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**The Role of *Anopheles stephensi* in The
Transmission of Malaria in Pakistan**

**Trip 1. Protocol Development and
Selection of Study Areas**

January 8 - 26, 1992

by

**William K. Reizen
and
Richard H. Baker**

VBC Report No. 82249

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Executive Summary

At the request of the Vector Biology Control Project and USAID/Islamabad, we visited Pakistan from January 8 to 26, 1992, to develop a protocol to investigate the role of *Anopheles stephensi* in malaria transmission in rural Pakistan. This research is important in deciding whether or not the Malaria Control Project (MCP) should switch from malathion to fenitrothion for residual house spray to interrupt malaria transmission because *An. stephensi* has developed resistance to malathion. Review of research completed in Pakistan allowed us to focus the protocol on comparing the entomological inoculation rates of the abundant *Anopheles* species during periods of low and high malaria transmission.

To identify study villages, we examined directorate, provincial, and district-level epidemiological and entomological data for elevated malaria transmission during 1991, for the presence of *An. stephensi*, and for its malathion resistance status. We then visited candidate villages in Punjab and NWFP to verify the occurrence of malaria cases by taking and examining blood films and to verify the presence of overwintering *An. stephensi* by hand-catch or flitting collections. Deputizing identified MCP staff for this research program, and training them at the NIMRT, will be critical in initiating the program.

The research protocol estimates fortnightly malaria prevalence by active and passive case detection, surveys of schoolchildren, and estimates of mosquito abundance by all-night human bait catches and indoor resting catches. Mosquitoes then will be dissected or tested by enzyme-linked immunosorbant assay (ELISA) to determine the presence of sporozoites or circumsporozoite protein (CSP). The protocol includes additional observations on time of host-seeking, age structure, and host selection.

1. Background

The Malaria Control Program (MCP) of the Government of Pakistan plans to decrease the incidence of malaria below a target threshold of 0.5 cases per 1,000 per year. Intervention relies on enhanced surveillance through active and passive case detection and control by a combination of rapid drug administration and focal house-spraying with malathion at localities with more than one case of *Plasmodium falciparum* or more than five cases of *P. vivax* per year. The primary malaria vector, *Anopheles culicifacies* Giles, remains susceptible to malathion; however, resistance was detected in the secondary vector, *Anopheles stephensi* Liston, shortly after the introduction of malathion to the MCP in 1976, and is now widespread.

No thorough evaluation has been done to determine how resistance in the secondary vector will affect the ability of residual malathion house spray to interrupt transmission. In an assessment of malaria transmission in Afghan refugee camps in Northwest Frontier Province (NWFP), Zulueta (1989) recommended that malathion be replaced with fenitrothion. However, after a country-wide evaluation of the resistance problem in *An. stephensi*, Georghiou (1990) concluded that replacement of malathion was not yet necessary. Similar conclusions were drawn by Lewis (1990) after a failure to retrospectively associate resistance to malathion in *An. stephensi* with spatial changes in the annual parasite incidence of malaria. These three reports and the 1987 and 1991 external reviews of the MCP have recommended research to evaluate the role of *An. stephensi* in malaria transmission in rural Pakistan. *An. stephensi* has long been recognized as an important vector of urban malaria in Karachi and Kelhi, India, but its ability to maintain rural transmission in the absence of *An. culicifacies* has not been established.

Scope of Work

The Vector Biology and Control Project (VBC) requested that we travel to Pakistan to develop a detailed research protocol to deter-

mine the role of *An. stephensi* in malaria transmission in rural and peri-urban Pakistan. Preliminary protocols addressing this problem in NWFP, Sindh, and Baluchistan Provinces were written during a previous workshop at the NIMRT in Lahore between October 21 and 31, 1989 (Reisen 1989). Subsequently, a protocol targeting the same operational research problem in Punjab Province (NIMRT Protocol S.4-1990, Title: Relationship of *Anopheles stephensi* to malaria control failures by malathion spraying) was submitted by S.D. Pervez and I.H. Shah, but was not funded.

Our scope of work was extensive (Appendix 1) but unrealistic, given the short time left (January-September 1992) before the current USAID project is terminated. In addition, much of the requested research has been published previously by scientists at the University of Maryland's Pakistan Medical Research Center and International Center for Medical Research and Training and the GOP's NIMRT (see Background, Appendix 2).

We completed the following portions of our scope of work during the present trip:

1. We reviewed available published and unpublished research in Pakistan relating to the work scope at VBC in Arlington, Virginia, and at the NIMRT in Lahore, Pakistan.
2. We reviewed malaria surveillance data at the national, provincial, and district levels to identify potential study villages in Punjab and NWFP. Periurban communities were not selected for study because of the lack of surveillance data in areas not covered by the MCF and the apparent low malaria prevalence in these areas. Instead, we identified two rural villages in each province that had high incidences of malaria during 1991. We reviewed available entomological data, including susceptibility test results, for the respective districts. In addition, slides were taken from fever patients and other residents of the potential study villages during the present trip to ensure that transmission was occurring. Mosquitoes were collected resting in houses by hand-catch and flitting to ensure the presence of overwintering *An. stephensi* in the villages. Villages having malaria cases and overwintering vector populations most likely would support

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transmission during the following spring and monsoon seasons. Villages also were evaluated for general size, access, and cooperation by residents.

3. We determined the availability and suitability of personnel transportation, and other resources. Few trained, available, and willing MCP staff were identified during the present trip. NIMRT entomological staff were committed to other research projects or were not routinely willing to leave Lahore. Protocol development, therefore, was delayed until after local MCP personnel and study areas could be identified. The project will have to be delayed until identified personnel can be deputized to work on the project and trained at NIMRT for mosquito processing and record keeping. A revised target date of March 7, 1992, has been set for the completion of training, receipt of funding and equipment, and the initiation of field work.
4. We prepared a final report and protocol. A protocol for the research is detailed in Appendix 2. Included are a detailed background of the research already completed; study area selection guidelines; case detection and malaria monitoring procedures; mosquito sampling and processing methodology; personnel; a schedule of sampling; equipment and commodity requirements; and a budget.

An itinerary of our trip and a list of people contacted are presented in Appendices 3 and 4.

2. Recommendations for Protocol Implementation

Duration of Study

Completion of the research during the proposed January through September 1992 period is operationally impractical and scientifically unsound. Operationally, MCP staff will not be ready to begin sampling until March 1992 at the earliest, leaving only seven months to complete the investigation. Scientifically, it is paramount that sampling be continued during the September 1992 - March 1993 period, when the greatest number of cases (especially *Plasmodium falciparum*) can be expected (Figure 1). If allowed to continue during the winter, this research could provide important new results demonstrating the winter transmission of malaria in Pakistan. USAID/Islamabad has committed verbally to the continuation of this project beyond September 1992.

Staffing

A cadre of well-trained, motivated personnel is critical for the careful collection of quality data in any research program. The availability of such personnel within the MCP is limited and will require the assignment of several key personnel to the project, including:

1. Dr. Imtiaz H. Shah, Director of NIMRT and principal investigator of the project (33-percent time), and his staff will be needed one week per month to visit the study areas to ensure quality control and to administer the project.
2. Mr. Abdul Majid Malik, Entomologist, District Rajanpur, Punjab, (75-percent time) is needed three weeks per month to lead the entomology and epidemiology research teams in Muzaffargarh and Dera Gazi Khan Districts, Punjab Province.

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3. **Mr. Shaukat Pervez, Assistant Entomologist, Directorate of Health Services, NWFP, (40-percent time) is needed for three days three times per month to lead the research teams in Mardan, NWFP.**
4. **Mr. A. Razzaq, Entomologist, District D.I. Khan, NWFP (40-percent time) is needed for three days three times per month to lead the research teams in Bannu, NWFP.**
5. **Two insect collectors from each of the four DHOs mentioned above (25-percent time) are needed for two or three days twice per month to supervise mosquito collection and help process specimens collected in their respective districts.**
6. **One malaria supervisor from each of the four districts (25-percent time) will be needed for two days twice per month to perform fortnightly ACD rounds in each study village. This will be an extension of his normal monthly ACD duties.**
7. **Two microscopists from each of the four districts (33-percent time) will be needed for eight days per month to examine slides from the enhanced ACD activities and to collect and examine slides from monthly school surveys of schoolchildren.**

We strongly recommend that the protocol (Appendix 2) and specific personnel requirements be circulated through the MCP at directorate, district and provincial levels and that each level sign a letter of collaborative support. Letters of support should also be obtained from USAID/Islamabad and the VBC Project.

Sporozoite Detection

Dissection of large numbers of mosquitoes is useful in vector incrimination studies to estimate species-specific entomological inoculation rates. However, these dissections are difficult to perform under primitive field conditions and may be prone to underestimate the sporozoite infection rates when done by inexperienced personnel in areas with low infection rates. To facilitate the detection of infective females, we recommend bringing enzyme-linked

immunosorbant assay (ELISA) technology to the NIMRT. The NIMRT has a plate reader, but will require reagents and staff training to establish the methodology. This technique will be invaluable to the planned and current research at NIMRT because large numbers of specimens, including pools of up to 20 females, can be processed relatively expeditiously. We recommend that the VBC identify a consultant, such as R.W. Wirtz, J.C. Beier, or T.A. Burkot, and have him visit Lahore in April 1992 to establish this method in NIMRT.

Alternatively, samples could be tested at the Médecins Sans Frontiers project in Peshawar. Dr. Mark Rowland, Director, has offered to do these tests after he brings this technology online in his laboratory. However, an exact timetable for the development of this technology has not been established.

Computer Training

Careful data summarization and analysis are critical to interpreting the results of any research project. The current research will generate large volumes of epidemiological and entomological data that can be expeditiously and accurately summarized only by computer. We have recommended the purchase of a computer for NIMRT, and feel it is important for several professional and clerical NIMRT staff to receive training in basic applications, including word processing, spreadsheet utilization, statistical analysis, and graphics. Data from the present study should be entered into spreadsheet or database files by NIMRT clerical staff.

