

PD-ABG-102



VBC PROJECT

Tropical Disease Control for Development

Trip Report

Technical Assistance to the Bolivian CCH Chagas Project

**(With notes on Dengue/DHF and Bolivian
hemorrhagic fever outbreaks)**

March 7 - 23, 1993

by

Andrew A. Arata, Ph.D.

VBC Report No. 82235A

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Author

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1. Introduction

The purpose of this trip was to attend a Chagas Control Project meeting in Tarija to review work in that area, and to work with the CCH Chagas team in Cochabamba on insecticide studies. Although these objectives were accomplished, considerable time was also spent on: a) coordinating the team of Drs. Peters, Yates and Salazar, who investigated the reported outbreak of Bolivian hemorrhagic fever in Beni, and b) investigating the first reported Bolivian outbreak of dengue hemorrhagic fever (DHF) in Santa Cruz.

I prepared a description of the project's insecticide needs for 1993 and a justification under the 1991 environmental assessment for purchases of the quantities needed. I also worked with the VBC-contracted team sent by the Cooperative Housing Foundation (CHF) to explore the possibility of developing rotating funds to establish community credit for housing improvements under the CCH Project.

Separate reports will be available on the Bolivian hemorrhagic fever survey by Peters, Yates and Salazar (VBC Activity No. 81419) and Cost Recovery Mechanisms by the CHF team of Coughlin and Calkins (VBC Activity No. 82235). A brief review of the DHF outbreak in Santa Cruz is included in this document.

2. Financial Report on CCH-VBC PIO/T

In early 1993, prior to the current round of consultants, the balance in this PIO/T account was approximately \$62,000. The TA TDYs recently completed or in progress include:

1. CHF (Cost Recovery Mechanisms - 2 persons/2 weeks);
2. Dr. S. Gonzales (KAP Studies - 2 weeks);
3. Dr. D. Schwartz (Congenital Transmission Study - 2 weeks), and;
4. Dr. A. Arata - (Program planning and entomology - 2 weeks plus).

When the final bills for these are accounted, it is estimated that the PIO/T account will have a balance of approximately \$15,000. The expiration date of this PIO/T is June 30, 1993.

Unless there are other recommendations from the CCH Project, I suggest that the remaining funds be used to support a two week TDY by Dr. Herman Bermudez (CCH Medical Entomologist) to visit Brazil in May - June 1993, to examine the insecticide application techniques and monitoring conducted by Dr. Oliverjo Filho and Dr. J. C. P. Dias in Belo Horizonte, M. G. Brazil; and that Dr. Oliverjo return with Dr. Bermudez to Bolivia to review the work of CCH and make appropriate recommendations based on his vast experience in Brazil.

The CCH Project had earlier requested a consultancy by Dr. J.C.P. Dias to Bolivia, but Dr. Dias has informed VBC that he would not be available until July 1993, after the expiration of this PIO/T.

The consultant team of Drs. Peters, Yates and Salazar to examine the Bolivian Hemorrhagic Fever outbreak was not funded under this PIO/T. The VBC Project was able to fund Dr. Yates and Mr. Salazar through central funds: Dr. Peters (CDC employee) was funded through a PASA between R&D/H/A.I.D./W and CDC/Atlanta at no cost to the USAID mission in La Paz.

3. Meeting in Tarija (March 8-10)

The meeting reviewed the work by the Habitat team in Tarija and summaries of activities in other areas were presented.

3.1 The Habitat work includes:

a. Research

- community beliefs
- local materials
- appropriate technology
- causes of house deterioration
- problems with other methods of assistance (e.g. use of food subsidies, forms of credit)

b. Education

- school children
- communities, focusing on the women and young
- training community workers

A list of material being produced by Habitat and the criteria for selection of communities is shown in Tables 1 and 2.

3.2 Dr. Balderrama and Dr. Bermudez reviewed the 1993 work in the Cochabamba area

These include:

- a. Congenital study involving 1000 mothers to start in March: separate reports covers this activity. Dr. Ann Moore, CDC, has been in Cochabamba this past month preparing final details of this activity with Dr. Torrico. VBC consultant Dr. David Schwartz, a pathologist, is due to arrive in Cochabamba (c. March 20) for a two week consultancy on this activity.

- b. Sylvatic study of *T. infestans* was outlined briefly. Further details are provided on page 9 of this report.
- c. Insecticide results were discussed. Control of reinfestation is not as good as anticipated. In the initial trials 10% of improved and sprayed houses became reinfested in 6 months, as opposed to 23% of un-improved but sprayed houses. Original infestation in trial area was 38%. A discussion was held on whether this was "reinfestation" from outside sources or simply residual vector populations. If the latter, further studies are needed on selecting proper insecticides, adjusting doses, and improving application. Further details are provided on page 7 of this report.
- d. New Communities. The process of initiating housing improvements in new communities in the Cochabamba area was outlined as follows:
 1. Meeting with leaders of community
 2. Selection of promoters
 3. Mapping
 4. Epi/Ento baseline (with report to community leaders)
 5. Improvement of houses (over approximately 2 month period)
 - plastering
 - roofing
 - corrals
 - bedrooms
 - finally, windows and doors are provided by CCH.

Throughout all of these steps there are community meetings with the promoters. These go through phases of demonstration and appropriate use of the house (hygiene and avoiding reinfestation with vectors). The final step is:

6. Spraying with insecticide.

3.3 Cost Recovery Mechanisms

- The ongoing CHF TDY to define potential for Cost Recovery Mechanisms for the CCH-Chagas project was reported by Mr. Jason Coughlin. The full CHF report is the subject of a separate document which was left in draft with the CCH Project during the debriefing of the CCH team on March 13, in La Paz.

