

Sida/SAREC Supported Collaborative Programme for Biomedical Research Training in Central America

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Cooperation, SAREC**

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EXECUTIVE SUMMARY

This programme will produce in eight years 40 MSc and 6 PhD graduates and at least 46 published or accepted papers. In addition, at least 14 submitted papers and several more will be submitted in the following months as 12 of the 40 MSc and 5 of the 6 PhD students will defend their theses by the end of 1996 or early in 1997.

This is only part of the achievements of the programme. It has also created stable collaborative links among Central American (CA) and Swedish scientists. Moreover, collaboration among CA senior scientists themselves was also promoted to facilitate the activities of the MSc III programme performed in CA. Also a significant number of CA active young scientists while studying and researching together in CA and Sweden have established strong personal and scientific links. A network connecting biomedical research being performed in the 6 CA countries exists as a direct consequence of this programme.

However, it must also be mentioned that the benefits of this programme have not been evenly distributed among the different CA universities and departments, although care was taken to minimize unevenness. This is approximately reflected in the country distribution of the 40 MSc students: 11 from Costa Rica, 8 from Panama, 6 from Honduras, 6 from Guatemala, 5 from Nicaragua and 4 from El Salvador. The more significant information to evaluate this issue would be the country distribution of the students' scientific production after returning to their home labs but these effects are not yet measurable. Heterogeneous distribution is likely to be associated with differences in the educational background and scientific training among the CA participants. Nonetheless, prioritization of even country distribution over academic merits would have severely affected the overall academic success of the programme and, accordingly, its future positive effects on the whole region.

Several of the CA laboratories will have, after these eight years, some trained scientists and basic research facilities. So far there are institutional limitations to the creation of totally CA based MSc and PhD programmes to take over the responsibilities of the Karolinska International Research and Training Programme (KIRT). Last March in Panama the authorities of CA universities discussed this issue (a possible regional MSc) and a positive opinion related to it has emerged, although no decision has yet been taken. In addition, regional funding is not yet available, being a further limitation to the creation of the above mentioned CA based research training programme.

Therefore, some actions may be taken by Sida/SAREC during the next phasing-out step of the KIRT-CA programme to help solve the identified problems that preclude CA universities from immediate takeover of the activities of the KIRT-CA programme. These actions should promote sustainability of the research capacity built up during these eight years in CA with Sida/SAREC support.

The following recommendations were found to be consistent with that goal:

A) Support for a second PhD programme (PhD II) involving two different approaches. One of them similar to PhD I (PhD IIa) and the other with a stronger participation of CA departments and tutors in the training of students (PhD IIb).

PhD IIb may only be feasible and accordingly available to those scientifically more developed CA departments that have created solid and mutually reliable scientific collaboration with the Swedish tutors. More specifically, to those MSc graduated students that have shown during their previous research in the programme they have the appropriate qualifications. During discussions with some of the CA and Swedish tutors, as well as with the students of the programme, a positive opinion was detected related to the "PhD IIa+PhD IIb" proposal. It has also been discussed with the KIRT Programme Manager, Dr. Carlson and the Dean of Students Affairs, Dr. Ljungstrom. They were positive in principle, although a careful institutional analysis of that possibility by KI is needed.

B) Support for a formal network is recommended. This to be created involving the CA departments participating in the programme. Support to that network by Sida/SAREC with a moderate funding should mainly be aimed to promote the interchange of scientists within the region. One of the roles of that network may be to provide the previously mentioned short research stages for training in specific technologies that are already available in different CA laboratories. Another may be to provide small re-entry grants for the MSc and PhD graduated researchers when they return to their home labs.

C) The funding problem is recommended to be approached by Sida/SAREC supporting a workshop designed to prepare collaborative grant applications with Swedish and other European colleagues (e.g. to INCO-DC last call that the EC plans for next 1997 with deadline in September 97). IFS may also be approached to cooperate with such a workshop designed to help young CA scientists to prepare applications for IFS grants. This may be done by IFS at least in the areas of natural products and animal health, that are involved in some of the research done in this programme. Training CA scientists to prepare grant applications seems to be a critical need related to sustainability of the research capability built up in CA. The German agency, DAAD may also be approached to jointly sponsor and support this workshop as this agency is also pursuing similar goals in CA.

D) Finally, the identified institutional obstacles to create a CA based programme are recommended to be addressed with the help of UNESCO. Its office dealing with Higher Education in Latin America (CRESALC) is organizing a meeting next November to address, among four other major issues, the role of international cooperation in Latin America's Higher Education system. The Director of CRESALC, Dr. Luis Yarzabal has extended to SAREC a formal invitation to participate and analyse the institutional problems related to the CA regional postgraduate education on the basis of the experience acquired with the KIRT-CA programme. The authorities of the involved CA universities will also participate, thus a clear opportunity for SAREC and KIRT to find some medium term solution to the institutional problem will exist. The academic support of UNESCO, that may result from that meeting could audit and credit the academic status of such a regional programme. This would legitimate it for all CA universities and eliminate one of the major obstacles for the creation of a regional post-graduate training programme. Moreover, UNESCO's academic sponsorship may also help to obtain international institutional funding for a CA-based programme, after Sida/SAREC phases out.

I) Programme background and context

This programme supports the academic collaboration among Karolinska Institute (KI) and the universities of six Central America (CA) countries (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panamá). The aims are to:

- a) contribute in building-up research capability in selected fields of biomedical sciences that are relevant for CA;
- b) promote regional collaboration in research and research training among the departments involved in CA and with those from KI.

To achieve these goals the approach used was the MSc and PhD training of CA students through a "sandwich" strategy involving KI and the CA universities. This strategy is expected to more efficiently promote the regional ability in CA to continue research and research training after this programme is finished, as compared with the alternative of training performed only in KI.

The programme started in 1988 with the first MSc programme (MSc I) followed by a second one (MSc II) launched in 1990 (see Table I). In 1992 an evaluation of the programme was performed and a third MSc programme (MSc III) with increased CA involvement, together with a first PhD programme (PhD I) were recommended (see the evaluation report by A. Nieto 14/2/92). SAREC decided to support both current programmes that will be completed in not more than one year's time.

Overall description of the different MSc programmes.

Each programme started with selection of tutors/projects and students, almost in parallel. In the cases of MSc I and MSc II, the CA scientists willing to be tutors of CA students, applied to the programme sending their CV and a research proposal.

The applications were reviewed by KIRT and the number of tutors/projects selected was the maximum number of students to be finally accepted to do their research in KI. This research was performed according to one of the proposals selected, and was co-supervised by the CA tutor that prepared it, and the KI tutor that had discussed it with the CA colleague before both of them agreed upon a final version to be performed by the student.

Candidate students were selected by the CA universities among their staff mainly on the basis of a balanced distribution among CA countries. These candidates took an exam in each country and those that succeeded were admitted to the Costa Rican course in biochemistry and cellular biology. Those successfully completing this course were accepted by KI to do the course in medical microbiology. Those completing this course successfully were finally accepted as research students for the MSc thesis. This was done using a "sandwich" approach: approximately 3-8 months in CA and 12 months in Sweden. Finally submit their thesis to KI and defend it according to the KI regulations.

For MSc III some modifications were introduced. There was a public invitation for

applications both for tutors/projects and for students among the staff of the universities. A Central American Board of Scientists (CABS) was established with one senior scientist from each CA country together with a representative of CADESCA (a foundation responsible for the administration of funds allocated by SAREC in CA for the programme) and the CA coordinator. CABS was involved in the selection of both tutors/projects and students.

Once CABS had selected the tutors/projects from the applications received, KI made the final selection of those compatible with the research interests of candidate Swedish tutors. The projects selected were modified by agreement between the CA and KI tutors to match their common interests.

The applicant students had to pass an English and an academic exam that was the same in all countries, taken at the same time, and corrected under the control of the CA coordinator. Those passing the exam were accepted to the Costa Rican course. If appropriate, care was taken to accept a balanced number of students from the different countries. In addition, the medical microbiology course was performed in León (Nicaragua) instead of Sweden and teaching was done mainly by CA teachers (74%) with the collaboration of some Swedish colleagues. The final selection of students to start research for their theses had to be made by a special Board including CABS and the KI coordinator of this programme.

The research continued to use the "sandwich" approach, but trying to increase the time spent in CA and avoiding "chopping off" too much of the productive time spent in KI, so students and KI tutors would have better conditions to carry out that part of the research. A further modification was that the KI regulations were changed (July 1993) to require one paper published or accepted and another submitted, before the MSc thesis could be defended.

Overall description of the PhD I programme.

This programme was created to improve research and research-training capacity in CA universities by further training up to PhD level of some CA students that already had the MSc degree in the MSc I or MSc II programmes.

Tutors/projects were selected as in MSc III programme and six students were selected after discussions with all MSc I and MSc II students, their tutors and authorities of the CA universities. There were no other candidates than these six, willing to enter in the PhD programme at this time.

The "sandwich" approach was used here too. Students performed their research approximately 18 months in CA and 18 months in KI under the supervision of both tutors. Before submitting and defending their theses, KI regulations require that they must have published or have had accepted at least 5 papers including those involved in their previous MSc theses.

Background data corresponding to the 3 MSc and the first PhD programmes are shown in Table I.

Table I
Background data on KIRT-CA programme

Program	Appl.stud.	Selec.stud.	Grad.stud.	Excl.stud.	Period
MSc I	17	14	13	MSc I-12	1988-90
MSc II	22	17	15	MScII-6/7	1990-93
MSc III	26	12			1993-96
PhD I	6	6			92-96/97

So far 28 CA students have obtained their MSc and one her PhD, while 12 more students are currently performing research for their MSc theses and 5 for their PhD theses.

The lists of students, tutors and titles of the corresponding theses involved in these programmes are shown in Annex I. The results obtained in the research so far performed in this programme have been included in 39 papers published, 7 accepted, 14 submitted and 12 in preparation (see Annex II).

The total financial contribution from Sida/SAREC from 1988 up to the end of the current programmes is more than 25 million SEK. The breakdown of these funds among different programmes and allocations for the whole period is shown in Table II.

Table II
Budgetary information on the KIRT-CA programme
(in thousands of SEK)

Program	Date	CA alloc.	KI alloc.	Total	CA admin.
MSc I	1988/89	1800	1200	3000	CSUCA
MSc I	1989/90	1200	1800	3000	CSUCA
MSc II	1990/92	3314	3886	7200	CSUCA
MSc II	1992/93	430.5	---	430.5	CADESCA
MSc III	1992/93	910	150	1060	CADESCA
MSc III	1993/94	1200	3459	4659	Fundesca
MSc III	1994/95	700	1800	2500	Fundesca
PhD I	1993/94	460	640	1100	Fundesca
PhD I	1994/95	520	780	1300	Fundesca
PhD I	1995/96	520	780	1300	Fundesca
TOTAL	1988/96	11054.5	14495	25549.5	

After these eight years some relevant questions need to be answered:

- a) Has this programme being academically successful?
- b) What progress has been achieved concerning the CA involvement in research training?
- c) What happened with the researchers trained through the programme when they returned to their home labs?

These are core issues of this evaluation and will provide the basis to prepare recommendations for the optimal way of phasing out Sida/SAREC support to this programme while also providing the highest probability of achieving its long term aims.

II) Scope, focus and implementation of the evaluation

The present evaluation should serve to update the previous one (February 1992) and make recommendations regarding the best cooperation strategy for the next stage of the programme which is to facilitate takeover of the research training activities by CA universities. The CA coordinator has submitted a pre-proposal to make a second PhD programme (PhD II) in collaboration with KI. The consistency of this pre-proposal with the long term aims of the programme should be assessed.

II.a) Mission in Central America

The mission to CA in April 1996 was to contact the academic and administrative coordinators in the region and a representative sample of tutors and students of the MSc and PhD programmes to discuss the progress of these programmes and identify possible modification of ongoing activities leading to a successful phasing out of Sida/SAREC support compatible with sustained research training and cooperation within the region.

