

Network for Research and Training in Tropical Diseases in Central America – NeTropica 1999–2002

Mikael Jondal

**Department for Research
Cooperation**

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Sida Evaluation 02/29

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Executive Summary

The NeTropica program

Sida/SAREC decided in 1987 to support a program for MSc and PhD Training in Central America (CA) which included the six countries: Panama, Costa Rica, Nicaragua, El Salvador, Honduras and Guatemala. The program was focused on infectious diseases with the major aim to strengthen the research capacity in microbiology, immunology, parasitology, biochemistry and epidemiology. The program was established between the Consejo Superior Universitario Centroamericano (CSUCA) and the Karolinska International Research Training Program (KIRT) and designed as a "sandwich" model. In total 40 MSc and 14 PhD exams were passed in this successful KIRT-CA program.

In 1999 Sida/SAREC decided to continue the support in the form of a "Network for Research and Training in Tropical Diseases in Central America" (NeTropica), formed in 1998 by former KIRT-CA members. The major objective of NeTropica was to strengthen biomedical research capacity and sustainable research environments in CA by funding collaborative research projects in defined priority areas, consisting of multi-national CA and Swedish research groups and by supporting different network activities. NeTropica was funded with 1.5, 2.5, 3.5 and 3.0 million SEK for the years 1999–2002, respectively.

The evaluation

The evaluation was done by reading background documents and by visiting CA (Costa Rica, El Salvador and Honduras) for one week (week 31, 2002). During this week meetings were held with the General Coordinator (GC) of the program, representatives from all of the involved research groups as well as some other persons important for the NeTropica program, including the president of the University of Costa Rica (UCR), Gabriel Macaya. In Sweden, the Swedish coordinator was interviewed and Swedish researchers were contacted. The chairman of the Karolinska International Research Training Program (KIRT), Professor Hans Rosling, was also contacted.

Main findings

In relation to Sida/SAREC objectives, it is clear that the NeTropica program has been successful in increasing the regional research capacity. Instrumental for this has been the funding of joint research projects and networking activities including the organisation of courses, meetings and an informative and useful NeTropica WebPages. NeTropica in this way maintained the former KIRT-CA network but strengthened, developed and expanded it. The NeTropica network supplied a mechanism for more advanced countries to support less advanced countries and for senior scientists to support younger ones. NeTropica clearly is an interesting model not only for CA but also for the whole of Latin America. The funding of multi-national, joint projects, even if the grants given were small, was very important as there is virtually no money spent on research in the northern CA countries and very small amounts in Costa Rica and Panama. Thus, the NeTropica grants were, in many instances, decisive for the possibility of scientists to perform any research at all. The projects were found to be scientifically sound and mostly well operated. Additional network activities, including meetings, courses, WebPages and continuous informal email contacts, in the CA region and with Sweden, greatly facilitated by the fact that members of the NeTropica network had the same Alma Mater (KI), substantially increased the research capacity and contributed to a sustainable research environment. The NeTropica program has also been successful in establishing efficient research administration and financial routines for the program at KI and in Costa Rica.

Main recommendations

- As the NeTropica program clearly must be considered successful in many respects: achieved objectives, relevance, impact, sustainability and cost-effectiveness, it is recommended that Sida/SAREC prolong the program for another 3-year period. As many NeTropica projects presently are in their mid-final stages, and many manuscripts are being prepared, the termination of the program by this year would have a strong negative effect. Also, the continued support of NeTropica would allow the full impact of some new initiatives taken, such as the collaboration with the Southern cone RTPD network, the improved WebPages, fund-raising initiatives and the interaction with an emerging CA PhD program to develop. It is anticipated that NeTropica, after an additional period of funding, could maintain most of its activities independent of support from Sida/SAREC. Potential sources of funding that together might substitute for Sida/SAREC funding are national universities, foundations from other countries, the EU, WHO, national S&T programs and commercial companies. In the NeTropica WebPages, a list of appropriate places to apply for research support is given to facilitate the funding process.
- In an extended NeTropica program it is important that as much as possible of the funding reach CA and that the less advanced northern CA countries (El Salvador, Guatemala, Honduras and Nicaragua) are given an increased part of the funding, including special initiatives for IT, local courses and travel.
- Sida/SAREC could consider including PhD stipends for the emerging local PhD program as part of a prolonged NeTropica program.
- Sida/SAREC could consider, in an extension of the NeTropica program, to support the formation of a special "KI laboratory for Central America", located at UCR and with the objectives to foster research collaboration, exchange of students, teaching initiatives, technology transfer and joint applied projects in biomedicine. This idea was brought up during the one-week visit to CA.

Background

Sida/SAREC supported a program for MSc and PhD Training in Central America (CA) which started in 1987 and included the six countries: Panama, Costa Rica, Nicaragua, El Salvador, Honduras and Guatemala. The program was focused on infectious diseases with the major aims to strengthen the research capacity in microbiology, immunology, parasitology, biochemistry and epidemiology in the area and thereby also increase contacts between regional research groups. The program was established between the Consejo Superior Universitario Centroamericano (CSUCA) and the Karolinska International Research Training Program (KIRT) and designed as a "sandwich" model. Swedish institutions, mainly from the Karolinska Institutet (KI), offered tutoring to CA students who were graduated at the KI within the KIRT program.

Support was given in three periods for the MSc part and two periods for the PhD part. In total 40 MSc and 14 PhD exams were passed. The total cost of the program was 32.6 million SEK, 22 million for the MSc part and 10.6 million for the PhD part.

Two evaluations of the KIRT-CA program (1992 and 1996) (12–13) concluded that it had been very successful and included in the recommendations the formation of a network for the continued support of research and training in tropical diseases in CA. Initially 1.5 million SEK was given for the formation of such a regional research network. The network was then formally established in a 1998 symposium and called the "Network for Research and Training in Tropical Diseases" (NeTropica) in CA.

The NeTropica program

The NeTropica network was formed by scientists formerly active within the KIRT-CA program with the main objective to generate a critical mass of scientists in the biomedical area in CA who could generate sustainable scientific and educational programs for the improvement of the living conditions in the region. The specific objectives were:

- To use CA scientists trained within the Swedish KIRT-CA program, the German DAAD program as well as in regional programs as a core resource for the network. To rely on earlier developed Swedish and other external, contacts as active collaborators and support for the network.
- To finance collaborative research projects in CA in defined priority areas, mainly in infectious diseases.
- To facilitate the flow of scientific information, technology and education between different regions in CA, from advanced to less advanced countries.
- To support fund-raising from external sources within the network.
- To have annual meetings for the discussion of results, financial reports, courses and other scientific activities centered on a theme of common interest.

Sida/SAREC decided to fund the research collaboration between the NeTropica network and the Karolinska Institutet for 3 years (2000–2002) (1–3). The scope and main objectives defined by Sida/SAREC as given in article one were:

- Strengthening of the biomedical research capacity and the sustainable research environments at involved CA universities.
- The promotion of efficient administrative and financial routines for the involved research groups.
- The promotion of the regional capacity to train and examine MSc and PhD students.
- The establishment of a framework for the handling of intellectual property rights (IPR).

Funds were given for a 3-year period 2000–2002 at a level of 2.5, 3.5 and 3.0 milj SEK, respectively. Four different types of expenses were specified: 1. Research funding (around 80%). 2. Regional courses and meetings (around 10%). 3. Coordination and administration (around 10%). 4. Unforeseen (around 0.5%).

Certain undertakings by KI and NeTropica were defined:

- KI was to receive the SAREC funds and to transfer the CA part to the NeTropica coordinator in Costa Rica.
- KI should have a representative on the NeTropica board.
- KI research groups should participate in NeTropica activities by active collaboration with CA groups based on scientific partnerships of mutual interest and benefit.
- At KI the KIRT committee was to be responsible for the coordination and administration of involved Swedish research groups.
- No administrative costs were to be charged by the KI for handling of the SAREC funds. However, the part that was given to KI groups was charged with the normal over-head cost.
- NeTropica was to be responsible for the administration of the program, the selection, funding and follow-up of the CA research groups and all other network activities.

Objectives of the evaluation

According to the Terms of Reference (Annex 1) the *general objective* of the evaluation was to evaluate the Sida/SAREC support to NeTropica with reference to the objectives, applications and reports presented by the program.

The *specific objectives* were to evaluate the background documents leading to the support of NeTropica and to what extent the objectives specified in these documents have been fulfilled; to evaluate the relevance of the program; to discuss the long-term impact of the NeTropica in terms of future sustainability; to evaluate the research cooperation between CA and Swedish research groups in terms of quality and mutuality; to discuss the desire and necessity of Swedish scientists to continue the NeTropica work; to evaluate the cost-effectiveness of the program and to judge how much of the research activities that could be attributed to the Sida/SAREC support; to discuss the financial management of NeTropica funds; to advise Sida/SAREC if continued support to NeTropica is recommendable and also discuss the present and future possible sources of funding for the network.

Methodology of the evaluation

Different approaches were used to perform the evaluation.

- Reading and review of background documents as listed in the Reference section (1–16)
- Meeting with the NeTropica General Coordinator, Professor Edgardo Moreno at the Veterinary School, National University, Costa Rica and NeTropica secretary Christina Tsagaraki.
- Meeting with the Swedish coordinator, Professor Monica Thelestam.
- Visits to Dr Josefa Moran (project 4), Dr Gilberto Ascencio (project 9) and Professor Castillo (head of research) at the Faculty of Medicine, University of El Salvador in San Salvador.
- Visits to Drs Lelany Pineda (project 5), Dr Jorge Carrasco (project 7) and Dr Annabelle Ferrera (project 6) at the National University of Honduras, in Tegucigalpa.
- Meetings and discussions with Dr Carlota Monroy (project 7), Dr Felix Espinosa (project 3), Dr Carlos Jimenez (project 3), Dr Rosario Archi (project 4), Dr Libia Herrero (project 6), Dr Silvio Vega (project 4), Dr Jose Gutierrez (project 1) and Dr Bruno Lomonte (projects 2) in San Jose, Costa Rica.
- Meeting with the president of University of Costa Rica (UCR) Professor Gabriel Macaya and Dr Laya Hun Opfer responsible for research coordination at UCR.
- Final meeting with GC Edgardo Moreno in San Jose.
- Contacts with Swedish counterparts by phone or email.
- Discussion with Professor Hans Rosling, chairman of the KIRT committee.

A number of Sida/SAREC and NeTropica background documents have thus been obtained from the SAREC office in Stockholm and studied. A visit to Costa Rica, El Salvador and Honduras was undertaken in week 31, July 29 to August 2, 2002 (Annex 2). Three working days were spent in Costa Rica and one day in El Salvador and Honduras each. During this visit I met with representatives from all research projects supported by NeTropica with the exception of project 8 which was represented by Dr Silvio Vega from Panama City.