3.4 Additional topics which were discussed include:

- Serological evaluation of communities improved in earlier activities will begin in April (1993): only children < 10 years of age will be examined.
- Further serological sampling should be kept low and only when specific information is required.
- Dr. Balderrama described one locality in Cochabamba (Pojo) where malaria is common, and the impact of the work being done for Chagas control (housing improvement and spraying) on malaria reduction will be measured.
- Twenty-five percent (25%) emigration (or movements) from study areas was noted. This is largely for economic reasons and may be seasonal. A small study will be initiated to determine whether movement is greatest from poorly constructed/maintained houses or from those of better quality.
- In relation to "residual" vector populations after spraying, further studies will be conducted to determine more precisely where in the housing compound the vectors are found and what stages (nymphs) are collected.
- Dr. Arata described the procedures required for purchasing insecticides not manufactured in the United States.

- A discussion was held on the feasibility of setting up serological and entomological laboratories in Tarija in conjunction with the Unidad Sanitaria and the local University. It was agreed that a serological laboratory was possible (training of technicians would be carried out in Cochabamba): for several reasons the entomological laboratory was not approved.
- Lic. Andres Yale, who has replaced Lic. Jaime Burgoa as CCH-Chagas coordinator, gave a financial review of the project's resources at this time.

4. Insecticide Selection and Testing

Initial laboratory and field trials with pyrethroid insecticides have not provided quick knock-down and mortality nor long residual effect: as measured by WHO cone bioassays. The laboratory has obtained fresh stocks of technical grade ingredients of approved insecticides from manufacturers and received the gift of a micro-applicator for topical tests.

- a. EA requirements - the most suitable for the EPA approved pyrethroids has been ICON® (lambda-cyhalothrin): a justification for purchase of this UK manufactured product has been prepared for purchase of 150 kg of 10% WP formulation. Both local costs and estimates provided by U.S. and U.K. vendors have been obtained. This documentation has been turned over to Ned Olney (CCH) and Clem Boucher (USAID) for ordering supplies in time for the scheduled spraying period in May 1993. (Annex 1)

In view of the use of K-Otrina® (deltamethrin) by WHO/PAHO approved Chagas control programs in Brazil, Argentina, Chile, Uruguay and Paraguay, a justification was prepared for use of this compound in laboratory and field trials (5 houses). USAID will not purchase any of this material: a small quantity has been given to the project for testing by the manufacturer.

- b. Laboratory and field trials (Cochabamba)
 - To more precisely measure the effect of pyrethroid insecticides, topical application tests will be carried out with technical grade material according to the protocol prepared by Dr. Bermudez (Annex 2).
 - Approximately 500 newly improved houses will be sprayed with lambda-cyhalothrin. Efforts will be made to carefully control spraying coverage of houses and especially the corrals and animal houses and other exterior buildings.

- Evaluations will carefully note location and stage of all vectors captured. Quantity and dosage of insecticides applied will be accurately monitored.
- A small cone bioassay trial will be conducted in 2-4 abandoned houses by applying sprayed walls with different concentrations of lambda-cyhalothrin (0.04; 0.08; 0.16%).
- A small field trial (with the fresh insecticides received) will be carried out with three compounds in five (5) houses each. These will be RODY, ICON, Deltamethrin and a control (total 20 houses).
- One explanation for the relatively poor results obtained in earlier residual trials may be the quality of the local water used for preparing the mixture for application. Alkaline or saline water, as exists in some rural areas, may have a deleterious effect on the insecticide. If time permits, a trial will be designed to test lambda-cyhalothrin with water of known quality used in the preparation of desired dilutions.

5. Sylvatic Cycle of *T. infestans*

This project is proceeding well. Dr. Bermudez has developed a protocol for the second phase of the study. (Annex 3) This is based on:

- a. capturing vector triatomines in eight (8) chicken-baited adobe "gallineros" placed at various distances from human habitations that have been sprayed with lambda-cyhalothrin, to detect movement of "wild" triatomines toward the human habitations.
- b. vectors captured will be used for genetic and population dynamic studies, as well as sources of wild and domestic blood meals.

The study of *T. cruzi* in wild mammals can be expedited by collaboration with Dr. Terry Yates, (U. New Mexico) - see section on BHF - page 10 - who will be conducting wild mammal studies during the summer of 1993 in the Cochabamba area, by means of a transect from the valley, over the sierra into the chapare.

6. Bolivian Hemorrhagic Fever (Machupo Virus) Outbreak in Beni

A team organized by the VBC Project arrived in Bolivia on March 10 and 11, 1993. It was composed of Dr. C. J. Peters, Chief of CDC's Special Pathogens Branch, Atlanta; Dr. Terry Yates, Professor at the University of New Mexico who has studied Bolivian rodents for eight years; and, Lic. Jorge Salazar Bravo, Curator of Mammals at the Museo Nacional de Bolivia, and currently a doctoral student of Dr. Yates at the University of New Mexico.

A separate report on the details of their survey is available (VBC Activity No. 81419). At the time of this writing a draft is available at the CCH Project and has been presented to the Ministry of Health in La Paz.

The teams's findings include:

- The case that was diagnosed in the city of Trinidad (February 1993) was confirmed by virus isolation in CDC Atlanta.
- No other cases have been diagnosed.
- The team visited all locations suspect as possible sites of transmission. Rodents, *Calomys callosus*, were trapped and tissue samples returned to CDC to attempt virus isolation.
- Rodent populations were not excessively high in the region during the time of this visit.
- Although no specific treatment for BHF is available, the team recommended consideration of using the recently developed Argentinean Hemorrhagic Fever (AHF) vaccine in populations at risk, and identification of sources of immune plasma from recovered cases.

