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SEMINAR ON THE ROLE OF HEALTH SERVICES AND TRAINING INSTITUTES IN THE CONTROL OF VECTORS AND RESERVOIRS OF DISEASES

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Agenda item 11

ROLE OF NATIONAL INSTITUTE OF HEALTH, ISLAMABAD PAKISTAN IN COUNTRY'S VECTOR BIOLOGY AND CONTROL PROGRAMME

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The National Institute of Health, Islamabad, undertakes surveillance of communicable diseases in Pakistan and is also responsible for applied research in the relevant fields. It is collaborating with national as well as international agencies and has also been designated as a WHO National Reference Centre for Influenza, Hepatitis and the Regional Centre for Immunological Reagents. In addition, it receives substantial support under the Special Programme for Tropical Diseases Research from UNDP/World Bank/WHO and is conducting research on leprosy, leishmaniasis and malaria.

With regard to arboviruses and their vectors, work on this subject is a continuous feature of this Institute and there is a separate unit concerned with Arboviruses. Historically, Burney (1966) has described his work done during 1963 to 1965 wherein the isolation of the West Nile Fever virus was performed and pools of vectors were examined. Burney et al (1980) described an outbreak of Viral Haemorrhagic Fever caused by Crimean Congo Virus in Pakistan. All the specimens were initially tested at the National Institute of Health, Islamabad. Specimens of blood collection from families in contact, the index case patient and sheep and goats were also tested. A collection of a large number of ticks and lice was also made. Hayee & Burney (1981) have described Arboviruses of Public Health Importance, along with different vectors (see Appendix I).

Nur and Burney (1962) described Scrub Typhus for the first time in Sialkot District of Pakistan. Later, Murine Typhus was also recorded from the Rawalpindi Area. A new species of Borrelia was also recorded from the Northern Area and Azad Kashmir.

Burney (1979) also described visceral leishmaniasis for the first time in Pakistan and various species of Phlebotomus were recorded. A new species, P. burnei, was also described.

Other work done in Pakistan on mosquitoes may be seen in Appendix II.

As regards Siphonaptera, the rat flea Xenopsylla cheopis has been recorded and there is an unauthenticated report of transmission of Bovine Pasteruellosis by fleas. Among Acarina of various genera such as Ornithodorus. Boophilus, Hyolomma, Haemophysalis, Rhipicephalus and Amblyomma are prevalent.

Keeping in view the importance of vector biology and control, the National Institute of Health has established a separate Entomology and Mammology department which is now commissioned to carry out independent research. Scientists in the relevant fields are being recruited and research in the following fields is to be monitored:

i) Surveillance of different vectors and reservoirs,

ii) Study on the genetics of resistance in different species of mosquitoes;

iii) Discovery of new compounds which may be unaffected by cross resistance
Besides the use of alternative chemicals, use of insecticides in mixtures and rotation

iv) Study on mosquito larvicides such as Pirimiphosmethyle and Jodfenphos etc (organophosphates).

v) With the collaboration of the Malaria Eradication Programme early detection of vector resistance is also to be monitored by taking into account different vector species in different areas and socioeconomic heterogeneity of the control areas with characterization of degree and dominance

The training Sub-Division of the National Institute of Health is being upgraded and after the start of the B.Sc. Medical Technology Courses for Vector Biology and Control are to be included Already the National Institute of Health is a seat of higher learning, being affiliated with the University, various scientific meetings, courses and workshops are conducted and its role in Vector Biology and Control is vital.

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*) to be completed

Virus	*Group*	*Original isolations*	*Source of original isolations*
Bakau	Bakau	Oct 1964 at Mahmoodbooti, 6 miles NE of Lahore	Pool of adult ticks (Argas abdussalami) collected from Gyps Bengalensis roost in Dalbergia tree
Congo-Crimean Hemorrhagic Fever	Congo	Nov 1965 at Changa Manga	1) Pool of ticks (Hyalomma a anatolicum) collected from a cow 2) Pool of ticks (Boophilus microplus and H.a. anatolicum) collected from a cow
		Jan-Feb 1976, Rawalpindi	6 isolates from human blood
		May 1976, Quetta, Baluchistan	4 isolates from human blood
		July 1978, Rawalpindi	1 isolate from human blood
Dera Ghazi Khan	Dera Ghazi Khan	April 1966, Sakhi Sarwar, Dera Ghazi Khan, District	Pool of tick larvae (Hyalomma redikorzevi) collected from a camel
Hazara	Congo	July 1964, at Gittida Kaghan Valley, Hazara District	Pool of adult ticks (Ixodes redikorzevi) collected from the vole, Aticola Royler
Manawa	Uukuniemi	August 1964 at Manawa 13 miles east of Lahore	1) Pool of ticks (Argas abdussalami) collected from Gyps Bengalensis roost in Dalbergia tree
		1964-66, Changa Manga Forest, Lahore district and Baltit, Hunza, Gilgit Agency	2) Pool of tick larvae (Rhipicephalus ramachandrai) collected from a gerbil (Tatera indica) 3) Pool of ticks, mixed stages (R sanguineus turanicus) collected from a goat
Wad Medani	Kemerovo	1965 at Changa Manga Forest, Lahore district	Pool of adult ticks (H a anntolicum and Boophilus microplus) collected from a cow
Karimabad	Phlebotomus Fever	1959 at Said Pur, Rawalpindi, district	Pool of sandfly females (Sergentomyia spp)
Sandfly Fever (Napels)	Phlebotomus Fever	1959 at Rawalpindi	1) Human plasma (Male 22 years of age) 2) Human plasma (Male 45 years of age)
Sandfly Fever (Sicilian)	Phlebotomus Fever	1959 Rawalpindi and Bazid Khel	1) Human plasma (Male 22 years of age) 2) Pool of sandfly females (Phlebotomus spp)
West Nile	B	1962-65, Lahore district	6 isolates from pools of mosquitoes (Culex tritaeniorhynchus) 5 isolates from human plasma from febrile patients
		1963-65, Rawalpindi Area	2 isolates from human blood from febrile patients
Dengue	B	Summer of 1968 in Lahore	Cerebrospinal fluid from a child