Additional meetings with high-ranking university officials in Costa Rica and El Salvador were valuable for the evaluation. Professor Castillo is head of research coordination at the University of El Salvador and in the process of starting a new center for research in Health sciences with support from the Spanish government. He gave a valuable insight into their strategic thinking in terms of building

science and technology in El Salvador. An important part in this program was the establishment of a centralized core facility unit at the university, which would offer modern technology to different departments at the university and to other research units in the country. Professor Gabriel Macaya is president of UCR, the dominating university in CA with around 60% of the scientific production in the area. He had been in this position for 5–6 years and explained the national and the university strategies to support science and technology in Costa Rica. At UCR there was an interesting initiative to organise research groups from different departments and institutes into broader programs with a more long-term perspective. At the national level the minister for S&T was outlining a new loan from the Inter American Development Bank (IADB) to promote the development of S&T in the country.

NeTropica research projects

The first NeTropica announcement for projects was distributed to researchers and university departments in CA, and at KI, that had earlier been involved in the KIRT-CA program. The projects were to involve at least two laboratories from different countries in CA and one Swedish collaborator. The projects were required to transfer technology and knowledge from Swedish to CA laboratories and between CA laboratories. In addition, submitted projects were required to already have some type of external funding or, at least, to have grant applications pending in a national or international agency. The maximum grant was limited to 7–8000 USD/year per laboratory for two years with a possible extension if the scientific report was considered successful.

Preference was thus given to those applicants who had been earlier involved in the KIRT-CA program and whose projects concerned NeTropica priority areas: parasitic and bacterial diseases and toxins. Each project required one Responsible Investigator (RI), collaborating Principal Investigators (PIs) and collaborating Swedish Investigators (SI).

In the first round of projects (1999) nine were selected by three external experts and the GC and in the second round (2001), nine were selected from 15 submitted projects by the same peer-review system. Three of the first generation projects were terminated and six were approved for continued support.

For project description see also Appendix 3.

Project 1

Snakebites are a problem in CA with 4000/year in the region out of which 600 in Costa Rica alone. The project concerns the tissue damage that can follow bites that deposit a mix of damaging enzymes and toxins in muscle tissue. Sometimes the damage is so extensive that an amputation is required. The RI (Jose Maria Gutierrez) has a long experience of snake poisons and is probably one of the most productive scientists in Costa Rica in terms of publications recorded in PubMed. He spends around 15% of his time on the project and is well funded by other external sources (Wellcome Trust). His Swedish counterpart, who is also the Swedish NeTropica coordinator (Monica Thelestam), is a recognized authority on bacterial toxins and together they form a strong research team. The RI has his laboratory in the "Clodomiro Picado" institute, situated outside of the UCR campus. This institute is also an important production site for anti-snake venom IgG, produced in horses, which generates an income that can be used to promote different functions and facilities. Thus, the institute is modern and well equipped. The PI (Patricia Saravia), a former MSc graduate from the KIRT-CA program, is now in Sweden working on her PhD thesis in the project. Three papers have been published and two manuscripts are being developed. Clearly an interesting, relevant and well progressing project that benefits strongly from the link to the KI.

Project 2

The RI (Bruno Lomonte) works together with Jose Maria Gutierrez at the "Clodomiro Picado" institute on the characterization of a snake venom derived 13 AA long peptide that shows a wide range of anti-bacterial activity. The peptide is derived from myotoxic phospholipase A2 and binds to LPS and thus modifies the induced cytokine profile. They have to synthesize the peptide manually. The RI got his PhD through the University of Gothenburg and is presently the director of the first CA PhD program, presented on the UCR home-page. The UCR program is similar to the KI PhD program and requires the students to publish at least 3 papers in international, peer-reviewed journals. This is a new tradition in CA, which probably will have an important impact in the future. The RI visited the SI (Andrej Tarkowski) in Gothenburg for one month to set up an in vivo model and the PI (Silda Larios) was in Costa Rica for two months to learn the test system for bactericidal activity. There are some earlier papers in the project and one manuscript is being developed. So far, they have had some difficulties in identifying any specific properties in the peptide that can explain the broad anti-bacterial effect. Given one more year of work, they will know if the peptide can be developed into a useful antibiotic. The project is interesting, and has a potential, but with limited relevance in context of NeTropica priorities.

Project 3

The major aim of the project is to surveille rotavirus strain diversity and dynamics in urban areas. By this type of molecular epidemiology it is also anticipated that better diagnosis of rotavirus infection will follow. In Sweden the PI (Carlos Jimenez) at KI, and two CA students at the University of Uppsala (with the SI Kåre Bondeson), have analyzed more than 100 collected strains by molecular techniques, including a new DNA microarray designed for high specificity and fast processing. The RI (Felix Espinoza) works in the same group as his wife who is well funded by three other bilateral Sida/SAREC projects. In the present project they have two manuscripts in process. The SI (Kåre Bondeson) thinks that the project requires more time and that the communication in the project could be better. The project is relevant and on the technological edge and with a potential to also include Honduras and Panama.

Project 4

The RI (Rosario Achi) was the first PhD graduated from the KIRT-CA program in 1994 (in Alf Lindbergs laboratory) and now holds a position as director of INISA, the Institute for Health Investigations at UCR. She took the initiative to the project in the first NeTropica meeting in 1998 and helped the PI in El Salvador (Josefa Moran) to set up the facilities for sample collection, at an initial cost of 23,000 USD. Moran has now collected 1050 patient samples and established 33 strains to be later analyzed at the molecular level. The project has identified shigellosis in 9% of hospitalized children in San Salvador. In Panama, the PI (Silvio Vega) has isolated around 100 strains, three of which were of the dysenteric type, which will be further analyzed by the RI for resistance elements, as antibiotic resistance is an increasing problem. The input of the SI (Peter Allebeck) has been very valuable and he has visited CA three times. The project group met recently in Nicaragua to set up a field study. The project is clearly relevant, well operated and broad in its approach, from epidemiology to the molecular identification of resistance elements. The group works well together. Two manuscripts are now in the process of being written.

Project 5

The RI (Lelany Pineda Garcia) did her MSc with the SI (Sven Hoffner) in the earlier KIRT-CA program and has very good working relations with him and the PI in Guatemala. She has collected 120 strains of *M. tuberculosis* from hospitalized patients and established a number of clones which she will later analyze by molecular gel techniques, including fingerprinting, at the KI. In Guatemala 77 strains have been isolated. Bacterial drug resistance has been studied, including a field study that applies a new, rapid test system. The project concerns a major medi-

cal problem, is well organized and has a potential to develop into important basic research. No papers or manuscripts so far but the results are being prepared for a presentation in Panama.

Project 6

The RI (Libia Herrero) was the coordinator for the second MSc program in the KIRT-CA program. She is now the dean at the Faculty of Microbiology at UCR. She has 20y of experience in CMV research. CMV is the most important cause of congenital infection in Costa Rica with 95% of adults and 43% of 4-month-old children infected. The PI in Honduras (Annabelle Ferrera) has collected, and characterized, 175 samples from alcoholics, blood donors and pregnant women. They need one more year to finish genotyping/subtyping. At present, they are planning a visit by the SI (Maria Brytting) to solve some technical problems. The project is relevant, well organized and likely to produce interesting results. No papers or manuscripts have been published so far.

Project 7

The RI (Carlota Monroy) got her MSc degree in the first generation KIRT-CA students at the KI studying serology in Chagas disease. Later she shifted to study vector control, as this is the most effective way to control the spread of the disease. She uses both molecular and morphometric techniques to study vector spread and dynamics. She also advises the Health authorities in Guatemala on how to conduct the fumigation programs. The PI is Gilberto Ascencio at the University of El Salvador. The SI (Thomas Jaenson) has been in Guatemala to follow and direct the work. In Uppsala the project has been extended to include research on plant derived insecticides and their potential effects on triatomines. The project is relevant and the RI a capable and effective person at many levels. In Honduras there have been some problems with sample collection and the contact between project members has been less than optimal. One manuscript in preparation.

Project 8

The relevance of this project relates to the idea that the milder form of Chagas disease that is seen in Panama might be due to the occurrence of the non-pathogenic *Trypanosoma rangeli* in this area, generating some type of protective immunity against *T. cruzi*. The characterization of *T. rangeli* immunity could thus possibly be useful for future *T. cruzi* vaccine development. The RI (Octavio Sousa), whom I did not meet, is a 76y old parasitologist, the Panamanian PI (Azael Saldana), who has a central function in the project, has a PhD from the KIRT-CA program. They have found interesting cross-reactive antibodies and have one manuscript accepted for publication and another being written. One PI has left the project (Eduardo Ortega Barria). The PI in Guatemala (Carlota Monroy) has mainly contributed some trypanosoma strains to the project. The SIs (Robert Harris and Anders Örn) has functioned as scientific advisors and providers of special reagents and more lately developed an extended research plan including *T. cruzi* functional genomics. The project is clearly interesting and should be further developed by the long-term collaborating group, with Azael Saldana as RI.

Project 9

The PI in El Salvador (Gilberto Ascencio) collects *T. Cruzi* samples and processes and tests these in the laboratory of the RI (Carmen Villagran de Tercero) in Guatemala. In El Salvador there is a high percentage of the population infected and there are yet no vector control programs in the country. There is a good contact between the RI and the SI (Inger Ljungström) who contributes quality control aspects to the serological and molecular test systems and also acts as a general advisor. There has been a delay in the project because of clinical obligations for the RI. One manuscript in preparation. The project is relevant and likely to bring interesting and useful results once the experimental part is finished.

Over-all evaluation of research projects

All of the projects are clearly scientifically sound and within, or close, to the NeTropica priority areas and are likely to bring interesting results from a Health perspective. Some have a broader epidemiological approach (projects 3–7 and 9) and others a more basic approach (projects 1–2 and 8). Most of the projects are on schedule, with some exceptions (projects 7–8 and 9) and likely to achieve their objectives. The Swedish participation was important and active in some projects (projects 1, 3, 4 and 6) and supportive in others (projects 2, 5, 7–9). All Swedish counterparts that answered an inquiry (7/9) expressed an interest and enthusiasm about NeTropica and wanted to continue the collaboration. In the seven projects that were approved for two periods, 4 papers and 11 manuscripts have been produced. No manuscripts are yet produced in the projects that were started in 2001 although data from these have been presented at different meetings. The best productivity was seen in project 1, reflecting a long history of collaboration. In many of the epidemiological projects there were an initial long period for collecting samples and setting up techniques which probably explains the limited number of papers reported.

Network activities

Meetings

During a summing-up meeting for the earlier KIRT-CA project in February 1998 in Costa Rica, "The immune system and its encounters with tropical pathogens", NeTropica was introduced and former KIRT-CA collaborators invited to participate, primarily by forming research projects according to NeTropica criteria.

The first annual NeTropica meeting was held in Guatemala in 2001 as "First International meeting on tropical diseases" and included lectures by invited guests, project presentation and posters. At the same time a Net-Board meeting was held and a course given in "Immunology and pathogenesis of tropical diseases of animals and humans". Fund-raising strategies were discussed and future NeTropica activities planned.