- Surveillance for increases in the local rodent population should be established as well as hygienic measures to keep rodents from housing and food stores.
- Dr. Peters' laboratory at CDC offers to train Beni technicians in the BHF ELISA technique to improve local diagnostic capability.

7. Dengue Hemorrhagic Fever Outbreak in Santa Cruz

Five confirmed cases of DHF have occurred since mid-February 1993: these are the first cases known from Bolivia. They occurred in Santa Cruz, which was the site of a dengue outbreak (approximately 140,000 cases in an estimated population of 600,000) in 1987-88, from November through March.

A brief report, based on two days of observation and discussions with local malaria/dengue control staff is attached (Annex 4).

The surveillance system in Santa Cruz is not functioning well. Cases of classic dengue are not being reported, and the magnitude of the outbreak cannot be estimated.

Blood samples have reportedly been sent to CDC for serotyping.

8. Recommendations (CCH-Chagas)

1. The Project should catalogue and coordinate production of all documents and training materials. A large amount of material is still being produced with evident duplication.
2. Time-lines for all scheduled 1993 activities should be produced, along with estimates of personnel involvement in each. Each activity should have a planned termination date for work in the field and a date on which the final report is due: interim reporting (monitoring) should also be scheduled so that project managers can review progress and adjust financial resources, as required.
3. USAID/La Paz should order 150 kg of 10% WP lambda cyhalothrin insecticide for use in intradomiciliary and corral spraying as soon as possible. Supplies are required to initiate spraying in May 1993.
4. Dr. Bermudez should contact Dr. Terry Yates, University of New Mexico, Albuquerque, New Mexico, to arrange collaborative studies on wild mammals in Cochabamba during the summer of 1993.
5. If CCH-Chagas approves, the VBC Project will make arrangements for Dr. Bermudez to visit control operations and insecticide testing laboratories in Brazil in May or June 1993.
6. The review meeting of the Chagas disease control participants in Tarija was useful, and such meetings should continue. It would be better if the meeting was not used to discuss small details of finance that can be negotiated more effectively in the office. A stronger agenda, prepared by the CCH office in La Paz, focusing on technical and coordination issues is recommended.
7. Despite the large number of manuals and TA reports produced by the CCH-Chagas project, there is no overall document that presents the objectives and accomplishments of the project over the past two years. This should be prepared, not to demonstrate what has been

done by Habitat, Cardenal Maurer, or in Cochabamba, but to demonstrate the capabilities that have been developed in planning, executing and monitoring a control program. An outline for this proposed document, and the purpose for which it should be used is provided in Annex 5.

This document should be technical, yet promotional, to reflect how money could wisely be invested in Chagas control in Bolivia. A shorter, promotional brochure or booklet (c. 10 pages) for broad distribution and to attract potential investors should also be prepared.

Itinerary

1. Arrived in La Paz March 7, 1993.
2. Departed for Tarija March 8, 1993:
 - CCH-Chagas Technical Review Meeting March 8-10
3. Departed for La Paz, March 10:
 - review of EA insecticide requirements;
 - assisted BHF team with briefings and other arrangements; and
 - debriefing with CHF team.
4. Departed for Santa Cruz March 14:
 - reviewed DHF outbreak.
5. Departed for Cochabamba March 17:
 - reviewed sylvatic study; and
 - discussed insecticide trials.
6. Departed for La Paz March 19:
 - was in contact with BHF team which was unable to return to La Paz: received their report by fax;
 - prepared trip report; and
 - debriefed on DHF and BHF outbreaks
7. Departed for Washington, Tuesday, March 23.

Persons Contacted

CCH

Dr. Alvanro Munoz
Dr. Joel Kuritsky
Lic. Andres Yale
Mr. Ned Olney
Dra. Ann Moore
Mr. Mike Flynn
Dr. Fanor Balderrama
Dr. Faustino Torrico
Dr. Hernan Bermudez

USAID

Mr. Paul Hartenberger
Ms. Sigrid Anderson
Mr. Charles Llewellyn
Mr. Clem Boucher
Ms. Eileen Stout

MOH

Dr. Virgileo Prieto
Dr. Fernando Gill
Mr. Victor Lima Castro
Mr. Justo Suarez Castedo
Dr. Jose Cespedes
Dr. Jack Antelo

HABITAT

Dra. Irene Vance
Mr. Jose Beltran
Dr. Roberto Marques

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Appendices

Details on insecticides programming for use in 1993 by CCH-Chagas Project.

- A. Lambda-cyhalothrin: Available under various trade names, e.g. LCON, AGRIPAC, COMMODORE, etc. The formulation to be used in this project is EPA registered 10% WP. Laboratory and field trials, i.e. 1000 houses are planned with quantities consistent with estimates made in 1991 Environmental Assessment (EA).

This is still a pilot project with much to be learned on housing improvements, materials used in construction, application and efficacy of insecticides. Lambda-cyhalothrin was listed in the 1991 EA and was one of eight (B) compounds approved by the Environmental Office.

During 1993 this is the only insecticide that will be purchased. Only 150 kg. of the compound is required: the local purchase price in Bolivia is approximately US\$15,000. Requests for prices from U.S. sources (formulators are being made. Origin of active ingredient (a.i.) is U.K. Sources are in many countries.

- B. Deltamethrin: EPA registration was not completed in 1992 as expected and is now expected in 1993. Project proposed to continue testing this material for efficacy in laboratory in small scale field trials. (50 houses). There will be no operational use of deltamethrin. There will be no purchase of deltamethrin. A small quantity i.e. 10 kg have been donated by the manufacturer for testing.

Permission for controlled experimentation exclusively for the use of research and field evaluation on compounds not registered by EPA may be permitted by the Environmental Officer under Reg. 216.2 (6) (ff).