Attention was also payed to the follow-up of research activities performed by students from MSc I and II in their home departments after their graduation. This was done to measure the level of success of the programme in training scientists able not only to do research under the conditions prevailing in CA, but also to improve the research environment of their home departments . If they are successful, they may not only do research themselves but also train, at their home labs, other CA researchers and this is a major long term aim of the programme.

The structure of the mission to CA was the following:

1.- Costa Rica

1.1. Discussions with the tutors: Dr. Edgardo Moreno (also CA coordinator of the programme), Dr. José María Gutierrez, Dr. Kirsten Visona, Dr. Fernando García, Dr. Misael Chinchilla.

1.2. Discussions with the MSc II students: Norman Rojas and Bernal Morera

1.3. Discussions with the PhD graduated and PhD student: Rosario Achí and Marcela Vives, working in the same lab. Marcela Vives is doing her PhD with SAREC support under another programme with Dr. Leonardo Mata (Costa Rica) and Dr. Catharina Svanborg (Lund, Sweden) as tutors.

2.- Panamá

2.1. Discussions with Dr. O.E. Sousa

2.2. Discussions with officers of the Programme: Dr. Jorge Arosemena (FUNDESCA) and Dr. Edgardo Moreno (CA coordinator).

2.3. Discussions with the MSc I student : Silvio Vega

2.4 Discussions with the MSc II students: Aura E. Horna, José I. Rojas and Euris Bultron.

2.5. Discussions with the PhD student: Azael Saldaña.

3.- Nicaragua

3.1. Discussions with the coordinator of the MSc III course performed in Nicaragua: Lic. Rosario Palma.

3.2. Discussions with the tutors: Margarita Paniagua, Teresa Rivera, Alleyda Teiles,

3.3. Discussions with the MSc students: Orlando Mayorga, Byron Leiva and Silda Larios.

3.4. Discussions with the PhD student: Mercedes Cáceres

3.5. Discussion with the Vicerector of UNAN-León: Dr. Ofelia Rojas.

II.b) Mission in Sweden

The mission in Sweden in May 1996 aimed to discuss with SAREC officers, KIRT coordinators, the Swedish tutors and the CA students (MSc III and PhD I) that were in Sweden, the progress and problems of the ongoing programme, as well as have their criticisms of the recommendations to be proposed in this report as a result of the CA mission.

A long and fruitful seminar was held with the 12 CA students in Sweden. Discussion was mainly about problems they foresee in continuing research after returning to their home departments. It must be noted that they were not well informed about the part of the programme that involves the commitment of their institutions to that issue.

1.- Discussions with the Sida/SAREC Officers: Dr. Lennart Freij, Dr. Ros-Mari Bälöw and Dr. Berit Olsson.

2.- Discussions with the KIRT Programme Manager Dr. Johan Carlson and with the KIRT Dean of MSc students affairs Dr. Inger Ljungström.

3.- Discussions with tutors from MTC: Dr. Hanna Akuffo, Dr. Staffan Arvidsson, Dr. Monica Thelestam and Dr. Anders Örn.

4.- Discussions with the tutors from Huddinge Hospital: Dr. Andreij Weintraub, Dr. Connie Jarstrand, Dr. Carl-Erik Nord and Dr. Anders Sönnberg.

5.- Discussions with tutors from SIIDC: Dr. Inger Ljungström, Dr. Lennart Svensson, Dr. Helene Norder and Dr. Lars Magnus.

6.- Discussions with the PhD I students: MSc. Enrique Freer (Costa Rica) and MSc. Alberto Alape-Girón (Costa Rica).

7.- Discussions with the following MSc III students: Estéban Chaves-Olarte (Costa Rica), Norma Gross (Costa Rica), Catherina Guzmán (Costa Rica), Patricia Saravia (Guatemala), Mario González (Guatemala), Claudia Lara (Honduras), Lelani Pineda (Honduras), Félix Espinoza (Nicaragua), Orlando Guevara (Panama), Jessica Vásquez (Panamá).

8.- Discussion with IFS officers: Dr. Christina Arosenius and Dr. Lennart Prage.

III) Academic Evaluation

Detailed information related to critical aspects of the 4 programmes will be provided and used for the analysis of the relevant issues of this evaluation.

Selection of candidates for the different programmes

1.- MSc I

A total of 17 students attended the Courses in Costa Rica (May - June 1988), 14 of them approved, attended the KI course from 26/9/88 to 9/12/88 and all succeeded. At the beginning of 1989 they returned to CA to start their research and afterwards returned to Sweden from July 1989 to January 1990. Student MSc I-12 was excluded from the programme at this stage and the other 13 graduated from June to December 1990. Their country distribution was: 3 from Costa Rica, 3 from Panamá, 3 from Honduras, 2 from Guatemala, 1 from El Salvador and 1 from Nicaragua.

2.- MSc II

From March to May 1990, from 22 applicant students, 18 were selected to attend the course in Costa Rica carried out from July to December 1990. From August to December 1990 KIRT selected 17 projects presented by CA researchers and, as only 16 students approved the course in CR, one project was rejected. In January 1991 the 16 students attended and approved the KI course in Sweden, returning to CA from June to September 1991, to start their research at home. During this period 2 of them were excluded from the programme and the other 14 returned to KI sponsored by the CA coordinator. One more student (MSc II-12) formally excluded, also returned to KI but without support from the CA coordinator.

The country distribution of graduated students was : 4 from Costa Rica, 3 from Panamá, 3 from Nicaragua, 3 from El Salvador, 1 from Honduras and 1 from Guatemala. The second batch of MSc students finished in early 1993.

3.- MSc III

A public advertisement for students applications appeared in newspapers and on posters in the universities. In addition, personal visits to the CA universities of a team of program officers (Dr. E. Moreno; Dr. Lars Smedman and Dr. Göran Skoglund), were made to promote interest. There were 26 applications and, after the exams, the CABS selected 18 to enter the course in Costa Rica. Five students were excluded from the programme at the end of that course and one more at the end of the Nicaraguan one. Therefore, only 12 students (4 from Costa Rica, 3 from Guatemala, 2 from Panamá, 2 from Honduras and 1 from Nicaragua) continued to Sweden and are currently preparing their theses.

4.- PhD I

Dr. E. Moreno contacted all the MSc I and MSc II graduated students and their CA tutors, as well as representatives of all the universities, to select those entering the PhD programme. Only 6 eligible students decided to enter the programme, 3 from Costa Rica, 1 from Honduras, 1 from Nicaragua and 1 from Panamá. These 6 students were accepted and one has already published her thesis (PhD I-1), while the other 5 are expected to finish during the next 12-15 months.

5.- Analysis of the selection process

Although some non significant reasons may influence the country distribution of students in each MSc programme, the three of them taken together is likely to provide a more significant picture. The country distribution of the 40 MSc students in the three programmes is: 11 from Costa Rica, 8 from Panamá, 6 from Honduras, 6 from Guatemala, 5 from Nicaragua and 4 from El Salvador. This distribution in some way reflects the influence of the degree of development of biomedical research in each country in spite of the specific care taken by the programme to achieve a balance among them.

Several institutional as well as social and personal factors also influence that distribution. Some of them are: the relative relevance of having a post-graduate degree for the academic faculty career in the different universities; the relative relevance of research as compared with teaching among the activities carried out by the different universities, and therefore the relative importance of scientific performance in the academic faculty career; the relative expertise in laboratory techniques provided by the different universities within their different undergraduate profiles (medicine, biology, biochemistry, pharmacy, veterinary, etc); the relative availability of laboratory facilities needed for research in the different departments and universities and also the relative number and size of departments likely to provide candidate MSc students in biomedical sciences in the different universities.

There are also some social and personal factors affecting that distribution. Due to some historical and social reasons some of those matching with the academic requirements were too old to enter the programme. Older people may also have family responsibilities that preclude them from being absent from their countries for long periods. In some CA universities, there are also bureaucratic regulations that preclude their staff from being abroad for long periods. These may include the risk of losing their jobs. English proficiency has also been a serious handicap; in some cases, inhibiting some candidates to apply.

The selection process used in MSc III allowed a more homogeneous evaluation of candidates from the different countries with more emphasis on academic performance. Nonetheless, the pool of candidates that fitted the requirements of the programme and were personally willing to enter it was reduced in some countries due to one or a combination of the above mentioned factors. Therefore, although the call for applications was more widely spread the final number of successful candidates was only 12. If a MSc programme entirely performed in CA is created in the near future by CA universities, some of these factors may not influence the country distribution of successful students, but some of them (mainly the institutional ones) will, unless significant changes are made at that level.

An important output of this programme is that it has provided some active researchers to the different CA universities who also spread the idea of a research-based university instead of the only teaching-based university that is strongly rooted in some countries. Furthermore, some of the tutors participating in the programme have influential positions in their universities and may also facilitate the changes needed.

Taken together, these facts suggest that, if a totally CA-based post-graduate programme is created in the near future, it would have a greater number of eligible applicants than the sandwich kind of programme. Therefore, provided that Sida/SAREC decides to promote and help to create such a programme during the next phasing out stage, it is likely that the long term aims of this cooperation will be achieved with an appropriate cost/benefit standard.

The selection of PhD I candidates clearly shows the difficulties in finding candidates for long term research stages out of the home country. In this case personal factors very strongly influenced their decisions,- according to the discussions I had with some of the possible candidates that refused to apply to the programme in its present form. Therefore, some modification related to this issue should be addressed in a next KIRT-CA PhD programme (PhD II).

CA academic coordination

The improved interaction among CA scientists promoted by the KIRT-CA programme has started to produce other beneficial effects for the long term aims of the programme. One of them was the proposal of a "Network for the Exchange and Advance of Biomedical Sciences in Central America" (NeBiS) under the framework of the Alfa Programme of the European Commission (EC). NeBiS involves the following CA and European universities: U. Nacional Autónoma de Honduras; U. de Panamá; U. Del Valle de Guatemala; U. de Costa Rica; U. Nacional Autónoma de Nicaragua-León; U. de San Carlos de Guatemala; U.

Nacional Autónoma de Nicaragua-Managua; U. Nacional de Costa Rica; U. de El Salvador; U. de Valladolid; U. de Navarra; Institut Pasteur; U. de Marseille; U. of Hamburg; Karolinska Institute and Swedish U. of Agricultural Sciences.

Another similar network has been created under the Spanish sponsored CYTED programme. It is a Central American Network of Cooperation in Tropical Diseases (REDCEN).

Moreover, the exact model of the Costa Rican course for the KIRT-CA MSc will be used in a Costa Rican based MSc in Microbiology (funded by DAAD, the U. de Costa Rica and the U. Nacional de Costa Rica). Favoured by the existing coordination with other CA universities, there are already some students from Nicaragua, Honduras and Panamá registered for it. Further to this, a new MSc has been launched by the Universidad Nacional de Costa Rica, the Regional MSc in Tropical Veterinary Sciences. Part of the expertise for the design and management of that MSc is linked to the ongoing KIRT-CA programme as its CA Coordinator (Dr. E. Moreno) is heavily involved in the new Costa Rican MSc.

This increased interest in developing national MSc programmes in CA was also observed in Nicaragua. The UNAN-León has MSc studies in the Health area: Health and Work, Health Education, Public Health and Natural Products are among the 19 available MSc distributed among the Schools of Medicine, Sciences, Chemistry, Laws and Education. Researchers involved with Swedish cooperation participate in some of them, but no MSc course involving Microbiology and Parasitology is yet available. According to discussions with the Vicerrector of UNAN-León, Dr. Ofelia Rojas, there is a positive position of the University towards that issue depending on the possibilities and initiative of the corresponding faculty members.

Although the creation of CABS for the MSc III has greatly improved the overall coordination among the CA scientists and departments involved, several problems yet remain to be solved. An example of this kind of problem may be shown related to the organization of the Nicaraguan course in the MSc III. Although there was a nominated Nicaraguan senior scientist for the CABS, and probably because the preparation of the course was coincident with the change of authorities in UNAN-León, there were some difficulties with the flow of information to the Nicaraguan coordinator of the course who, nonetheless, could in the end successfully arrange the details with the CA coordinator (Dr. Moreno) and the CA and Swedish teachers.