Appendix 1. Work Scope

Pakistan: Role of *Anopheles stephensi* in Malaria Transmission

Overall

1. Conduct a two-day team planning meeting with the Directorate of Malaria Control (DOMC) and the National Institute of Malaria Research and Training (NIMRT). The purpose of the meeting will be to identify and finalize the protocol for this research study to be conducted in two provinces — Punjab and NWFP.
2. Review the parasitological and entomological data available at the DOMC and the provincial offices of health and malaria control (MCP) at Lahore and Peshawar.
3. In each of the two provinces, identify one rural and one periurban community that have endemic malaria and *Anopheles stephensi* populations for inclusion in the study. Make field visits to confirm that the four sites are suitable (i.e., that they have a significant number of malaria cases and high *An. stephensi* populations).
4. Determine available trained staff and other resources to work at those sites.
5. Conduct a survey of *Anopheles stephensi* larval breeding sites in each area.
6. Initiate laboratory and field studies on the vectorial capacities and bionomics of *Anopheles stephensi* and *An. culicifacies*.
7. Determine monthly malaria prevalence and sporozoite inoculation rates in humans in the four study sites, and identify pertinent ecological and sociological characteristics of the four communities.

8. Develop geographical reconnaissance information on the four sites, including census figures, house location, water sources, topography and positive larval breeding sites, and their characteristics.
9. Finalize the schedule and scopes of work of the proposed follow-up consultancies for the research study.

First Trip

1. Same as above, but with the following modifications:
 - a. Confirm identified sites and areas of mosquito resistance to relevant insecticides and mark those on district and locality maps.
 - b. Establish coordination mechanism with the NIMRT and provincial MCPs for the research study; identify area and coordination personnel in the research sites and at NIMRT.
 - c. Assess research equipment and commodity needs for the study, and arrange their procurement through the Project Officer.
 - d. Prepare a report identifying research steps to be followed up during the next consultancy in the study.

Second Trip

1. Follow up the research work initiated in the first trip.
2. Update the database with data collected since the first trip.
3. Identify the role, if any, of the vectors during the current season and period of the year. Continue the field tests and research activities as necessary in line with the longitudinal study design established during the first trip.

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4. Prepare a report identifying the vectors' roles as observed, the research steps taken, the activities completed, and the research steps to be followed up during the next consultancy.

Third Trip

1. Follow up the research work initiated during the first two trips.
2. Update the database with data collected since the first trip, including any mosquito resistance data.
3. Identify the role, if any, of the vector during the current season and period of the year. Continue field tests and research activities as necessary in line with the longitudinal study design established in the first trip.
4. Prepare a report identifying the vectors' role as observed, the research steps taken, the activities completed, and the research steps to be followed up during the next consultancy.

Fourth Trip

1. Carry out concluding research work, including necessary mosquito resistance tests, according to the study design and protocol, and update research data to complete the study.
2. Identify and consolidate observations from the research study in light of the data on the established role of the vector *An. stephensi*.
3. Consolidate coordinated actions taken for the transfer of technology used in the study by the coordinating staff of NIMRT and the provincial MCPs.

4. **Prepare a final report of the research study identifying the established role of *Anopheles stephensi* in malaria transmission in the Punjab and the NWFP. The report will provide an executive summary, observations, findings and recommendations.**
5. **The report will identify cost-effective insecticides for future vector control operations if necessary.**
6. **Conduct an end-of-the-study seminar for senior federal and provincial MCP/health services staff, highlighting results of the longitudinal research on malaria transmission in Pakistan and transferring information obtained from the research study. During this seminar, the consultant will facilitate interaction between federal and provincial MCP/Health staff in identifying future courses of action for vector control activities in light of research findings and recommendations.**

Appendix 2. Protocol

Protocol Title: The role of *Anopheles stephensi* in the transmission of malaria in Pakistan

Principal Investigator: Dr. I.H. Shah

I. Background

Despite over 30 years of attempted suppression, malaria remains a major public health problem in Pakistan with 79,689 cases reported nationwide during 1990 (incidence = 1.11 cases per 1,000). *Anopheles culicifacies* Giles (mostly species A) is recognized as the primary vector of rural malaria (Mahmood et al. 1984) and is uniformly susceptible to malathion, the insecticide currently used for control by residual house spray. Among the remaining 24 *Anopheles* species known to occur in Pakistan (Aslamkhan 1971), only *Anopheles stephensi* Liston has been incriminated widely in malaria transmission. This species was considered to be the primary vector of urban malaria transmission in Karachi (Hussain et al. 1956, Rahman and Muttalib 1967) and has been incriminated in Punjab by sporozoite dissection (Pervez and Shah 1989).

The importance of *An. stephensi* in the maintenance of malaria transmission in rural Pakistan requires further clarification. Zulueta (1989) felt *An. stephensi* was the primary vector of malaria among Afghan refugees near Peshawar, but sporozoite dissections were not carried out to verify this assumption. In Punjab, comparative dissections of *An. culicifacies* and *An. stephensi* over an 18-month period failed to reveal sporozoite positive *An. stephensi*, while positive *An. culicifacies* were found repeatedly from August to November (Mahmood and Macdonald 1985). Resistance to malathion by *An. stephensi* is now widespread, but a retrospective analysis comparing the geographical distribution of malathion resistance to the incidence of malaria failed to indicate a positive correlation (Lewis 1990). In addition, transmission has been successfully interrupted by the combination of malathion spray and drug administration (e.g., Shah and Mahmud 1989). Thus, further research will be required to carefully assess the role of *An.*

stephensi in transmission, especially in areas where *An. stephensi* is the dominant anopheline. This evaluation is especially critical in deciding whether or not the MCP should change from malathion, a relatively inexpensive insecticide with moderate human toxicity, to fenitrothion, a more expensive compound with greater toxicity to man.

To participate effectively in the transmission of malaria, an anopheline species should 1) be abundant during periods of active transmission, 2) feed frequently and repeatedly on man, 3) survive long enough to allow the completion of sporogony, 4) repeatedly be found naturally infected, and 5) be able to efficiently develop sporozoites after experimental infection. Where one or more vectors are involved in transmission, a comparative analysis is necessary to determine their relative and cumulative importance. Much of the critical entomological information necessary to incriminate *An. stephensi* as a vector has been compiled previously.

A. Abundance

Numerous studies (e.g., Mahmood and Macdonald 1985, Reisen and Milby 1986, Suleman 1986) have described the spring-dominated, bimodal seasonal abundance pattern of *An. stephensi* in Punjabi villages near Lahore, with the lesser fall peak occurring during the late summer/fall period of malaria transmission. These data indicated that sufficient numbers of females were present during the transmission season.

B. Host selection

All of the anophelines in Pakistan evaluated by precipitin tests of resting females (e.g., Reisen and Boreham 1979) or by comparative bovid and human bait catches (Ludlam 1971, Mahmood and Macdonald 1985) have been found to feed predominantly on bovids (i.e., cattle or buffaloes). Abundance at human bait varies seasonally, but rarely exceeded 10 bites per man per night in study villages near Lahore (Mahmood and Macdonald 1985).

C. Survivorship

Extensive studies have been conducted on both *An. stephensi* and *An. culicifacies* survivorship under field conditions. Reisen and Aslamkhan (1979) and Reisen et al. (1981, 1982) described seasonal changes in longitudinal survivorship and population size in Punjabi villages using mark-release-recapture methods and compared these results to concurrent vertical estimates using age-grading methods.

More extensive vertical estimates were later provided by Reisen et al. (1986) and Mahmood and Macdonald (1985). Collectively these studies indicated that both species were comparatively short-lived during summer and that the reproductively oldest specimens with the greatest chance of being sporozoite-positive were collected during late fall, winter, and spring. Suleman (1986) has provided an alternative method of vertical estimation; however, his overall estimates agreed well with previous studies.

Combining the above estimates of abundance, host selection patterns and survivorship with estimates of the duration of the sporogonic (Detinova 1962) and gonotrophic cycles (Mahmood and Reisen 1981) calculated from degree-day models, vectorial capacities were estimated to be consistently low (Reisen and Boreham 1982), even during periods of active malaria transmission (Mahmood and Macdonald 1985).

D. Natural infection

Two published studies have attempted to incriminate *An. stephensi* as a vector of malaria in rural Punjab through sporozoite dissection of field-collected females. Mahmood and Macdonald (1985) found 25 of 8,453 *An. culicifacies* females and 0 of 2,573 *An. stephensi* to be sporozoite-positive, and concluded that *An. culicifacies* was the primary, if not the only, vector of malaria in Punjabi villages near Lahore. Malaria was mesoendemic during the study period, with slide positivity rates at PCD clinics ranging from 9 to 43 percent (Zafar-Latif et al. 1985). In contrast, during a field study restricted to a period of epidemic transmission (slide positiv-

ity rate = 67 percent, n = 196), Pervez and Shah (1989) reported relatively comparable immediate and delayed sporozoite rates in *An. culicifacies* (immediate = 3 positive/218 dissected, delayed = 2/223) and *An. stephensi* (immediate = 1/106, delayed = 2/93). These data indicated that *An. stephensi* may become secondarily involved during epidemic transmission, but that *An. culicifacies* may be responsible for endemic malaria maintenance in rural Punjab. However, additional research is needed to substantiate this hypothesis over both time and space.

E. Experimental infection

Laboratory strains of both *An. culicifacies* (species A) and *An. stephensi* have been shown to be highly susceptible to malaria in experimental studies of malaria transmission in several laboratories. Recently Pervez et al. (1988) verified that strains of *An. stephensi* from Punjab could successfully develop sporozoites after experimental infection with Punjab strains of both *Plasmodium falciparum* and *P. vivax*.

