Darwin Initiative for the Survival of Species

Annual Report

1. Darwin Project Information

Project Ref. Number	162/10/030
Project Title	Developing local capacity for biodiversity surveys in Papua New Guinea
Country(ies)	U. K. and Papua New Guinea
UK Contractor	University of Sussex
Partner Organisation(s)	Parataxonomists Training Center
Darwin Grant Value	£ 162,489.00
Start/End dates	September 2001 / August 2004
Reporting period (1 Apr 200x to 31 Mar 200y) and report number (1,2,3..)	1 Apr 2003 to 31 Mar 2004 Annual Report No. 3
Project website	www.entu.cas.cz/png/
Author(s), date	AJA Stewart, V Novotny; 28 April 2004

2. Project Background

The project is led by Alan Stewart (University of Sussex (UoS), UK) in collaboration with Mike Wilson (National Museum of Wales, Cardiff, UK) and Vojtech Novotny (Parataxonomist Training Center, Madang, Papua New Guinea). The primary aim of the project is to train a team of 'parataxonomists' (research technicians) based at the Parataxonomist Training Center (PTC) Papua New Guinea (PNG), so that they will become a source of expertise for carrying out local biodiversity surveys, producing data for national and international nature conservation and sustainable forest use projects and material for national taxonomic collections.

3. Project Purpose and Outputs

A team of parataxonomists in Papua New Guinea is being trained to (1) design and implement biodiversity surveys, (2) process and evaluate plant and insect samples, (3) produce high quality biological specimens, (4) document the specimens by digital photography, and (5) summarise the information in electronic databases, field guides, technical reports, education leaflets for grassroots landowners and www pages.
The project objectives have not been modified.

4. Progress

Brief history of the project to the beginning of this reporting period:

The project started in September 2001, so is currently nearing its completion. Prior to the year being reported upon, we have (i) set up the parataxonomist team and trained the parataxonomists in field and laboratory research techniques, (ii) equipped the parataxonomist team, including purchasing a vehicle and other equipment, (iii)

completed four biodiversity surveys, (iv) created and distributed environmental awareness literature (leaflets etc.), (v) given environmental awareness presentations to village communities and schools, run a butterfly farming course, and assisted villagers with their ecotourism projects, and (vi) enabled parataxonomists to present their results at national and international scientific conferences.

Progress over the last year: The main progress milestones of this reporting year were: (i) continued training of parataxonomists (the project's main objective) in PNG and overseas, (ii) continued training of the MSc. student from University of Technology (PNG) resident at PTC, (iii) completion of one biodiversity survey, (iv) attendance by parataxonomists at one national and two international conferences, giving oral presentations and posters, (v) development of a village ecotourism project, (vi) development of village-based field research stations lead by parataxonomists, (vii) run a butterfly farming course for villagers, and (viii) grassroots education, including the completion of a number of educational leaflets in Tok Pisin and English and their distribution to remote village communities and NGOs in PNG. Details on each of these are provided below:

(i) Training of parataxonomists in PNG and overseas

Training of the parataxonomist team continued at PTC led by Dr Vojtech Novotny. The training has also benefited from long-term stays at PTC by PNG and overseas M.Sc. and Ph.D. students (Darren Bito, Rapo Pokon, Gregory Setliff, Milan Janda, Antonin Krasa - entomology and Daniel Stancik - botany) and shorter visits by researchers (George Weiblen, Nyree Zeriga - botany) who assisted in training and helped to create an intellectually stimulating environment at PTC. Eight parataxonomists also passed a three-day first-aid course.

All parataxonomists were also required to complete a full-day comprehensive test designed to assess their theoretical and practical skills, including understanding of basic biological concepts, practical identifications of insects and plants, practical computer tasks, and questions relevant to biological survey logistics and data analysis. This test was designed to recognise the gaps in training and rectify them during the last year of the project. The results indicate that there is a core group of 8 parataxonomists who already possess the crucial skills needed for their work, since they scored >75% of the maximum number of points, while the remaining 5 parataxonomists need to improve particularly their computer skills.

The second of the three planned overseas training visits was successfully completed. Two parataxonomists, John Auga and Richard Kutil, visited three academic institutions in the UK:

(a) University of Sussex, hosted by Dr Alan Stewart. The parataxonomists were introduced to a variety of field ecological techniques and UK habitats, including temperate deciduous forest as a comparison to tropical forest. Day visits were made to the Natural History Museum in London, where they were able to see and discuss the work done by insect taxonomists specialising in Lepidoptera, Hymenoptera and Coleoptera, and to the Royal Horticultural Society at Wisley where they were shown the work of the entomology section. At Sussex University, they were given training in various laboratory techniques including insect mounting techniques and examination of specimens using a Scanning Electron Microscope.