Deltamethrin is the insecticide of choice in Chagas Control programs sponsored by PAHO/WHO and is in use in Argentina, Brazil, Chile, Uruguay, etc. It is important to have small scale field trials that compare Bolivian results to those of neighboring countries even prior to EPA registration.

Table 1

**MATERIALS BEING PRODUCED BY HABITAT
FOR CCH CHAGAS PROGRAMME 1992-1993**

MATERIAL	TARGET GROUP	TOPIC	DISTRIBUTION
MANUAL	FAMILY ESPECIALLY COMMUNITY MASON'S CARPENTERS	Housing improvement	In 7 communities Approximately 600 families
MANUAL	FAMILY ESPECIALLY YOUNG MEN AND WOMEN	Maintenance and repairs	Communities Approximately 600 families
FLIPCHARTS	COMMUNITY HEALTH PROMOTERS	Chagas disease Steps to improve the dwellings Technical information and procedures for spraying and house inspection	
CALENDAR	FAMILY ESPECIALLY WOMEN		Approximately 600 families
BLACK AND WHITE POSTER	SCHOOL CHILDREN	"Find the Vinchuca" Focuses on the main places where vinchucas are found in the dwelling	6 schools 3 in Erqui 1 school in Laja 1 school in Orozas 1 school in Colmata Children in Cadillac Approximately 650 children
2 AUDIO-VISUALS	INSTITUTIONS COMMUNITY HEALTH PROMOTERS	Housing improvements Hygiene practices Habitat of the vector	
ONE 10 MINUTE VIDEO	INSTITUTIONS	Methodology for community participation and planning	CCH and others
TWO 10 MINUTE VIDEOS	COMMUNITY	Housing improvements Prevention of chagas disease	CCH and other NGO's
PUPPET SHOWS	CHILDREN AND YOUTH	Health and hygiene	4 puppet shows
GUIDE BOOK	INSTITUTIONS AND TRAINERS	Guidelines on participatory and non formal education	CCH NGO's International Organizations

Table 2

**CRITERIA FOR SELECTION OF
COMMUNITIES 1992 - 1993**

COMMUNITY	DISTANCE FROM TARIJA Km	TOTAL POPULATION HAB.	SOCIO-ECONOMIC CHARACTERISTICS	SELECTION CRITERIA AND VARIABLES	OBJECTIVES
CADILLAR	17	137	MIXED FARMING AND COMMERCE	<ul style="list-style-type: none"> 1. LOCATED WITHIN 1991-92 CONTROL AREA 2. SMALL COMMUNITY 3. POOR ORGANIZATION 4. ABSENCE OF POTABLE WATER 5. NO ELECTRICITY 6. NO SCHOOL 	CARRY OUT HOUSING IMPROVEMENTS IN A CONTEXT WHERE IT IS NECESSARY TO CREATE A COMMUNITY ORGANIZATION COMBINE HOUSING IMPROVEMENTS AND WATER INSTALLATION. DEVELOP AND INTRODUCE A PARTICIPATORY LOW COST MODEL
COIMATA	20	445	MIXED-SCALE FARMING COMMERCE	<ul style="list-style-type: none"> - LOCATED WITHIN 1991-1992 CONTROL AREA - STRONG COMMUNITY ORGANIZATION ECONOMICALLY HETEROGENEOUS GROUP - DISPERSED HOUSES 	CARRY OUT HOUSING IMPROVEMENTS TO INTRODUCE A COST RECOVERY ELEMENT
OROZAS	32 65	720	SMALL-SCALE SUSTINENCE FARMING ARTISAN CARPENTERS	<ul style="list-style-type: none"> - VARIED ECONOMIC BASE - PRESENCE OF SMALL SCALE PRODUCERS - VERY DISPERSED HOUSES - POOR COMMUNICATION WITH TOWN - STRONG ORGANIZATION - PRESENCE OF ACTIVE RURAL TEACHERS 	SUPPORT THE LOCAL ARTISAN MARKET ASSIST IN THE COMMERCIALIZATION OF PRODUCTS (construction materials) TEST EDUCATIONAL MESSAGES IN A GROUP WITH A HIGH DEGREE OF TRADITIONAL BELIEFS ON CHAGAS
IRQUIS	20	1494	FARMERS		STUDY THE REASONS WHY THE COMMUNITY DID NOT COMPLETE HOUSING IMPROVEMENTS IN 1992
LAMAS	25	425	SMALL-SCALE FARMERS AND BAKERS		ESTABLISH A MAINTENANCE PROGRAMME. TRAIN LOCAL MASONS IN REPAIR WORK COMPLETE THE IMPROVEMENT OF DWELLINGS

**RESUMEN DE LOS RESULTADOS DE LAS PRUEBAS BIOLÓGICAS DE 7 infestans EN PAREDES
OBSERVACION A LAS 72 HORAS DESPUÉS DE LA APLICACION**