In conclusion, much research on the comparative bionomics of *An. culicifacies* and *An. stephensi* in relation to malaria has been completed at rural villages in the Lahore area of Punjab. These studies indicate that both species are comparably inefficient as vectors, feeding infrequently on man and having moderate survivorship. *An. culicifacies* is typically more abundant in rural villages than *An. stephensi* and this increased abundance may have led to its apparent importance in transmission. However, malathion spray, soil salinity related to waterlogging, and other ecological factors have created situations in rural Pakistan where *An. stephensi* abundance equals or exceeds *An. culicifacies* abundance.

Malathion residual house spray selectively eliminates susceptible *An. culicifacies*, but leaves large numbers of resistant *An. stephensi*. Careful entomological assessment of the impact of malathion spray on malaria transmission will be required to determine whether *An. stephensi* can maintain transmission after the elimination of *An. culicifacies*. In areas of Punjab such as Muzaffargarh and Dera Ghazi Khan that are affected by waterlogging, increased salinity

Table 1. Data on Selected Study Villages, January 1992

Province	District	Village	Code	PV	PF	Total Slides	<i>An. stephensi</i>	<i>An. culicifacies</i>	Other
Punjab	Muzaffargarh	Usman Kooria	M-7	0	1	16	23	1	1
Punjab	D G Khan	Sikhani Wala	D-25-1	0	0	10	49	5	1
NWFP	Mardan	Hussai	B-14-3	2	11	71	0	0	3*
NWFP	Bannu	Fateh Khan Khel	C-3-2	2	2	71	68	25	3

* *An. annularis* larvae

and malathion spray have resulted in an anopheline fauna predominated by *An. stephensi*. In colder areas of rural NWFP, climatic conditions combined with malathion spray and different cropping patterns also have created areas where *An. culicifacies* is less abundant than *An. stephensi*.

II. Objectives

We propose to study the ecology of malaria in areas of Punjab and NWFP where transmission is ongoing and *An. stephensi* is a dominant vector species. Our specific objectives will be to compare epidemiologically related entomological parameters estimated for *An. stephensi* to those evaluated concurrently for *An. culicifacies* and other anophelines (e.g., *An. fluviatilis*) including (in descending order of priority): 1) immediate and/or delayed gut and salivary gland infection rates, 2) abundance in relation to man, 3) human host selection frequency, 4) age structure and survivorship, and 5) bionomics, including resting habits, biting rhythms, and oviposition preferences. Since study villages will be chosen because of elevated malaria transmission rates, these villages sprayed by the MCP will also allow a careful entomological assessment of the impact of malathion spray on mosquito abundance and malaria transmission. These results should enable us to recommend effective control strategies, including residual insecticides for future vector control operations.

III. Methods and Materials

A. Study area selection

1. Criteria

Two rural villages will be selected in Punjab and NWFP provinces based primarily on elevated malaria incidence during 1991 and secondarily on the abundance of *An. stephensi*. Study village size will exceed 100 houses to provide an epidemiologically meaningful sample size from which to estimate monthly parasite incidence. Additional criteria will include ease of access, travel distance, and community cooperation. Villages

identified for study were in Muzaffargarh and Dera Gazi Khan District, Punjab Province, and in Mardan and Bannu Districts, NWFP. Details of these villages are shown in Table 1.

2. Geographical Reconnaissance (GR)

Recent MCP locality maps including house numbers were not maintained or were not available. Maps of the selected localities and villages including MCP house numbers will be constructed by MCP during February-March 1992 using standard mapping methods. Copies of the maps will be made and malaria cases from 1991 plotted to indicate the distribution of past malaria transmission in the study area and guide sampling patterns for the current research. Malaria cases recorded from each study village during 1991 also will be plotted by residence to delineate possible changes in the spatial pattern in transmission. Additional information on human population size and numbers of alternative mosquito blood meal hosts (bovids, sheep, goats, and dogs) will be recorded during the initial GR.

B. Malaria case detection

The monthly incidence of malaria in the study villages will be monitored by three methods:

1. Active Case Detection (ACD)

One malaria supervisor will visit each house at two-week intervals (fortnightly) to collect blood smears from current and recent fever cases. Name, age, sex and residence of these persons will be recorded on FORM 1 (or standard MCP ACD form). ACD will be performed the week before the entomological sampling so that slides can be examined and recent malaria cases identified. Mosquitoes will be collected from these homes during the following week.

2. Passive Case Detection (PCD)

Residents of each study village seeking treatment at health units and diagnosed as malaria-positive will be reported to the Malaria Supervisor responsible for ACD activities for the current study on FORM 2.

3. Blood Smears

Additional blood smears will be collected by two District Microscopists at monthly intervals (i.e., every second ACD round) from 200 children in classes 1-5 at the village school and from available "street" children not attending school. Sampling should emphasize children from houses nearest the entomological survey sites.

All fever cases will be treated presumptively with chloroquine. Slides must be read in a timely manner by district-level microscopists. Fever cases with positive blood smears will be given radical and curative treatment by MCP personnel in a timely manner. Epidemiological information recorded for each positive case will include date of onset, name, residence, sex, age, occupation, and recent travel history (FORM 2, MCP Malaria survey form). Emphasis will be placed on ensuring that each case was contracted within the study village.

C. Mosquito sampling

Mosquitoes will be sampled fortnightly in each province by a team consisting of an experienced MCP entomologist, two insect collectors from the respective District Headquarters, and six locally hired villagers as follows:

1. Human Biting Catches

Collectors will be positioned to sample host-seeking female mosquitoes at sites representative of villager sleeping habits (i.e., outdoors during summer and indoors during the winter). Three teams of two locally hired collectors will sample mosquitoes from their exposed legs from dusk to dawn (i.e., three bait

nights per sampling occasion). Each team member will work six hours per night (depending on day length) and in the same sequence each evening for all biweekly collections. Teams will be stationed at different houses to effectively sample different ecological situations; e.g., center of village, edge of village or scattered compounds, or portions of the village having low, medium, and high rates of transmission. These data will estimate the abundance of vectors in relation to people (i.e., bites per person night).

The MCP staff will supervise the collectors to ensure they are awake and actively sampling mosquitoes. Collections should be kept separate and labeled by hour and village location to define the time of night when the risk of transmission is greatest. Observations also will be made and data entered on standards forms, concerning villagers' nocturnal behavior that relates to vector contact such as the time and place of sleeping, the type of sleeping covers, and juxtaposition of sleeping locations to livestock and breeding sites. Temperature and relative humidity will be taken at hourly intervals at one site using a sling psychrometer.

2. Resting Collections

Beginning at dawn the three teams consisting of one MCP team member and two locally hired collectors will sample indoor resting *Anopheles* from 10 bedrooms, storerooms, or animal sheds near the site where the biting catches were made.

Five fixed and numbered rooms (two bedrooms, one storeroom, and two animal sheds) near each night-biting collection site will be sampled during each trip by flitting (5 rooms x 3 sites = 15 houses per sample). Ground-cloths must cover the floor of the entire structure. Mosquitoes will be removed as quickly as possible and placed in pillboxes kept separate by structure for later processing. These collections will monitor seasonal changes in density.

Each team then will collect mosquitoes by hand catch from five additional structures (bedrooms of malaria cases identified by previous ACD round or, if no cases, randomly selected

structures) for 10 minutes per room (3 collectors x 10 min = 30 min/room x 5 rooms = 150 min x 3 sites = 7.5 man-hours per village per sample), with collections kept separate to estimate relative abundance. The collections should be kept alive in paper cups kept separate and labeled by house number.

D. Mosquito processing

Upon return to the laboratory all mosquitoes will be anesthetized, identified to species, and counted, and the data from human biting and resting collections entered on FORMS 3 and 4 (MCP Form), respectively. Each team then will process the specimens as follows:

1. Dissections

Up to 200 *An. stephensi*, *An. culicifacies* and *An. fluviatilis* collected alive by hand catch will be anesthetized by triethylamine (or chloroform) and then dissected on the day of collection to determine reproductive and gonotrophic age status and infection. The data will be entered on FORM 5.

a. Age structure

One ovary from freshly fed resting or unfed host-seeking females (primarily follicle \leq IIB) will be placed on a slide, and allowed to dry, and the tracheation will be examined to determine parity. Parity rates (number parous/total dissection) will be used to estimate survivorship by the method of Davidson (1954). The duration of the gonotrophic cycle will be estimated from the degree-day model of Mahmood and Reisen (1981). Survivorship may then be used to estimate the length of infective life with the duration of sporogony based on the degree-day model of Detinova (1962).

b. Infection

Salivary glands of parous females from biting and hand catch collections will be excised into a drop of physiological saline and examined under 400X to determine the presence of sporozoites. The intensity of infection will be estimated subjec-

tively, using the criteria presented in WHO (1975). Permanent stained slides will be made of all sporozoite-positive females and then rechecked at NIMRT. Midguts will be excised into a separate drop of saline, stained lightly with mercurochrome, and examined at 400X to determine the presence of oocysts. The number of oocysts will be counted to compare the intensity of gut and gland infections. Cadavers (thorax + abdominal remnants) of sporozoite-positive females will be frozen at -70°C or will be dried thoroughly at room temperature, stored in numbered vials in a desiccator, and then tested by ELISA for *P. falciparum* or *P. vivax* CSP antigens. Infection rates multiplied by the human biting rate will be used to estimate the entomological inoculation rate (i.e., infective bites per person per night for each anopheline species).