The second annual NeTropica meeting is scheduled to be held in Panama, in the beginning of 2003.

Net-Board meetings

Yearly Net-Board meetings were held 1999–2002 and minutes recorded. In the latest meeting in April 2002, the Sida/SAREC representative Pär Svensson was present. In that meeting several issues were decided. Edgardo Moreno was to meet Dr Arnaldo Zaha, the representative for the "Network for research and training in parasitic diseases in the southern cone of Latin America" (RTPD) in Brazil and outline a future collaboration between the two networks. A special fund-raising seminar was to be held in Guatemala in 2002. It was also decided to apply to Sida/SAREC for a new funding period for the NeTropica network.

Collaboration with the RTPD network

In April 2002 a Letter of Agreement was signed between NeTropica and the southern cone RTPD network (Arnaldo Zaha) for a future collaboration at many different levels. Exchange of students and scientists between groups belonging to the two networks. Participation of network members in courses and seminars organized by the two networks. A shared member data bank between the two networks to support junior scientists in manuscript writing and project reviewing. The integration of post-doc training. Joint scientific projects. Exchange of information regarding scholarships.

WebPages

A WebPage was constructed in June 2002. The first design included information regarding the history of NeTropica to which later (2001) was added a list of grants. In July 2002 the web page was

completely restructured to its present form: www.nettropica.org. It contains general information about NeTropica, the history of the long-term collaboration with Sweden, grants offered by NeTropica and projects that are presently approved as well as a grant and a bibliography section and two new sections, a list of relevant medical journal that are available on-line and laboratories of interest for Central American research in tropical diseases. The web page is well presented, informative and useful in many respects. An excerpt is given in Annex 4.

Fund-raising seminar

A fund-raising seminar was held in Guatemala in august 2002, organized by Carmen Villegran de Tercero and Carlota Monroy, attended by 23 students/scientists. The purpose of the seminar was to inform junior researchers about possible funding agencies (this information is also given in the home-page) and to teach them how to write grant applications, including their own. All NeTropica members and scientists from collaborating institutions were invited. The course was held during three days at the University of San Carlos. The seminar was attended by NeTropica members from Guatemala, El Salvador and Nicaragua.

Courses

One course was given in connection with the first "Annual Meeting" (see above) in April 2001. NeTropica sponsored a local PCR course in Guatemala organized by Carlota Monroy. Maybe some more local courses were given within the program.

Evaluation of network activities

As most of the NeTropica participants had a similar educational background in the KIRT-CA program the initial conditions for networking were very good. NeTropica got a "flying start" at the KIRT-CA program summing-up meeting in 1998 and re-enforced its network character by the way NeTropica projects were organized. The Swedish-CA axis was in some cases excellent and in others supportive and always useful for the CA research groups. In CA the NeTropica network consisted of a stronger part (Costa Rica and Panama) supporting a weaker part (Nicaragua, El Salvador, Honduras and Guatemala) by flow of information, know-how and technology. The 2001 meeting was well organized and the internet/email technology very useful for the on-going NeTropica networking process even if there still are some problems with internet access in some of the countries. The recently improved WebPages (www.nettropica.org) (see above) will be very useful for the future expansion of the network and for the introduction of new ideas such as senior scientists supporting younger scientists in writing manuscripts and grant proposals. The recently outlined collaboration with the southern cone RTPD network will most probably be very useful for NeTropica in the future. Given that a limited part of the budget was allocated for networking activities NeTropica has clearly achieved very well in this area.

NeTropica administration

NeTropica is governed by a board (Net-Board) consisting of the CA (Professor Edgardo Moreno) and the Swedish (Professor Monica Thelestam) coordinators as well as representatives from all supported research projects. The number of board members should not exceed eleven persons. In the board all countries should be represented by at least one person. The responsibility of the board is to oversee all network activities: research projects, meetings, courses, seminars, as well as the administration of the program. The Net-Board appointed Professor Edgardo Moreno from the School of Veterinary Medicine, National University (UNA), Costa Rica as a General Coordinator (GC) of the program. NeTropica was administrated from the office of the GC with the support of a part-time secretary.

The SAREC funding was paid yearly in total to an account at the KI (for 2001, 3.5 million SEK). After subtracting the amount of money required for the Swedish part of the program, as decided jointly by

the coordinators and the Net-Board, the remaining sum was transferred to FUNA (for 2001 67%), a special foundation set up by UNA for the handling of external funding. FUNA then, following NeTropica's instructions, transferred funding for research projects to the accounting office of the receiving group (see projects in Appendix 3) or to the General Coordinator for other expenses. The over-head at FUNA was not to exceed 4% and FUNA was to submit monthly reports to the GC and yearly reports to both the GC and the Swedish coordinator, before March 31 the following year. The 2001 report specified total expenses (187,600 USD) in the following items: Office equipment (0.7%), Consumables (= research projects) (77.5%), Travel (3.2%), Communication services (0.1%), Technical assistance (0.6%), Regional courses and meetings (3.6%), coordination and administration (8.4%), Administration expenses (1.3%), Unforeseen (0.0%) and Overhead (4.8%) Sida/SAREC then received yearly joint reports from the coordinators. A formal external audit for the first half of 2001, including expenses for the Annual Meeting in Guatemala, was done with no complaints.

Evaluation of NeTropica administration

The selection, composition and function (yearly meetings recorded in minutes) of the Net-Board seem logical and accurate with the exception that a representative from El Salvador is presently missing (see WebPages). Due to the cost for travel, Net-Board meetings have been limited but the ambition for the future is to intensify the Net-Board work through increased email contacts.

The NeTropica GC and his office at UNA have functioned well. The GC has also worked very well with the Swedish coordinator as they already had a long history together in the earlier KIRT-CA program.

The WebPage is a valuable and useful tool for the future.

Research projects were announced, peer-reviewed (by a three member international committee: Professors Mats Wahlgren (Sweden), Ignacio Moriyon and Carmen Alvarez (Spain)) and selected in a transparent and acceptable way.

The financial administration was transparent and well organized, as discussed in "Administrational considerations with reference to NeTropica", Office for Internal Affairs, Karolinska Institutet. The KI office (no charge for central handling, normal over-head for KI groups) and the FUNA foundation (4% charge) guaranteed cost-efficient and reliable accounting and transfer of funding to the receiving office at the university of the particular NeTropica research group. The groups then reported back expenses to the GC and the Swedish coordinator. There were no complaints from the groups visited (in Costa Rica and Honduras) about the administration of the local universities except in El Salvador where requisition and purchase of even small laboratory items took an inordinate amount of time. In summary, the administration of research projects was in itself a valuable educational process for NeTropica and maybe also for Sida/SAREC.

General findings

In relation to SAREC objectives, it is clear that the NeTropica program has increased the regional research capacity in different ways. The funding of multi-national, joint projects, even if the grants given were small, was very important as there are virtually no money spent on research in the northern CA countries and small amounts in Costa Rica and Panama. Thus, the NeTropica grants were, in many instances, decisive for the possibility of scientists to perform any research at all, even if all of the projects had some type of additional funding according to NeTropica rules (6). The projects were found to be scientifically sound and mostly well operated. Additional networking activities, including courses meetings, WebPages and continuous informal email contacts, in the CA region and including Sweden, greatly facilitated by the fact that members of the NeTropica network had the same Alma Mater (KI),

substantially increased the research capacity. The promotion of fundraising and the creation of a senior scientist network to support younger colleagues are mechanisms that are likely to further reinforce the network and promote its sustainability. The sustainability is also favored by the recently started PhD program, initially with 20 students for the first 5 year period (for more information about this program, see Project 2, page 6). In Costa Rica the government is planning a new Inter-American Development Bank (IADB) loan for science and technology which should also favour the future research environment. Also, the fact that many researchers trained in the NeTropica/KIRT-CA program hold important positions in their home countries is likely to be important for the sustainability of these programs.

The NeTropica program is clearly successful in establishing efficient research administration and financial routines for the program at KI and in Costa Rica. How far this lesson penetrated into the local administration in the other five countries is not clear, there were problems in El Salvador.

NeTropica also supported the regional capacity for MSc and PhD programs by active participation of NeTropica members in these. The director for the first PhD program in biomedicine is Dr Bruno Lomonte, RI for project 2. A major impact of the NeTropica/KIRT-CA program is the fact that the CA PhD program is outlined with KI as a model, meaning that students will have to produce at least three publications in international, peer-reviewed journals to pass.

The objective, initially suggested by Sida/SAREC, that the NeTropica program should increase the regional capacity to handle intellectual property rights (IPR), was actually not addressed in the program. There is a patent office in San Jose, but it is not really operational, according to the GC.

In summary, the NeTropica program is relevant, cost-efficient and has achieved its objectives to a high degree. There is a good possibility that the program can become sustainable by alternative funding (national universities, foundations in other countries, the EU, WHO, national S&T programs and commercial companies) given a little more time. NeTropica has had quite an impact in the region, by inter-connecting countries that were not communicating well before and thus setting the course for a future positive spiral in scientific and educational development.

Some points that could be discussed in the program

Is the balance between Swedish and CA funding correct? In 2001 33% of the total grant (3.5 milj SEK) was kept in Sweden for the SIs and the administrative costs. All NeTropica investigators were given a standardized sum (around 8.000 USD/year) which they could use freely to promote the projects (except for investigator salaries). It can be argued that this is practical and correct as this comparatively low sum, especially after subtraction of Swedish university over-head, can be regarded more as a travel grant. However, it can also be argued that as much as possible of the funding should go to CA and that the SI should mainly receive the cost for the actual travel done. Clearly, for the type of SIs that should be involved in a projects like NeTropica (senior scientists with strong groups) travel costs, manpower and interesting biological samples should be enough of a "carrot" to participate in the program.

Is the balance between funding of research projects and networking activities correct? In 2001 77% of the funding was used for research projects and it can be discussed if this part should be reduced to allow more of other activities such as travel, courses and meetings, especially for the benefit of the northern countries. Maybe to some degree? However, as the jointly organized research projects is the strongest "glue" in the NeTropica network, the present design of the program is quite good and should probably be kept as it is.

It is very important for the NeTropica program with a strong GC in CA and a strong coordinator in Sweden that work well together, as has been the case with Edgardo Moreno and Monica Thelestam.

The Net-Board has nominated Dr Esteban Chavez as a successor for Edgardo Moreno, starting 2003, in case Sida/SAREC decides to continue the program. Dr Chavez is in the same department as Dr Moreno and can thus rely on Dr Moreno's earlier experience of the program.

In CA Panama and Costa Rica are the more scientifically advanced countries. In particular UCR in San Jose is the dominating university. It is UCR that organizes the first regional PhD program in biomedicine, with KI as a model and along the lines in the earlier KIRT-CA program. The GC is located in Costa Rica. However, as the need for research capacity build-up is most pressing in the northern countries, maybe that should be more reflected in terms of the distribution of the NeTropica funding and in terms of the design of the program? In the present program there is less spent in Honduras and El Salvador. Different types of local courses and possibilities to travel to meetings and to other laboratories to learn techniques are much in demand in the northern countries.