INSECTICIDA FORMULACION Y DOSIS	Prueba a 24 Hrs. del ROCIAMIENTO				Prueba a 1 mes del ROCIAMIENTO				Prueba a 2 meses del ROCIAMIENTO				Prueba a 3 meses del ROCIAMIENTO				Prueba a 4 meses del ROCIAMIENTO								
	No. de total aplic.		SSI		CCM + M		No. de total aplic.		SSI		CCM + M		No. de total aplic.		SSI		CCM + M		No. de total aplic.		SSI		CCM + M		
	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	Nº	%	
RODY liq 10% 0,1 gr/m2	240	179	74,6	61	25,4	180	141	78,3	39	21,7	180	168	93,3	12	6,7	180	163	90,5	17	9,5	60	60	100	0	0
RODY liq 10% 0,2 gr/m2	60	0	0	60	100	60	22	36,7	38	63,3	120	72	60	48	40	60	19	31,7	41	68,3	120	101	84,2	19	15,8
RODY polvo 5% 0,1 gr/m2	240	23	9,6	217	90,4	300	80	26,7	220	73,3	120	23	19,2	97	80,8	180	69	38,3	111	61,7	60	24	40	36	60
RODY polvo 5% 0,2 gr/m2	60	0	0	60	100	60	0	0	60	100	60	0	0	60	100	120	5	4,2	115	95,8	120	0	0	120	100
ICON polvo 10% 0,04 gr/m2	180	11	6,1	169	93,9	120	43	35,8	77	64,2	120	80	66,7	40	33,3	120	106	88,3	14	11,7					
TEMPO polvo 10% 0,02 gr/m2	180	0	0	180	100	240	22	9,2	218	90,6	180	135	75	45	25	120	107	89,2	13	10,8					
CYMPERATOR liq 2,5% 0,025 gr/m2	180	12	6,6	168	93,3	180	60	33,3	120	66,7	120	38	31,7	82	68,3	120	64	53,3	56	46,7					
DELTAMETHRIN polvo 2,5% 0,025 gr/m2	300	15	5,0	285	95,0	360	48	13,3	312	86,7	240	55	22,9	185	77,1	240	38	15,8	202	84,2	120	10	8,3	110	91,7
FENITROTHION polvo 50% 1 gr/m2	60	22	36,7	38	63,3	120	113	94,2	7	5,8	60	48	80	12	20	60	60	100	0	0					

SSI = Sin Signos de Intoxicación

CCM+M= Suma de los Caídos con Movimiento y los Muertos

UNCLASSIFIED

COPY

AID/LAC/DR/E:ACHIRI:AC:CHAGAS
 10/29/91 647-5680
 AID/LAC/DR/E:JWILSON

LAC/DR/RD:WNLSESTUEN(Info) LAC/DR/SA:LLUCKE(Info)
 LAC/SAH:SEFSTEIN(Info)



PRIORITY LA PAZ, QUITO

AIDAC LA PAZ FOR C. LLEWELLYN, QUITO FOR H. CLARK

E.O. 12356: N/A

TAGS:

SUBJECT: APPROVAL OF ENVIRONMENTAL ASSESSMENT FOR CHAGAS'
 DISEASE CONTROL PROGRAM, COMMUNITY AND CHILD HEALTH
 PROJECT (S11-0594)

REF: LLEWELLYN/HESTER MEMO OF 10/1/91

1. LAC DEPUTY CHIEF ENVIRONMENTAL OFFICER, JOHN WILSON, HAS REVIEWED AND HEREBY APPROVES SUBJECT ENVIRONMENTAL ASSESSMENT (EA), PREPARED BY ANDREW ARATA AND DATED 8/1/91.
2. APPROVAL IS CONTINGENT UPON ADOPTION OF THE MITIGATIVE ACTIONS RECOMMENDED IN SUBJECT EA IN PROJECT IMPLEMENTATION. RECOMMENDED ACTIONS INCLUDE: (A) PESTICIDE MANAGEMENT TRAINING AND PROJECT PROVISION OF PROTECTIVE EQUIPMENT AND EXPLICIT SAFE PESTICIDE USE INSTRUCTIONS FOR APPLICATORS; (B) INCORPORATION OF PESTICIDE SAFETY INFORMATION INTO THE EDUCATIONAL MATERIALS DEVELOPED BY PROJECT FOR HOUSEHOLD OCCUPANTS; (C) CLOSE SUPERVISION AND MONITORING OF PESTICIDE SPRAY PERSONNEL AND OPERATIONS; (D) FREQUENT MONITORING OF CHOLINESTERASE LEVELS FOR APPLICATORS IF ORGANOSPHATE INSECTICIDES ARE SELECTED FOR OPERATIONAL USE; AND (E) TESTING FOR PESTICIDE CONTAMINATION OF SOIL AND WATER IN AND NEAR HOUSES LOCATED IN REPRESENTATIVE PROJECT SITES AT THE END OF THE FIRST YEAR OF PROJECT ACTIVITIES, AND IMMEDIATE IMPLEMENTATION OF CORRECTIVE ACTIONS AND A PERIODIC MONITORING PROGRAM IF EXCESSIVE RESIDUES ARE FOUND.
3. ONLY THOSE INSECTICIDES LISTED IN TABLE 3 OF THE EA ARE APPROVED FOR USE UNDER PROJECT. FURTHERMORE, THE PROJECT SHALL NOT USE THE PESTICIDE, DELTAMETHRIN, IN FIELD OPERATIONS UNTIL THE EPA HAS COMPLETED ITS REVIEW AND REGISTRATION OF THIS PESTICIDE (DELTAMETHRIN MAY BE REGISTERED BY EPA SOMETIME IN 1993).
4. MISSION IS COMMENDED FOR DEVELOPING A COMPREHENSIVE, INFORMATIVE, AND HIGHLY READABLE EA. 44

Table 1
Insecticides to be tested for efficacy against *Triatoma infestans*
vector of Chagas' disease in Bolivia.

Insecticide	Manufacturer	EPA Reg. Nos.*	
Organochlorine:	None to be tested		
Organophosphates:			
50 WP Malathion	American Cyanamid	EPA Reg.	N°241-208AA
40 WP Fenitrothion	Sumitomo Corp of Amer.		N° 39398-9
Impr. Paint Chlorpyrifos	Insecta Corp. (Florida)		N° 45600-1
Carbamates:			
40/20 WP Bendiocarb (FICAM)	Nor-Am Chem. Corp.		N° 45639-1
Pyrethroids:			
Pounce 25 WP Permethrin	FMC Corporation or Fairfield American	Tech.	N°279-3013 279-3051
Cynoff EC/25 Cypermethrin	FMC Corporation or ADAPCO		N°279-3081
Commdore (US) Lambda-Cyhalothrin ICON (UK)	ADAPCO (ICI)		N°10182-96
Tempo 20WP Cyfluthrin K-Otrin Deltamethrin	Mobay U.S. (Bayer) Roussel Bio (France & Bolivia)	EST	N°3125-380 N°97805

* Most compounds have multiple EPA REG. Nos. depending on formulation: Those listed are those appropriate for testing.