Mosquitoes collected by flitting will be dried at room temperature and then divided into lots of 10 females per species each and stored in individually numbered vials for later analysis at NIMRT using ELISA. Number codes should include a letter prefix specific for each village and then be numbered sequentially. At the time of testing, only the head/thorax should be saved and the abdomen discarded, to prevent the detection of false positives due to the presence of CSP in the maturing, but not ruptured, oocysts.

c. Host selection

The midguts of up to 50 freshly fed females from resting collections (hand catch + flitting) per species per sampling occasion (i.e., fortnightly visit) will be smeared onto filter paper, dried, and later tested for human blood antigens, using either precipitation or ELISA methodology. These data will provide an estimation of the probability of human feeding.

2. Delayed Infection Rates

The remaining adult females collected alive by hand catch will be held in date- and site-specific cartons and maintained on 10 percent sucrose for three to four days, after which they will be dissected to determine gut and salivary gland infection using the methods described above. Comparative immediate and

delayed sporozoite rates may provide valuable information on the susceptibility of each species to salivary gland infection.

IV. References.

- Aslamkhan, M. 1971. Mosquitoes of Pakistan. I. A checklist. **Mosquito Systematics Newsletter** 3: 147-159.
- Davidson, G. 1954. Estimation of the survival rate of anopheline mosquitoes in nature. **Nature (London)** 194: 792-793.
- Detinova, T.S. 1962. Age-grouping methods in Diptera of medical importance. **WHO Monogr.** 47: 1-216.
- Georghiou, G. 1990. An Analysis of Insecticide Resistance in Malaria Vector Mosquitoes in Pakistan and Recommendations for Future Action. Consultant report to USAID/Islamabad and the Government of Pakistan.
- Hussain, N.Z.Y. and S.A. Talibi. 1956. Incrimination of vectors of malaria in the Federal Karachi Area (Pakistan). **Pak. J. Hlth.** 6: 65-72.
- Lewis, A.N. 1990. An assessment of how resistance to malathion by *Anopheles stephensi* affects the incidence of malaria in Pakistan. VBC Report No. 81228, 31 pp.
- Ludlam, K.W. 1971. Feeding behavior of six common anophelines of West Pakistan. Ph.D. Diss., Univ. Maryland, Baltimore, 67 pp.
- Mahmood, F. and M.B. Macdonald. 1985. Ecology of malaria transmission and vectorial capacity of *Anopheles culicifacies* species in rural Punjab Province, Pakistan. **Pak. J. Med. Res.** 24: 95-106.

- Mahmood, F. and W.K. Reisen. 1981. Duration of the gonotrophic cycles of *Anopheles culicifacies* Giles and *Anopheles stephensi* Liston, with observations on reproductive activity and survivorship during winter in Punjab Province, Pakistan. **Mosq. News** 41: 41-50.
- Mahmood, F., R.K. Sakai and K. Akhtar. 1984. Vector incrimination studies and observations of species A and B of the taxon *Anopheles culicifacies* in Pakistan. **Trans. Roy. Soc. Trop. Med. Hyg.** 78: 607-616.
- Nalin, D.R. et al. (1985) A point survey of peri-urban and urban malaria in Karachi. **J. Trop. Med. Hyg.** 88(1): 7-15.
- Pervez, S.D. and I.H. Shah. 1989. Role of *Anopheles stephensi* as a malaria vector in rural area of Pakistan. **Pak. J. Hlth.** 26: 73-84.
- Pervez, S.D., I.H. Shah and M.A. Rai. 1988. A successful attempt to incriminate *Anopheles stephensi* as malaria vector in rural area of Pakistan. **Pak. J. Hlth.** 25: 41-50.
- Rahman, M. and A. Muttallib. 1967. Determination of malaria transmission in central part of Karachi City and incrimination of *Anopheles stephensi* as the vector. **Pak. J. Hlth.** 73-84.
- Reisen, W.K. 1989. Applied field research on malaria in Pakistan: a workshop on proposal and protocol preparation. VBC Report No. AR-118: 1-12.
- Reisen, W.K. and M. Aslamkhan. 1979. A release-recapture experiment with the malaria vector, *Anopheles stephensi* Liston (Diptera: Culicidae), with observations on dispersal, survivorship, population size, gonotrophic rhythm and mating behavior. **Ann. Trop. Med. Parasit.** 73: 251-270.
- Reisen, W.K. and P.F.L. Boreham. 1979. Host selection patterns of some Pakistan mosquitoes. **Am. Soc. Trop. Med. Hyg.** 28: 408-421.

- Reisen, W.K. and P.F.L. Boreham. 1982. Estimates of malaria vectorial capacity for *Anopheles culicifacies* and *Anopheles stephensi* (Diptera: Culicidae) in rural Punjab Province, Pakistan. **J. Med. Entomol.** 19: 98-103.
- Reisen, W.K. and M.M. Milby. 1986. Population dynamics of some Pakistan mosquitoes: changes in adult relative abundance over time and space. **Ann. Trop. Med. Parasit.** 80: 53-68.
- Reisen, W.K. , F. Mahmood and K. Azra. 1981. *Anopheles culicifacies* Giles: adult ecological parameters measured in rural Punjab Province, Pakistan, using capture-mark-recapture and dissection methods, with comparative observations on *An. stephensi* Liston and *An. subpictus* Grassi. **Res. Popul. Ecol.** 23: 39-60.
- Reisen, W.K. , F. Mahmood and T. Parveen. 1982. Seasonal trends in population size and survivorship of *Anopheles culicifacies*, *An. stephensi* and *An. subpictus* (Diptera: Culicidae) in rural Punjab Province, Pakistan. **J. Med. Entomol.** 19: 86-97.
- Reisen, W.K., F. Mahmood, S. Niaz, K. Azra, T. Parveen, R. Mukhtar, Y. Aslam and T.F. Siddigui. 1986. Population dynamics of some Pakistan mosquitoes: temporal changes in reproductive status, age structure, and survivorship of *Anopheles culicifacies*, *An. stephensi* and *Culex tritaeniorhynchus*. **Ann. Trop. Med. Parasit.** 80: 77-95.
- Shah, S.M.A. and S.A.K. Mahmud. 1989. Report on the outbreak of malaria in Shah Jamal area of District Muzaffargarh during August 1989. Directorate Gen. Hlth. Svcs., Punjab, unpubl. trip rpt., 4 pp.
- Suleman, M. 1986. Epidemiology of malaria in Punjab Province, Pakistan: a case study in a rural community near Lahore. Ph.D. Diss., Univ. Hawaii, Honolulu, 341 pp.

Zafar-Latif, A., G.T. Strickland, E. Fox, A.A. Khaliq and M.A. Choudhry. 1985. Seasonal fluctuation of malaria in four selected villages of the Punjab. **Pak. J. Med. Res.** 24: 53-61.

Zulueta, J. de. 1989. Malaria among Afghan refugees in Pakistan. Rept. of an Evaluation Mission of the United Nations High Commission on Refugees.

V. Schedule of Sampling

There will be 26 biweekly entomology and ACD sampling trips to each village per year and 13 trips every four weeks to collect slides from schoolchildren. Research is scheduled tentatively to commence on March 3, 1992. The sequence of events and trips in each district follows and must remain on the same four-week sequence repeated 13 times. Maintaining this schedule is critical to coordinate trips by Dr. I.H. Shah and consultants:

Week 1: ACD round, schoolchildren survey; slides read before entomology sampling

Week 2: Entomology sampling: All-night human bait catch (three man-nights: six baits for 1/2 night), morning indoor resting collections (three team total: 15 fixed rooms by flitting, 15 rooms hand-catch emphasizing confirmed malaria cases)

Week 3: ACD round

Week 4: Entomology sampling

Note: In Punjab Mr. A. Majeed Malik will sample Muzaffargarh District on Saturday/Sunday, travel to D G Khan District on Monday, and commence sampling on Tuesday and Wednesday. This will allow Monday and Thursday for the completion of leftover mosquito processing and maintaining records.

A complete calendar of events for carrying out the protocol can be found in Appendix 7 of this report.

VI. Collaborative Arrangements and Personnel

A. Vector Biology and Control Project (VBC)

VBC will procure consultants and assist in literature surveys, report preparation, and final publication of results in scientific journals. A schedule of consultancies requested follows:

- January 1992:** RHB and WKR* visit Pakistan to develop protocols and identify MCP personnel and study areas.
- April 1992:** After the agreements have been signed, training completed, and sampling initiated, RHB or WKR and an ELISA expert will visit Pakistan to supervise sampling and bring ELISA technology to the NIMRT. The ELISA expert will train NIMRT staff, run known positive specimens, and supervise the initial processing of field specimens.
- July 1992:** Dr. F. Mahmood will visit Pakistan to provide backstopping to technical problems and quality control on sampling and processing, and to review the data collected.
- Aug./Sept. 1992:** RHB will visit the project to provide course corrections and database update.
- November 1992:** RHB or WKR will visit the project to provide course corrections for winter sampling and update the database.
- March 1993:** RHB or WKR will visit Pakistan to summarize the data and prepare a final report.

*Richard H. Baker and William K. Reisen

B. USAID/Islamabad

USAID, through the Malaria Project Officer (Dr. Rifaq Ismail), will provide necessary funding for the completion of the project and assist with the purchase of requested commodities and equipment, and (with the Principal Investigator) will be responsible for project cost accounting.

C. Director General of Health, Government of Pakistan

The Director General of Health will permit Dr. I.H. Shah, principal investigator, (33 percent of time on project) to travel to study areas each month and administrate the project. Mr. Mujahid, Acting Director, Malaria Control Project (5 percent) will provide advice on project progress and administrative assistance.