Recommendations

As the NeTropica program clearly must be considered successful in many respects: achieved objectives, relevance, impact, sustainability and cost-effectiveness, it is recommended that Sida/SAREC prolong the program for another 3-year period. As many NeTropica projects presently are in their mid-final stages, and many manuscripts are being prepared, the termination of the program by this year would have a strong negative effect. Also, the continued support of NeTropica would allow the full impact of some new initiatives taken, such as the collaboration with the RTPD network, the improved WebPages, fund-raising initiatives and the interaction with the emerging PhD program to develop.

As much as possible of the funding should reach CA, no less than 75%. In CA the northern countries (Nicaragua, Honduras, El Salvador and Guatemala) should get their fair share of the funding, including special initiatives for IT, local courses and travel.

The present flow of funding from Sida/SAREC to KI to Costa Rica/FUNA to local universities/offices works well, is cost-efficient and supports a close collaboration between the CA and the Swedish coordinator and should thus be kept as it is.

The standardized amount given to all research groups could be more differentiated according to defined needs in the particular projects. Swedish groups can receive relatively less, in principle only support for travel.

The individual accounting from all involved research groups should be included in the yearly report so that it is clear how the money has been spent in all detail, how big over-heads that have been charged and how much that remains at the end of the year. The groups could also report any complaints with the local administration, if any.

The present Swedish coordinator functions very well and has a strong control of the program. It is important that the person in this position functions like this. If she chooses to leave the program, at some time point, it is important that a correspondingly efficient person is appointed to take over, someone that will work well with the nominated, potential new GC in Costa Rica.

The participating SIs should be selected from strong groups/departments that are likely to maintain their line of science for a long time, to be able to act as long-term, important collaborators, even after the NeTropica program has ended.

The Net-Board should have representatives from all participating countries, at present El Salvador is missing due to special circumstances.

Sida/SAREC could consider including PhD stipends for the emerging local PhD program as part of a prolonged NeTropica program. One stipend for each CA country would be a valuable contribution to support the first PhD program in the region. At present at the level of 20 students with very little economical support.

Sida/SAREC could consider, in an extension of the NeTropica program, to support the formation a special "KI laboratory for Central America", located at UCR and with the objectives to foster research collaboration, exchange of students, teaching initiatives, technology transfer and joint projects in applied biomedicine. This idea was brought up during the one-week visit to CA.

References

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6. NetBoard Minutes. Meetings: 1999-10-15, 2000-03-17, 2001-03-14, 2002-04-20.
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8. Letter of Agreement between NeTropica and RTPD networks. Edgardo Moreno and Arnaldo Zaha. 2002.
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10. Financial NeTropica report for 2000.
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Earlier evaluations

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14. Science and technology program evaluation. Costa Rica. Inter-American Development Bank. PPR-7/97.
15. Evaluation of IDB's science and technology programs in Chile, Costa Rica and Uruguay. Final Report. Inter-American Development Bank. WP-6/98.
16. Sida/SAREC evaluation. Network for research and training in parasitic diseases at the southern cone in latinamerica (RTPD). Alvaro Moncayo and Mikael Jondal. 2001.

Appendix 1

Program for the NeTropica evaluation in centralamerica

July 29 to august 2, 2002

Monday	Meeting with <i>Professor Edgardo Moreno</i> at the Veterinary School, National University, UNA. At UNA. NeTropica Coordinator. Meeting with <i>Christina Tsagaraki</i>. At UNA NeTropica secretary. Meeting with <i>Dr Carlota Monroy</i>. Department of Pharmacology and Chemistry, University of Guatemala. At UNA. Responsible Investigator. Project 7. Meeting with <i>Dr Felix Espinoza</i>. National University of Nicaragua. At UNA. Responsible Investigator. Project 3. Meeting with <i>Dr Carlos Jimenez</i>. Veterinary School, UNA. At UNA Principal Investigator. Project 3.
Tuesday	Meeting with <i>Dr Josefa Moran</i>. Faculty of Medicine, University of El Salvador. In San Salvador. Principal Investigator. Project 4. Meeting with <i>Dr Gilberto Ascencio</i>. Faculty of Medicine. University of El Salvador. In San Salvador. Principal Investigator. Project 9. Meeting with <i>Professor Castillo</i>. Head of Reserch at the University of El Salvador.
Wednesday	Meeting with <i>Dr Lelany Pineda</i>. Department of Microbiology and Chemistry. National University of Honduras. In Tegucigalpa. Responsible Investigator. Project 5. <i>Dr Jorge A. Carrasco</i>. Same department. Principle Investigator. Project 7. Meeting with <i>Dr Annabelle Ferrera</i>. Department of Microbiology, National University of Honduras. In Tegucigalpa. Principal Investigator. Project 6.
Thursday	Meeting with <i>Dr Rosario Archi</i>. INISA, University of Costa Rica (UCR). At UCR. Responsible Investigator. Project 4. Meeting with <i>Dr Libia Herrero</i>. Dean of the Faculty of Microbiology, UCR. At UCR. Responsible Investigator. Project 6. Meeting with the President of UCR, <i>Professor Gabriel Macaya</i> and with <i>Dr Laya Hun Opfer</i>, responsible for research coordination at UCR. Meeting with <i>Dr Jose M. Gutierrez</i> at the Instituto Clodomiro Picado, UCR. Responsible Investigator. Project 1. Meeting with <i>Dr Bruno Lomonte</i> at the Instituto Clodomiro Picado, UCR. Responsible Investigator. Project 2.
Friday	Meeting with <i>Dr Silvio Vega</i>. Department of Microbiology and Parasitology. University of Panama. In San Jose. Principle Investigator. Project 4. Final meeting with <i>Professor Edgardo Moreno</i>. NeTropica Coordinator.

Appendix 2

Terms of reference

2002-12-08

cc:

Diarienummer: 1999-004003

Terms of Reference for the Evaluation of the Regional Network for Research and Training in Tropical Diseases in Central America.

1 Background

SAREC and Sida/SAREC have supported a regional programme for biomedical research training 1987–1998 with . This programme was one of the activities financed by specific regional means funds by the Swedish government in order to support positive initiatives in the region and support Costa Rica as a peace promoter. The main aim of the programme was to strengthen research capacity within the areas of microbiology, immunology and parasitology and to support contacts between the regional research groups. The participating countries in the programme were Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

Since 1987, the programme has awarded 40 MSc and 14 PhD degrees. The degrees were awarded by Karolinska Institutet. When the support from Sida/SAREC stopped at 1999, the need for support to a research network was identified. NeTropica research network was initiated and received 1,5 mil SEK for 1999 and 9 mil SEK for three years from year 2000 to 2002. The main activity was to support research and networking including scientific regional meetings. The majority of the researchers in the network were trained within the initial programme co-ordinated by Karolinska Institutet.

2 Purpose and Scope of the Evaluation

During early autumn 2002, NeTropica is expected to submit an application to Sida SAREC for continued support during three years from 2003 to 2005. The last evaluation of the regional support made in 1996 by Dr A Nieto and a new evaluation of the NeTropica activities is required to make a fair assessment of the new application.

Another reason for the requirement of an evaluation is that the capacity of the network is gradually evolving towards independent research and research training. One sign, for instance, is that NeTropica will start a self-sustained and self-supported regional PhD-training programme during 2002–2003. However, it is unclear how far the capacity building has reached.

The findings and recommendations of the evaluation will guide decisions on future Sida/SAREC support to the network. Also, the evaluation will constitute a document for future internal development of the network.

3 The Assignment (issues to be covered in the evaluation)

General

The consultant shall evaluate the Sida/SAREC support to the regional network for research and training in tropical diseases in Central America with reference to the objectives, applications and reports presented by the programme.

Specific

The consultant shall evaluate the background documents leading to the support of the Network activities. Against these documents and the decisions made by Sarec and later Sida/SAREC (promemorias), the consultant shall judge to what extent the objectives of the programme have been fulfilled.

The consultant shall evaluate the relevance of the programme.

The consultant shall discuss the long-term impact of NeTropica in terms of future sustainability.

The consultant shall evaluate the research co-operation between Central American and Swedish research groups in terms of quality and mutuality. Also, the desire and necessity to continue research cooperation with Swedish counterparts shall be discussed.

The consultant shall try to evaluate the cost-effectiveness of the programme and to judge how much of the research activities could be attributed to Sida/SARECs support.

The consultant shall discuss the financial management of NeTropica funds.

The consultant shall finally advise Sida/SAREC if continued support to the Network is recommendable and also discuss present and future possible sources of funding for the Network.

4 Methodology, Evaluation Team and Time Schedule

The evaluation will be carried out by Mikael Jondal.

The consultant shall read required background documents presented by Sida/SAREC. The evaluator will have unlimited access to registered background material at Sida/SAREC.

The consultant shall make his own travel and meeting arrangements to fulfil the assignment. The site visits and contacts with NeTropica will be facilitated through contacts from the Secretariat of SAREC.

The evaluator shall visit Costa Rica and interview the NeTropica coordinator, Dr Edgardo Moreno.

The evaluator shall visit NeTropica research groups in Costa Rica, Honduras and El Salvador. The evaluator shall talk to representatives from the other three participating countries (Guatemala, Panama, Nicaragua) to get an overview and insight into activities of the network and the research groups.

The evaluator shall meet the co-ordinator in Sweden, Dr Thelestam, and discuss the role of the network for the Swedish counterparts.

The preparation for the evaluation will start in June 2002 and the visit to Central America will be performed in July/August 2002. The maximum work time spent on the evaluation should be 150 hours.

5 Reporting

The evaluation report shall be written in English and shall not exceed 40 double spaced typed pages, excluding annexes. Format and outline of the report shall follow the guidelines in **Sida Evaluation Report – a Standardized Format** (see Annex 1). The draft report shall be submitted to Sida electronically and in 2 hardcopies (air-/surface mailed or delivered) no later than 15 September 2002. Within 2 weeks after receiving Sida's comments on the draft report, a final version shall be submitted to Sida, again electronically and in 2 hardcopies. The evaluation report must be presented in a way that enables publication without further editing. Subject to decision by Sida, the report will be published in the series *Sida Evaluations*.

The evaluation assignment includes the completion of **Sida Evaluations Data Work Sheet** (Annex 2), including an *Evaluation Abstract* (final section, G) as defined and required by DAC. The completed Data Worksheet shall be submitted to Sida along with the final version of the report. Failing a completed Data Worksheet, the report cannot be processed.