If something may be concluded it is that there may not yet be a complete understanding by some University authorities in CA of the respective roles played by them and the senior scientists taking care of the academic decisions in CABS. It should be clear that for the sake of excellency, academic decisions are taken by the CABS while the role of university is mainly to nominate candidates to the CABS from their senior scientists. The risk associated with not doing things in this way may be illustrated by the problems created in the former example that, fortunately, were finally solved by the academic staff on the spot.

Generally speaking, difficulties may be observed in some CA universities to effectively delegate to their senior faculty the kind of decisions the CABS takes. This is one of the major obstacles that many of the senior CA scientists foresee in the creation of a totally CA-based post-graduate programme. They correctly understand that it may severely impair the academic

quality of the programme if some kind of non pertinent interests are allowed to interfere with relevant academic decisions. These are major institutional obstacles precluding the immediate creation of a totally CA-based post graduate programme. Before achieving that goal, a general discussion of the "rules of the game" should be performed with the participation of some external reference party be legitimate for all parties involved and with international recognition in these questions.

Nonetheless, there are also some positive news related to the regional institutional involvement in scientific development, that may help CA institutions to takeover research capacity building in the near future. Some of them, that may be relevant to the long term aims of the programme , are listed here.

- The coordinating commission for CA universities (CSUCA) has been reorganized and its General Secretary is Dr. Ricardo Sol Arriaza (Costa Rica)(Fax: Int+ (506) 234 00 71). One activity of the new CSUCA that may be relevant to this programme is the Workshop held in November 1994 in San José, Costa Rica on: "Performance of University professions and acknowledgement of University studies in CA". To date, participating universities are: U. de San Carlos (Guatemala), U. de El Salvador, U. Nacional Autónoma de Honduras, U. Nacional Autónoma de Nicaragua, U. Nacional de Ingeniería de Nicaragua, U. de Costa Rica, U. Nacional de Costa Rica y U. de Panamá.

- A special regional governmental board named CTCAP (for the Spanish of Commission for the Scientific and Technological Development of Central America and Panamá) was integrated with representatives of the National Research Councils of the different countries. A meeting held in November 1995 in San José, Costa Rica, decided the priority issues for research in the region. All the research projects included in the KIRT-CA programme are consistent with items B and C of the Area 3 (Health) of the official document produced in that meeting. This indicates the pertinency of the research performed under the KIRT-CA programme related to the regional health priorities. That was one of the issues to be assessed in this evaluation.

- It is interesting to note, just as an example of the situation in Panamá, that a significant recent investment of national funds in scientific equipment was made in 2 of the labs visited. New equipment costing approximately U\$S 150.000 has just been installed. Interestingly enough the National Research Council of Panamá launches next June 1996 a National Plan of Science and Technology that includes funding of: research training; technological innovation; scientific research; scientific and technological documentation; visiting scientists and organization of scientific meetings ("Desarrollo Científico y Tecnológico: Desafío para Panamá", SENACYT (1996) pp 72-78). According to Dr. OE Sousa, similar actions are being planned in other CA countries, although starting dates are not yet decided.

However the situation is not homogeneous around CA. The case of Costa Rica may be quite different. The national grants available for research come from the university (Vicerrectoría de Investigación) and are not greater than U\$S 2.500 per year. Although a plan similar to that now starting in Panamá has been running in Costa Rica for several years, sponsored by the Interamerican Development Bank, it was strongly biased only to technological research. For that reason research in biosciences in Costa Rica is mainly supported by external funds obtained from competitive applications.

In Nicaragua, research is also mainly funded from external funds but they may have much more difficulties than Costa Rican scientists to obtain those funds due to the different scientific development in both countries. The bilateral Sida/SAREC programme was almost the only funding of research in microbiology and parasitology in Nicaragua. However it must be noted that one of the MSc II graduated students (MSc. Orlando Mayorga) has successfully applied, together with Félix Espinoza (a current MSc III student), for US\$ 75.000 of Swiss funding (Bern Laboratory) and also for US\$ 50.000 of German funding (Hamburg Institute of Tropical Medicine, DAAD). The latter includes a training stage in Hamburg.

- In some labs visited in CA they have identified other CA and European scientists working in similar areas that may be contacted to establish collaborative research projects with regional and/or external funding. Therefore if some help is provided, this may be another relevant output of the academic coordination promoted by the KIRT-CA programme.

CA-KI tutorship coordination

Collaboration between KI and CA departments has been very fruitful as shown by the amount of collaborative papers published and the improved research environment existing in CA departments after these years of cooperative research with KI departments. Further to this, some KI tutors have started new productive research areas as a consequence of this cooperation and are willing to continue (e.g. through PhD II programme). Although in the majority of cases this coordination worked appropriately, there are some aspects related to this issue that merit further consideration due to its possible relevance for a further PhD II programme.

When a CA tutor and a KI tutor met for the first time to participate in this programme and supervise the research of a candidate student, some kind of quality assurance had to be available on both sides if they are to be able to reliably carry out research in the two different laboratories. In addition, due to the higher scientific development and experience of an average Swedish laboratory as compared with an average CA laboratory, this fact has been fairly accepted by the CA tutors. That means that at the beginning of their collaboration some of the experiments done in the CA labs were repeated in the Swedish one to be sure that results from both labs were comparable as they should be. The consequence should have been to continue the research if the experiments showed significantly similar results or address the issue until this goal was achieved.

Unfortunately, sometimes experiments performed in CA continued to be repeated in Sweden, in spite of the fact that cooperation had been established several years ago. These cases, fortunately very few, are clearly out of the scope and objectives of this programme that is aimed at building up research capability in CA and not only to provide scientifically interesting field material for researchers in Sweden. Although in some of these few cases there may be an implicit acceptance of that way of coordination by both parties involved, those partners are not recommended to be involved in a new PhD programme. Careful evaluation of that issue in the proposed projects is therefore highly recommended. The reason is that the expected outcome of training under such unfavourable conditions for the CA laboratory is not consistent with a successful phasing-out, as the CA lab is not likely to achieve any relevant improvement in

research capability.

Students evaluation of the MSc III courses performed in CA

The students were requested to fill in a form with ten questions related to different issues associated with the quality of the MSc III courses and questions related to the performance of the teachers. Answers were ranked into four possible scores: Excellent, Good, Regular or Bad.

The overall results expressed as percentages of the answers corresponding to each score are shown in Table III.

Table III

Score	Biochem. - theory	Biochem.-lab.	Microbiology
Excellent	49	46	21
Good	46	41	46
Regular	5	12	19
Bad	0	1	14

The results of this survey are consistent with the fact that the biochemistry courses have been given for the third time (MSc I, II and III) while this was the first time that the Microbiology course was given in CA. Nonetheless, the majority of the answers (67%) corresponded to scores "Good" + "Excellent", in spite of communication problems that forced some urgent solutions on the spot (see the item *CA academic coordination*).

The answers related to the performance of teachers in the three courses showed that 91%, 94% and 85% of the answers corresponded to scores "Good"+"Excellent" in the biochemistry-theory, biochemistry-lab and microbiology courses, respectively. Taken together, those figures suggest that students evaluated the CA courses and teachers positively.

IV) Conclusions

The programme has been successful as measured both by the production of trained scientists (40 MSc and 6 PhD) and of scientific papers (more than 46 published and accepted, and 14 submitted). But it has been also successful in creating a network of CA scientists involved in biomedical research with a coordinating board of senior scientists from each country.

Another index to assess the success of the programme to achieve its long term aims is the demonstrated capacity of the graduated students to continue to do research at their home laboratories and involve new students in this research. This goal has been, as expected,

achieved with differing levels of success by the different graduates. Nonetheless, it is very interesting to note that similar levels of success or failure were observed in the three CA countries visited. This suggests that in all of them the goal is feasible depending on the specific conditions of each student and home lab.

A general strategy to involve new students in research was proposed and discussed with CA tutors and students in the three countries, that may soon help to start that involvement. This implies identification of small parts of their own research that may fit the requirements for the small thesis (6 months work) needed to obtain the BSc degree, and make every semester a formal and systematic call for applications from those students needing that final work for their graduation. Selection of the applicants may be made according to their performance during the laboratory part of the undergraduate corresponding course. If these pieces of research are well planned, the student will be able to have enough results for his/her thesis and further to this, will have a personal contact with research activity. On the other side, the tutor will not only have some help for her/his research, but also will be able to select candidates in a realistic way for MSc studies when these are available. Thorough discussions related to problems and feasibility of this approach have been maintained with graduated students from the three countries. In these three cases some of them and the senior scientists running the labs are interested to try this strategy. It may help them to accelerate research work and so have more data to be used as preliminary results in grant applications.

According to the analysis shown in previous items of this report it seems too early to create a totally CA-based and supervised Research Training Programme to provide MSc and PhD *in situ*. Nonetheless, this goal is feasible in the medium term. The following are some of the reasons: all the tutors and students consulted agreed there was a need and foresee that possibility, provided some conditions (financial support and institutional regulations prioritizing academic excellency over other considerations) are fulfilled. Furthermore, the issue is already being discussed among authorities of CA universities. According to the information provided by Dr. Ofelia Rojas (Vice rector, UNAN-León) a resolution on that issue, related only to MSc may be achieved soon. In addition, a global institutional solution is feasible, involving also PhD, as the UNESCO office for Higher Education in Latin America and the Caribe (CRESALC) is willing to address this issue during a meeting planned by that organization for next November: *Regional Conference on Policy and Strategies for the Transformation of Higher Education in Latin America and the Caribbean*. The agenda of that conference has five items, and the fifth is: "*Reformulation of international cooperation: Role of international cooperation; impact of the political and economical integration processes; co-validation of curricula, degrees and diplomas; strengthening of the institutions and higher education systems in the region; mechanisms to reduce disbalances, stop brain drain to the industrialized world and facilitation of knowledge and technology transfer.*"

Among the participants will be representatives of the CA universities and other CA authorities related with higher education. A strategy to solve the above mentioned institutional obstacles may emerge as a recommendation from the analysis made at this meeting. Furthermore, the Director of CRESALC/ UNESCO, informed me that Sida/SAREC participation in the event would be very much appreciated as well as the eventual analysis of a Postgraduate Programme for Central America in that meeting.

Another factor promoting such a regional programme in the medium term is the significant success achieved so far by the Sida/SAREC programme that will have at the end of eight years of existence 40 MSc graduates, 6 PhD graduates, more than 46 published and accepted papers and 14 submitted. This is a relevant introduction to raise additional funds for the CA regional programme that may come up with UNESCO academic sponsorship. In addition, not only the trained researchers, but also the facilities existing in several CA labs provided by Sida/SAREC programme, significantly improved their ability to carry out MSc and PhD research training. Moreover, some of the KIRT graduated students have already been able to raise their own funds for research by successfully applying for research grants. Raising funds for research through individual grant applications in international (and, in Panamá, also national) competitive calls, as well as through Institutional funding, although difficult and growing only slowly, seems to make feasible a regional programme in the medium term that may take over the Sida/SAREC effort.

Taken together, these facts show that the conditions to achieve sustainability are present in CA, although they are not evenly spread among the universities and departments involved in the KIRT-CA programme.

V) Recommendations

Then the main question arising from the previous analysis is: What must be done in the short term to optimally help the creation of such a CA regional MSc and PhD training programme? This has been one of the major issues discussed during my meetings in CA and Sweden. As a result of the overall evaluation of the programme and of the specific situation of the CA universities and Departments involved, the following actions are recommended:

1) Support of a new PhD programme (PhD II) combining two different approaches. One of them similar to PhD I (PhD IIa) and the other with a stronger participation of CA Departments and tutors in the training of students (PhD IIb). The PhD IIb programme should involve increased research time in CA and accordingly require an increased share of the funding to CA departments where that research will be done. The latter approach may only be feasible and, accordingly made available, to those scientifically more developed CA departments that have created solid and mutually reliable scientific collaboration with the Swedish tutors and more specifically, to those MSc graduated students that have shown during their previous research in the programme to have the appropriate qualifications. During the discussions with some of the CA and Swedish tutors, as well as with the students of the programme, a positive opinion was detected related to the "PhD IIa+PhD IIb" proposal. It has also been discussed with the KIRT Programme Manager, Dr. Carlson and the Dean of Students Affairs, Dr. Ljungström who were also positive in principle, although a careful institutional analysis of that possibility by KI is needed.