(b) National Museums & Galleries of Wales, Cardiff, hosted by Dr Mike Wilson. The parataxonomists were given an introduction to the museum's insect

collections and taxonomic facilities (including photomicroscopy, morphometric analysis and freeze drying). They were also given training in taxonomic and curatorial techniques and were able to see how a major national museum operates. They visited a number of local habitat types, including montane environments, and were able to see a variety of agricultural systems.

(c) Royal Botanic Garden and Herbarium, Kew, hosted by Drs Tim Utteridge, Simon Owens and Rogier de Kok. The parataxonomists were given an introduction to the systematics and phylogeny of key plant groups and training in botanical curation techniques. They were shown the experimental work done by Kew and given the opportunity to discuss issues associated with particular plant taxa found in PNG.

Furthermore, other overseas collaborators with PTC invited the two trainees (as well as another PTC parataxonomist, Brus Isua) to visit their institutions where they obtained additional training. These visits, funded from non-Darwin sources, represent significant added value to the Darwin-sponsored training in the UK as they were made possible by the Darwin programme. Their programme included visits to:

(a) Smithsonian Tropical Research Institute, Panama, hosted by Dr Yves Basset. The parataxonomists visited the canopy crane facility at Port Sherman and were taught insect collecting methods using the crane. Furthermore, this was their first experience of tropical environments outside New Guinea and it provided an opportunity to visit a Neotropical forest.

(b) Department of Plant Biology and the Bell Museum of Natural History at the University of Minnesota, St. Paul, USA, hosted by Dr. George Weiblen. The parataxonomists visited plant collections and molecular biology laboratories, where they sequenced plant material previously collected in PNG by them and were taught the general rationale of phylogenetic studies using molecular data. They also visited the Bell Museum exhibit on PNG plants.

(c) Institute of Entomology of the Czech Academy of Sciences and the University of South Bohemia, Ceske Budejovice, Czech Republic, hosted by Dr. Vojtech Novotny, Prof. Jan Leps and postgraduate students Lukas Cizek, Milan Janda and Jiri Hulcr with whom they had worked in PNG in the past. The parataxonomists visited several nature reserves demonstrating Central-European ecosystems. They completed botanical surveys of permanent plots as a training exercise that provided them with a comparison to analogous plots in PNG. They also took part in an introductory biology field course organised by the University of South Bohemia for undergraduate biology students. Also, visits to several farms informed them about European agricultural methods.

(ii) Student training

Mr. Rapo Pokon, a graduate student from the University of Technology, Lae, PNG, continued his M.Sc. research, based at PTC as a Darwin-sponsored in-house student; Lawong Balun (University of Technology, Lae) and Vojtech Novotny serve as his co-supervisors, with John Mukiu (University of Technology, Lae) as the principal supervisor. His research on diversity in root-feeding chrysomelid beetles (Title: *Host specificity and species richness of beetle larvae (Coleoptera) feeding on the roots of trees in a lowland rainforest in Madang, Papua New Guinea*) has progressed particularly well as he was able to obtain the first quantitative data on this topic from the tropics. He reported on his results at the 5th New Guinea Biological Conference (see below). He also gave a mid-study seminar on his results at the University of Technology, which was well attended and well received. His principal fieldwork has been completed and he is now in the process of analysing the data and writing the dissertation. In order to facilitate this work, we have also organised his study stay at

the Wildlife Conservation Society's centre in Goroka. We expect that the dissertation will be submitted by August 2004 and his results published in an international journal in 2004.

(iii) Biological surveys

Our programme of light-trap surveys continued with an additional survey on Misima Island (Milne Bay Province, PNG). This survey was the last of a series of three surveys in this particularly interesting area. We originally planned only one survey in each major geographical area of PNG. However, we decided to modify this programme as the Misima surveys presented a unique opportunity to compare moth communities in three contrasting habitats: primary forest, secondary re-growth after traditional slash-and-burn agriculture and artificially revegetated areas after gold mining. The survey conducted in this reporting period provided 6,000 mounted and spread moth specimens. In total, our Misima surveys produced 14,000 individuals from 916 species of Lepidoptera. A research paper based on this data set will be completed during 2004.

PTC was invited by the *Partners with Melanesians* NGO to participate in a biodiversity survey in Gulf Province in June 2004. We have therefore postponed our plans for the second Darwin survey, to be organised in February 2004, in order to take advantage of this opportunity.

Finally, parataxonomists Markus Manumbor and Mark Andreas assisted WWF with a biodiversity survey of the Mt Bosavi area for 3 weeks in July - August 2003.