Appendix 3

Historical Scope

Central America is a region which spans in 7 countries; it has a population of 35 million people, and is a potentially reach source of scientific knowledge and wealth. To a greater extent than in any other Latin American country, Central American scientists must struggle against almost non-existent budgets, laboratory equipment, and communications systems. This reality, coupled with constant conflicts and natural disasters, has contributed to the exodus of some of the best students and scientists who are drawn to opportunities in Europe and the United States. This “brain drain” has spelt disaster for Central American universities and public health systems struggling to participate in the progress of their nations. In order to address their shortcomings in a coordinated manner, the Central American universities and non-profit institutions have initiated joint academic and scientific ventures, often in collaboration with scientists from developed countries and supported by international agencies. These efforts have contributed to an increase in caliber of university scholars involved in a wide range of disciplines, especially in the fields of biology, agronomy and biomedicine.

There is still much ground to cover, however, before the universities possess the requisite number of qualified academics necessary for the development of the region. Indeed, the task of making scientific research flourish in Latin America is not easy and its consolidation will take time. Several old habits have to be reversed and there are no magical short-term solutions. However, with creativity and common sense, it should be possible to identify areas where world-class contributions can be made. Graduate programs supported by regional universities as well as by Swedish and other international agencies from the developed countries have been invaluable in the expansion and progress of a trained body of biomedical scientists in Central America. What the region now requires is a concerted effort to promote the formation and growth of a competitive “critical mass” of investigators capable of independent fund raising and research. It is within this context that the Network for Research and Training in Tropical Diseases in Central America (*NeTropica*) had its genesis.

Creation of NeTropica

In order to demonstrate the importance and successes of the international cooperative educational efforts and to stimulate continuing research within Central America, current and former students, scientists from Latin America, Europe, United States, and representatives of research funding agencies were invited to a Symposium titled, “The Immune System and its Encounters with Tropical Pathogens.”

In February 1998, during the symposium, students and tutors of the former MSc. and Ph.D. programs had the opportunity to present past and on-going research projects. Scientists from Central American universities, Germany, France, Latin America, North America, the Karolinska Institute and the Central American graduates and their tutors discussed past and on-going graduate programs. Conferences on tropical pathogenesis were presented by top scientists as part of the continuing interest in the region in understanding old and emerging diseases. Program graduates were introduced to fundraising concepts and the International Foundation for Science and Sida/SAREC.

The final aim of the conference was to introduce the formation of the **Network for Research and Training in Tropical Diseases (NeTropica)**, which has been partially supported by Sida/SAREC for the period 1999/2003.

Appendix 4

Organization of *NeTropica*: 2002–2003

NeTropica Scientific Board (NeT-board)

The *NeTropica* Scientific Board (*NeT*-board) is composed by at least one representative from each Central American country subscribed in each project, the Central American Coordinator and the Swedish Coordinator. The total membership of the Board should not exceed 11 people. *NeT*-board membership can be changed according to the incorporation of new projects or the discontinuation of previous projects.

The responsibilities of the *NeT*-board includes the coordination of the activities of the network such as, the organization of scientific meetings, the development of training programs and the fostering of research collaborations. In addition, the *NeT*-board will develop a list of evaluators who will review the periodic status reports from the research group. The Board will also assist the research groups in fundraising and in exploring alternatives for the management of research funds. For future projects, the *NeT*-board will be responsible for appointing a new Selection Committee. To minimize expenses every effort will be made to coordinate the group activities through the use of electronic mail and facsimile.

NeT-board for 2002–2003

Name	Institution
Lic. Silda Larios	Universidad de Leon, Nicaragua
Dr. Edgardo Moreno	NeTropica Coordinator – C.A.
Dr. Felix Espinoza	Universidad de Leon, Nicaragua
Dr. José-María Gutiérrez	Universidad de Costa Rica
Dr. Monica Thelestam	NeTropica Coordinator – Sweden
Dr. Octavio Sousa	Universidad de Panamá
Dra. Carlota Monroy	Universidad de San Carlos de Guatemala
Dra. Carmen Villagrán de Tercero	Universidad de San Carlos de Guatemala
Dra. Lelany Pineda	Universidad Nacional Autonoma de Honduras
Dra. Libia Herrero	Universidad de Costa Rica
Dra. Mercedes Caceras	Universidad de Leon, Nicaragua

Central American Coordination

The General Coordinator of *NeTropica* is selected by the *NeT*-board for a threeyear period. The General Coordinator is responsible for the functioning of the network, coordinating the meetings and activities of the Selection Committees and the *NeT*-board, and collaborating with the agencies responsible for the management of grant funds. The Coordinator is responsible for selecting the administrative support staff that will assist in carrying out these functions.

Coordination of the network requires access to e-mail, efficient mail service, facsimile, telephone, extensive computer facilities, and administrative support from the university authorities. The Coordinator must work in Central America; furthermore must have extensive links with the scientific and academic communities in the region and abroad. Both the Coordinator and administrative support staff should be fluent in spoken and written English.

Dr. Edgardo Moreno NeTropica Coordinator Programa de Investigaciones en Enfermedades Tropicales. Escuela de Medicina Veterinaria, Universidad Nacional Apartado 304- 3000 Heredia, Costa Rica (506) 238.0761 tel (506) 238.1298 fax emoreno@medvet.una.ac.cr	Christina Tsagaraki NeTropica Program Assistant Programa de Investigaciones en Enfermedades Tropicales. Escuela de Medicina Veterinaria, Universidad Nacional Apartado 304- 3000 Heredia, Costa Rica (506) 238.0761 tel (506) 238.1298 fax netropica@netropica.org netropic@medvet.una.ac.cr
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Swedish Coordination

The Swedish Coordinator is appointed by the *Karolinska Institute* authorities, and is responsible for the functioning of *NeTropica* in collaboration with the Central American Coordinator.

Dr Monica Thelestam NeTropica Swedish Coordinator Karolinska Institute Micorbiology & Tumorbiology Center Box 280 S-17177 Stockholm Sweden (46) 8-728-7162 tel (46) 8-33-1547 fax monica.thelestam@mtc.ki.se	Monica Grangien NeTropica Program Assistant IHCAR Karolinska Institute SE-171 76 Stockholm Sweden (46) 8-517-76721 tel (46) 8-31-1590 fax monica.grangien@phs.ki.se
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Budget

In addition to the research funds requested from Sida, the Central American contribution to *NeTropica* includes: salaries of responsible investigators and principal investigators; technicians and graduate students; laboratory equipment; transportation; and grant money from national (e.g. University Scientific Councils, National Scientific Councils, National Academy of Sciences, Ministry of Scientific Affairs and NGO) and international sources (JICA, TWAS, IFS, EC, WHO, FAO, CR-USA, CIDA, DAAD, GTZ, Netherlands Co-operation Agency). The contribution of each source usually is specified in the research projects. The Karolinska Institute also offers a further substantial contribution for the development of *NeTropica* research projects and activities.

Appendix 5

Research Grants Approved

Obligations of the Grantees

- Contracto (español)
- Contract (English)

Progress Reports

A report from the *NeTropica* Coordination to the granting agencies is required on an annual basis. In extraordinary cases a report on a six-month basis will be elaborated. Reports must be received on time by the *NeT*-board who will be responsible for communicating to the responsible investigators the deadline for these reports. Therefore, each responsible investigator must request from the principal investigators participating in the project the required information from the institutions in charge of the management of funds as well as a report of the scientific achievements to date. Then each responsible investigator must submit the information to the *NeTropica* coordination so that a complete report can be submitted to the granting agencies. All reports from different projects must be in the hands of the Coordination at least two months before submission to the granting agencies.

The method for reporting financial information is indicated within the Exhibits and includes an ordinary accounting statement and a detailed report with the items classified as follows: equipment, consumables, travel, communication and services, coordination and administration. Both a progress and financial report are required.

An application for grant continuation is also required at this time. This should include a short plan (not to exceed 2 pages) of research activities and a budget, and information about the institution who will be managing project funds. Decisions regarding financing will be made by the *NeT*-board, provided that the granting agencies provide the requested funds for the *NeTropica* program.

Presentation of the Successful Projects for the Period 2002–2003

Nine proposals were selected for participation in the *NeTropica* project 2002–2003. Priority was given to scientists who have previously participated as students or tutors in the various Graduate Programs in Biomedical Sciences in Central America. Research teams were selected on the basis of scientific and academic achievement, demonstrated leadership, and existing infrastructure.

Abstracts of the nine selected research projects:

PROJECT 1

Effects of tissue damage toxins from the venom of the snake *Bothrops asper* on infection of muscle tissue by *Staphylococcus aureus*

PROJECT 2

Antimicrobial activity of cationic peptides derived from tropical snake venom

PROJECT 3

Rotavirus gastrointestinal infection in Nicaraguan, Panamanian and Honduras children

PROJECT 4

Clinical Epidemiological and Seroepidemiological aspects of Shigellosis

PROJECT 5

Molecular typing of mycobacterium tuberculosis in Honduras and Guatemala

PROJECT 6

Cytomegalovirus genotypes circulating in Honduras and Costa Rica in different patient populations.

PROJECT 7

Morphometric and genetic characterization for sylvatic and domestic *Triatoma dimidiata* populations in Guatemala, Honduras and Nicaragua to understand the migration and reinfestation pattern of the species.

PROJECT 8

Preparation and characterization of monoclonal antibodies against a *Trypanosoma rangeli* Sialidase

PROJECT 9

Trypanosoma Cruzi minicircle DNA detection among cardiac patients from Guatemala endemic area hospitals.

Research contracts were written for the Responsible Investigator and the Principal Investigator(s) for each of the nine research projects. Signed copies of the contracts in Spanish and English are kept on file at the office of *NeTropica* ; copies were also sent to the Karolinska Institute in Sweden.

PROJECT 1

Effects of tissue damage toxins from the venom of the snake *Bothrops asper* on infection of muscle tissue by *Staphylococcus aureus*.

Comparative study on the biochemistry, toxicology and immunology of snake venom in Central America. This project is a comparative analysis of the biochemistry and toxicology of the venom's of three species of snakes common in Central America, as an initial step in understanding the interspecies variability of snake venom's in this region. The venom's of *Bothrops asper*, *Crotalus durissus* and *Atropoides nummifer* will be studied, as they constitute three of the most important snakes from a medical point of view in Central America. The second stage in the project will be a comparative toxicological and pharmacological characterization of venoms from Guatemala and Costa Rica. The third stage in the project will be an evaluation of the ability of antivenoms produced in México and Costa Rica to neutralize the most relevant toxic constituents of Guatemalan and Costa Rican snake venoms. This part of the project will provide the information required to decide if there is a need to design novel immunization mixtures to produce anti-venoms of higher efficiency than those already available for the neutralization of Guatemalan snake venoms. The methodologies and conclusions of this project will be the basis of a more complete and comprehensive characterization of snake venoms from Central America.