One of the advantages of adding the PhD IIb approach to the already existing one is that some CA departments will have the opportunity to improve their research training capacity not only with a new PhD on the staff (as in the PhD IIa approach) but also with the small funding associated with the PhD IIb grant itself (consumables and minor equipment). Both factors may have a synergistic effect increasing the research activity in that department and thus improving

the scientific environment that promotes sustained research capacity (e.g. involving graduate students in research to achieve their small graduation theses, supervised by the KIRT-involved staff).

Another foreseen advantage is that living costs in CA are lower than in Sweden, so more students may enter the whole PhD II programme (PhD IIa+ PhD IIb) with the same Sida/SAREC amount of funding. In addition, another not minor advantage is related to the family, economic and employment problems that have discouraged scientifically sound CA candidates from applying for the PhD programme if they must spend more time in Sweden. Actually, this reluctance to be away was observed during the selection of the PhD I candidates.

One major difficulty foreseen is related to the feasibility of the Swedish tutorship if the student stays mostly at her/his home laboratory. This has been discussed with all the Swedish tutors and some of them thought that in the specific framework involving his/her MSc student, CA tutor and CA collaborating laboratory, they could manage to supervise such kind of PhD research. Not all the tutors agreed. Therefore a criterium mainly based on the former experience of each Swedish tutor with the candidate as well as with his/her CA tutor and lab must be used to select candidates for the PhD IIb model, if KI finds it feasible and Sida/SAREC decides to support it.

This selection should also consider if the kind of collaboration existing between both labs (CA and KI) has provided relevant research capability improvement to the CA laboratory.

Another possible disadvantage of PhD IIb is that this approach will in some way increase the gap between the different CA universities and departments. This problem may be partially overcome by involving those stronger CA departments in training young scientists from the other countries for short stages. Anyway, it is not possible to avoid that increasing gap without severely affecting the regional ability to build up research capability that will be based on the academically best qualified tutors and laboratories wherever these may be.

2) Consistently with the former, the creation of a formal network is recommended involving the CA departments participating in the programme. Sida/SAREC support of that network with moderate funding during the next stage of the programme is proposed to promote interchange of scientists in the region. The CABS may act as the steering committee of that network.

One of the roles of that network may be to provide the previously mentioned short research stages for training in specific technologies that are already available in different CA labs. Another may be to provide small re-entry funds for the MSc and PhD graduates when they return to their home labs. After discussions with some of the MSc I, MSc II and PhD I graduated students during visits to their present labs, significant problems have been identified related to that issue. Nonetheless it must be noted that some of them have been able to continue their research at the home labs and some have also applied successfully for external grants to fund their starting research.

3) The funding problem may be approached by Sida/SAREC supporting a workshop designed

to prepare collaborative grant applications with Swedish and other European colleagues (e.g. to INCO-DC last call that the EC plans for next 1997 with deadline in September 97). IFS may also be approached to cooperate in such a workshop in order to help young CA scientists prepare applications for IFS grants. This may be done by IFS at least in the areas of natural products and animal health, that are involved in some of the research done in this programme. Training CA scientists to prepare grant applications seems to be a critical need related to sustainability of the research capability built up in CA. Further to this, the German agency DAAD may also be approached to jointly sponsor and support this workshop as it is also pursuing similar goals in CA. Support to that workshop may be provided through the proposed network (see recommendation # 2).

4) Finally, the identified institutional obstacles to create a CA-based programme may be addressed with the help of UNESCO, whose Office involved in Higher Education in Latin America (CRESALC) is organizing a meeting next November to address, among four other major issues, the role of international cooperation in Latin American's higher education system. The Director of CRESALC, Dr. Luis Yarzabal has extended to SAREC a formal invitation to participate and analyse the Institutional problems related to the CA-regional postgraduate education on the basis of the experience gained from the KIRT-CA programme. The authorities of the involved CA universities will also participate, providing a clear opportunity for SAREC and KIRT to find some solution for the medium term to the institutional problem.

The academic support of UNESCO, that may result from the meeting can be relevant to audit and credit the academic status of such a regional programme thus legitimating it to all the CA Universities, which will eliminate one of the major obstacles for the creation of a regional post-graduate training programme in CA. Moreover, UNESCO's academic sponsorship may also be useful to obtain some international institutional funding for a CA-based programme, after Sida/SAREC phases out.

ANNEX I

List of students, tutors and thesis titles of the MSc and the PhD programmes

MSc - I Programme (1988 - 1990)

MSc I-1.- Student: Enrique Freer, (Costa Rica)

Tutors: Edgardo Moreno (Program de Investigación en Enfermedades Tropicales-UCR, Costa Rica); Alf Lindberg (Department of Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden) and Andreij Weintraub (same institution).

Title: Production and characterization of monoclonal antibodies against *Brucella* lipid A and demonstration of the heterogeneity of *Brucella* lipid A by high performance thin layer chromatography (HPTLC). (see also PhD I-2).

MSc I-2.- Student: María del Rosario Achí, (Costa Rica)

Tutors: Leonardo Mata (Instituto de Investigaciones en Salud, UCR, Costa Rica); Alf Lindberg (Department of Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden) and Urban Forsum (Institute of Clinical Bacteriology, Hälsouniversitetet, Linköping, Sweden).

Title: Antibodies against enterobacterial lipopolysaccharide antigens in breast milk of Costa Rican mothers. (see also PhD I-1).

MSc I-3 Student: Silvio Vega, (Panamá)

Tutors: Leonardo Mata (Instituto de Investigaciones en Salud, UCR, Costa Rica); Alf Lindberg (Department of Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden) and Urban Forsum (Institute of Clinical Bacteriology, Hälsouniversitetet, Linköping, Sweden).

Title: Class-specific antibody titers against common pathogenic bacteria in healthy children from Panamá.

MSc I-4.- Student: Ana Berta Canas Posada, (San Salvador).

Tutors: Leonor Isabel Murillo de Linares (Departamento de Microbiología-UES, El Salvador) and Solgun Bygdeman (Department of Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden).

Title: Prevalence of uro-genital *Chlamydia trachomatis* infection in El Salvador.

MSc I-5.- Student: Vilma Susana Venegas, (Honduras)

Tutors: Humberto Cosenza (Departamento de Microbiología-UNAH, Honduras) and Solgun Bygdeman (Department of Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden).

Title: Sexually transmitted diseases in Honduras. Gonorrhea, uro-genital chlamydial infection, human immunodeficiency virus infection and syphilis in female prostitutes.

- MSc I-6.- **Student: Carlota Monroy de Gómez, (Guatemala)**
 Tutors: Humberto Cosenza (Departamento de Microbiología-UNAH, Honduras); Anders Örn (Department of Immunology, Karolinska Institute, Sweden) and Hans Wigzell (Swedish Bacteriological Laboratory, Sweden).
 Title: Serology in Chagas disease. A comparative study in human and experimental infections.
- MSc I-7.- **Student: Jorge Alberto Carrasco, (Honduras)**
 Tutors: Humberto Cosenza (Departamento de Microbiología-UNAH, Honduras); Anders Örn (Department of Immunology, Karolinska Institute, Sweden) and Hans Wigzell (Swedish Bacteriological Laboratory, Sweden).
 Title: Biological and immunological characterization of *Trypanosoma cruzi* strains from Honduras.
- MSc I-8.- **Student: Irma Gloria Enamorado de Gallo, (Honduras)**
 Tutors: Humberto Cosenza (Departamento de Microbiología-UNAH, Honduras); Anders Örn (Department of Immunology, Karolinska Institute, Sweden) and Hans Wigzell (Swedish Bacteriological Laboratory, Sweden).
 Title: Malaria in Honduras. An epidemiological and immunological study.
- MSc I-9.- **Student: Azael Saldaña, (Panamá)**
 Tutors: Octavio E. Sousa (Departamento de Microbiología y Parasitología-UP, Panamá); Anders Örn (Department of Immunology, Karolinska Institute, Sweden) and Hans Wigzell (Swedish Bacteriological Laboratory, Sweden).
 Title: Immunoparasitological studies of *T. cruzi* clones from Panamá. (see PhD I-4)
- MSc I-10.- **Student: Juan Miguel Pascale, (Panamá)**
 Tutors: Paulina de Carreira (Departamento de Microbiología y Parasitología-UP, Panamá) and Anders Örn (Department of Immunology, Karolinska Institute, Sweden).
 Title: Studies on immunological reactivities in patients with cutaneous leishmaniasis in Panamá.
- MSc I-11.- **Student: José Antonio Gené, (Costa Rica)**
 Tutors: José María Gutiérrez (Instituto Clodomiro Picado-UCR, Costa Rica) and Monica Thelestam (Department of Clinical Bacteriology, Karolinska Institute, Sweden).
 Title: Studies on the mechanisms of action of myotoxin II, a toxin from *Bothrops asper* (Fer-de-Lance) snake venom.
- MSc I-12.- **Student: Ana Marta Ballar, (Costa Rica)**
 Tutors: Elena Campos (INCIENSA, Costa Rica); Tord Holme (Department of Clinical Bacteriology, Karolinska Institute, Sweden) and Ann Margret Sjögren (Department of Clinical Bacteriology, Karolinska Institute, Sweden).
(Excluded from the programme)

MSc I-13.- Student: Mercedes Cáceres, (Nicaragua)

Tutors: Vivian Mata (Departamento de Microbiología, Facultad de Medicina, Universidad de San Carlos, Guatemala); Carl-Erik Nord (Department of Oral Microbiology, Huddinge Hospital, Karolinska Institute, Sweden) and Anders Heimdahl (Department of Oral Microbiology, Huddinge Hospital, Karolinska Institute, Sweden).

Title: Beta-lactamase producing anaerobic bacteria in the oropharyngeal and intestinal human microflora. (see PhD I-5)

MSc I-14.- Student: Edmundo Jesús Velásquez, (Guatemala)

Tutors: Misael Chinchilla (Facultad de Microbiología-UCR, Costa Rica); Liliana Reyes (Facultad de Microbiología-UCR, Costa Rica) and Ewert Linder (Swedish Bacteriological Laboratory, Sweden).

Title: Autoantibodies and *T. cruzi*: False positive reactions in serodiagnosis and identification of heart-reactive antibodies in Chagas disease and experimental infection.

MSc - II Programme (1990 - 1992)**MSc II-1.- Student: Norman Rojas-Campos, (Costa Rica)**

Tutors: Edgardo Moreno (Programa de Investigación en Enfermedades Tropicales-UCR, Costa Rica) and Andreij Weintraub (Department of Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden).

Title: Immunochemical characterization of lipopolysaccharides from different *Brucella* species.

MSc II-2.- Student: Euris Bultron, (Panamá)

Tutors: José María Gutiérrez (Instituto Clodomiro Picado-UCR, Costa Rica) and Monica Thelestam (Department of Clinical Bacteriology, Karolinska Institute, Sweden).

Title: Actions of *Bothrops asper* myotoxin III on muscle cells and membranes *in vivo* and *in vitro*.

MSc II-3.- Student: María Laura Arias, (Costa Rica)

Tutors: Misael Chinchilla (Facultad de Microbiología-UCR, Costa Rica); Liliana Reyes (Facultad de Microbiología-UCR, Costa Rica) and Ewert Linder (Swedish Bacteriological Laboratory, Sweden).

Title: Seroepidemiological study of *T. gondii* in humans and meat producing animals in Costa Rica.

MSc II-4.- Student: Marta Darce Rivera, (Nicaragua)

Tutors: Teresa Rivera (Departamento de Microbiología y Parasitología-UNAN-León, Nicaragua) and Hannah Akuffo (Roslagstulls Hospital, Stockholm, Sweden).

Title: Resistance to *Leishmania* infection: A comparison between self-healing and persistent strains.

MSc II-5.- **Student: Ana Lourdes Sánchez, (Honduras)**

Tutors: Humberto Cosenza (Departamento de Microbiología-UNAH, Honduras); Inger Ljungström (Department of Parasitology, National Bacteriological Laboratory, Sweden) and Anders Örn (Department of Immunology, Karolinska Institute, Sweden). (see PhD I-3)

Title: *Taenia solium* infections in a rural community in Honduras.