ANNEX 2

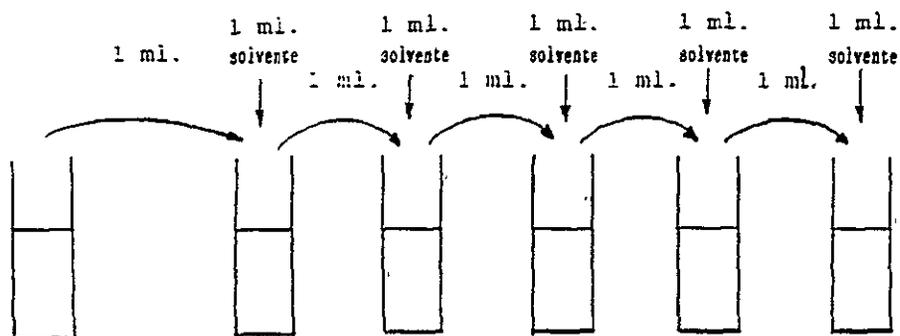
Protocolo para el estudio de sensibilidad de
triatominos a insecticidas 1993

1. Material y equipo

- Micropipeteador manual Arnold (BURKARD MEG. Co. LTD. Rickmausworth England), con jeringa "Agla" de 1 ml. y agujas hipodérmicas de 3/10o x 25mm doblado en ángulo recto.
- Insecticidas grado técnico:
 - Deltamethrin polvo 98% de pureza, recibido de Roussel UCLAF (vencimiento 11/95)
 - Cypermethrin liq. conc. 94,4% de pureza, recibido de Roussel UCLAF (vencimiento 11/93)
 - Permethrin, liq. conc. 99,4% de pureza recibido de ICI (California) a través del Dr. A. Arata.
 - Permethrin, liq. conc. 95,6% de pureza, recibido dea través del Dr. A. Arata. FMC Pennsylvania
 - Cyfluthrin, liq. conc. 93,4% de pureza, recibido de Mites Inc. a través del Dr. A. Arata.
 - Lambdacyhalothrin, liq. conc. 98,0% de pureza, recibido de ICI (UK) a través del Dr. A. Arata.
- Butanone (o acetona) como diluyente del insecticida
- Cajas de petri de plástico
- Triatominos ninfas de 5to. estadio alimentados 5 días antes, colonizados en el laboratorio y originarios de Tarija, Chuquisaca y Cochabamba.
- Papel filtro

2. Metodología2.1 Preparación de las diluciones

Se prepararán 5 diluciones para cada insecticida, inicialmente del concentrado puro se preparará 2 ml. de solución madre al 1%; luego de esta solución madre se obtendrá las diluciones correspondiente de acuerdo al esquema siguiente:



2 ml. 1%	= 2 ml. 0,5%	= 2 ml. 0,25%	= 2 ml. 0,125%	= 2 ml. 0,0625%	= 2 ml. 0,03125%
Dil. madre	Dil.1	Dil.1	Dil.3	Dil.4	Dil.5
Cont. en c/gota 1 μ l	= 5,0 μ g	2,5 μ g	1,25 μ g	0,62 μ g	0,31 μ g
En c/gota 0,5 μ l	= 2,5 μ g	1,25 μ g	0,62 μ g	0,31 μ g	0,15 μ g

2.2 Triatominos a aplicar

Se utilizarán 20 triatominos (ninfas de 5to. estadio) de cada localidad (Cochabamba, Tarija y Chuquisaca) y por cada dilución en cada prueba, se efectuarán 3 pruebas idénticas. Después de cada aplicación se guardarán en frascos de vidrio limpio 10 ejemplares por frasco.

2.3 Observaciones

El registro de la mortalidad se efectuará cada 24 horas hasta un total de 72 horas.

Annex 3

ANEXO

Protocolo de investigación de Focos Silvestres de
T. infestans y T. cruzi en los Valles de CochabambaEsquema de actividades de la segunda fase, ENERO 19931. Introducción

Hasta el momento las actividades realizadas en 1992 contribuyen a conocer los siguientes objetivos:

- 1.a Comprobación del desarrollo del ciclo biológico de T. infestans en ecotopos silvestres de Jamach'uma.
- 1.b Estudio de la infección de Triatominos y mamíferos silvestres por T. cruzi en Jamach'uma.

En este anexo se proponen actividades complementarias para cumplir con los objetivos:

- 2.a Determinar la magnitud de la dinámica estacional de T. infestans en ecotopos silvestres de Jamach'uma.
- 2.b Determinar la magnitud de la probable migración de T. infestans silvestre a domicilios contiguos.
- 3.a Comparar las características genéticas de las poblaciones de T. infestans y T. cruzi silvestres con los domésticos.
- 3.b Estudiar el origen de la sangre ingerida por las poblaciones de T. infestans silvestres y domésticos.