(iv) Scientific and conservation conferences

5th New Guinea Biological Conference, "Conservation through Education and Research", Goroka University, Goroka, Papua New Guinea, 23-25 August 2003: Three parataxonomists (Joseph Kua, Borenke Kaupa, and Martin Mogia) as well as M.Sc. student Rapo Pokon participated. They presented their own research in the form of three oral presentations and one poster:

Kua, J., Kaupa, B., Nimai, K., Eresula, L., Auga, J., Boen, W., Isua, B., Kutil, R., Manaono, M., Manumbor, M., Molem, K., Mogia, M. & Tamtiai, E. (2003) Caterpillars feeding on *Piper aduncum* (Piperaceae), an alien tree in Papua New Guinea, at high and low elevations. (oral presentation).

Mogia, M., Andreas, M., Hulcr, J. & Setliff, G. P. (2003) Host specificity of bark beetles (Curculionidae: Scolytinae and Platypodinae) in lowland rainforests of Papua New Guinea. (oral presentation and poster).

Pokon, R. & Setliff, G. (2003) Host specificity of leaf beetle larvae (Chrysomelidae) feeding on the roots of trees in the lowland rainforest in Madang, Papua New Guinea. (oral presentation).

"Biotic Interactions in the Tropics", Conference organised by the Association for Tropical Biology and Conservation and the British Ecological Society, Aberdeen, UK, 7-11 July 2003: One parataxonomist (John Auga) and two Project Leaders (Alan Stewart and Vojtech Novotny) participated (Richard Kutil was unable to attend due to illness). John Auga presented a poster:

Auga, J., Kutil, R. & Isua, B. (2003) Host specificity of cerambycid beetles (Cerambycidae) and fruit flies (Tephritidae) in a lowland rainforest in Papua New Guinea.

Royal Entomological Society Symposium on "Insect Evolutionary Ecology" and National Meeting, Reading, UK, 27-31 July 2003: Two parataxonomists (John

Auga and Richard Kutil) and the Project Leader (Alan Stewart) participated. The poster Auga *et al*. (see above) was presented.

(v) Village ecotourism project

We have further developed the Jeolmanu Waterfall eco-tourism project in Ohu Village (Madang Province, approximately 15 km from PTC) that was initiated last year. The tourist track through the rainforest to local waterfalls was sufficiently advanced by the local village landowners to be launched officially as one of the Madang tourist attractions. The launch ceremony was attended by many visitors from neighbouring villages, local and overseas tourists and the national press. It was accompanied by traditional dancing and deemed to have been a success.

(vi) Village-based field stations

As a part of the parataxonomist training, we have further developed our new concept of village 'bush laboratories.' The bush (or village) laboratory is a traditional village house converted into a simple laboratory that is lead by a local villager, who has been trained at PTC as a parataxonomist. The laboratory, equipped with solar power, serves as a local center for ecological research and environmental education.

We have further developed an existing bush laboratory in Ohu Village, lead by senior PTC parataxonomist Brus Isua. A new research project on insect host specificity was initiated there that includes training of two lab assistants by B. Isua. Furthermore, a public display for environmental leaflets was built next to the laboratory building that will serve to inform both local villagers and tourists on the laboratory's activities.

In view of the good results from Ohu village, a new bush laboratory was built in Mu Village (Chimbu Province). It is a new house that includes a laboratory, a room for community meetings and accommodation quarters for six persons. The laboratory was built as a community effort by the villagers who established an NGO (Simbu Bioresearch Group) lead by PTC-trained parataxonomists Borenke Kaupa and Joseph Kua, who also supervise the laboratory. It was equipped with solar power, a laptop computer, digital camera and portable printer. It is now ready to serve as a base for biodiversity research. A proposal for such research has been submitted by B. Kaupa and J. Kua in collaboration with PTC and overseas researchers to the National Geographic Society.

(vii) Butterfly farming course

Butterfly farming is being successfully promoted as a sustainable use of biodiversity. The reared insects are purchased centrally by the Insect Trading Agency and then marketed to collectors. Many villagers are interested in this activity but lack the expertise. William Boen, the PTC parataxonomist who specialises on butterfly farming, organised a one-week course for 12 prospective butterfly farmers. This was his second course organised as a Darwin Initiative activity; he is also working on the *Butterfly Farming Manual*, an instruction brochure that will be completed and printed by PTC towards the end of the Darwin project.