MSc II-6.- **Student: Eugenia B. Rosito Lemus, (Guatemala)**

Tutors: Mario R. Pinto Mansilla (Facultad de Microbiología, Universidad de San Carlos, Guatemala) and Alf A. Lindberg (Department of Clinical Bacteriology, Huddinge Hospital, Sweden).

Title: The effect of specific secretory IgA in the self limitations of *Salmonella enteritidis* diarrhoea.

(Excluded from the programme)

MSc II-7.- **Student: Julio E. Castellanos, (Guatemala)**

Tutors: Eduardo Samayoa (Departamento de Patología, Facultad de Medicina, Universidad de San Carlos, Guatemala) and Ewert Linder (Department of Parasitology, National Bacteriological Laboratory, Sweden)

Title: Secretory antibodies related to invasive amoebiasis.

(Excluded from the programme)

MSc II-8.- **Student: Miguel A. Reyes, (El Salvador)**

Tutors: Ivette Lorenzana de Rivera (Departamento de Microbiología-UNAH, Honduras) and Anneka Ehrnst (Central Microbiology Laboratory, Stockholm, Sweden).

Title: Epidemiology of respiratory tract infections in small children of two Central American countries and Sweden.

MSc II-9.- **Student: José I. Rojas, (Panamá)**

Tutors: Ceferino Sánchez (Escuela de Farmacia, Facultad of Medicina, UP, Panamá); Hiro Goto (Department of Immunology, Karolinska Institute, Sweden) and Anders Örn (Department of Immunology, Karolinska Institute, Sweden)

Title: *Leishmania (Viannia) panamensis* induced cutaneous leishmaniasis in Balb/c mice.

MSc II-10.- **Student: Aura E. Horna, (Panamá)**

Tutors: Octavio E. Sousa (Departamento de Microbiología y Parasitología-UP, Panamá) and Anders Örn (Department of Immunology, Karolinska Institute, Sweden)

Title: Biochemical and immunological characterization of *T. rangeli* (Tejera 1920) strains affecting rural populations of Central and South America.

MSc II-11.- **Student: Gilberto Ascencio Alemán, (El Salvador)**

Tutors: Gerardo Arroyo (Escuela de Microbiología, USC, Guatemala); Carmen I. Villagrán (Escuela de Microbiología, USC, Guatemala) and Anders Örn (Department of Immunology, Karolinska Institute, Sweden).

Title: Chronic Chagas disease: relevance of antibodies to *T. cruzi*, synthetic peptides and laminin for disease and diagnosis.

MSc II-12.- Student: Edwin A. Colucho, (El Salvador)

Tutors: María del Pilar Salas (INISA, Costa Rica); Örjan Strannegård (Central Microbiology Laboratory, Stockholm, Sweden) and Claes Örvall (Central Microbiology Laboratory, Stockholm, Sweden).

Title: Studies on the serology and pathogenesis of RSV-infection in children in El Salvador. The CA Academic coordinator (Dr. E. Moreno) did not propose him to continue in Sweden but Swedish tutors accepted him, so he finished his MSc with no funds from the programme.

MSc II-13.- Student: Alberto Alape-Girón, (Colombia/Costa Rica)

Tutors: Bruno Lomonte (Instituto Clodomiro Picado, UCR, Costa Rica); Monica Thelestam (Department of Clinical Bacteriology, Karolinska Institute, Sweden) and Björn Gustafsson (Department of Clinical Bacteriology, Karolinska Institute, Sweden).

Title: Biochemical and Immunochemical characterization of *Micrurus* (Coral snake) venoms. (see PhD I-6).

MSc II-14.- Student: Bernal G. Morera, (Costa Rica)

Tutors: Rafaela Sierra (INISA, Costa Rica); María del Pilar Salas (INISA, Costa Rica) and Carl-Erik Nord (Department of Oral Bacteriology, Huddinge Hospital, Sweden).

Title: Comparison of different methods for the diagnosis and epidemiological studies of *Helicobacter pylori* infections in Costa Rican and Swedish patients.

MSc II-15.- Student: Carmen I. Villagrán, (Guatemala)

Tutors: Vivian L. Matta (Escuela de Microbiología, Facultad de Medicina, USC, Guatemala) and Anders Örn (Department of Immunology, Karolinska Institute, Sweden).

Title: Congenital Chagas disease: correlations between clinical manifestations and serological reactivities to *T. cruzi* peptides and laminin.

MSc II-16.- Student: Byron Leiva, (Nicaragua)

Tutors: Aleyda Telles (Departamento de Microbiología y Parasitología, UNAN-León, Nicaragua) and Ewert Linder (Department of Parasitology, National Bacteriological Laboratory, Sweden).

Title: Seroepidemiological study of amoebiasis in León, Nicaragua.

MSc II-17.- Student: Orlando R. Mayorga, (Nicaragua)

Tutors: Margarita Paniagua (Departamento de Microbiología y Parasitología-UNAN-León, Nicaragua) and Örjan Strannegård (Central Microbiology Laboratory, Sweden)

Title: A seroepidemiological study of viral infections in León, Nicaragua.

MSc - III Programme (1993 - 1996)

MSc III-1.- Student: Patricia Arauz (Costa Rica)

Tutors: Kirsten Visona (ICMRT, Univ. Louissiana, Costa Rica) and Lars Magnus (Swedish Institute for Infectious Disease Control; SIIDC, Sweden).

Title: Molecular epidemiology of hepatitis B virus in CA.

MSc III-2.- Student: Estéban Chaves (Costa Rica)

Tutors: José M. Gutiérrez (Instituto Clodomiro Picado; ICP-UCR; Costa Rica) and Monica Thelestam (Karolinska Institute, Microbiology and Tumorbiology Center, Sweden)

Title: *Clostridium difficile* toxin B and mechanisms for regulation of the actin cytoskeleton in mammalian cells.

MSc III-3.- Student: Norma Gross (Costa Rica)

Tutors: Misael Chinchilla (Departamento de Microbiología-UCR; Costa Rica) and Connie Jarstrand (Karolinska Institute, Department of Clinical Bacteriology; Huddinge Hospital, Sweden).

Title: Interaction between lung macrophages and *Cryptococcus neoformans*.

MSc III-4.- Student: Catarina Guzmán (Costa Rica)

Tutors: Fernando García (Facultad de Microbiología, UCR, Costa Rica) and Staffan Arvidsson (Karolinska Institute; MTC; Sweden).

Title: Functional characterization of Hlyc, the protein responsible for the activation of the *E. coli* hemolysin.

MSc III-5.- Student: Gabriel Guzmán (Guatemala)

Tutors: Ricardo Luján (Departamento de Microbiología y Parasitología, Escuela de Medicina, Universidad Del Valle Guatemala) and Hannah Akuffo (Karolinska Institute; Roslagstulls Hospital, Sweden).

Title: Antigen recognition by Onchocerciasis patients from different geographic regions: characterization of immunodominant *O. volvulus* antigens by sera of patients from Guatemala and Ghana.

MSc III-6.- Student: Patricia Saravia (Guatemala)

Tutors: Fernando García (Facultad de Microbiología, UCR, Costa Rica) and Staffan Arvidsson (Karolinska Institute; MTC; Sweden).

Title: Regulation of the expression of fibronectin binding proteins and other extracellular proteins in *Staphylococcus aureus* of bovine origin.

MSc III-7.- Student: Mario González (Guatemala)

Tutors: Kirsten Visona (ICMRT, Univ. Louissiana, Costa Rica) and Lars Magnus (SIIDC, Sweden).

Title: Blood born infections in normal Honduran population.

MSc III-8.- Student: Claudia Lara (Honduras)

Tutors: Yvette Lorenzana de Rivera (Departamento de Microbiología, UNAH, Honduras) and Anders Sönnnerborg & Matti Sällberg (Karolinska Institute, Huddinge Hospital, Sweden).

Title: Detection and characterization of human retroviruses and hepatitis viruses in Honduras.

MSc III-9.- Student: Lelani Pineda (Honduras)

Tutors: Annabelle Ferrera (Departamento de Microbiología, UNAH, Honduras) and Sven Hoffner (SIIDC, Sweden).

Title: Characterization of *Mycobacterium tuberculosis* strains in Honduras.

MSc III-10.- Student: Félix Espinoza (Nicaragua)

Tutors: Margarita Paniagua (Departamento de Microbiología y Parasitología, UNAN-León, Nicaragua) and Hans Hallander & Lennart Svensson (SIIDC, Sweden).

Title: Rotavirus in a prospective cohort study on infant diarrhoea in León, Nicaragua. Studies on prevalence serotype distribution and clinical features.

MSc III-11.- Student: Orlando Guevara (Panamá)

Tutors: Paulina R. de Carreira (Departamento de Microbiología y Parasitología-UP, Panamá) and Anders Örn (Karolinska Institute, Microbiology and Tumorbiology Center, Sweden).

Title: Evaluation on the production of inductive phase cytokines produced after infection of Balb/c mice with Panamanian isolates of *L. (v)* parasite and *L. mexicana* - like parasites.

MSc III-12.- Student: Jessica Vásquez (Panamá)

Tutors: Octavio Sousa (Centro para la Investigación y el Diagnóstico de Enfermedades Parasitarias-UP, Panamá) and Anders Örn (Karolinska Institute, Microbiology and Tumorbiology Center, Sweden).

Title: Immune control mechanisms during *Trypanosoma rangeli* infections.

PhD - I Programme (January 1992 and March 1993 to December 1995 and June 1996)**PhD I-1.- Student: Rosario Achí (Costa Rica) (Thesis defended 94/04/08)**

Tutors: Leonardo Mata (Instituto de Investigaciones en Salud-UCR, Costa Rica) and Alf Lindberg (Dept. Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden)

Title: Shigellosis in Costa Rica: A study of urban and rural populations using antibody determinations in breast milk and serum and isolation of shigellae.

She was the former student MSc I-2.

PhD I-2.- Student: Enrique Freer (Costa Rica)

Tutors: Edgardo Moreno (Programa de Investigación en Enfermedades Tropicales-UCR, Costa Rica) and Andreij Weintraub (Dept. Clinical Bacteriology, Huddinge Hospital, Karolinska Institute, Sweden).

Title: *Brucella abortus* lipopolysaccharides epitopes.

He was the former student MSc I-1.

PhD I-3.- Student: Ana Lourdes Sánchez (Honduras)

Tutors: Marco Medina (Departamento de Microbiología, UNAH, Honduras) and Inger Ljungström (Swedish Institute for Infectious Disease Control; Sweden).

Title: Taeniasis and cysticercosis in Honduras: Immunological, clinical and epidemiological aspects.

She was the former student MSc II-5.

PhD I-4.- Student: Azael Saldaña (Panamá)

Tutors: Octavio Sousa (Centro para la Investigación y el Diagnóstico de Enfermedades Parasitarias-UP, Panamá) and Anders Örn (Microbiology and Tumor Biology Center, Karolinska Institute, Sweden).

Title: Immunobiochemical significance of *Trypanosoma rangeli* on the study of *Trypanosoma cruzi*.

He was the former student MSc I-9.

PhD I-5.- Student: Mercedes Cáceres (Nicaragua)

Tutors: Ernesto Medina (Departamento de Química, UNAN-León, Nicaragua) and Carl-Erik Nord (Department of Oral Microbiology, Huddinge Hospital, Karolinska Institute, Sweden).

Title: Antimicrobial resistance in anaerobic bacteria in Nicaragua.

(She started later and will finish probably later than the others that are likely to finish early in 1997, the latest). She was the former student MSc I-13.

PhD I-6.- Student: Alberto Alape-Girón (Costa Rica)

Tutors: José María Gutiérrez (Instituto Clodomiro Picado-UCR, Costa Rica) and Monica Thelestam (Microbiology and Tumor Biology Center, Karolinska Institute, Sweden).

Title: Characterization of the major toxic activities of *Micrurus nigrocinctus* venom and their neutralization with monoclonal and polyclonal antibodies.