this survey was on the seven villages of Punjab

Appendix II

Table 3

Species of mosquitoes identified, the life history stages collected, periods of seasonal abundance and the total number of adults (♀-♂) collected by each sampling method

Species[1]	Stages collected	Periods of abundance[2]	ADULT ABUNDANCE Indoor Resting	Outdoor Resting	Bovid Bait	Light Trap	Total Specimens	Percent[4]
Collection effort			(547.5)MH	(434.0)MH	(629.5)MH	(313)LN		
Aedes								
1 *albopictus* (Skuse)	♀	M,PM	0-0	1-0	0-0	0-0	1-0	r-0
2 *caspius* (Pallas)	♀, ♂	S	1-2	184*-88*	1409-0	337-9	1931-99	0·6-0·1
3 *caticinus* Edwards	L,♀,♂	PM	0-0	17*-4	6-0	0-0	23-4	r-r
4 *detritus* (Theobald)	♀	?	0-0	1-0	0-0	0-0	1-0	r-0
5 *lineatopennis* (Ludlow)	♀,♂	?	0-0	17* 14*	104-0	15-0	136 14	r-r
6 *micropterus* (Giles)	♂	?	0-0	0-0	0-0	0-1	0-1	0-r
7 *pulverulentus* Edwards	♀ ♂	?	0-0	1-0	0-0	0-0	1-0	r-0
8 *scatophagoides* (Theobald)	L,♀	M,PM	0-0	0-0	14-0	0-0	14-0	r-0
9 *taeniorhynchoides*(Christophers)	♀	?	0-0	1-2	6-0	0-0	7-2	r-r
10 *thomsoni* (Theobald)	♀,♂	PM	0-0	3-2	0-0	0-0	3-2	r-r
11 *vittatus* (Bigot)	♀	PM	0-0	0-1	0-0	0-0	0-1	0-r
12 *w-albus* (Theobald)	♀,♂	M,PM	0-0	11-1	0-0	2-0	13-1	r-r
Anopheles								
1 *annularis* van der Wulp	L,♀,♂	W,S	6551* 44-	403-410ns	9717-0	592-13	17763-864	5·0-0·8
2 *barbirostris* van der Wulp	♀	?	0-0	0-0	1-0	0-0	1-0	r-0
3 *culicifacies* Giles	L,♀,♂	S,M,PM	14524* 4897*	1-2	1270-0	466-150	1c261-5049	4·8-4·6
4 *fluviatilis* James	♀,♂	S	8-0	0-0	5-0	0-0	13-0	r-0
5 *hyrcanus* Giles	L,♀,♂	PM	53-9	354*-141*	4066-0	215-4	4688-154	1·4-0·1
6 *pallidus* Theobald	L	?	0-0	0-0	0	0-0	0-0	0-0
7 *pulcherrimus* Ludlow	L,♀,♂	S,M,PM	1148*-295*	169-121	13961-0	55-13	15333-429	4·5-0·4
8 *stephensi* Liston	L,♀,♂	S,PM,W	11000* 1702*	24-18	4144-0	461-111	15629-1831	4·6-1·7
9 *subpictus* Grassi	L,♀,♂	M,PM	10832*-4471*	17-13	6206-0	107-5	17222-4489	5·0-4·1
Coquillettidia								
1 *crassipes* (van der Wulp)	♀,♂	PM	2-0	5-21*	1-0	0-0	8-21	r-r
Culex								
1 *bitaeniorhynchus* (Giles)	L,♀,♂	M,PM	103-54	307*-368*	78-0	25-4	513-826	0·2-0·4
2 *epidesmus* (Theobald)	L,♀,♂	PM	0-0	30* 11*	147-0	0-0	177-11	0·1-r
3 *fuscanus* Wiedemann	L,♀,♂	PM	0-1	21*-66*	8-0	1-0	30-67	r-0·1
4 *furvocephala* Theobald	L,♀,♂	PM	71-48	3605* 1999*	1561-0	80-6	4717-2053	1·4-1·9
5 *halifaxii* Theobald	♀,♂	PM	0-0	2-1	0-0	0-0	2-1	r-r
6 *infula* Theobald	L,♀,♂	M,PM	4-1	6-1	6-0	0-0	16-2	r-r
7 *malayi* (Leicester)	♀,♂	PM	0-0	2-3	1-0	0-0	3-3	r-r
8 *pallidothorax* Theobald	♀,♂	S	11* 2	0-0	0-0	0-0	11-2	r-r
9 *quinquefasciatus* Say	L,♀,♂	W,S	14695ns-8500	14965ns-34313*	929-18	341-187	30930-43018	9·0-39·4
10 *pseudovishnui* Colless	L,♀,♂	S,M,PM	295-38	4687* 5828*	19758-0	nd	24740-5866	7·2-5·4
11 *theileri* Theobald	♀,♂	?	0-0	1-1	2-0	0-0	3-1	r-r
12 *tritaeniorhynchus* Giles	L,♀,♂	S,M,PM	4168-1690	48525*-39602*	118408-0	18578-2910	189629-44202	55·4-40·5
13 *univittatus* Theobald	L,♀,♂	S	0-1	25*-38*	2-0	0-0	27-39	r-r
14 *vagans* Wiedemann	L,♀,♂	W,S	1-3	479*-347*	2-0	11-2	493-352	0·1-0·3
15 *vishnui* Theobald	L,♀,♂	S	8-0	27* 15*	138-0	nd	173-15	0·1-r
16 *whitmorei* (Giles)	♀,♂	S	0-0	7-7	21-0	0-0	28-7	r-r

