the inhabited dwellings of three villages in the Tehran area. Given the transportation, the material, and equipment, it is believed that each of these men is fully capable of instructing and supervising one or two crews in residual spray operations.

To assist the trainees in their work the Communicable Disease Center publication "DDT Residual Spray Operations" was revised to make it applicable to the Iranian situation. This revised version was translated by members of the staff of the Ministry of Health and mimeographed for distribution to the training classes and to subsequent students.

The first class included 31 civilians and 10 officers of the Iranian Army.

After the termination of the classes the students returned to their original stations, in some cases driving trucks containing their necessary supplies. At these stations, under the direction of their health officer, they were to assemble crews consisting of other pezeshkiars whom they would train during the season's operations. By this means it is believed that by the end of the season 150 to 200 capable spray crew foremen will be available for next season's operations.

B. Ministry of Health Employee Trained for Leadership. In searching for a competent man to train as technical supervisor for all the projects during the current season, an employee of the Ministry of Health, Mr. Mirshab, was found to be directing residual spray operations in the Shahriar Valley, west of Tehran. The work being done by these crews was found to be of excellent quality; therefore, two of the new trainees were assigned to relieve Mr. Mirshab who was in turn ordered to report to Tehran for duty. On arrival, the details of assigning the transportation, obtaining orders for oil, DDT, and other materials and equipment were turned over to him. He was given further instruction in techniques of residual spray application with which he was not familiar, including the application of water-wettable DDT. Mr. Mirshab proved to be very reliable and to have considerable initiative and drive. He showed particular ability in supervising crews of pezeshkiars during spraying operations. Although the Ministry of Health had planned to send Mr. Mirshab to Rome for 3 months' training under Professor Missiroli, they were persuaded to defer such training until a later date in order that Mr. Mirshab

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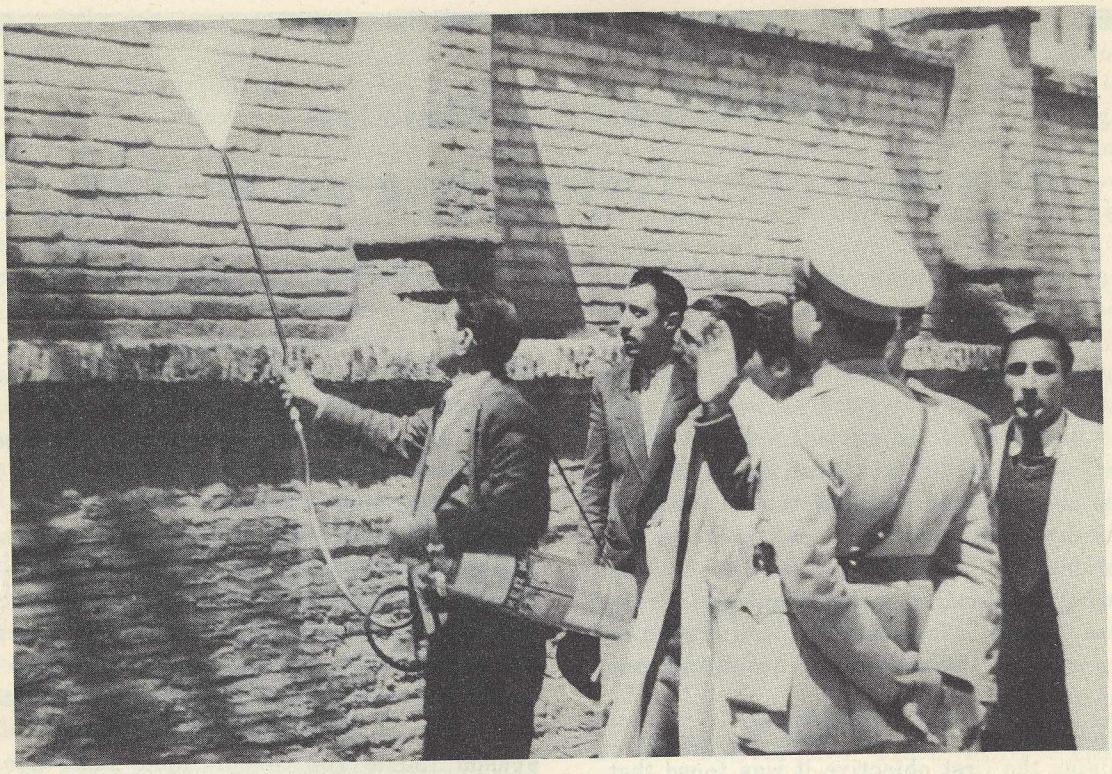