He was the former student MSc II-13.

ANNEX II

PUBLICATIONS GENERATED BY MSC AND PHD STUDENTS

Publications by MSc students included in KIRT - I

P1.- Achí R., Cam PD, Forsum U, Karlsson K, Sáenz P, Mata L and Lindberg AA. Titers of class-specific antibodies against *Shigella* and *Salmonella* lipopolysaccharide (LPS) antigens in colostrum and breast milk of Costa Rican, Swedish and Vietnamese mothers. *Journal of Infection* 25 (1992) 89-105 (This is paper N° 1 in her PhD Thesis).

P2.- Achí R, Vives M, García ME, Mata L and Lindberg AA. Antibodies to *Shigella* LPS and invasion plasmid antigens in colostrum and breast milk of women from Pruriscal, a rural area of Costa Rica. *Serodiagnosis and Immunotherapy in Infectious Diseases*. 5 (1993) 237-244. (This is paper N° 3 in her PhD Thesis).

P3.- Achí R, Mata L and Lindberg AA. Serum antibody titers against *Shigella* LPS and invasion plasmid antigens in healthy Costa Rican and Swedish women. *Scandinavian Journal of Infectious Diseases*. 26 (1994) 329-337. (This is paper N° 4 in her PhD Thesis).

P4.- Achí R and Lindberg AA. Rapid and sensitive detection of *Shigella sonnei* in faeces by the use of an O-specific monoclonal antibody in immunomagnetic separation-PCR combined assay. 1994. *Clinical Microbiology and Infection* (in press). (This is paper N° 5 in her PhD Thesis).

P5.- Achí R, Siles X, Mata L and Lindberg AA. *Shigella* assays based on immunomagnetic separation and PCR-detection show shigellae to be more common than previously surmised in children from urban marginal communities of Costa Rica. (1996). Accepted for publication in *Journal of Infection*.

P6.- Cáceres M, Palmgren A-C and Nord CE. Antimicrobial resistance in human anaerobic microflora in Nicaragua and Sweden. *Revista Española de Quimioterapia* 4 (1991) 151-155. (This is paper N° 1 in her MSc Thesis).

P7.- Cáceres M, Hedberg M, Lindqvist L and Nord CE. Purification and characterization of a new beta-lactamase from *Bacteroides distasonis*. *J. Chemotherapy* 3(Suppl) (1991) 121-124. (This is paper N° 2 in her MSc Thesis).

P8.- Cam PD, Achí R, Lindberg AA and Pál T. Antibodies against invasion plasmid coded antigens of shigellae in human colostrum and breast milk. *Acta Microbiologica Hungarica* 39 (1992) 263-270 (This is paper N° 2 in her PhD Thesis).

P9.- Carrasco J, Madrid I, Acosta L, Örn A and Cosenza H. *Trypanosoma cruzi* isolates from Honduras.I. Biological characterization. Manuscript not submitted. (This is paper N° 1 in his MSc Thesis).

P10.- Carrasco J, Madrid I, Guevara E, Acosta L, Örn A and Cosenza H. *Trypanosoma cruzi*

isolates from Honduras.II. Susceptibility to Nifurtimox. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P11.- Carrasco J, Madrid I, Guevara E, Acosta L, Sporrang L, Örn A and Cosenza H. *Trypanosoma cruzi* isolates from Honduras.III. Expression of SAPA and Ssp-4 antigens during morphogenesis. Manuscript not submitted. (This is paper N° 3 in his MSc Thesis).

P12.- Carrasco J, Madrid I, Acosta L, Örn A and Cosenza H. *Trypanosoma cruzi* isolates from Honduras.I. Differences in the capacity to infect epithelial cells. Manuscript not submitted. (This is paper N° 4 in his MSc Thesis).

P13.- De Gallo IG, Guevara E, Örn A and Cosenza H. Parasitological and serological evaluation of malarial infection rates in an Honduran village. Manuscript not submitted.(This is paper N° 1 in her MSc Thesis).

P14.- De Gallo IG, Guevara E, Barnwell JW, Örn A and Cosenza H. Antigens of *Plasmodium vivax* isolates from Honduras identified by monoclonal antibodies specific for blood stage parasite proteins. Manuscript not submitted. (This is paper N° 2 in her MSc Thesis).

P15.- Freer E, Weintraub A, Lindberg AA, Mayer H and Moreno E. An immunochemical method for determination of bacterial lipid A heterogeneity. Submitted for publication in Diag. Clin. Immunol Invest.(This is paper N° 2 in his MSc Thesis).

P16.- Freer E, Rojas N, Weintraub A, Lindberg AA and Moreno E. Heterogeneity of *Brucella abortus* lipopolysaccharides. Res. Microbiol. 146 (1995)569-578. (This is paper N° 1 in his Ph.D Thesis).

P17.- Gené JA, Gutiérrez JM and Thelestam M. Effect of myotoxin II, isolated from *Bothrops asper* (Fer-de-Lance) snake venom, on mouse gastrocnemius muscle and liposomes. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P18.- Gené JA, Gutiérrez JM, Lomonte B and Thelestam M. Effects of myotoxin II from *Bothrops asper* (Fer-de-Lance) snake venom on different cell types. Manuscript not submitted. (This is paper N° 3 in his MSc Thesis).

P19.- Monroy-Gómez C, Madrid I, Acosta L, Guevara E, Sporrang L, Örn A and Cosenza H. A comparative serological study in a Central American population infected with *T. cruzi*, *T. rangeli* & *Leishmania* spp. Manuscript not submitted. (This is paper N° 1 in his MSc Thesis).

P20.- Monroy-Gómez C, Madrid I, Sporrang L, Örn A and Cosenza H. Antibody responses in experimental Chagas' disease using Honduran strains of *T.cruzi*. Detection by stage-specific immunofluorescence and peptide-ELISA techniques. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P21.- Nord C-E, Cáceres M, Hedberg M and Linqvist L. Purification and characterization of a novel beta-lactamase from *Bacteroides fragilis*. Proceedings of the 18th ICC, Stockholm (1993) p123. Was submitted for publication to Alpe Adria Microbiology Journal.

- P22.- Pascale JM, de Carreira P, Suárez M, Sousa OE and Örn A. Immunological factors associated with healing and recurrence of Leishmaniasis caused by *L. braziliensis panamensis*. Manuscript not submitted. (This is paper N° 1 in his MSc Thesis).
- P23.- Pascale JM, de Carreira P, Suárez M, Sousa OE and Örn A. Cellular and humoral reactivities in patients with cutaneous Leishmaniasis against a membrane fraction isolated from *L. braziliensis panamensis*. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).
- P24.- Pascale JM, De Carrera P, Ljungström I, Sousa OE, and Örn A. Recurrence in localized cutaneous leishmaniasis: clinical and immunological factors. *Chronica Dermatologica* 4 (1994) 749-765.
- P25.- Posada AB, Jonasson J, de Linares L and Bygdeman S. Prevalence of urogenital *Chlamydia trachomatis* infection in El Salvador. I. Infection during pregnancy and perinatal transmission. *International Journal of Sexually Trasmitted Diseases AIDS* 3 (1992) 33-37. (This is paper N° 1 in his MSc Thesis).
- P26.- Posada AB, Jonasson J, de Linares L and Bygdeman S. Prevalence of urogenital *Chlamydia trachomatis* infection in El Salvador. II. Gynaecology outpatients *International Journal of Sexually Trasmitted Diseases AIDS* 3 (1992) 434-436. (This is paper N° 2 in his MSc Thesis).
- P27.- Posada AB, Jonasson J, de Linares L and Bygdeman S. Prevalence of urogenital *Chlamydia trachomatis* infection in El Salvador. III. Men with urethritis and healthy medical students. *International Journal of Sexually Trasmitted Diseases AIDS* 4 (1992) 307. (This is paper N° 3 in his MSc Thesis).
- P28.- Quiros S, Gené JA, Gutiérrez JM and Thelestam M. Effect of *Bothrops asper* (Fer-de-Lance) snake venom on erythrocyte membrane. A comparative study. *Comp. Biochem. Physiol.* 101C (1992) 433-436. (This is paper N° 1 in his MSc Thesis).
- P29.- Rasool O, Freer E, Moreno E and Jarstrand C. Effect of *Brucella abortus* lipopolysaccharides on oxidative metabolism and lysozyme release by human neutrophils. *Infection and Immunity* 60 (1992) 1699-1702.
- P30.- Saldaña A, Örn A, Henriksson J and Sousa O.E. Evaluacion de 4 metodos inmunobioquimico/moleculares en la identificacion de cepas de *T. cruzi* y *T. rangelli*. *Revista Medica de Panama* 18 (1993) 41-52.
- P31.- Saldaña A, Örn A and Sousa OE. Immunoparasitological studies of *T. cruzi* clones from Panamá: I. Isoenzyme patterns. Manuscript not submitted. (This is paper N° 1 in his MSc Thesis).
- P32.- Saldaña A, Sousa OE and Örn A. Immunoparasitological studies of *T. cruzi* clones from Panamá: II. Humoral immune responses and antigenic cross-reactions with *T. rangeli* in experimentally infected mice. *Scandinavian Journal of Immunology* 42 (1995) 644-650. (This is paper N° 2 in his MSc Thesis).

P33.- Vega S, Forsum U, Karlsson K, Mata L and Lindberg AA. Class-specific antibody titers against 5 LPS antigens from *Shigella*, *Salmonella* and *Yersinia enterocolitica* in 800 healthy children from Panamá. Manuscript not submitted. (This is paper N° 1 in his MSc Thesis).

P34.- Vega S, Mata L and Lindberg AA. Class-specific antibody titers against some selected *Staphylococcus aureus*, *Haemophilus influenzae*, *Streptococcus pneumoniae* and *Neisseria meningitidis* antigens in healthy children from Panamá. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P35.- Vega S, Mata L and Lindberg AA. Total serum immunoglobulins levels in healthy children from Panamá. Manuscript not submitted. (This is paper N° 3 in his MSc Thesis).

P36.- Velásquez E, Reyes L, Thors C, Miettinen A, Chinchilla M and Linder E. Autoantibodies give false positive reactions in the serodiagnosis of *T. cruzi* infection. Transactions of the Royal Society of Tropical Medicine and Hygiene 87 (1993) 35. (This is paper N° 1 in his MSc Thesis).

P37.- Velásquez E, Thors C, Reyes L, Chinchilla M and Linder E. Autoantibodies in *T. cruzi* infection: Identification of antimyocardial antibodies in Chagas disease and in experimental infection of mice. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P38.- Venegas VS, Villafranca P, Madrid JP, Cosenza H and Bygdeman S. Gonorrhea and urogenital chlamydial infection in female prostitutes in Tegucigalpa, Honduras. International Journal of Sexually Transmitted Diseases AIDS 2 (1991) 195-199. (This is paper N° 1 in his MSc Thesis).

P39.- Venegas VS, Madrid JP, Lorenzana I, Grillner L, Cosenza H and Bygdeman S. Human immunodeficiency virus infection and syphilis in Honduran female prostitutes. International Journal of Sexually Transmitted Diseases AIDS 2 (1991) 110-113. (This is paper N° 2 in his MSc Thesis).

Publications from MSc students included in KIRT - II

P40.- Akuffo H, Darce M, Maasho K and Yamane Berhan T. In vivo evaluation of immune responses in Leishmaniasis: the use of cross-species leishmanin preparations for skin testing. American Journal of Tropical Medicine and Hygiene 53 (1995) 16-22. (This is paper N° 3 in her MSc Thesis).

P41.- Alape-Girón A, Gustafsson B, Lomonte B, Thelestam M and Gutiérrez JM. Immunochemical characterization of *Micrurus nigrocinctus nigrocinctus* venom with monoclonal and polyclonal antibodies. Toxicon 32 (1994) 695-712. (This is paper N° 1 in his MSc Thesis).

P42.- Alape-Girón A, Lomonte B, Gustafsson B, Da Silva NJ and Thelestam M. Electrophoretic and immunochemical studies of *Micrurus* snake venoms. Toxicon 32 (1994) 713-723. (This is paper N° 2 in his MSc Thesis).