D. Directors of Health for Punjab and NWFP Provinces

The Directors of Health will ensure that the staff requested to work on the project will be made available from Muzaffargarh, D.G. Khan and Rajanpur Districts, Punjab, and Mardan, Bannu and D.I. Khan Districts, NWFP. They also agree that the newly purchased vehicles and commodities are to be available to the project members for field research for the duration of the project and that the vehicles may be transferred to Baluchistan and Sindh Provinces, if the project is extended for a second year. Requested staff are listed below:

1. Mr. Abdul Majeed Malik, Entomologist, District Rajanpur (75 percent of time), is needed three weeks per month to lead the entomology and microscopist slide collecting teams in Muzaffargarh and Dera Gazi Khan Districts, Punjab Province.
2. Mr. Shaukat Pervez, Assistant Entomologist, Directorate of Health Services, NWFP (40 percent of time), is needed for three days three times per month to lead the research teams in Mardan, NWFP.

3. Abdul Razzaq, Entomologist, District D.I. Khan, NWFP (40 percent of time), is needed for three days three times per month to lead the research teams in Bannu, NWFP.
4. Two Insect Collectors from Muzaffargarh, D.G. Khan, Mardan and Bannu DHOs (25 percent of time), are needed for two to three days twice per month to supervise mosquito collection and assist with the processing of specimens collected in their respective districts.
5. One Malaria Supervisor from each of the 4 districts (10 percent of time) will be needed for two days twice per month to perform ACD rounds in each study village at fortnightly intervals. This duty would be a one-week extension of normal responsibilities.
6. Two Microscopists from each of the 4 districts (25 percent of time) will be needed for eight days per month to examine slides from the enhanced ACD activities and to collect and examine slides from monthly schoolchildren surveys.

E. Proposed Budget in Rupees (RS.)

The proposed budget for this project is listed in tabular format as follows:

VII. BUDGET		03/01/92 - 09/30/92				10/01/92 - 02/28/93			
Item	Number Trips	Days/Trip	TA/DA	Total	Number Trips	Days/Trip	TA/DA	Total Rs	
Punjab Muzaffargarh-Usman Kooria									
Dr. Imtiaz Shah	8	3	450	10,800	5	3	450	6,750	
Abdul Majid Malik	22	2	300	13,200	17	2	300	10,200	
Insect Collector	15	2	140	4,200	11	2	140	3,080	
Insect Collector	15	2	140	4,200	11	2	140	3,080	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Microscopist	8	1	140	1,120	5	1	140	700	
Microscopist	8	1	140	1,120	5	1	140	700	
CDC Supervisor	15	2	140	4,200	11	2	140	3,080	
Driver for Dr. Shah	8	3	140	3,360	5	3	140	2,100	
Ghazala Nadeen	8	1	300	2,400	5	1	300	1,500	
Subtotal				62,600				44,390	

		03/01/92 - 09/30/92				10/01/92 - 02/28/93			
Item	Number Trips	Days/Trip	TA/DA	Total	Number Trips	Days/Trip	TA/DA	Total Rs	
Punjab Dera Gazi Khan- Sikhani Wala									
Dr. Imtiaz Shah	8	3	450	10,800	5	3	450	6,750	
Abdul Majid Malik	22	2	300	13,200	17	2	300	10,200	
Insect Collector	15	2	140	4,200	11	2	140	3,080	
Insect Collector	15	2	140	4,200	11	2	140	3,080	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200	
Microscopist	8	1	140	1,120	5	1	140	700	
Microscopist	8	1	140	1,120	5	1	140	700	
CDC Supervisor	15	2	140	4,200	11	2	140	3,080	
Driver for Dr. Shah	8	3	140	3,360	5	3	140	2,100	
Ghazala Nadeen	8	1	300	2,400	5	1	300	1,500	
Subtotal				62,600				44,390	

VII. BUDGET (cont.)	03/01/92 - 09/30/92				10/01/92 - 02/28/93			
	Item	Number Trips	Days/Trip	TA/DA Total	Number Trips	Days/Trip	TA/DA Total	Total Rs
NWFP Mardan-Hussai								
Dr. Imtiaz Shah	8	3	450	10,800	5	3	450	6,750
Shaukat Pervez	22	2	300	13,200	17	2	300	10,200
Insect Collector	15	2	140	4,200	11	2	140	3,080
Insect Collector	15	2	140	4,200	11	2	140	3,080
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Microscopist	8	1	140	1,120	5	1	140	700
Microscopist	8	1	140	1,120	5	1	140	700
CDC Supervisor	15	2	140	4,200	11	2	140	3,080
Driver for Dr. Shah	8	3	140	3,360	5	3	140	2,100
Ghazala Nadeen	8	1	300	2,400	5	1	300	1,500
Subtotal				62,600				44,390

	03/01/92 - 09/30/92				10/01/92 - 02/28/93			
Item	Number Trips	Days/Trip	TA/DA	Total	Number Trips	Days/Trip	TA/DA	Total Rs
NWFP Barru-Fatah Khan Khel								
Dr. Imtiaz Shah	8	3	450	10,800	5	3	450	6,750
Abdul Razzaq	22	2	300	13,200	17	2	300	10,200
Insect Collector	15	2	140	4,200	11	2	140	3,080
Insect Collector	15	2	140	4,200	11	2	140	3,080
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Local Hire Insect Collector	15	2	100	3,000	11	2	100	2,200
Microscopist	8	1	140	1,120	5	1	140	700
Microscopist	8	1	140	1,120	5	1	140	700
CDC Supervisor	15	2	140	4,200	11	2	140	3,080
Ghazala Nadeen	8	1	300	2,400	5	1	300	1,500
Driver for Dr. Shah	8	3	140	3,360	5	3	140	2,100
Subtotal				59,240				42,290

VII. BUDGET (cont.)

Item		03/01/91 - 09/30/92		10/01/92 - 02/28/93	
		Total Rs		Total Rs	
Supplies:					
ELISA Reagents		2,000			
Vials		100			
Pippeter Tips		200			
Descater tupperware		3,750			
Chloroform		1,000			
Cotton					
Paper Cups		1,000			
Ice Box @ Rs. 600	12	7,200			
Lancet Disposal @ Rs. 2	16,000	32,000			
Subtotal:		40,200			0
Transportation:					
Petrol Mardan @ Rs. 3/Mile	400 Miles/Month	9,600	400 Miles/Month	6,000	
Petrol Muzaffargarh/D.G. Khan @ 3	750 Miles/Month	18,000	750 Miles/Month	11,250	
Rental Vehicle Banru		14,769		9,231	
Petrol Dr. I Shah	1,650 Miles/Month	39,600	1,650 Miles/Month	24,750	
Subtotal:		81,969		51,231	

Item		03/01/91 - 09/30/92		10/01/92 - 02/28/93	
		Total Rs		Total Rs	
Equipment:					
Suzuki Vans @ 200,000	2	400,000			
Vehicle Insurance @ 5,000	2	100,000			
Computer/Printer	1	100,000			
Subtotal:		600,000			0
Accounting and Secretarial Svcs.					
Bookkeeping @ Rs 500		4,000			2,000
Typing and Other Services		4,000			2,000
Subtotal:		8,000			4,000
Training in Lahore:					
Assistant Entomologists @1 wk TA/DA		33,000			
Instructors for Training	3	10,000			
Subtotal:		43,000			0
Misc. 10% of Total		102,000			23,069
Total:		1,122,230			253,760
Grand Total: 03/01/92-02/28/93		1,375,990			

Appendix 3. Itinerary

Date	Place	Activities
January 1992		
3	Arlington, VA	Participated in briefing with USAID/Washington and VBC.
4	Arlington, VA	Reviewed literature on malaria in Pakistan and began protocol draft at VBC.
5-6	Travel to Islamabad, Pakistan	
7-9	Islamabad	Reviewed work scope with USAID; planned trip itinerary in Pakistan; visited Directorate of Malaria Control and National Institute of Health; met with Dr. M. Rowland, MSF.
10	Travel to Lahore	
11-12	Lahore	Met with NIMRT and Malaria Directorate, Punjab, to review surveillance data and identify personnel to work on project.
13-14	Sheikhupura	Visited DHO and reviewed surveillance data. Visited WHO insecticide trial area and localities with elevated SPRs (Kotli Viru and scattered houses near defence canal). Attempted mosquito collections.

January 1992

- | | | |
|-----------|-------------------------------|--|
| 14 | Lahore | Met with Dean, College of Community Medicine, Illama Iqbal Medical College, and NIMRT staff. |
| 14 | Travel to Muzaffargarh | |
| 15 | Muzaffargarh | Visited DHO to review malaria and entomology data. Visited 2 potential villages (Shah Jamal and Usman Kooria) and collected mosquitoes and blood films. |
| | D.G. Khan | Visited DHO to review data. Sampled 2 villages for mosquitoes (Sikhani Wala and Drahma). |
| 16 | Muzaffargarh | Visited DHO for final discussions of protocol. |
| | Travel to Lahore | |
| | Lahore | Met with Dr. I.H. Shah, NIMRT, to discuss trip. |
| 17 | Travel to Peshawar | |
| | Peshawar | Worked on protocol format. |
| 18 | Peshawar | Visited Provincial Malaria Headquarters and Zoology Department, Peshawar University. |
| 19 | Mardan | Visited KHO to review data and selected localities. Sampled 3 villages (Balagarhi, Degan Shadi Khan and Hussai) for mosquitoes and blood films. |

January 1992

- 20** **Travel to Bannu**
- Bannu** **Visited DHO and reviewed data. Sampled Sham Shi Khel village.**
- 21** **Bannu** **Sampled Fateh Khan Khel, Kakki and Degan Shadi Khan villages.**
- 22** **Travel to Peshawar**
- Peshawar** **Meeting with Dr. Rifaq Ismail.**
- 23** **Peshawar** **Final discussions with Dr. I.H. Shah. Meeting at Peshawar University.**
- 24** **Travel to Islamabad**
- Islamabad** **Final report preparation.**
- 25** **Islamabad** **Report submission and debriefing with USAID/Islamabad and Directorate of Malaria Control.**
- 26** **Travel to USA**