Investigator	Laboratory	Funds administrator
Jose Maria Gutierrez – Responsible Investigator jgutierrez@icp.ucr.ac.cr	Instituto Clodomiro Picado-UCR Costa Rica	FUNDEVI
Patricia Saravia – Principal Investigator patriciaso@hotmail.com	Universidad de San Carlos de Guatemala Guatemala	Colegio de Farmaceuticos de Guatemala
Monica Thelestam – Swedish Investigator monica.thelestam@mtc.ki.se	Karolinska Institute Sweden	KIRT

PROJECT 2

Antimicrobial activity of Cationic Peptides derived from tropical snake venom.

Previous studies have shown that myotoxic phospholipases A2 (PLA2s) present in the venom of the snake *Bothrops asper* from Costa Rica are capable of killing bacteria *in vitro*. In this project, we propose to further characterize the bactericidal activity and anti-microbial spectrum of venom myotoxins.

Investigator	Laboratory	Funds administrator
Bruno Lomonte – Responsible Investigator blomonte@cariari.ucr.ac.cr	Universidad de Costa Rica Costa Rica	Academia Nacional de Ciencias
Silda Larios – Principal Investigator slarios@unanleon.edu.ni	Universidad Autonoma de Nicaragua-LEON Nicaragua	UNAN-LEON
Andrej Tarkowski- Swedish Investigator tarkow@clavicula.mednet.gu.se	University Goteborg Sweden	University of Goteborg

PROJECT 3

Rotavirus gastrointestinal infection in Nicaraguan, Panamanian and Honduras children.

Human group A rotavirus (HRV) is the major cause of severe gastroenteritis in infants worldwide. The Center for Disease Control has recommended universal administration of rotavirus vaccination in children. In future rotavirus vaccine trials, and generally in other interventions of microbiological systems, methods with high-throughput are needed to describe the genetic diversity of circulating strains and isolates before and after intervention. HRV shares the feature of high genetic diversity with other RNA viruses and is therefore difficult to genotype. We have developed a method that can easily be established in the laboratory. It is of general utility and is likely to gain a wide applicability for specific detection and genotyping of microorganisms.

Investigator	Laboratory	Funds administrator
Felix Espinoza – Responsible Investigator micromed@unanleon.edu.ni	Universidad Nacional Autonoma de Nicaragua	UNAN-LEON
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PROJECT 4

Clinical Epidemiological and Seroepidemiological aspects of *Shigellosis*

Shigellosis plays an important role in rates of morbidity and mortality in developing countries and is still an important disease in industrialized nations. *Shigella* is prevalent in overcrowded areas with poor sanitation. Transmission of *Shigella* is person-to-person by the fecal oral route. Shigellosis or bacillary dysentery is mainly a disease of young children, but all age groups can be affected. Symptoms of the disease include acute, severe gastrointestinal infection with fever, tenesmus, abdominal cramps and in particular frequent small, mucous depositions containing visible blood and leukocytes. As *Shigella* is prevalent in Costa Rica, particularly among poor, urban groups, we wish to continue our investigation of the epidemiological and clinical aspects of shigellosis in Costa Rica; specifically, its prevalence and seroprevalence, as well as to improve diagnostic methods. Our future goal is to study shigellosis in other Central American countries where the disease is common, but no studies are presently being conducted, due to the lack of laboratory facilities and researchers trained to work with enteric bacteria.

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PROJECT 5

Molecular typing of *Mycobacterium tuberculosis* strains from Honduras and Guatemala.

This project is a comparative molecular analysis using DNA fingerprinting of *Mycobacterium tuberculosis* a genetic technique. Isolates will be obtained from tuberculosis patients from Honduras and Guatemala. Restriction Fragment Length Polymorphism (RFLP) with the insertion sequence IS 6110 will be used to compare all the fingerprinting of *M. tuberculosis* isolated. Additionally, this method will allow the identification of the specific clone circulating among tuberculosis patients. As an initial stage isolate strains from different kind of samples will be used. The second stage of the project will be the standardization of RFLP method and the molecular characterization of *M. tuberculosis* strains isolated from both countries. The last stage will be the analysis of fingerprints using Gel Compar system. Such data will provide information about the characterization of *M. tuberculosis* from Honduras and Guatemala or both. Other uses include the identification of outbreaks, the tracing nosocomial infections and the investigations of ongoing spread of infections in a certain population such as drug-susceptible and drug-resistant patients.

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PROJECT 6

Cytomegalovirus genotypes circulating in Honduras and Costa Rica in different patient populations.

The general objective of this proposal is to determine the gB genotypes circulating in Costa Rica and Honduras at the present time and compare them with genotypes of viruses isolated fifteen years ago in Costa Rican newborns. The specific objectives are to determine if there is a different distribution of genotypes in different patient populations and compare them with circulating genotypes of fifteen years ago. The glycoprotein B (gB) of the cytomegalovirus is considered to be a multifunctional envelope component responsible for the virion entry, cell to cell spread and syncytium formation, and it is also the major target for neutralizing antibodies. Sera samples will be used from a sera bank of alcoholics, neonatal patients, AIDS patients and blood donors. Amplified products by PCR will be analyzed by restriction fragment length polymorphism followed by electrophoresis and staining by ethidium bromide. This will allow the CMV isolates to be classified into four gB genotypes. To group specimens into further subtypes a single-stranded conformation polymorphism and heteroduplex mobility analysis will be done. Sequencing of selected specimens will also be performed. It is very important to determine the CMV genotypes circulating in Costa Rica and Honduras in the different populations to be able to implement more effective procedures for treatment and patient care.

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PROJECT 7

Morphometric and genetic characterization for sylvatic and domestic *Triatoma dimidiata* populations in Guatemala, Honduras and Nicaragua to understand the migration and reinfestation pattern of the species.

This is a control-oriented study with the aim of obtaining information about the re-infestation pattern of *T. dimidiata*, *T. nitida* and *Rhodnius prolixus* in areas of Guatemala, Honduras and Nicaragua where CHAGAS disease is endemic. To support the Central American initiative on the control of CHAGAS disease vectors, further research is required to understand the re-infestation patterns of the main vectors. *T. dimidiata*, for example, is found in both urban and rural areas, and is one of the most important vectors of CHAGAS disease. In order to develop strategies to avoid reinfestation of treated houses, its migration pattern must be clarified. *T. nitida* is also among the important vectors in Guatemala and Honduras and nothing is known about the infestation pattern of this species. *Rhodnius prolixus* is the main vector in Honduras and is related to house construction; in Guatemala, *R. prolixus* is among the main vectors.

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PROJECT 8

Preparation and Characterisation of Monoclonal Antibodies Against a *Trypanosoma rangeli* Sialidase

Trypanosoma rangeli is a human parasite closely related to *T. cruzi*, the etiologic agent of Chagas' disease. Because of their common vectors and hosts, the comparative biochemical and immunological properties of the pathogen *T. cruzi* and apparently non-pathogenic *T. rangeli* are of significant interest. Experimental studies have established that these haemoflagellates share common and specific antigenic characteristics.; The identification and characterization of *T. rangeli* components able to elicit an immune response and the degree of similarity with those found in *T. cruzi* have until now been overlooked. Appropriate studies could help in the correct parasite identification, which is imperative if appropriate therapeutic measures are to be implemented. The study of the composition and characteristics of *T. rangeli* is likely to contribute to our understanding of the biochemical and regulatory changes which the parasite adopts in particular biological conditions. Such information could help in the understanding of important parasite-host interactions such as the pathogenic and harmless infections observed in the vector and mammalian respectively.

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PROJECT 9

Trypanosoma Cruzi minicircle DNA detection among cardiac patients from Guatemala endemic area hospitals.

American trypanosomiasis, also called Chagas' disease, is considered by the World Health Organization (WHO) to be one of the major health problems in Central and South America. An estimated 18 million persons are infected, and Chagas' disease is a leading cause of cardiomyopathy and sudden cardiac death. Persons infected with *T. cruzi* have life long parasitemia. Most, however, are unaware that they are infected, but approximately 30% of them eventually develop the clinical manifestation of chronic Chagas' disease, which is characterized by irreversible cardiac damage. The disease is fatal in 2–3% of cases involving young children who do not receive anti-parasitic treatment during the acute phase of the disease, thus early detection is very important. The main objective of this study is detecting *T. cruzi* infection among 3500 schoolaged children from endemic areas of Guatemala and to compare the efficacy of 4 different serologic techniques used for diagnosis.

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Appendix 6

Research Priorities

Here is presented a list for research priorities for the Central American region as well as for the World Health Organization (WHO). The main topics are parasitic diseases with emphasis on leishmaniasis, trypanosomiasis, malaria, diarrhea and helminthic disease. Viral diseases emphasizing dengue, hepatitis, AIDS and diarrhea. Bacterial diseases like tuberculosis and diarrhea. And gastrointestinal diseases and zoonoses (brucellosis, leptospirosis and rickettsiosis.) Also included should be toxins, snakebite venom and alimentary poisoning (clostridia).

Parasitic Diseases

Leishmaniasis, trypanosomiasis and malaria have been identified by the World Health Organization (WHO) as priorities for control in tropical countries.

The *leishmaniasis* form a whole group of parasitic species of *Leishmania* transmitted by sandflies, producing at least five distinct diseases with differing symptoms. Most forms are “zoonotic” -i.e. they are normally passed on from animals, and limited to areas where the animal hosts live. Dogs, rats and other rodents, foxes, jackals, wolves, raccoons, sloths and marsupials have all been found to carry the parasites. Some forms, however, are “anthroponotic” – affecting humans – and can be spread through migration and lead to epidemics. Of 88 countries affected, all but 16 are low/middle income countries. Research agency tracking efforts suggest that there could be some 12 million infected people in the world and of the 350 million at risk, some 1.5 to 2 million will be infected every year.

Trypanosomiasis (Chagas) has been shown to be a serious and ongoing public health problem throughout Latin America. An estimated 16–18 million people are infected in the Americas and some 100 million people are at risk of contracting the disease. Chagas is caused by infection with the parasite *Trypanosoma cruzi* transmitted by Triatomine “kissing” bugs. An increased incidence of infection is associated with poor housing and living conditions. Infection also occurs through transfusion of tainted blood or can be transferred from mother to baby during childbirth. In Central America, the disease is transmitted by a species of Triatomine that lives in rural and urban areas. In most Latin American cities, the prevalence of *T. cruzi* infected blood is much higher than that of hepatitis or HIV, so monitoring blood banks is crucial in controlling this disease. As 10% of infected people develop severe cardiac and digestive lesions, the socio-economic impact of the disease is quite high.

Malaria is a seriously infectious disease, affecting humans throughout much of the world. In some areas, the malaria transmission cycle was effectively disrupted almost a decade ago. The disease has since resurfaced as a significant health problem. Over 100 million new cases of malaria occur every year, and this number is increasing. Factors contributing to this situation include the increased resistance of the infectious agent to insecticides and of the malaria carrier to anti-malarial drugs, changes in land use, and reductions in funding and manpower dedicated to control activities. As global eradication of malaria in the foreseeable future is a formidable task, emphasis has been shifted from eradicating the disease to controlling its outbreaks through the use of new technologies directed at the parasite and the carrier. World leaders of the G7 countries have recognized the importance of this, and efforts and funds have been earmarked for malaria control.