Spraying techniques are demonstrated to a class studying malaria control in Iran.

could be utilized in Iran during the 1949 spraying season. It is believed that Mr. Mirshab will carry out the duties adequately during the current year, but further training in this field should be made available to him as soon as possible.

C. Considerable Time Spent on Operational Plans. Dr. Andrews' report recommended that, before arrival of the undersigned, the necessary transportation, sprayers, DDT, and miscellaneous equipment and materials be distributed to the field. Operational areas were to have been selected early in the program by the Ostan Health Officers. It was found on arrival that only limited progress had been made toward these objectives. Therefore, considerable time was expended on making plans for operations and in setting in motion the necessary administrative machinery within the Ministry of Health to accomplish the desired objectives. Very little, however, had been accomplished by May 18, on which date the first class completed its training. Beginning on May 19, a committee composed of members of the staff of the Ministry of Health sat in almost continuous session until selection of areas of operation was made and distribution of necessary materials and equipment was determined. The areas tentatively selected for operations are shown in an accompanying map. Only through the concerted efforts of members of the staff of the Ministry was the distribution of these items to the respective regions finally accomplished.

On May 25, 1 week after the close of the first class of instruction, it was found that few or none of the trainees had returned to their official stations due to the fact that the necessary orders had not yet been issued nor had the trainees received pay for an extended period. Most of them were without sufficient funds to accomplish the required travel. These difficulties were finally resolved and many of the students returned to their stations driving vehicles containing equipment and material. The balance of the equipment and materials was sent by Levant express to the proper destinations.

Adequate vehicular transportation presented a very serious problem. Certain trucks and other vehicles normally were assigned to the Ostan Health Officers, but these were designated for other duties and great difficulty was encountered in securing their release for residual spraying activities. It was also found almost impossible to secure transportation for supervisory personnel.

The Ministry of Health purchased one new Ford pick-up truck for the use of the writer and other supervisory personnel. However, this vehicle was wrecked in a major accident shortly after purchase and no other transportation was available to take its place. The use of public transportation by air or rail was not wholly feasible inasmuch as local transportation was not available after arrival at the general scene of operations. As an illustration of the transportation difficulties, it was found necessary for the Ministry to hire a vehicle from a private source at a cost of approximately $100 to permit the writer to make a tour of inspection through the Caspian littoral, a trip of 2 days and less than 700 miles. As a partial solution to this problem, it was recommended to the Ministry that two one-quarter-ton Jeeps be recalled from field assignments, for use by Mr. Mirshab and his assistant in the supervision of field operations. Although travel by Jeep in Iran is difficult, it presents less difficulty than travel by any other means.

The wreck of the new Ford pick-up truck occurred just prior to the beginning of travel for the purpose of field supervision. In the wreck Mr. Mirshab, Colonel Shahin, and the driver were seriously injured. This accident prevented adequate early field supervision of the projects. However, at the time of departure of the writer, it was definitely known that active operations were under way in Shiraz, the Shahriar Valley, and Bandar-e-Abbas. Complete spraying of the city of Chalus on the Caspian had been completed and preparations were under way to continue the activity in the surrounding area. Activities in the Varamine Plain and in the Afghanistan area had been under way for some time under the capable direction of Mr. T. H. Noe of the Near East Foundation. Other planned projects would undoubtedly get under way before the recovery of Mr. Mirshab; and still others would begin operations as soon as this supervisor could reach the locality. All projects initiated to this date were conducted using DDT in kerosene (NAFT).