Table 3 (Cont'd)

Species[1]	Stages collected	Periods of abundance[2]	ADULT ABUNDANCE[3] Indoor Resting	Outdoor Resting	Bovid Biting	Light trap	Total Specimens	Percent[4]
Culiseta								
1 *alaskaensis indica* (Edwards)	L	?	0-0	0-0	0-0	0-0	0-0	0-0
Mimomyia								
1 *chamberlaini clavipalpus* (Theobald)	L, ♂	PM	0 0	191*-7	2-0	0-0	193-7	0 1-r
Mansonia								
1 *uniformis* (Theobald)	L,♀ ♂	M PM	6-0	127*-78	1715 33	40-10	1888-121	0 6-0 1
Orthopodomyia[nr]								
1 near *anopheloides* (Giles)	♀,♂	PM	0-0	7-4	0-0	0-0	7-4	r-r
Uranotaenia								
1 *unguiculata* Edwards	♀,♂	?	0-0	1-0	0-0	0-0	1-0	r-r
Total 43			63481-22155	73622-83527	183748-51	21326-3425	342179-109158	

[1] Species nomenclature followed Knight and Stone (1977) nr=new collection record for Pakistan according to Aslamkhan (1972) *significantly greater number of either sex collected resting in or outdoors using a chi square test for departure from randomness ($P<0.05$) ns=not significant ($P>0.05$)

[2] S=spring P_rM=premonsoon M=monsoon PM=postmonsoon W=winter (see Fig. 1) ?=too few specimens to determine

[3] Total specimens collected MH=man hours TN=trap night light trapped *vishnui* complex mosquitoes not determined (nd) and pooled under *Cx tritaeniorhynchus*

[4] Percent of total r=rare (<0.05%)

tritaeniorhynchus from May to October, and *Cx quinquefasciatus* during the post monsoon and spring seasons

Although more species were collected during 1977, more total specimens were taken during 1976, however, considerable among-village and collection-method variability prevented these means from being statistically significant (Table 2) The highest numbers of endophilic anophelines were recorded in 1976 before the onset of insecticide spraying of houses for malaria abatement and before the monsoon flooding of 1976 (Figs 2, 3) Anopheline populations that were decimated by these catastrophic mortality factors did not readily recover and remained low during 1977 Exophilic resting mosquitoes were not adversely affected by insecticides and remained comparably abundant throughout 1976 and 1977, e g *Cx tritaeniorhynchus* (Fig 4)

The 4 collection methods employed differed considerably among the fauna sampled, the number of specimens recovered, and the apportionment of specimens among species (Table 2) Evening bovid bait collections were among the most productive capturing the most species, the largest numbers of specimens and having among the highest equitability of specimens among species However, early evening biting collections were not suitable to monitor the population abundance of *An culicifacies*, *An stephensi* and perhaps *An subpictus* which markedly varied their time of biting from early evening during winter to late night during summer (Reisen and Aslamkhan, 1978) This method was also inadequate for those species which were partially anthropophilic *(Cx quinquefasciatus)* or ornithophilic (e g *Cx bitaeniorhynchus, Cx fuscanus, Cx vagans*) (Reisen and Boreham, 1979) Biting collections did provide good estimates of relative abundance for those species feeding preferentially on bovids early in the evening throughout the year, e g *Ae caspius, An nigerrimus, Cx fuscocephala, Cx pseudovish-*