Appendix 4. People Contacted

Vector Biology and Control Project, Arlington, VA

Dr. R. Lennox, VBC
Dr. B. Silverman, VBC
Dr. R.G. Andre, VBC
Dr. D. Carroll, USAID/Washington

USAID/Islamabad

Ms. Anne Aarnes, Chief, Office of Health, Population and
Nutrition (HPN)
Dr. Rifaq A. Ismail, Project Officer, Malaria Control Project

National Institute of Health, Islamabad

Maj. Gen. M.J. Burney (retd), Consultant

**Ministry of Health, Directorate of Malaria Control,
Islamabad**

Mr. C.A.A. Mujahid, Director
Dr. G. Hashim, Epidemiologist

NIMRT, Lahore

Dr. I.H. Shah, Director
Mr. S.D. Pervez, Entomologist
Ms. G. Nadeem, Entomologist

Health Directorate, Punjab Province

Dr. Riaz Syed, Director General
Dr. Rauf Baig Mirza, Director of Health
Dr. M.M.A. Naqvi, Assistant Director, Malaria
Mr. M.A. Shah, Parasitologist
Mr. J. Malik, Entomologist
Mr. S.A.K. Mahmud, CDC Officer

DHO, Sheikhpura

Mr. Azam Khan, CDC Officer
Mr. Naeem Khan, Assistant Entomologist

Multan Division Headquarters

Dr. Nasir Bajwa, Director of Health
Mr. C. Mushtaq, CDC Officer

DHO, Muzaffargarh

Dr. Abdul Hameed Chughtai, DHO
Mr. Chiraj Hussain Shah, CDC Officer

DHO, Rajanpur

Mr. Abdul Majid Malik, Entomologist

DHO, D.G. Khan

Dr. M. Khalid, Assistant DHO
Mr. Qazi Farooq, CDC Officer

Health Directorate, Peshawar

Mr. Shaukat Pervez, Entomologist
Mr. Ata Mohammed, Insect Collector
Mr. Abdul Aziz Khan, Malaria Supervisor

Peshawar University, Zoology Department

Dr. Mohammad Suleman

Bannu, DHO

Dr. Mohabat Khan, DHO

Mr. Abdul Razzaq, Assistant Entomologist

Mr. Saifullah Khan, Assistant Entomologist

MSF Belgium-Holland, Peshawar

Dr. Mark Rowland, Malaria Project Manager

Appendix 5. Survey Forms

Form 1-1

MALARIAS CONTROL PROGRAM
M.C.P.

MALARIOMETRIC SURVEY RECORD
SPLLENW/BLOOD SURVEY

Name of Locality: _____
 Method of Collection: _____
 Name of Head Collector: _____
 Date of Survey: _____

Code No. _____

Sex: _____
 Age: _____
 Status: _____
 Sub-Group: _____

Malarionetric General Survey (adult or school children)
 Indian Parasite Survey
 Epidemiological control Survey
 Mass Blood Survey

SUMMARY OF MALARIONETIC SURVEY

Age	No. Ex.	Parasite Species					SR	AS	AS	No. Ex.	v	m	f	Min	Total	D.R.	C.R.
		1	2	3	4	5											
0-1																	
1+																	
2+																	
5+																	
10+																	
Grand Total																	

FIELD AND LABORATORY RESULTS

Serial No.	Name of Subject	Name of		Case	Age			Species					Parasite	Drug Given	v	C.R.
		Place	Field		Sex	Y	M	D	1	2	3	4				
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																

Form 3

N. W. F. P.
MALARIA CONTROL PROGRAMME

ANOPHELINE ADULT SURVEY RECORD OF

000025. MWHQ. 1-100 M.S.P. 1-100 M.S.P. 1-100 M.S.P. (100)

(EVA-2/16)

FIXED STATION

RANDOM STATION

Code No.

Loco.....
Sector.....
Sub Sector.....

ISLET WINDOW TRAP OUTLET WINDOW TRAP MALT TRAP MUGHAM ANIMAL LIGHT TRAP

District.....
Tahiti.....
Thana.....

Method used: Pitfall Head Capture

Traps Status: Sprayed Disposed

Date of Spray:

Name of Collector.....

Date:

Station No. / Type	Block No.	Time		A. culicoides					A. stephensi					A. tritaeniorhynchus					A. sinensis					Total					
		From	To	UP	FP	MS	G	M	UP	FP	MS	G	M	UP	FP	MS	G	M	UP	FP	MS	G	M						

FORM 4

MOSQUITO COLLECTIONS: HUMAN BAIT

DATE: _____ VILLAGE: _____

HOUSE NUMBER: _____

VILLAGER SLEEPING HABITS:

Time sleeping: _____ Place: In Out Covers: + -

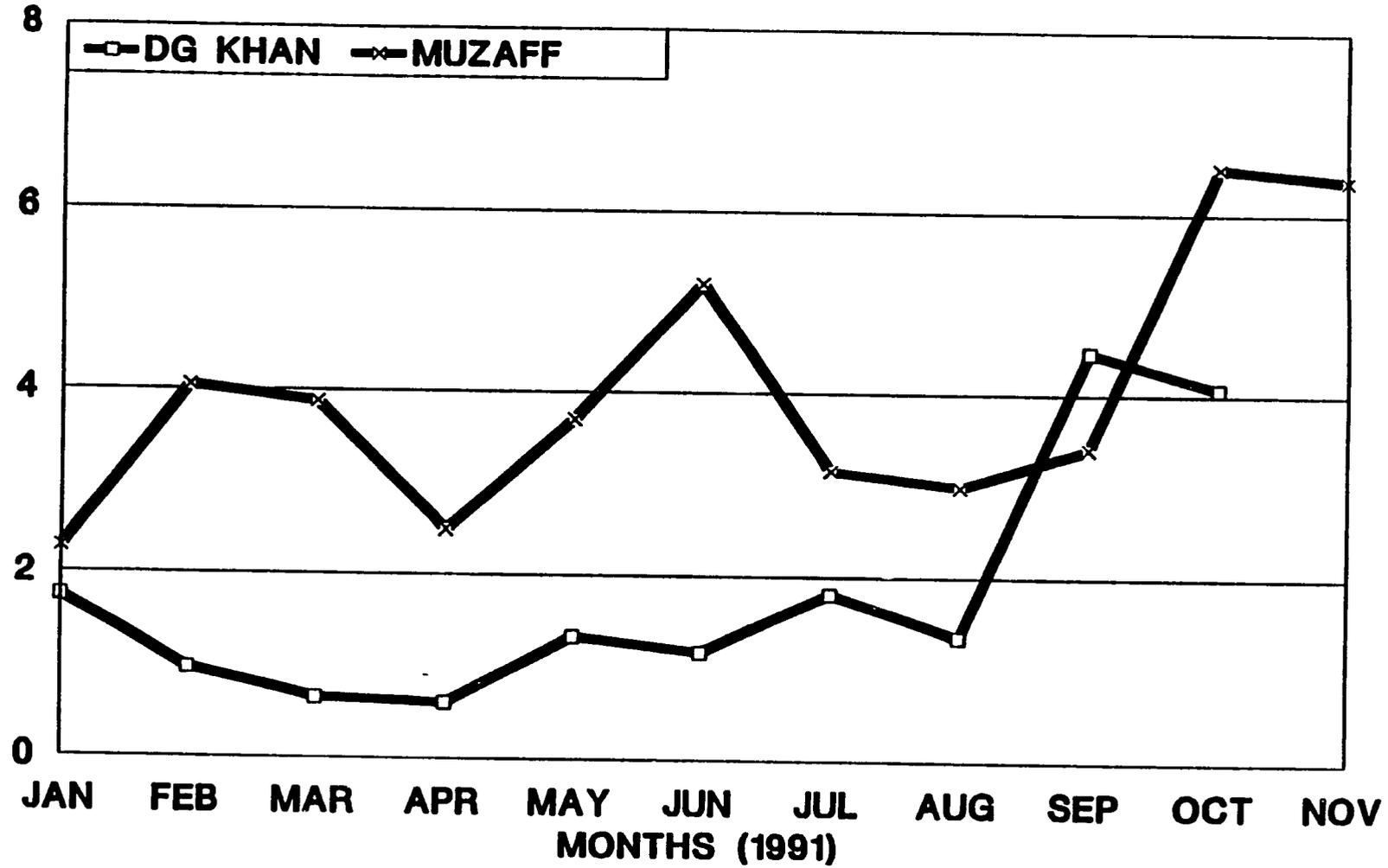
TIME (HRS)	TEMP	RH%	Anopheles species							
			ann.	cul.	flu.	nig.	pul.	ste.	sub.	other
1700										
1800										
1900										
2000										
2100										
2200										
2300										
2400										
0100										
0200										
0300										
0400										
0500										
0600										
0700										

Appendix 6.

**Figure 1.
Slide Positivity Rates**

- 46 -

FIG. 1. SLIDE POSITIVITY RATES, PUNJAB DISTRICT, 1991.