The Ministry of Health had received 400 hand sprayers during the past year. Of these, 150 had been placed in the field but records of distribution were not wholly adequate. Distribution of the remaining 250 was made on the basis of anticipated requirements. The sprayers were equipped with xylene-resistant hose, but some of the washers and gaskets were made of nonresistant rubber which quickly disintegrated. Supervisors and crew members provided ingenious replacements, frequently made of leather. The nozzles were of the disc type which wasted some material and provided a poor spray pattern even when slotted discs were substituted; but the nozzles were considered to be usable during the current season. No extra wands were available but high ceilings were successfully sprayed by fastening the nozzle, wand, and shut-off valve to a stick of sufficient length. Though operations were carried out by means of these expedients, efficiency was curtailed and materials wasted through lack of needed spare parts.

Sixty tons of water-wettable DDT and 100 special Lofstrand sprayers were reported to be in a port on the Persian Gulf, but these had not reached Tehran at the time of departure of the writer. Nevertheless, preparations were under way to initiate use of water-wettable DDT on a number of the projects as soon as possible. It was recommended to the Ministry of Health that sufficient sprayers and water-wettable DDT be supplied to spray 35 villages with 7,000 inhabitants on the Varamine Plain under the direction of the Near East Foundation. This project would be of short duration after which the equipment used would be diverted to other areas. It was also planned that water-wettable DDT with an appropriate number of sprayers be used to spray a maximum number of houses in the Caspian littoral.

Numerous problems were encountered in the use of DDT in kerosene, particularly the problem of transportation of the heavy weight and volume of the oil from the main roads to the habitations at a distance from vehicular roadways. For this and other reasons the use of water-wettable DDT in Iran, when available, appears very desirable; and its use was urged in succeeding seasons provided that it could be demonstrated that under Iranian conditions the water-wettable DDT was no less lethal to the malaria vector that the oil-carried DDT. To determine the answer to this important question during the current season the Ministry of Health, assisted by the American Embassy, initiated a request to the Department of State for the assignment of a trained medical entomologist.* It was anticipated that if the entomologist could reach Tehran by July 1 that at least a rough evaluation of the relative merits of the

*Dr. Dow reported in August 1949.

two systems might be completed during the current season.

D. Inter-Agency Cooperation. Cooperation of the other agencies was very satisfactory as is indicated in the following paragraphs.

WORLD HEALTH ORGANIZATION

On arrival it was found that Dr. Gramecia and Engineer Pavanello, representing the World Health Organization, were making a survey of the country to serve as the basis for a report to WHO on the advisability of sending malaria control personnel to that country during the 1950 malaria season. Dr. Gramecia and Mr. Pavanello in discussions stated that they would recommend that WHO put on a malaria control demonstration in a selected area. However, when the matter was discussed with Dr. Pampana in Geneva, he agreed that as a member he would recommend to the Expert Committee on Malaria that WHO provide an entomologist and a director of malaria control operations to assist the Iranian nation-wide program for malaria control during the season of 1950 rather than attempt to engage in a small-scale demonstration.

ROCKEFELLER FOUNDATION

The Rockefeller Foundation, represented in Tehran by Dr. Guy G. Hayes, offered very considerable assistance in the training activities and the establishment of the operating program. Dr. Bruce Wilson spent 1 week in Tehran during April, at which time he was contacted by members of the American Embassy with a request to supply a director of field operations to the malaria control program for a period of 2 or more years. Dr. Wilson indicated that the Foundation would take the matter under advisement and would supply such assistance as was possible.

Dr. Paul Russell of the Foundation arrived in Tehran on the date that the writer departed. Personal contacts, therefore, were not possible; but a report of activities was left for Dr. Russell, and it has been learned by letter since that date that he is inclined to recommend to the WHO Expert Committee on Malaria that considerable assistance be given to Iran. The extent of direct assistance by the Rockefeller Foundation in this program is doubtful inasmuch as the Foundation seems to believe that this problem lies within the province of the World Health Organization and it is therefore less likely to step into the picture.