2. Actividades y metodología

- 2.1 Reciamiento con ICON el intra y peridomicilio de las viviendas de Kaluyo, T'ajras Jamach'uma y Villa Rosario.
- 2.2 Captura de triatominos domiciliarios en el medio silvestre y en los domicilios de las 4 localidades mencionadas. Realizar el examen parasitológico en busca de T. cruzi y agruparlos en positivos y negativos, luego tomar las muestras en forma secuencial de la siguiente manera:

a) Ejemplares negativos a T. cruzi

- Cortar la cabeza con tijera de punta fina, depositarla en un vial con 2 cc de alcohol 70, etiquetarlo con el mismo número asignado en el cuaderno de registro. Guardarlo a temperatura ambiente. Estas muestras serán utilizadas para un estudio taxonomico de la QUETOTAXIA de las antenas por Gorla (Inglaterra).
- Cortar los rebordes de los conexivos; levantar las tergitas y con una pinza fina retirar las GONADAS, estas muestras serán depositadas en un papelillo etiquetado adecuadamente; introducirlo en un vial con 2 cc de solución fijadora (3 partes de Etanol absoluto mas 1p. de Ac acetico glacial). Estas muestras serán guardadas a menos 20°C en refrigerador y servirán para un estudio CITOGENETICO de los cromosomas por F. Pancera (Uruguay).
- Cortar el intestino a nivel del "triangulo posterior", retirar el estomago y su contenido impregnarlo en papel filtro Whatman No.1, anotar el numero del registro, dejar secar al aire los papeles con las muestras separadas con papel celofán en forma intercalada y luego guardarlos en conjuntos de 10 papeles en bolsas de plástico a 4°C en refrigerador. Estas muestras serán utilizadas para estudiar el origen de la sangre ingerida por los triatominos. Las muestras serán procesadas en la Facultad de Medicina de la UMSS por el metodo de ELISA (puesto a punto en forma conjunta con el Dr. R. Wirtz).
- En los ejemplares adultos cortar la genitalia (masculina y femenina), depositarlos en un vial con alcohol 70, guardarlos a temperatura ambiental debidamente etiquetado. Estas muestras serán utilizadas para estudios morfologicos comparativos de Genitalia en FIOCRUZ (Brasil).
- Separar el tórax y las patas y depositarlas en un tubo Ependorf a seco, etiquetarlo y guardarlo a menos 70°C en Deep Freezer o Nitrogeno liquido. Estas muestras serán utilizadas para estudios Bioquímico-Geneticos con isoenzymas en Montpellier y en la Facultad de Medicina de la UMSS.

b) Ejemplares positivos a T. cruzi

Para la toma de muestras de estos ejemplares es necesario contar con una "campana de flujo laminar", dentro la cual se efectuarán los siguientes pasos:

- Sumergir el abdomen por 1 minuto en una solución al 2% de HIBITANE.
- Las muestras de la cabeza, gonadas y sangre estomacal serán tomadas de la misma manera que los negativos a T. cruzi.
- Cortar el intestino posterior a la altura del Ciego, luego todo el intestino depositarlo epticamente en un tubo NUNC con 2 ml. de medio de cultivo LIT. Estas muestras mantenerlas a temperatura ambiente por 2 días al cabo de los cuales agregar 1/3cc de una solución de Dimetilsulfoxide (DMS) y guardarlas en Deep Freezer o Nitrógeno líquido a menos 70°C. Las cepas aisladas serán estudiadas por métodos Bioquímicos Genéticos en Montpellier y en la Facultad de Medicina de la UMSS.
- Las muestras de la genitalia y el tórax serán tomadas de la misma manera que en los ejemplares negativos.

- 2.3 Búsqueda de triatomíneos en forma exhaustiva a intervalos mensuales durante todo el período de estudio en las localidades rociadas. Los triatomíneos colectados fraccionarlos en 5 ó 6 muestras indicadas anteriormente.
- 2.4 Construir 8 gallineros centinela. en el área del ciclo silvestre y entre esta y las localidades rociadas, mantener 2 gallinas en cada gallinero durante todo el período de estudio (12 meses)
- 2.5 Disección de los gallineros en busca de triatomíneos a intervalos mensuales. Los triatomíneos colectados fraccionarlos en las 5 ó 6 muestras indicadas anteriormente.
- 2.6 Disección de ecotopos silvestres a intervalos mensuales en busca de Triatomíneos silvestres. Los triatomíneos colectados fraccionarlos de la misma manera.

- 2.7 Envío de las muestras a los lugares destinatarios para su procesamiento. El costo del proceso de estas muestras en otras instituciones correrá por cuenta de aquellas instituciones con excepción de los costos de la Facultad de Medicina de la UMSS, principalmente el que se relaciona con la identificación del origen de la sangre del estómago de los triatomíneos.
- 2.8 Correlación estadística de los datos obtenidos en:
a) triatomíneos de gallineros, b) en triatomíneos domiciliarios post-rociamiento

ANNEX 4

Draft Report: Dengue/DHF Outbreak

Santa Cruz, March 15, 1993

Dr. Andrew A. Arata

I visited the SNEM office in the morning and was introduced by Dr. Fernando Gill of the Unidad Sanitaria: Dr. J. Céspedes (tel. 4249 29/20) was out of town checking a malaria (P.f.) outbreak and was due to return tomorrow. I spoke with inspectors Victor Lima Castro and Justo Suarez.

They reported that:

1. Cases

- Five (5) cases of hemorrhagic fever were reported approximately two weeks ago and had been confirmed to be DHF by CENETROP: one suspect not yet confirmed.
- Ages: 3 young, 11-15 years; 2 others 25-30 but, not certain.
- These have not been serotyped as yet: approximately 30 blood samples were taken from cases and family members last Saturday (13 March) and reportedly sent to Atlanta CDC for serotyping.
- The five positive cases were reported from communities outside of ring road pas (anillo) 5 on the carretera to Cochabamba: 3 cases were from an area 6 km. from Santa Cruz and 2 cases from an area 9 km. from S.C.