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Appendix 7. Calendar of Events

-48'

CALENDAR OF EVENTS FOR DISTRICT MUZAFFARGARH-USMAN KOORIA

March 1992

- 7 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 8 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Saturday
ALL NIGHT HUMAN BAIT UK
- 15 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 21 Saturday
ACD BY MALARIA SUPERVISOR UK
- 22 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Saturday
ALL NIGHT HUMAN BAIT UK
- 29 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK

April 1992

- 4 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 5 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Saturday
ALL NIGHT HUMAN BAIT UK
- 12 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 18 Saturday

April 1992

- 18 Saturday
ACD BY MALARIA SUPERVISOR UK
- 19 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Saturday
ALL NIGHT HUMAN BAIT UK
- 26 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK

May 1992

- 2 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 3 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Saturday
ALL NIGHT HUMAN BAIT UK
- 10 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 16 Saturday
ACD BY MALARIA SUPERVISOR UK
- 17 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Saturday
ALL NIGHT HUMAN BAIT UK
- 24 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 30 Saturday
ACD BY MALARIA SUPERVISOR UK

CALENDAR OF EVENTS FOR DISTRICT MUZAFFARGARH-USMAN KOORIA

May 1992

- 30 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 31 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

June 1992

- 1 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Saturday
ALL NIGHT HUMAN BAIT UK
- 7 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 13 Saturday
ACD BY MALARIA SUPERVISOR UK
- 14 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Saturday
ALL NIGHT HUMAN BAIT UK
- 21 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 27 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 28 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS

July 1992

- 1 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Saturday
ALL NIGHT HUMAN BAIT UK
- 5 Sunday
MOSQUITO IDENTIFICATION

July 1992

- 5 Sunday
INDOOR RESTING COLLECTIONS UK
- 11 Saturday
ACD BY MALARIA SUPERVISOR UK
- 12 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Saturday
ALL NIGHT HUMAN BAIT UK
- 19 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 25 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 26 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

August 1992

- 1 Saturday
ALL NIGHT HUMAN BAIT UK
- 2 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 8 Saturday
ACD BY MALARIA SUPERVISOR UK
- 9 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Saturday
ALL NIGHT HUMAN BAIT UK
- 16 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 22 Saturday

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CALENDAR OF EVENTS FOR DISTRICT MUZAFFARGARH-USMAN KOORIA

August 1992

- 22 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 23 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Saturday
ALL NIGHT HUMAN BAIT UK
- 30 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK

September 1992

- 5 Saturday
ACD BY MALARIA SUPERVISOR UK
- 6 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Saturday
ALL NIGHT HUMAN BAIT UK
- 13 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 19 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 20 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Saturday
ALL NIGHT HUMAN BAIT UK
- 27 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK

October 1992

- 3 Saturday
ACD BY MALARIA SUPERVISOR UK
- 4 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Saturday
ALL NIGHT HUMAN BAIT UK
- 11 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 17 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 18 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Saturday
ALL NIGHT HUMAN BAIT UK
- 25 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 31 Saturday
ACD BY MALARIA SUPERVISOR UK

November 1992

- 1 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Saturday
ALL NIGHT HUMAN BAIT UK
- 8 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 14 Saturday
ACD BY MALARIA SUPERVISOR UK

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CALENDAR OF EVENTS FOR DISTRICT MUZAFFARGARH-USMAN KOORIA

November 1992

- 14 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 15 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Saturday
ALL NIGHT HUMAN BAIT UK
- 22 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 28 Saturday
ACD BY MALARIA SUPERVISOR UK
- 29 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Monday
READ BLOOD FILMS BY MICROSCOPISTS

December 1992

- 1 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Saturday
ALL NIGHT HUMAN BAIT UK
- 6 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 12 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 13 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Saturday
ALL NIGHT HUMAN BAIT UK
- 20 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 26 Saturday
ACD BY MALARIA SUPERVISOR UK

December 1992

- 27 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

January 1993

- 2 Saturday
ALL NIGHT HUMAN BAIT UK
- 3 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 9 Saturday
ACD BY MALARIA SUPERVISOR UK
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 10 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Saturday
ALL NIGHT HUMAN BAIT UK
- 17 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 23 Saturday
ACD BY MALARIA SUPERVISOR UK
- 24 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Saturday
ALL NIGHT HUMAN BAIT UK
- 31 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK

February 1993

- 6 Saturday
ACD BY MALARIA SUPERVISOR UK

ENTOMOLOGIST ABDUL MAJID MALIK

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT MUZAFFARGARH-USMAN KOORIA

February 1993

- 6 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 7 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Saturday
ALL NIGHT HUMAN BAIT UK
- 14 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK
- 20 Saturday
ACD BY MALARIA SUPERVISOR UK
- 21 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Saturday
ALL NIGHT HUMAN BAIT UK
- 28 Sunday
MOSQUITO IDENTIFICATION
INDOOR RESTING COLLECTIONS UK

CALENDAR OF EVENTS FOR DISTRICT DERA GAZI KHAN-SIKHANI WALA

March 1992

- 7 Saturday
ACD BY MALARIA SUPERVISOR SW
- 8 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 10 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Tuesday
ALL NIGHT HUMAN BAIT SW
- 18 Wednesday
INDOOR RESTING CATCHES SW
- 21 Saturday
ACD BY MALARIA SUPERVISOR SW
- 22 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Tuesday
ALL NIGHT HUMAN BAIT SW

April 1992

- 1 Wednesday
INDOOR RESTING CATCHES SW
- 4 Saturday
ACD BY MALARIA SUPERVISOR SW
- 5 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 7 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Tuesday
ALL NIGHT HUMAN BAIT SW
- 15 Wednesday
INDOOR RESTING CATCHES SW
- 18 Saturday
ACD BY MALARIA SUPERVISOR SW

April 1992

- 19 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Tuesday
ALL NIGHT HUMAN BAIT SW
- 29 Wednesday
INDOOR RESTING CATCHES SW

May 1992

- 2 Saturday
ACD BY MALARIA SUPERVISOR SW
- 3 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 5 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Tuesday
ALL NIGHT HUMAN BAIT SW
- 13 Wednesday
INDOOR RESTING CATCHES SW
- 16 Saturday
ACD BY MALARIA SUPERVISOR SW
- 17 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Tuesday
ALL NIGHT HUMAN BAIT SW
- 27 Wednesday
INDOOR RESTING CATCHES SW
- 30 Saturday
ACD BY MALARIA SUPERVISOR SW
- 31 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

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CALENDAR OF EVENTS FOR DISTRICT DERA GAZI KHAN-SIKHANI WALA

June 1992

- 1 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 2 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Tuesday
ALL NIGHT HUMAN BAIT SW
- 10 Wednesday
INDOOR RESTING CATCHES SW
- 13 Saturday
ACD BY MALARIA SUPERVISOR SW
- 14 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Tuesday
ALL NIGHT HUMAN BAIT SW
- 24 Wednesday
INDOOR RESTING CATCHES SW
- 27 Saturday
ACD BY MALARIA SUPERVISOR SW
- 28 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 30 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS

July 1992

- 1 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Tuesday
ALL NIGHT HUMAN BAIT SW
- 8 Wednesday
INDOOR RESTING CATCHES SW
- 11 Saturday
ACD BY MALARIA SUPERVISOR SW
- 12 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS

July 1992

- 15 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Tuesday
ALL NIGHT HUMAN BAIT SW
- 22 Wednesday
INDOOR RESTING CATCHES SW
- 25 Saturday
ACD BY MALARIA SUPERVISOR SW
- 26 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 28 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Thursday
READ BLOOD FILMS BY MICROSCOPISTS

August 1992

- 4 Tuesday
ALL NIGHT HUMAN BAIT SW
- 5 Wednesday
INDOOR RESTING CATCHES SW
- 8 Saturday
ACD BY MALARIA SUPERVISOR SW
- 9 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Tuesday
ALL NIGHT HUMAN BAIT SW
- 19 Wednesday
INDOOR RESTING CATCHES SW
- 22 Saturday
ACD BY MALARIA SUPERVISOR SW
- 23 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
- 25 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

ENTOMOLOGIST ABUUL MAJID MALIK

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT DERA GAZI KHAN-SIKHANI WALA

August 1992

27 Thursday
READ BLOOD FILMS BY MICROSCOPISTS

September 1992

1 Tuesday
ALL NIGHT HUMAN BAIT SW
2 Wednesday
INDOOR RESTING CATCHES SW
5 Saturday
ACD BY MALARIA SUPERVISOR SW
6 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
8 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
9 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
10 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
15 Tuesday
ALL NIGHT HUMAN BAIT SW
16 Wednesday
INDOOR RESTING CATCHES SW
19 Saturday
ACD BY MALARIA SUPERVISOR SW
20 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
21 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
22 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
23 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
24 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
29 Tuesday
ALL NIGHT HUMAN BAIT SW
30 Wednesday
INDOOR RESTING CATCHES SW

October 1992

3 Saturday
ACD BY MALARIA SUPERVISOR SW
4 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
6 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
7 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
8 Thursday
READ BLOOD FILMS BY MICROSCOPISTS

October 1992

13 Tuesday
ALL NIGHT HUMAN BAIT SW
14 Wednesday
INDOOR RESTING CATCHES SW
17 Saturday
ACD BY MALARIA SUPERVISOR SW
18 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
19 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
20 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
21 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
22 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
27 Tuesday
ALL NIGHT HUMAN BAIT SW
28 Wednesday
INDOOR RESTING CATCHES SW
31 Saturday
ACD BY MALARIA SUPERVISOR SW

November 1992

1 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
3 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
4 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
5 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
10 Tuesday
ALL NIGHT HUMAN BAIT SW
11 Wednesday
INDOOR RESTING CATCHES SW
14 Saturday
ACD BY MALARIA SUPERVISOR SW
15 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
16 Monday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/MAJID
17 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
18 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
19 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
24 Tuesday
ALL NIGHT HUMAN BAIT SW

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CALENDAR OF EVENTS FOR DISTRICT DERA GAZI KHAN-SIKHANI WALA

November 1992

- 25 Wednesday
INDOOR RESTING CATCHES SW
- 28 Saturday
ACD BY MALARIA SUPERVISOR SW
- 29 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

December 1992

- 1 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Tuesday
ALL NIGHT HUMAN BAIT SW
- 9 Wednesday
INDOOR RESTING CATCHES SW
- 12 Saturday
ACD BY MALARIA SUPERVISOR SW
- 13 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Monday
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 15 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Tuesday
ALL NIGHT HUMAN BAIT SW
- 23 Wednesday
INDOOR RESTING CATCHES SW
- 26 Saturday
ACD BY MALARIA SUPERVISOR SW
- 27 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Thursday
READ BLOOD FILMS BY MICROSCOPISTS