Onchocercosis is caused when an infected female blackfly injects the larvae stage of *Onchocerca volvulus*. Mass treatment using ivermectin is believed to be eradicating onchocercosis. Adequate monitoring of the prevalence of the disease and potential new foci is necessary, however. The experience of the past dictates that eradication of *Onchocercosis* must be absolute if it is to be sustained.

Swine are the principle host of the zoonotic cestodes larvae which commonly infect humans, leading to muscular, neuro-ocular and cerebral cysticercosis. Incidence is usually restricted to rural and semi-rural areas, where personal or environmental hygiene is deficient and where swine live in close contact with humans and human products. Zoonosis is becoming one of the most prevalent parasitic diseases in Central America.

Viral Diseases

Mosquitoes transmit the *dengue* virus. Prior to its virtual eradication 30 years ago, the disease was prevalent throughout Central America. During the past few years, the virus has re-emerged with renewed strength, infecting up to 5% of the population in rural areas. The recuperation process is lengthy and precludes gainful economic activity. The disease can be fatal upon a second infection. The eradication of mosquitoes and their fresh water breeding grounds is essential in controlling this disease.

Education and research are both needed to improve the ability to promptly diagnose infected persons, thereby helping to reduce the negative consequences of the disease.

Hepatitis and *AIDS* are becoming significant problems in Central America due to the ever increasing rate of infection and the already strained state of public health services in most of the Central American countries. While health professionals are struggling to deal with the ramifications of these diseases, governments must focus on educating the public about modes of transmission and prevention strategies. Drug use and sexually transmitted diseases have been increasing rapidly, aggravated by the opening of the region to trade and tourism, an increasingly important source of income. Blood bank controls have been imposed and the incidence of this route of transmission is relatively low. Nevertheless, the strain imposed on medical services by these diseases is a permanent and worsening problem that the Central American countries must confront daily.

Viral diarrhea is a major cause of morbidity and mortality among babies and young children in Central America. Some reports have isolated Rotaviruses and Coronaviruses as the main causal agents, though little etiological research of this problem has been systematically conducted. To improve the general human health indices of the region and the productivity of its livestock, it is important to increase the level of scientific inquiry into the causes of diarrheal diseases.

Bacterial Diseases

Aggressive new strains of *M. tuberculosis* are emerging in Central America. The indiscriminate use of antibiotics and the prevalence of poverty and malnutrition in the region have favored the spread of these new bacterial strains. Development of new diagnostic tools and better understanding of the epidemiology of tuberculosis in its more virulent forms is necessary for the control of this dangerous and devastating disease.

Bacterial diarrhea and *gastrointestinal diseases* are one of the world's major health problems. Every year in the developing countries more than 5 million of the more than 3 billion cases of diarrheal disease result in death. The under-nourishment, which results from, repeated diarrheal disease among children during the first years of life is a significant problem in these countries. The most common cause of diarrhea is *Escherichia coli* (ETEC) bacteria. Human strains of *Shigella* sp. and *Salmonella* sp. are also prevalent. Cholera bacterium, however, is the most dangerous and can cause violent diarrhea and death.

Cholera is highly infectious and has, after many years of absence, returned to large parts of Central America.

Furthermore, new strains of *Helicobacter pylori* have emerged as some of the many pathogenic bacteria causing gastrointestinal problems, including cancer.

Zoonosis

Leptospirosis is a disease caused by bacteria of the genus *Leptospira*. More than 160 carriers, each of which can independently infect any possible host animal, are known. The infecting agent of leptospirosis is transmitted from one animal to another via direct contact with urine that contains viable leptospires or through a contaminated non-animate vehicle such as soil, water or contaminated utensils, etc. The most commonly cited carriers for transmission among humans are rodents and livestock. The recent fatal outbreaks in Central America have alarmed the region's health units and governments. Therefore, this is an important emerging disease in the region.

Brucella organisms are facultative intracellular parasites infecting a large proportion of humans and animals in the world. The means by which these bacteria invade, persist and reproduce inside cells are not known. Humans can be infected with brucellosis by direct contact with animals or indirectly through ingestion of contaminated animal products. The most rational focus for prevention has been the control and elimination within the animal population. Obligatory pasteurization of milk would help to protect a good percentage of mankind. The consumption of raw milk and milk products, however, is a common dietary habit among a majority of the region's population. Moreover, *Brucella* constitutes an occupational hazard among farm and slaughterhouse workers as well as veterinarians.

New *Rickettsia* transmitted by ticks has been diagnosed in several Central American countries as a result of deforestation. Most of the strains have been detected in both wild and domestic animals found in or near the forest fringe of rural communities. When these strains are transmitted to humans they become very aggressive and often fatal. In this respect, rickettsiae are part of the new group of emerging bacterial diseases that must be controlled in order to avoid their spread throughout Central America and the world.

Toxins

Envenomations caused by snakes account for more than 2000 accidents every year in Central American. The main snake species involved are those of the genus *Bothrops*. These vipers proliferate where forests have been razed and replaced by cropland or pasture, where rodents, the dietary staple of these snakes, flourish. Snakebites are also a cause of disfiguration and amputation. Priority research areas include developing antivenoms and improving the understanding of tissue regeneration.

Alimentary poisoning is a common problem in Central America. The microorganisms involved are gram-positive bacteria of the genus *Clostridium* and *Staphylococcus*. Detection of the toxins in processed foods and production of antivenoms are priorities in most countries within the region.

Emerging Diseases

Ever-increasing international travel and globalization, as well as the ongoing transformation of the environment are likely to lead to the spread of a number of new infectious diseases. Some of these so-called "emerging" diseases are caused by recently discovered pathogens, which have found an adequate substrate for reproduction and proliferation in humans and domestic animals. Other diseases are caused by previously known parasites that have emerged with an increased potential for virulence. In this respect, the scientific community in Central America must be aware of the presence of emerging diseases in order to prevent public health and animal care problems.

Appendix 7

Objectives

General Objective

To generate a critical mass of scientists and academics in Biomedical Sciences in Central America that can generate sustainable scientific and educational programs for the improvement of the living conditions in the region.

Specific objectives:

- To build upon the foundation of co-operation among Central American scientists and laboratories, which began under the auspices of the MSc and Ph.D. programs in Biomedical Sciences, supported by Sida/SAREC, DAAD and other regional graduate programs. Within this framework, the Karolinska Institute and other Swedish institutes are considered as participants in the network and are therefore included as members of *NeTropica*.
- To perform collaborative research in areas of common interest in infectious diseases and envenomations which are identified as priorities for the region.
- To address the disparities in laboratory and research quality that exists among the Central American countries by promoting the exchange of technology and scientists within Central America.
- To augment the budget available for network projects by raising funds from international agencies.
- To establish and support up of research grants for the period proposed.
- To establish an annual general meeting to include the presentation of scientific achievements, financial reports, and scientific-activities centered on a theme of common interest.
- To increase collaborations between Central American scientists and Swedish scientists as well as Central American investigators and other researchers from high income countries for mutual development and scientific improvement of research activities.
- To establish links with other Networks for the promotion of research activities in Biomedical Sciences.

Appendix 8

NeTropica Complementary Funds for Research Projects

Before Applying

One of the aims of the Network is to form teams consisting of at least two laboratories from different Central American countries and a laboratory at a Swedish institute or university to develop projects in priority of health and medical areas for Central America. In addition, the projects should promote the transfer of technology and knowledge among Central American countries and the development of a competitive body of research scientists.

In order to develop competitiveness in project fund-raising, a requirement of the Network is that each applicant already has funding, or if not, has submitted applications to a national or international funding agency. Collaborative projects with recognized laboratories from other countries will be encouraged. The grants will be of a maximum of US\$8000 per Central American laboratory participating in each project for a maximum of two years. Grant renewal will be based on successful proposed research.

Research Areas & Submission Requirements

The priority areas are parasitic diseases (leishmaniasis, trypanosomiasis, malaria, cestodes), viral diseases (dengue, hepatitis, HIV, diarrhea), bacterial diseases (tuberculosis, diarrheal and gastrointestinal diseases, zoonosis such as leptospirosis, brucellosis and rickettsiosis) and toxins (snakebites, alimentary poisoning).

For definitions and details please visit the page of [Research Priorities for Netropica](#).

Each group must submit a project proposal, monitored by a Responsible Investigator and the Principal Investigator. The proposal must be within the following guidelines.

- *The applicants* should be working in a Central American laboratory.
- *There should be* at least two laboratories from different Central American countries and one laboratory from a Swedish institute or university per project. There are no restrictions on the inclusion of participants from other countries.
- *At least one* of the participating laboratories should have approved project funding or have submitted a project (preferably within the same area of research) for funding to a national or international research funding agency.
- *There should be* a Principal Investigator (PI) for each country participating in a project. They will be responsible for developing the project budget for their specific laboratories and coordinating the research project in their laboratories.
- *Each PI should have* a laboratory, technicians, assistants and research project at his/her disposal.
- *There should be* one Responsible Investigator (RI) per project, to be selected from within the group of PI's. Each research group will submit only one project proposal. The RI will prepare and coordinate the entire project. Duplicate projects will not be accepted.
- *Each PI* will receive those funds for the approved individual budget through the institution cited as the Fund Management Institution (where the grant money is being handled from). The RI can include in the budget a modest amount to cover the additional expenses associated with the project coordination. The RI will receive only those funds pertaining to his/her portion of the project budget plus the project coordination budget.

- *One person* can participate in several proposals for research but will receive only one grant.
- *It is important* to clearly indicate the organization (e.g., foundation, university institution, non-governmental organization) that will be responsible for the administration of the grant funds (Fund Management Institution). The requirement is that it is a recognized organization capable of administering the grant funds in an efficient manner and that the use of the funds be restricted to the project and Network objectives. Otherwise, the program coordination will recommend an institution, which can do so until the Responsible Investigator proposes one. Under no circumstances are the funds to be managed through personal bank accounts. For available Fund Administrators in Central America visit our page: http://www.netropica.org/admin_funds.htm
- *Project investigators* are required to submit to *NeTropica* a letter of acceptance from the Fund Management Institution before the funds will be released, accepting the management of the funds. The heads of the research teams will review all accounting expenses. In addition, the local institutions are required to submit a financial statement to the Coordination Administration of *NeTropica* on a yearly basis so that their performance can be monitored and evaluated.
- *The project* will be of a maximum of two years duration, at the completion of which a report must be presented. These progress reports will be evaluated according to established criteria and used to determine future funding requests.
- *The project* proposal must be written in English and follow the format requirements as stated under the section: Application.