THE NEAR EAST FOUNDATION

The Near East Foundation, represented in Iran by Mr. Theodore Noe, has been active in the field of malaria control in certain sections of Iran for the last several years. Using DDT and equipment supplied by the Minister of Health, Mr. Noe has done a considerable amount of residual DDT spraying in the villages of the Varamine Plain, near Tehran. This work has been very successful, and there has been considerable pressure on the part of the Royal Family for the Near East Foundation to expand its sphere of malaria control activities. While this Foundation has been most cooperative in attacking the problem, it cannot be expected to expand too far in this field, to the exclusion of its other interests. However, the Near East Foundation, at the request of the Ministry of Health, undertook to spray the habitations in the vicinity of Zabolin Ostan VIII, near the Afghanistan border, a successful operation and a definite accomplishment.

THE SEVEN-YEAR PLAN

Dr. Claire Turner was in Iran during part of the writer's visit, preparing the public health portion of the report by Overseas Consultants, Inc., on the Seven-Year Plan. This Plan, whose purposes and procedures are outlined in Dr. Andrews' report, represents a definite effort on the part of the Iranian Government to improve certain conditions within the country. While Dr. Turner's proposed report considered many phases of the public health problem, he verbally indicated to the writer that the report might recommend the employment of one top-flight sanitary engineer and ten junior sanitary engineers or sanitarians, one for each ostan. This proposal was approved by the writer in anticipation of the value that such personnel could be to the malaria program as well as to environmental sanitation activities in Iran. It was believed that such personnel could adequately operate a resid-spray program if they were available in the country. Personnel of Overseas Consultants, Inc. also cooperated extensively with the Ministry of Health in planning the malaria program. It is possible that funds made available under the Seven-Year Plan may contribute to or constitute the entire fund available for the malaria control program in future years.

MALARIA CONTROL RECOMMENDATIONS TO THE IMPERIAL IRANIAN GOVERNMENT

The following recommendations are made for the operation of a national program for malaria in Iran.

1. ORGANIZATION

Operations should be decentralized as far as is possible. As recommended in Dr. Andrews' report, the organization should be based on the work of the provincial health officer who should select the areas of operation, and assign personnel, equipment, and vehicles within the province. To assist these decentralized units there should be set up in Tehran a Malaria Control Unit staffed by a malariologist, a director of field operations, a medical entomologist, and subordinate personnel. The Malaria Control Unit should report, administratively, to the Minister of Health; but the Unit should have its own budget, its own appropriation, and should have complete authority to control its own personnel, equipment, and vehicles.

The duties of the Malaria Control Unit should be to assist the provincial health officer in delineating and measuring its malaria problem, and in selecting the areas of operation; procure, assign and deliver to the areas of operation sufficient quantities of vehicles, equipment, and materials; and to provide training and technical supervision to operational personnel.

2. TRAINING

Further training of malaria control personnel at all levels will be necessary through the years of operation of the program. The top-level men of the organization, that is, malariologists, engineers, and entomologists, should be sent, where possible, to Italy or the United States for further training in malaria control techniques. The work offered by Professor Missiroli in Rome is excellent for this purpose, and every attempt should be made to have all possible personnel receive this training some time during the early part of their employment on the malaria control program.

It is recommended that local malaria-control supervisors, that is, pezeshkiars and others who will work at the provincial level, be detailed to Mr. T. H. Noe of the Near East Foundation for a minimum of 6 weeks' and a maximum of 3 months' training in malaria-control spray techniques. Mr. Noe has indicated an entire willingness to undertake this training, and it is believed that advantage should be taken of the facilities and knowledge of employees of the Near East Foundation in this matter. Ministry employees could at the same time be given some basic foundation in environmental sanitation as it pertains to conditions in Iran.