January 1993

- 5 Tuesday
ALL NIGHT HUMAN BAIT SW
- 6 Wednesday
INDOOR RESTING CATCHES SW

January 1993

- 9 Saturday
ACD BY MALARIA SUPERVISOR SW
- 10 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Monday
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 12 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Tuesday
ALL NIGHT HUMAN BAIT SW
- 20 Wednesday
INDOOR RESTING CATCHES SW
- 23 Saturday
ACD BY MALARIA SUPERVISOR SW
- 24 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Thursday
READ BLOOD FILMS BY MICROSCOPISTS

February 1993

- 2 Tuesday
ALL NIGHT HUMAN BAIT SW
- 3 Wednesday
INDOOR RESTING CATCHES SW
- 6 Saturday
ACD BY MALARIA SUPERVISOR SW
- 7 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Monday
SCHOOL CHILDREN SURVEY MICROSCOPISTS/MAJID
- 9 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Tuesday
ALL NIGHT HUMAN BAIT SW
- 17 Wednesday
INDOOR RESTING CATCHES SW
- 20 Saturday
ACD BY MALARIA SUPERVISOR SW

ENTOMOLOGIST ABDUL MAJID MALIK

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT DERA GAZI KHAN-SIKHANI WALA

February 1993

- 21 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Thursday
READ BLOOD FILMS BY MICROSCOPISTS



CALENDAR OF EVENTS FOR DISTRICT BANNU-FATEH KHAN KHEL

March 1992

- 3 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 4 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 11 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 17 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 18 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 25 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 31 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ

April 1992

- 1 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 8 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 14 Tuesday

April 1992

- 14 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 15 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 22 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 28 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 29 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Thursday
READ BLOOD FILMS BY MICROSCOPISTS

May 1992

- 2 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 6 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 12 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 13 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 20 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 26 Tuesday
ACD BY MALARIA SUPERVISOR FKH

ENTOMOLOGIST ABDUL RAZZAQ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT BANNU-FATEH KHAN KHEL

May 1992

- 26 Tuesday
SCHOOL CHILDREN SURVEY MICROSCOPISTS/RAZZAQ
- 27 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

June 1992

- 2 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 3 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 9 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 10 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 17 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 23 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPISTS/RAZZAQ
- 24 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Tuesday
ALL NIGHT HUMAN BAIT FKH

July 1992

- 1 Wednesday
INDOOR RESTING COLLECTIONS FKH

July 1992

- 1 Wednesday
MOSQUITO IDENTIFICATION FKH
- 7 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 8 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 15 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 21 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPISTS/RAZZAQ
- 22 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 29 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH

August 1992

- 4 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 5 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 12 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 18 Tuesday

ENTOMOLOGIST ABDUL RAZZAQ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT BANNU-FATEH KHAN KHEL

August 1992

- 18 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 19 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 26 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH

September 1992

- 1 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 2 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 9 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 15 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 16 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 23 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 29 Tuesday

September 1992

- 29 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 30 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

October 1992

- 1 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 7 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 13 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 14 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 21 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 27 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 28 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Saturday
READ BLOOD FILMS BY MICROSCOPISTS

November 1992

- 1 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 4 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH

ENTOMOLOGIST ABDUL RAZZAQ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT BANNU-FATEH KHAN KHEL

November 1992

- 10 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 11 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 18 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 24 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 25 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

December 1992

- 1 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 2 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 8 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 9 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 16 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 22 Tuesday

December 1992

- 22 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 23 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 30 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH

January 1993

- 5 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 6 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 13 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 19 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 20 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 27 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH

ENTOMOLOGIST ABDUL RAZZAQ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT BANNU-FATEH KHAN KHEL

February 1993

- 2 Tuesday
ACD BY MALARIA SUPERVISOR FKH
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/RAZZAQ
- 3 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 10 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH
- 16 Tuesday
ACD BY MALARIA SUPERVISOR FKH
- 17 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Thursday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Saturday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Tuesday
ALL NIGHT HUMAN BAIT FKH
- 24 Wednesday
INDOOR RESTING COLLECTIONS FKH
MOSQUITO IDENTIFICATION FKH

ENTOMOLOGIST ABDUL RAZZAQ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT MARDAN-HUSSAI

March 1992

- 7 Saturday
ALL NIGHT HUMAN BAIT H
- 8 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 14 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 15 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Saturday
ALL NIGHT HUMAN BAIT H
- 22 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 28 Saturday
ACD BY MALARIA SUPERVISOR H
- 29 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS

April 1992

- 1 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Saturday
ALL NIGHT HUMAN BAIT H
- 5 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 11 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 12 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Saturday

April 1992

- 18 Saturday
ALL NIGHT HUMAN BAIT H
- 19 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 25 Saturday
ACD BY MALARIA SUPERVISOR H
- 26 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

May 1992

- 2 Saturday
ALL NIGHT HUMAN BAIT H
- 3 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 9 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 10 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Saturday
ALL NIGHT HUMAN BAIT H
- 17 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 23 Saturday
ACD BY MALARIA SUPERVISOR H
- 24 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Saturday
ALL NIGHT HUMAN BAIT H
- 31 Sunday

ENTOMOLOGIST SHAIKAT PERVEZ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT MARDAN-HUSSAI

May 1992

31 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H

June 1992

6 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
7 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
8 Monday
READ BLOOD FILMS BY MICROSCOPISTS
9 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
10 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
13 Saturday
ALL NIGHT HUMAN BAIT H
14 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
20 Saturday
ACD BY MALARIA SUPERVISOR H
21 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
22 Monday
READ BLOOD FILMS BY MICROSCOPISTS
23 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
24 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
27 Saturday
ALL NIGHT HUMAN BAIT H
28 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H

July 1992

4 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
5 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
6 Monday
READ BLOOD FILMS BY MICROSCOPISTS
7 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
8 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

July 1992

11 Saturday
ALL NIGHT HUMAN BAIT H
12 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
18 Saturday
ACD BY MALARIA SUPERVISOR H
19 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
20 Monday
READ BLOOD FILMS BY MICROSCOPISTS
21 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
22 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
25 Saturday
ALL NIGHT HUMAN BAIT H
26 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H

August 1992

1 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
2 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
3 Monday
READ BLOOD FILMS BY MICROSCOPISTS
4 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
5 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
8 Saturday
ALL NIGHT HUMAN BAIT H
9 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
15 Saturday
ACD BY MALARIA SUPERVISOR H
16 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
17 Monday
READ BLOOD FILMS BY MICROSCOPISTS
18 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
19 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
22 Saturday
ALL NIGHT HUMAN BAIT H
23 Sunday

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CALENDAR OF EVENTS FOR DISTRICT MARDAN-HUSSAI

August 1992

- 23 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 29 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 30 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Monday
READ BLOOD FILMS BY MICROSCOPISTS

September 1992

- 1 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Saturday
ALL NIGHT HUMAN BAIT H
- 6 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 12 Saturday
ACD BY MALARIA SUPERVISOR H
- 13 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Saturday
ALL NIGHT HUMAN BAIT H
- 20 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 26 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 27 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 29 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 30 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS

October 1992

- 3 Saturday
ALL NIGHT HUMAN BAIT H
- 4 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 10 Saturday
ACD BY MALARIA SUPERVISOR H
- 11 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 13 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Saturday
ALL NIGHT HUMAN BAIT H
- 18 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 24 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 25 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 27 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 31 Saturday
ALL NIGHT HUMAN BAIT H

November 1992

- 1 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 7 Saturday
ACD BY MALARIA SUPERVISOR H
- 8 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 10 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 11 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 14 Saturday
ALL NIGHT HUMAN BAIT H
- 15 Sunday

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CALENDAR OF EVENTS FOR DISTRICT MARDAN-HUSSAI

November 1992

- 15 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 21 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 22 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 24 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 25 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 28 Saturday
ALL NIGHT HUMAN BAIT H
- 29 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H

December 1992

- 5 Saturday
ACD BY MALARIA SUPERVISOR H
- 6 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 7 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 8 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 12 Saturday
ALL NIGHT HUMAN BAIT H
- 13 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 19 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 20 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 21 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 22 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 26 Saturday
ALL NIGHT HUMAN BAIT H
- 27 Sunday

December 1992

- 27 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H

January 1993

- 2 Saturday
ACD BY MALARIA SUPERVISOR H
- 3 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 4 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 5 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 9 Saturday
ALL NIGHT HUMAN BAIT H
- 10 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 16 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 17 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 18 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 19 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 23 Saturday
ALL NIGHT HUMAN BAIT H
- 24 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 30 Saturday
ACD BY MALARIA SUPERVISOR H
- 31 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

February 1993

- 1 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 2 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 3 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 6 Saturday
ALL NIGHT HUMAN BAIT H

ENTOMOLOGIST SHAIKAT PERVEZ

2/4/1992

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CALENDAR OF EVENTS FOR DISTRICT MARDAN-HUSSAI

February 1993

- 7 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 13 Saturday
SCHOOL CHILDREN SURVEY MICROSCOPI-
STS/SHAIKAT
ACD BY MALARIA SUPERVISOR H
- 14 Sunday
READ BLOOD FILMS BY MICROSCOPISTS
- 15 Monday
READ BLOOD FILMS BY MICROSCOPISTS
- 16 Tuesday
READ BLOOD FILMS BY MICROSCOPISTS
- 17 Wednesday
READ BLOOD FILMS BY MICROSCOPISTS
- 20 Saturday
ALL NIGHT HUMAN BAIT H
- 21 Sunday
INDOOR RESTING COLLECTIONS H
MOSQUITO IDENTIFICATION H
- 28 Sunday
READ BLOOD FILMS BY MICROSCOPISTS

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