Application

Applications must be prepared in a typed form:

- MSWord or WordPerfect;
- letter size (8 1/2 x 11 inch) page;
- top & bottom margins 2.5 cm, right & left margins 3.0 cm;
- font Times New Roman 12;
- single spaced;
- no formatting (e.g. bold, centering, etc.)
- in English

in accordance with the following guidelines:

1. *Title of project*
2. *Short summary of project (1500 words maximum)*
3. *Responsible Investigator and Principal Investigators*
 - a. Name and work address
 - b. Area code/Telephone/Facsimile/e-mail
 - c. Nationality/Date of birth/Sex
 - d. Name and address of institution (if different from above)
 - e. Native language
 - f. Other languages: Reading ability/Comprehension/Speaking ability/Writing ability
 - g. Education (university)
 - h. Work experience (last five years)
 - i. Lists of grants, including funding levels
 - j. Lists of publications (last ten years)

4. *Research Project*

- a. Introduction (700 words maximum)
- b. Justification (700 words maximum)
- c. Hypothesis (200 words maximum)
- d. Objectives
- e. Ongoing scientific work at institutions related to the project (1500 words maximum)
- f. Strategy & methodology (3000 words maximum)
- g. Expected results (1500 words maximum)
- h. Time schedule
- i. Individual budget plan: List in this order: equipment, expendable supplies, literature, travel, extra personnel, salaries (neither the PI nor RI is allowed salary, per-diem, etc.) other
- j. Indicate name, address, contact person of organization responsible for administering project funds (Fund Management Institution)
- k. References
- l. Other grant(s) supporting this project or name of national or international funding agency to which application has been submitted, with documentation to demonstrate this.

Selection Criteria & Contacts

Laboratories will be selected on the basis of scientific and academic achievements, demonstrated leaderships and existing infrastructure.

Applications should be submitted to NeTropica headquarters by E-mail: netropica@netropica.org and emoreno@ns.medvet.una.ac.cr or by regular mail (hard copy and/or 3.5" computer disk):

A/A: Edgardo Moreno

Network for Research and Training in Tropical Diseases in Central America (*NeTropica*)

Programa de Investigación en Enfermedades Tropicales (PIET)

Escuela de Medicina Veterinaria

Universidad Nacional

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The proposals will be evaluated by a Selection Committee according to their relevance to the stated objectives of the Network.

Selection Committee

An international committee evaluates research projects submitted to NeTropica. The *NeTropica* Selection Committee will consist of a group of three recognized scientists appointed by the *NeT-board* and the General Coordinator. The committee is responsible for the revision of the new proposals and the renewal of ongoing projects. The Selection committee may be assisted by a group of evaluators. The evaluators must be recognized scientists, with experience in the specific fields of research, who are not directly involved in the research projects. The projects and renewals will be selected according to:

1. Relevance and scientific merit of the project within the established priorities.
2. Involvement of at least two laboratories from distinct Central American countries

3. Sponsorship by at least one Swedish laboratory
4. Available research funds or submission of a grant proposal to an international or national funding organization.
5. Promotion of transfer of technology and knowledge among Central American countries
6. Timeline and budget within project parameters.
7. Number and quality of publications regarding the project
8. Relevance of the research to Central America
9. Number of graduate and undergraduate students involved in the project
10. Successful grant application to other funding agencies
11. Organization and participation in scientific meetings and training programs
12. Development and transfer of technology.

Appendix 9

Benefits Obtained from the Central American and Swedish Collaboration

Several important achievements have been generated in the course of more than one decade of collaboration in research in biomedical sciences between the Central American countries and Sweden. Among the most significant accomplishments have been the graduation of 40 MSc. and 14 Ph.D. students of Central America that have followed the so-called “sandwich program”. This program supported training in Central America and Sweden under the supervision of two tutors, one local and one from Sweden. After conclusion of their thesis work, the title is granted by the Karolinska Institute, in Sweden.

An important benefit of this program has been the strong research and academic links established between the Central American and Swedish scientists, who have produced more than 140 first class manuscripts published in international journals. Moreover, in less than ten years the Swedish-Central American scientific joint publications have come to second place in volume and the first one in efficiency, demonstrating by this the relevance of the collaboration (<http://cariari.ucr.ac.cr/~blomonte/>). Furthermore, in contrast to other training programs, the “sandwich” style has avoided the “brain drain” that siphons off some of the best Central American students who obtain fellowships abroad and remain there. To date, none of the students of the previous graduate programs supported by SAREC has migrated to other countries.

Another very important achievement of the collaboration has been the strengthening of local and regional MSc. and Ph.D. programs in Microbiology, Epidemiology, Human Medicine and Veterinary Medicine, following similar profiles to the graduate programs in Sweden that served as a model. In some of these programs, there is a strong participation of Swedish counterparts as tutors and professors. The graduate programs in biomedical sciences in Central America and *NeTropica* have contributed to the integration of research projects at different levels. For instance, several of the former Central American graduates from the Karolinska Institute are participating in important research programs and have obtained funds from the European Commission, International Atomic Energy Agency, WHO, Institute National de la Santé et de la Recherche Medicale (INSERM), TWAS, Fundacion Costa Rica-USA, JIICA, International Foundation for Science (IFS).

Within this perspective, *NeTropica* has supported already 10 collaborative research projects in Biomedical Sciences with the participation of several Central American laboratories and Swedish institutes. In all the projects there are several former Central American graduates who are part of the core of scientists collaborating with *NeTropica*. It is important to stress that several of the *NeTropica* projects initiated within the “sandwich” training program. The interactions between both parties has allowed collaborations in educational and postdoctoral training with several Swedish institutions, as well as the generation of relevant bilateral joint projects. In addition, international courses and international Symposia have been attained, under the framework of *NeTropica*. The Central American and Swedish interactions has facilitated the collaborative study of the basic public health problems of Central America. Former graduates from different countries have actively participated and exerted strong leadership in the diagnosis, control and eradication of outbreaks of dengue, malaria, AIDS, cholera, brucellosis, diarrheal diseases and envenomations in Central America. Several of our graduates and collaborating scientists maintain strong links with the Red Cross and local and regional Health Programs. It is precisely within this framework that *NeTropica* encourages collaborative efforts among Central American Scientist with other Latin American and Swedish investigators.

Appendix 10

Development of Regional Graduate Programs in Biomedical Sciences

The collaboration with first class institutions and the support granted from European countries, mainly Sweden and Germany promoted the development of regional Graduate Programs in Biomedical Sciences at the different Central American Universities. Most of these graduate agendas have been initiated at the Microbiology, Medicine, Pharmacology and Veterinary Faculties or Schools, following the successful models of *Germany* and *Sweden*. The founding of regional programs was strengthened by the strong links established among the different investigators that have been trained under the framework of Central American graduate programs in Biomedical Sciences during the last 15 years (e.g. KIRT). Most of the programs began as Master's training with emphasis in tropical diseases and several are in the process of evolving into Ph.D. training programs.

The rationale for the regional MSc. and Ph.D. programs is to collaborate in academic courses and in the exchange of students and scientists. It is expected that each Central American country will contribute its expertise in specific disciplines and take advantage of the strengths that each academic group possesses. The exchange of professors and courses within the region provide excellent opportunities for comprehensive regional training programs. In this direction several MSc. Programs in Biomedical Sciences have been initiated at the different Central American Universities. In 2002 a PhD program based at the University of Costa Rica initiated activities. The profile of this program has been based in the experience gained during the Ph.D. project in collaboration with the *Karolinska Institute*.

The German Model

In 1981 an agreement was established between the German government (Federal Republic) through the “Deutschen Akademischen Austauschdiens” (DAAD) and the “Consejo Superior Universitario Centroamericano” (CSUCA) concerning academic training for students from the six Central American countries: Costa Rica, Panama, El Salvador, Guatemala, Nicaragua and Honduras. The DAAD-CSUCA Program received financial support from the German government and was established within the framework of the Master of Science (MSc.) Regional Graduate Programs. The DAAD-CSUCA program has been devoted to training in several disciplines, including biomedical sciences.

Students from one Central American institution were to carry out their academic and research activities within the Graduate Program of another Central American University, according to the regulations dictated by the Host University. Applications to carry out studies in their home countries were not permitted. The students had to conclude their studies within a period of 2–5 years. On obtaining the MSc. degree the students were given the opportunity to further their training in Germany by applying directly to the DAAD in Germany, being subject to the regulations of the Host University. The approximate number of MSc. students who graduated in biomedical sciences during the 1981–1994 period has comprised almost 40% of the total fellowships conferred by the DAAD, mainly in the fields of Medicine, Microbiology, Pharmacy, Biochemistry, Epidemiology and Veterinary Medicine. Alternatively, Central American students could apply directly to the DAAD for graduate training in Germany. Students choosing this option had to take an intensive German language course in Germany for six months before initiating their graduate training at a German university for a period ranging from 2–6 years. The Program also included 3 to 12 month fellowships for Central American academics for postdoctoral training in Germany, and visits of 1 to 24 months of German scientists to Central American institutions. The total number of students who graduated in biomedical sciences at Central American universities under the DAAD Program during this period was approximately 50. Similarly,

the total number of Central American students who graduated in biomedical sciences during a 15-year period in Germany has been almost 90. The total number of postdoctoral fellows in biomedical sciences is estimated at 50.

The Swedish model

During the course of the year 1987 a relationship was established between the Karolinska International Research Training (KIRT) Program and the Consejo Superior Universitario Centroamericano (CSUCA) to foster research and academic training of students from six Central American countries: Costa Rica, Panamá, El Salvador, Guatemala, Nicaragua and Honduras. The KIRT-CSUCA Program received financial support from SAREC and was established within the framework of a Master of Science (MSc.) in Biomedical Sciences (MSBS). The Program was designed to train Central American scholars in Bacteriology, Virology, Parasitology, Immunology, Biochemistry and Epidemiology. Central American scientists working at Central American universities wrote research proposals, from which Swedish scientists at the Karolinska Institute selected specific projects. Students carried out academic and research activities in Central America and Sweden under the supervision of both Central American and Swedish tutors. After a 2.5–3 year period, the students wrote their dissertations and submitted them to an Academic Committee at the Karolinska Institute for evaluation; the Karolinska Institute then extended the MSc. degree. The second and third MSBS Programs were renewed by SAREC for the periods 1990-1993 and 1993–1996, respectively.

Representatives from Central American universities and KIRT began discussions on the creation of a “Doctorate Program (Ph.D.) in Biomedical Sciences” in 1992. Evaluation of the KIRT-CSUCA Program to date concluded that: “the MSBS Program succeeded in creating strong research collaboration and academic relationships between Central America and Sweden. The program graduated a considerable number of technically well trained students at the MSc. level, but was not sufficient to promote independent scientists in Central America”. The Ph.D. Program was considered to be the next step to be taken in order to increase “the critical mass of highly skilled scientists (at the Ph.D. level) qualified to perform independent research activities and capable of leading research groups in Central America.” Subsequently, two Ph.D. Programs were finally approved by SAREC: the first was approved in September 1993, for the period 1993/1996, and the second was approved in March 1997 for the period 1997/2000.

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