Training classes should also be set up in each ostan at the beginning of each malaria season. Crew foremen and ostan supervisors should attend these classes where they should be given the latest information on spraying techniques and materials. Such classes should be conducted by the Director of Operations of the Malaria Control Unit and his staff. Any newly employed men should certainly attend such classes and those who have had previous experience should attend for refresher purposes.

After completion of the training classes in each ostan the crew foremen should return to their areas and train the necessary laborers. Since the labor turnover necessarily may be high, it is important that crew supervisors learn the techniques of training their laborers on the job. Since the techniques are quite simple and since supervision of the laborers can be quite close, this task should be easily accomplished.

3. EQUIPMENT AND MATERIALS

A certain number of vehicles must be made available to the Malaria Control Unit. These vehicles should be definitely assigned to this program, and though they might be used for other purposes during the non-malaria operations season, they must be under the direction of the Malaria Control Unit when required. In turn, the Malaria Control Unit must assign the required number of vehicles to the provincial health officer who should direct their use within the ostan. It is not satisfactory to requisition such vehicles from other programs when the need arises and and assign such surplus vehicles to the malaria program. It is suggested that Dr. Andrews' recommendations be followed as completely as possible and that heavy-duty vehicles be procured for the purpose of transportation of materials, equipment, and labor. Several lighter vehicles will be required for supervisory personnel, particularly at the Ministry level. Jeeps or Jeep Station Wagons should serve this purpose adequately. Since even

four-wheel drive vehicles cannot reach all the areas of operations, a certain number of animals will be required. It is suggested that a number of donkeys and other animals be obtained and assigned to these operations. Containers can be fastened easily to these animals for transportation of DDT and equipment from roadside depot to the scene of operations.

Adequate sprayers will be required for the operations. It is recommended that the best sprayers obtainable be procured. No money will be saved by the use of inferior or light-duty spraying equipment. In the event that water-wettable DDT is used, sprayers should have a large high-capacity filter screen incorporated in the sprayer unit to prevent constant clogging of the spray nozzle. For each sprayer it is recommended that at least one spare wand (tube) be ordered. It is frequently necessary to use two or more tubes on the sprayer in order to reach high ceilings and other inaccessible areas. An extra wand ordered for each sprayer will permit the necessary tube extensions and also will supply extra tubes to replace those damaged. Other spare parts for the sprayers such as gaskets, hose, washers, air-check valves, and others should be ordered in sufficient quanity to care for replacements during the season. It will be found to be false economy to use cheap disc-type nozzles with the spraying equipment. This type nozzle not only gives a poor spray pattern but wastes a considerable amount of the spray material. Therefore if the sprayers are originally equipped with this type nozzle, the nozzles should be discarded immediately and better nozzles substituted. It is recommended that Sprayings System Company or equal nozzles be used throughout the operation. Spare parts for these nozzles should also be ordered, specifically extra tips and filter screens. If water-wettable DDT is used, it is suggested that tips calibrated 8004 be used experimentally as compared with the 8002 tips. The former deliver twice the quantity and may be subject to less clogging, also permitting faster application of the material. In view of the anticipated high turn-over of labor, the 8004 nozzle tips might prove preferable since it would be better to obtain an excess application of material rather than too little.

It is recommended that during the coming spray season at least 1 percent of the DDT ordered be 90 percent water-wettable. This should be stored preferably in the Tehran warehouse and careful checks be made on its efficiency. If no difficulties are encountered in its use, further steps might be taken to use it more extensively in future years.

4. OPERATIONS

Spraying of DDT should not be undertaken during the winter months in Iran with the possible exception of the extreme southern part of the country. Exact dates should be specified by the malariologists and entomologists, but any pressure to continue spraying from the months of October through February should be discouraged.