P43.- Alape-Girón A, Gustafsson B, Lomonte B and Thelestam M. Monoclonal antibodies for immunoaffinity isolation and neutralization of myotoxic phospholipases from *Micrurus nigrocintus nigrocintus* venom. Manuscript not submitted. (This is paper N° 3 in his MSc Thesis).

P44.- Arias ML, Reyes L, Chinchilla M and Linder E. Seroepidemiology of toxoplasmosis in humans in Costa Rica. Submitted for publication in the American Journal of Tropical Medicine and Hygiene. (This is paper N° 1 in her MSc Thesis).

P45.- Arias ML, Reyes L, Chinchilla M and Linder E. Seroepidemiology of *T. gondii* (Apicomplexa) in meat producing animals in Costa Rica. Revista de Biología Tropical 42 (1994) 15-20. (This is paper N° 2 in her MSc Thesis).

P46.- Ascencio G, Arroyo G, Villagrán de Tercero C, Ayau O, de León H and Örn A. Reactivity against *T. cruzi* synthetic peptides in chronic Chagas disease. Manuscript not submitted. (This is paper N° 1 in her MSc Thesis).

P47.- Ascencio G, Arroyo G, Villagrán de Tercero C, Ayau O, Matta V, de León H and Örn A. Anti-laminin and anti-Gal antibodies in patients with chagasic cardiomyopathy. Manuscript not submitted. (This is paper N° 2 in her MSc Thesis).

P48.- Bultrón E, Gutiérrez JM and Thelestam M. Effects of *Bothrops asper* (Terciopelo) myotoxin III, a basic phospholipase A2, on liposomes and mouse gastrocnemius muscle. Toxicon 31 (1993) 217-222. (This is paper N° 1 in her MSc Thesis).

P49.- Bultrón E, Thelestam M and Gutiérrez JM. Effects on cultured mammalian cells of myotoxin III, phospholipase A2 isolated from *Bothrops asper* (Terciopelo) venom. Biochimica et Biophysica Acta 1179 (1993) 253-259. (This is paper N° 2 in her MSc Thesis).

P50.- Colacho ZEA, Pettersson CA, Forsgren M, Örvell C and Strannegård Ö. Respiratory syncytial virus infection in hospitalized patients and healthy children in El Salvador. American Journal of Tropical Medicine and Hygiene 51 (1994) 577-584. (This is paper N° 1 in her MSc Thesis).

P51.- Colacho ZEA, Örvell C and Strannegård Ö. Eosinophil cationic protein (ECP) in nasopharyngeal secretions and serum of children infected with respiratory syncytial virus (RSV) Pediatric Allergy and Immunology 5 (1994) 100-106. (This is paper N° 2 in her MSc Thesis).

P52.- Darce M, Rivera T and Akuffo HO. Cytokine profiles induced by *L. braziliensis* are more similar to profiles generated by *L. aethiopica* than those by *L. major*. Manuscript not submitted. (This is paper N° 1 in her MSc Thesis).

P53.- Darce M and Akuffo HO. Cutaneous leishmaniasis in Nicaragua: sera from patients with American cutaneous leishmaniasis can modulate antigen and mitogen driven responses in a fashion unrelated to the level of soluble IL-2 receptor. Manuscript not submitted. (This is paper N° 2 in her MSc Thesis).

P54.- Goto H, Rojas JI, Sporrang L, de Carreira P, Sánchez C and Örn A. *Leishmania (Viannia) panamensis* induced cutaneous leishmaniasis in susceptible and resistant mouse strains. In press in Revista do Instituto de Medicina Tropical de Sao Paulo, 3 (1995). (This is paper N° 1 in his MSc Thesis).

P55.- Horna AE, Saldaña A, Örn A and Sousa OE. Biochemical characterization of five strains of *T. rangeli* infection in a murine model. Manuscript submitted for publication in Memorias do Instituto Oswaldo Cruz. (This is paper N° 1 in her MSc Thesis).

P56.- Horna AE, Saldaña A, Örn A and Sousa OE. Experimental *T. rangeli* infection in a murine model. Accepted for publication in Revista de Biologia Tropical. (This is paper N° 2 in her MSc Thesis).

P57.- Horna AE, Saldaña A, Örn A and Sousa OE. Humoral immune responses in mice immunized with five different *T. rangeli* strains from different geographical areas. Manuscript not submitted. (This is paper N° 3 in her MSc Thesis).

P58.- Leiva B., Lundin L, Meyer E, Tellez A, Rivera T and Linder E. Estimation of *E. histolytica* prevalence in Leon based on serology and stool examination. Manuscript in preparation. (This is paper N° 1 in his MSc Thesis).

P59.- Mayorga O, Morales W, Paniagua M and Strannegård Ö. Prevalence of antibodies to hepatitis A, B, C and E virus in a healthy population in León, Nicaragua. In press in American Journal of Tropical Medicine and Hygiene. (This is paper N° 1 in his MSc Thesis).

P60.- Mayorga O, Morales W, Paniagua M and Strannegård Ö. Seroprevalence of antibodies to measles, mumps and rubella in León, Nicaragua: a basis for Immunization strategies. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P61.- Morera-Brenes B, Sierra R, Barrantes R, Jonasson J and Nord CE. *Helicobacter pylori* in a Costa Rican dyspeptic patient population. European Journal of Clinical Microbiology & Infectious Diseases 13 (1994) 253-257. (This is paper N° 1 in his MSc Thesis).

P62.- Morera-Brenes B, Sierra R, Mora F, Mora W, Palmgren A-C, Quiros E, Salas P, Solano L, Henriksson EK and Nord CE. Comparison of different methods for the diagnosis of *Helicobacter pylori* infections in Costa Rican and Swedish patients. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P63.- Reyes M, Hedlund K-O, Lorenzana I and Ehrnst A. Respiratory infection and iatrogenic diarrhoea in Honduras and El Salvador during the 1991-1992 season. Accepted for publication in the American Journal of Tropical Medicine and Hygiene 54 (1996). (This is paper N° 1 in his MSc Thesis).

P64.- Reyes M, Hedlund K-O, Eriksson M and Ehrnst A. Epidemiology of respiratory syncytial virus and rotavirus infections during 13 and 8 seasons in Stockholm. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P65.- Rojas JI, Tani E, Örn A, Sánchez C and Goto H. *Leishmania (Viannia) panamensis* induced cutaneous leishmaniasis in Balb/c mice: pathology. International Journal of Experimental Pathology 74 (1993) 481- 491. (This is paper N° 2 in his MSc Thesis).

P66.- Rojas N, Freer E, Weintraub A, Ramírez M, Lind S and Moreno E. Immunochemical identification of *Brucella abortus* LPS epitopes. Clinical and Diagnostic Laboratory Immunology 1 (1994) 206-213. (This is paper N° 1 in his MSc Thesis).

P67.- Rojas N, Weintraub A, Freer E, Pereira R and Moreno E. Expression of LPS epitopes on the surface of *Brucella* cells: specific detection using LPS-specific monoclonal antibodies and immunoelectron microscopy. Manuscript not submitted. (This is paper N° 2 in his MSc Thesis).

P68.- Saldaña A, Harris RA, Örn A and Sousa OE, T rangelli: Identification and purification of a 48 kDa specific antigen. Submitted for publication (1996). (This paper is included in the PhD Thesis of A. Saldaña)

P69.- Sánchez AL, Gómez OD, Soto N, Allebeck P, Cosenza H and Ljungström I. Human taeniasis and cysticercosis in a rural village in Honduras. See P70 (This is paper N° 1 in his MSc Thesis).

P70.- Sánchez AL, Gómez OD, Soto N, Allebeck P, Cosenza H and Ljungström I. Porcine cysticercosis in a rural village in Honduras. A manuscript is in preparation combining this one with P69 and will be submitted to Annals of Tropical Medicine and Parasitology. (This is paper N° 2 in his MSc Thesis).

P71.- Tellez A, Morales W, Rivera T, Meyer E, Leiva B, and Linder E. Prevalence of intestinal parasites in León, Nicaragua. Manuscript submitted for publication to Royal Society of Tropical Medicine and Hygiene. (This is paper N° 2 in his MSc Thesis).

P72.- Villagrán de Tercero C, Ríos VM, Barillas E, Gaitan G and Örn A. Serological reactivities against some *T. cruzi* synthetic peptides and laminin in *T. cruzi* congenitally infected children in relation to clinical progress. Manuscript not submitted. (This is paper N° 1 in her MSc Thesis).

P73.- Villagrán de Tercero C, Ríos VM, Barillas E, Gaitan G and Örn A. Non conventional alternatives for the diagnosis of congenital Chagas disease. Manuscript not submitted. (This is paper N° 2 in her MSc Thesis).

Publications from MSc students included in KIRT - III

P74.- Arauz P, Norder H, Visona K and Magnus LO. Relation of precore-mutants to HBV genotypes in Central America. Manuscript in preparation.

P75.- Arauz P, Norder H, Visona K and Magnus LO. Genotype F dominates among HBV genotypes in Central America. Manuscript in preparation.

- P76.- Chaves-Olarte E, Florin I, Boquet P, Popoff M, von Eichel-Streiber C and Thelestam M. UDP-Glucose deficiency in a mutant cell line protects against glucosyltransferase toxins from *Clostridium difficile* and *Clostridium sordellii*. Journal of Biological Chemistry 271 (1996) 6925-6932.
- P77.- Chaves-Olarte E, Florin I, Boquet P, von Eichel-Streiber C and Thelestam M. A mutant cell resistant to *Clostridium difficile* toxins has a low cytosolic level of UDP-Glucose. In: Bacterial Protein toxins (Eds. P.L. Frandsen et al.), Proc. 7th European Workshop Conference on Bacterial Protein Toxins, 2-7 July 1995, Hindsgavl, Middelfart, Denmark (in press 1996).
- P78.- Espinoza F, Paniagua M, Hallander H, Hedlund KO and Svensson L. Prevalence and characteristics of severe rotavirus infections in Nicaraguan children. Accepted for publication in Annals of Tropical Pediatrics.
- P79.- Espinoza F, Paniagua M, Hallander H, Svensson L and Strannegard O. Rotavirus infection in children: A two years prospective field study in Leon, Nicaragua. Manuscript in preparation.
- P80.- Gonzalez-Perez M, Taylor ML, Vinelli E, Magnus LO and Visona KA. Reduction in seroprevalences of blood borne agents after the introduction of written counselling in a Central American blood donor population. Manuscript in preparation.
- P81.- Gross NT, Nessa K, Camner P, Chinchilla M, Jarstrand C. Interaction between *Cryptococcus neoformans* and alveolar macrophages. Submitted for publication in Journal of Medical and veterinary Mycology.
- P82.- Gross NT, Chinchilla M, Camner P and Jarstrand C. Effects of cortisone on rat alveolar macrophages challenged with *Cryptococcus neoformans*. Manuscript in preparation.
- P83.- Guzmán GE, Akuffo HO, Lavebratt C and Luján R. Differential immune response to *Onchocerca volvulus*: IgG4 antibody responses differ in Onchocerciasis patients from Guatemala and Ghana. Submitted for publication in Journal of Clinical and Experimental Immunology.
- P84.- Guzmán GE and Akuffo HO. Characterization of protein subunits by two dimensional quasi-native/SDS PAGE. Submitted for publication in Journal of Immunological Methods.
- P85.- Lavebratt C, Ljungström I, Guzmán GE, Thors C, Griksson T and Akuffo HO. Evaluation of serological assays for diagnosis of Onchocerciasis. Submitted for publication in Scandinavian Journal of Infectious Diseases.
- P86.- Nessa K, Gross NT, Jarstrand C, Johansson A, Camner P. *In vivo* interaction between alveolar macrophages and *Cryptococcus neoformans*. Submitted for publication in Journal of Medical and veterinary Mycology.
- P87.- Pineda GL, Ferrera A, Alvarado C and Hoffner S. Drug-resistant *Mycobacterium tuberculosis* and atypical mycobacteria isolated from patients with suspected pulmonary

tuberculosis in Honduras. Manuscript submitted for publication in Chest, The Cardiopulmonary and Critical Care Journal.