2. Vectors

- Larval inspection in infected areas on Thursday, 11 March showed breeding of Aedes in only 3 of 10 manzanas (1 house in each block).
- On Friday, 12 March, the area 6 km. out of town was sprayed with malathion ULV.
- I examined the last city-wide larval inspection data (April -May-June 1992): all districts of the city showed high house indices of Aedes breeding $x = 21\%$ with no apparent significant variation between districts.

- There were heavy rains all year (1992): usually heavy rains occur during December to February.
 - The last dengue outbreak occurred November 1987 - March 1988.
3. Dengue Vector Control Resources
- Dengue control personnel = 52
 - Thirty-five field staff: inspectors, breeding container reduction and abate larviciding operations.
 - 10 LECO ULV machines: only 1 in operation - others to be truck mounted when needed.
 - Twenty back pack sprayers (Fontan)
 - Insecticides in warehouse:
 - 18000 kg. of abate
 - 8800 l. of malathion (95%)
4. Other possible cases outside of Santa Cruz
- I was told that one other suspect DHF case (13 March, Saturday) was reported from San José on road to Cochabamba, 25 km. from S.C. and there were possibly others from smaller communities.
5. Field Visit - Monday, 15 March, p.m. I drove to sites of reported DHF cases at 6 and 9 km. from S.C. with Inspector Lima:
- Most houses have potable water (standing taps and some wells).
 - Lots of trees and vegetation present, so that truck-mounted ULV will be only partially effective.
 - Inspectors indicate that not much water is stored, but flower pots and used tires are common.
 - Visited with auxiliary nurse at health post that diagnosed and reported positive DHF cases - this was at 9 km. past anillo 5.
 - She understood dengue well and claims to have seen numerous cases of regular dengue.

- She took us to one house where an elderly woman and several children were feverish: woman presented typical dengue-like symptoms.
- Auxiliary nurse said "the authorities did not want to alarm the people". Poor surveillance technique.
- Forms for reporting dengue exist - but probably are not at most health posts or clinics.
- Nurse had no equipment to bleed patients - commented that she could only take malaria blood slides.

6. Findings and recommendations

- a. There is clearly an outbreak of DHF in Santa Cruz: Five confirmed and several suspect cases are known. There are apparently numerous of cases of classic dengue but these appear not to be reported.
- b. There is a MOH dengue reporting form for referral of suspect DHF cases to hospital:
 - this form does not indicate age of patient, or length of residence in Santa Cruz;
 - it should be improved and placed in the hands of all health providers along with information on dengue diagnosis and for reporting to MOH authorities. The Unidad Sanitaria has 450 posts in the city of Santa Cruz and 200 in the surrounding areas.
 - cases with hemorrhagic symptoms should be referred to a single hospital facility selected by MOH authorities: lab confirmation at CENETROP is essential.
- c. Surveillance for all dengue cases and their location needs to be strengthened as soon as possible. Vector control resources are very limited, especially if cases are found outside of Santa Cruz: targeting vector control operations is essential.
- d. A seroepidemiologic survey should be made of all diagnosed dengue and a sample of the general population to identify the dengue virus serotypes presently circulating in the population. The 1987-1988 epidemic was caused by Dengue 1 virus.
- e. Given the time of the year (late in the rainy season, compared to the 1987-88 epidemic), all efforts should be made to determine if the number of cases is increasing or remains stable: contingency plans should be made for the next season.

Annex 5

PROMOTION OF CCH-CHAGAS 1993

1. Outline: A document to describe the capabilities and achievements of the CCH-Chagas Control Project and establish its potential role in all future Bolivian National Chagas control programs.
 1. Paragraph/page on the present status of Chagas disease in Bolivia:

Presentation of housing and environmental relationship as demonstrated by base-line data; the role of congenital and transfusional transmission; estimation of the economic impact of the disease in human-cost terms.
 2. Review of CCH - Chagas capabilities: Description of how these can serve to provide a technical basis for any governmental or donor-based activities in the country to include:
 - a) **Management and Economic Assessments**
 - Planning
 - Cost assessments
 - Economic models for efficient implementation of interventions
 - b) **Housing Improvements**
 - Construction plans
 - Development of community participation
 - Use of local construction materials
 - Training
 - c) **Health Education**
 - Community participation
 - Training of promoters
 - Media dissemination
 - d) **Enhancing Awareness for Other Health Interventions**
 - Child survival services (EPI, ARI, diarrheal control, etc.)
 - Family planning
 - Hygienic practices
 - e) **Insecticide usage**
 - Testing efficacy and modes of application
 - Safe usage

- f) **Epidemiological and entomological evaluations and analysis**
 - Laboratory and field surveys
 - Evaluations
 - Monitoring: serological and entomological
 - g) **Preparation of background and training materials for all of above activities**
 - h) **Operational research for all of above activities**
3. Description of results (photos and graphics included) of initial phase of CCH-Chagas project:
- Cochabamba, Tarija and Chuquisaca
 - Epidemiological statistics
 - Cost data (pilot phase)
4. Prospects for collaboration with other development projects:
- Agriculture
 - Water
 - Rural housing
 - Health education
 - Primary health care
 - Others

With this document in hand, plans should be made to promote the CCH-Chagas project by:

- Listing existing and potential collaborators (UNGECH, PAHO, IDB, FIS, PMA, bilateral donors, etc.), their areas of interest (housing, epidemiology, training, etc.) and capabilities (resources, staff, experience, etc.);
- Organizing planning meeting to "sell" role of CCH-Chagas as a partner, not necessarily the leader; provide CCH-Chagas services, at cost, to influence direction and quality of allied projects; and
- Emphasizing that such a coordinated approach will evolve into a real national control program, with management and planning growing to suit the number of collaborators and size of the effort.

The VBC Project is managed by
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