If studies during the current season indicate that water-wettable DDT has at least equal toxicity with that of DDT in oil, water-wettable should be used as extensively as possible in the malaria control operations. While DDT in oil has several advantages, including that of fast knock-down, water-wettable DDT from the program-wide standpoint has too many advantages to be ignored, the principal advantage being comparative ease of transport. A laborer can carry easily all the water-wettable DDT that he can spray in 1 day's time. Water, while at a premium at many points in Iran, is at least equally as available as oil. Mixing can be accomplished in the spray can itself or, if preferred, in an extremely light 5-gallon tin can. Therefore, a spray crew can be entirely mobile and can walk from its supply depot to the scene of the day's operations if necessary. Where practical, the crew should be carried as near its objective as possible in a motor vehicle and then it can complete, with or without pack animals, the journey on foot. At the end of the day the motor vehicle should pick up the crewmen at a designated point and return them to their depot. Using water-wettable DDT, each member of the crew can carry a sprayer and a container of the insecticide. If desired, one member of the crew can also carry a mixing can, but in many instances adequate containers can be found at the scene of operations. Oil-carried DDT, in contrast, requires large volumes and weights of oil. While oil is available from many points of distribution throughout the country, a very severe problem, nevertheless, is encountered in attempting to move the necessary volume and weight of oil from accessible points on the roads to the more remote areas of spray operation. Furthermore, oil is a valuable property and is subject to pilferage as well as evaporation and shrinkage. For these

reasons and many others, the use of water-wettable DDT is strongly urged provided it is determined that it has the necessary toxicity under Iranian conditions.

Protection of the nomadic tribesmen of the country presents a problem difficult of solution inasmuch as they live the majority of the year in tents of cloth and skins. When the program has progressed to a point where the solution of this problem can be undertaken, it is suggested that the use of DDT with a sticking agent be explored. Several formulas for the use of such a sticking agent are available currently. At the time of use the best of these should be determined and applied to the tents of the tribesmen. Evaluation of the results should be made by the entomologists and malariologists.

A somewhat similar problem may be encountered in areas where the population sleeps on the roofs of the dwellings at night. Similar situations have been found in other countries and in some instances it has been found that adequate control of malaria has been obtained by the residual spraying of the surfaces inside the dwellings, even though the inhabitants sleep on the roofs at night. Where such a situation occurs in Iran the interiors of the dwellings should be sprayed in a manner similar to that done in the rest of the country, and the results carefully evaluated by the malariologists and entomologists.

As pointed out in Dr. Andrews' report, there are a number of areas in the country where silkworms are raised, presenting a difficult problem in avoiding damage to the silkworm industry through the use of DDT. Dr. Andrews has recommended that therapeutic measures be used in these areas. In this recommendation the writer concurs; but should therapeutic measures not prove to be feasible or successful, it is recommended that small-scale trials of the application of DDT be attempted. There are several landowners in the country who are willing to underwrite such experiments, assuming responsibility for any damage to the silkworms. The DDT should be applied only to the dwellings and only after the silkworms have been removed to the shelters out of doors. Careful determination should be made by the entomologists to find out if enough residual DDT lingers in the dwellings from season to season to damage the silkworms when they are brought into the dwelling 1 year after the application. It is believed that by careful study and evaluation, techniques can be worked out, if necessary, which will permit the use of DDT in the dwellings in the silkworm-industry area.

5. ADJUNCTIVE MEASURES

In a number of areas in the world where malaria has been markedly reduced in the last few years, there is evidence to indicate that the reduction has been partially due to the greatly increased use of insecticides, including DDT, by the general population, in addition, in some cases, to the residual spraying of homes by the respective governments. The destruction of disease-carrying insects by individual application of DDT is considered to be of such importance that it is recommended that the use of insectides be encouraged by every means possible. To accomplish this objective, it is recommended that as long as the basic materials for insecticides are not produced or manufactured in Iran that such materials be made completely duty-free on entering the country, even though they be imported by individuals or commercial organizations as well as by the Government. To ensure that the saving in duty be passed on to the public, it is suggested that the Government obtain the necessary basic materials, mix the insecticides, and make them available at absolutely minimum cost to the population through the provincial health departments or other local governmental organizations. Besides governmental distribution, however, commercial distribution and distribution by any other means should be encouraged; for the use of such insecticides, no matter how applied, will, in the aggregate, be of benefit to the health of the people of the country.

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