P88.- Pineda GL, Ferrera A, Alvarado C and Hoffner S. Molecular heterogeneity among *Mycobacterium tuberculosis* strains in Honduras. Manuscript in preparation.

P89.- Popoff MR, Chaves-Olarte E, Lemichez E, von Eichel-Streiber C, Thelestam M, Chardin P, Cussac D, Antonny B, Chavrier P, Flatau G, Giry M, de Gunzburg J and Boquet P. Ras, Rap, and Rac small GTP-binding proteins are targets for *Clostridium sordelli* lethal toxin glycosylation. Journal of Biological Chemistry 271 (1996) 10217-10224.

P90.- Thelestam M, Florin I and Chaves-Olarte E. A mutant cell line resistant to *Clostridium difficile*. Microb. Ecol. Health. Dis. 8 (1995) 190.

P91.- Thelestam M, Florin I and Chaves-Olarte E. Review: *Clostridium difficile* toxins. Chapter 13 in: Bacterial toxins: a laboratory companion. (Ed. Klaus Aktories) Chapman & Hall 1996.

P92.- Vásquez JE, Krusnell J, Sousa OE and Örn A. Serological diagnosis of *T. rangeli* infected patients. A comparison of different methods and its implications on the diagnosis of Chagas disease. Manuscript in preparation.

P93.- Yun Z, Lara C, Johansson B, Lorenzana Y and Sonnerborg A. Discrepancy of Hepatitis C Virus genotypes as determined by phylogenetic analysis of partial NS5 and core sequences. Accepted for publication in Journal of Medical Virology

Publications by students in the PhD I programme

P94.- Alape-Girón A, Gustafsson B, Lomonte B, Thelestam M and Gutiérrez JM. Immunochemical characterization of *Micrurus nigrocinctus nigrocinctus* venom with monoclonal and polyclonal antibodies. Toxicon 32 (1994) 695-712.

P95.- Alape-Girón A, Stiles BG and Gutiérrez JM. Antibody-mediated neutralization and binding-reversal studies on alfa-neurotoxins from *Micrurus nigrocinctus nigrocinctus* (Coral snake) venom. Toxicon 34 (1996) 369-380. (PhD I-6 Thesis).

P96.- Alape-Girón A, Stiles B, Schmidt J, Girón-Cortés M, Thelestam M, Jörnvall H and Bergman T. Characterization of multiple nicotinic acetylcholine receptor-binding proteins and phospholipases A2 from the venom of the coral snake *Micrurus nigrocinctus nigrocinctus*. FEBS Letters 380 (1996) 29-32. (PhD I-6 Thesis).

P97.- Alape-Girón A, Miranda-Arrieta K, Cortes-Bratti X, Stiles BG, and Gutiérrez JM. A comparison of *in vitro* methods to assess the potency of therapeutic antisera against the venom of the coral snake *Micrurus nigrocinctus*. Submitted for publication in Toxicon.

P98.- Amvy E, Alape-Girón, A, Lomonte B, Thelestam M and Gutiérrez JM. Development

and comparison of immunoassays to detect *Micrurus* venom antigens in biological fluids. Manuscript in preparation.

P99.- Freer E, Rojas N, Weintraub A, Lindberg AA and Moreno E. Heterogeneity of *Brucella abortus* LPS. Research in Microbiology 146 (1995) 569-578.(PhD I-2 Thesis) Idem P14.

P100.- Freer E, Moreno E, Moriyón I, Pizarro-Cerdá J, Weintraub A, and Gorvel J-P. The outer membranes of *Brucella*-*Salmonella* lipopolysaccharide chimeras are less permeable to hydrophobic probes and more sensitive to bacterial cationic peptides than their native *Brucella* spp. counterparts. Submitted for publication in J. Bacteriol. (PhD I-2 Thesis).

The overall production of scientific papers has been: 39 published; 7 accepted; 14 submitted and 12 in preparation.

Sida

Dept for Research Cooperation,
SAREC
R-M Bålöw/L Freij

6 March 1996

FOLLOW-UP EVALUATION OF THE Sida/SAREC SUPPORTED COLLABORATIVE PROGRAMME FOR MEDICAL RESEARCH TRAINING IN CENTRAL AMERICA

Terms of Reference

Background

Following a Swedish governmental initiative in 1987 to increase the cooperation with Central America, a research training programme in biomedicine for students from the region was launched. The programme is based on cooperation between universities in six countries in Central America (Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama) and Karolinska Institutet (KI), Sweden.

The aims of the collaborative programme are to:

- contribute to the build-up of research capacity within relevant fields of biomedicine, in the region generally and in the involved university departments specifically, and
- promote the regional cooperation in research and research training and the scientific cooperation with Swedish departments.

Students selected for research training are provided with supervisors both from their home university and from KI. The training is based on the "sandwich model", where the teaching is performed partly in the region and partly at KI. The research topics emanate from the region, while biological material and data collected in the region may be analysed in Sweden. The MSc degree is awarded by KI.

A first MSc course was started in 1988 and the first batch of 13 students were graduated in 1990. The second and third MSc courses followed in 1990 and 1993, respectively. Hitherto, 28 students have graduated and 12 further students will complete their MSc-thesis before the end of 1996. In 1991 a PhD programme was initiated as a result of the successful training of MSc-students and their interest in further research training. Five students are presently completing their PhD theses and are expected to graduate before the end of the current fiscal year (1995/96).

The total financial contribution from Sida/SAREC, from the beginning of the both programmes up to end of the current agreements is 25,9 million SEK, of which 3,7 million SEK has been allocated to the PhD programme.

Initially the Central American participation in the programme was coordinated by the regional university federation CSUCA. In 1992, due to a financial management crisis within CSUCA, the administrative and financial reporting responsibilities were transferred to FUNDESCA, Panama (Dr J Arosemena) with Dr E Moreno, Universidad Nacional, Costa Rica as the scientific coordinator. In Sweden the Karolinska International Research and Training-programme (KIRT) is responsible for the administration of the activities at KI.

The MSc programme was evaluated in 1992 by Prof A Nieto. His main recommendations were:

- to increase the participation of Central American teachers and also increase the time spent in the region by the students during the training programme;
- to organize more of the basic courses in the MSc programme in the region;
- to further develop the methods for selection of students and supervisors for the programme, aiming at ensuring the highest possible proficiency of the participants selected as well as a balance between the involved countries;
- to provide re-entry grants for the returning graduates in order to enable them to continue research activities at their home universities;
- to create a PhD programme including one PhD student from each Central American country.

As a result of the above-mentioned evaluation a PhD programme was launched in 1992. The third and concluding MSc programme will be completed by the end of 1996, as well as the PhD programme. A preliminary proposal concerning a second PhD-programme has been submitted by the Central American coordinator in collaboration with KI. Against this background a follow-up evaluation of the programmes is considered well motivated.

Scope and focus of the evaluation

1. The Evaluation shall serve to update the previous evaluation and in particular to

- assess the performance and the scientific standard of the MSc- and PhD-training components;
- assess the relevance of the research topics selected for the students within both programmes;
- assess the outcome of the efforts to increase the involvement of the Central American universities in the basic training and in the process of selection of students (MSc programme); and

- assess the mode of collaboration between the Central American universities and KI and its cost-effectiveness (PhD programme).

2. Make recommendations regarding optimal ways of phasing out the support to the training programmes. This should include views on the following issues:

- What should be done by the involved Central American universities to sustain the achievements of the programmes in terms of regional collaboration in research and research training?

- What would be required from Sida/SAREC to facilitate the above? Should e. g. an extension of the PhD programme be considered?

Methods, organization and timing of the evaluation

The evaluation will be carried out by Professor A Nieto, Uruguay.

The evaluation will comprise

1. Review of project plans, reports, thesis and publications emanating from the programmes;
2. Visits to relevant institutions in Costa Rica, Nicaragua and Panama and if possible a seminar with participants from other involved countries; and
3. Visits to relevant institutions at KI, Sweden.
4. Compilation of an evaluation report (using a word processing programme compatible with WordPerfect), which should not exceed 25 double spaced typed pages. The report should include an executive summary, conclusions and recommendations. A summary for the Sida Evaluations Newsletter should be written in accordance with the instructions (Enclosure 1) and the "Sida Evaluations Data Worksheet" filled in (Enclosure 2).

The evaluation will be carried out during April and May 1996 according to a time schedule agreed on with Department for Research Cooperation, Sida. A preliminary written report should be presented to Sida preferably before the consultants' departure from Stockholm but not later than May 20. Following discussions with Sida the final evaluation report should be submitted not later than May 31.

Sida Evaluations - 1995/96

- 95/1 Educação Ambiental em Moçambique. Kajsa Pehrsson
Department for Democracy and Social Development
- 95/2 Agitators, Incubators, Advisers - What Roles for the EPU's? Joel Samoff
Department for Research Cooperation
- 95/3 Swedish African Museum Programme (SAMP). Leo Kenny, Beata Kasale
Department for Democracy and Social Development
- 95/4 Evaluation of the Establishing of the Bank of Namibia 1990-1995. Jon A. Solheim, Peter Winai
Department for Democracy and Social Development
- 96/1 The Beira-Gothenburg Twinning Programme. Arne Heileman, Lennart Peck
The report is also available in Portuguese
Department for Democracy and Social Development
- 96/2 Debt Management. (Kenya) Kari Nars
Department for Democracy and Social Development
- 96/3 Telecommunications - A Swedish Contribution to Development. Lars Rylander, Ulf Rundin et al
Department for Infrastructure and Economic Cooperation
- 96/4 Biotechnology Project: Applied Biocatalysis. Karl Schügerl
Department for Research Cooperation
- 96/5 Democratic Development and Human Rights in Ethiopia. Christian Åhlund
Department for East and West Africa
- 96/6 Estruturação do Sistema Nacional de Gestão de Recursos Humanos. Júlio Nabais, Eva-Marie Skogsberg, Louise Helling
Department for Democracy and Social Development
- 96/7 Avaliação do Apoio Sueco ao Sector da Educação na Guiné Bissau 1992-1996. Marcella Ballara, Sinesio Bacchetto, Ahmed Dawelbeit, Julieta M Barbosa, Börje Wallberg
Department for Democracy and Social Development
- 96/8 Konvertering av rysk militärindustri. Maria Lindqvist, Göran Reitberger, Börje Svensson
Department for Central and Eastern Europe
- 96/9 Building Research Capacity in Ethiopia. E W Thulstrup, M Fekadu, A Negewo
Department for Research Cooperation
- 96/10 Rural village water supply programme - Botswana. Jan Valdelin, David Browne, Elsie Alexander, Kristina Boman, Marie Grönvall, Imelda Molokomme, Gunnar Settergren
Department for Natural Resources and the Environment
- 96/11 UNICEF's programme for water and sanitation in central America - Facing new challenges and opportunities. Jan Valdelin, Charlotta Adelstål, Ron Sawyer, Rosa Núnes, Xiomara del Torres, Daniel Gubler
Department for Natural Resources and the Environment
- 96/12 Cooperative Environment Programme - Asian Institute of Technology/Sida, 1993-1996. Thomas Malmqvist, Börje Wallberg
Department for Democracy and Social Development
- 96/13 Forest Sector Development Programme - Lithuania-Sweden. Mårten Bendz
Department for Central and Eastern Europe
- 96/14 Twinning Programmes With Local Authorities in Poland, Estonia, Latvia and Lithuania. Håkan Falk, Börje Wallberg
Department for Central and Eastern Europe
- 96/15 Swedish Support to the Forestry Sector in Latvia. Kurt Boström
Department for Central and Eastern Europe

- 96/16 Swedish Support to Botswana Railways. Brian Green, Peter Law
Department for Infrastructure and Economic Cooperation
- 96/17 Cooperation between the Swedish County Administration Boards and the Baltic Countries.
Lennart C G Almqvist
Department for Central and Eastern Europe
- 96/18 Swedish - Malaysian Research Cooperation on Tropical Rain Forest Management
Systems.96/18Swedish Malaysian Research Cooperation on Tropical Rain Forest Management
Systems. T C Whitmore
Department for Research Cooperation, SAREC



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