(viii) Environmental education

The PTC parataxonomists continued their programme of developing educational leaflets; 50 have been produced in Tok Pisin or English during this year (see Appendix 1). These leaflets were distributed in villages around Madang that have had long-term collaboration with PTC (Ohu and Baitabag Villages) as well as in four remote village communities (Wannang Village, Niksek Village, Yapsiei Village, Utai Village). The four remote villages were located within large tracts of intact rainforests, owned by the villagers, and lacked any road connection with the rest of the country. Each of these villages was visited by PTC parataxonomists and the leaflets were provided to the villagers and village school, together with verbal explanations by the parataxonomists.

PTC also created a CD that includes pdf files of all research papers, educational leaflets, conference presentations and media reports produced by the PTC and associated researchers (195 items in total). It was distributed free of charge to all environmentally oriented NGOs in PNG, as well as universities, teachers' colleges, research institutes and other relevant organisations (50 addresses in total).

Workplan for the five months remaining in the project: April - August 2004

The milestones for the remaining five months of the project are as follows:

- biodiversity survey with Partners with Melanesians in the Gulf Province rainforests, June 2004
- training of two parataxonomists (Markus Manumbor and Martin Mogia) for one month in UK, June-July 2004
- the Project Leader (Alan Stewart) will present a paper summarising the results of the biodiversity surveys at the International Entomology Congress in Brisbane, Australia, August 2004.
- final Darwin project seminar to be held at PTC in August 2004, to be attended by Alan Stewart, Vojtech Novotny and all parataxonomists, that will summarise the project's achievements and set up a framework for further activities and fund-raising.
- one parataxonomist will attend the New Guinea Biological Conference in August 2004 and present PTC results there.

The project has achieved its goals for this year (Table 1). We have achieved better results in the environmental education and training than originally planned. There was also one important refinement of the methods, viz. that we successfully tested village laboratories as a new approach to parataxonomist-assisted ecological research in remote field locations. We are slightly behind schedule with one biodiversity survey and also did not achieve the media exposure as originally planned (note that the latter problem is only temporary as we had much higher than expected media exposure in the previous year). The project did not experience any significant difficulties.

Progress over the last year against the agreed baseline timetable for the period and the logical framework is summarised in Annex 1.

5. Actions taken in response to previous reviews (if applicable)

After full discussion with our collaborators, we have provided a full response to the reviews of both our first and second year annual reports, which we did not receive until 28th October 2003. Our full response (dated 6th November 2003) is reproduced here in Appendix 2. However, some significant points arising out of this dialogue are:

- We provided considerable extra detail on the parataxonomist training programme within PNG (including such aspects as field sampling techniques, identification

skills, data analysis, IT skills and digital image capture and processing), including the use of quarterly reviews of progress. Significant training takes place during the field surveys.

- Some rearrangement of survey locations has had to be done due to problems of political and social instability in certain provinces; new locations have been identified that maintain the essence of the original objectives.
- The exit strategy of the parataxonomist team becoming self-financing has progressed well, with training taking place in grant and contract proposal writing. Steps have also been taken to train key individuals in the finances and logistics of project management.
- The parataxonomist team has already demonstrated its potential in attracting external funding for survey work, by securing two significant contracts at realistic financial rates.
- Ideas have been explored for dissemination of the parataxonomist approach. One output from this has been the publication of a research paper reviewing the use of parataxonomists in biodiversity studies (Bassett *et al*., 2004).
- The PTC website is currently being updated. The Darwin project has been listed on the website since the beginning of the project, but we accept that it should now be given higher prominence. We plan to complete this by June 2004.
- We are increasingly convinced that PTC provides a logistically, educationally and intellectually supportive environment for postgraduate studies. We are developing this through building on collaborations with the two universities in PNG, both of which have sent students to PTC and are enthusiastic about strengthening these links. V. Novotny also participated in teaching a field course in ecology for postgraduate students from these universities in PNG in December 2003.
- We were especially pleased to take up the suggestion of arranging a workshop towards the end of the Darwin project, at which all participants can summarise their experiences and results, and when strategies for attracting future funding and contracts can be discussed. We have arranged this for August 2004.

6. Partnerships

Collaboration between PTC and the UK institutions continues to be very positive. We are especially pleased to have secured the (unpaid) support of the Royal Botanic Garden at Kew, who will have hosted for a week each of the three pairs of parataxonomists visiting the UK. We continue to enjoy excellent collaboration with other long-standing stakeholders in PTC biodiversity research: the Smithsonian Tropical Research Institute in Panama, the Department of Plant Biology and the Bell Museum of Natural History at the University of Minnesota, St. Paul, USA, and the Institute of Entomology of the Czech Academy of Sciences and the University of South Bohemia, Ceske Budejovice, Czech Republic. All of these will have hosted a pair of parataxonomists for periods of between one and three weeks in each of the three years of the project.

The project continues to enjoy the collaborative support of:

- The National Agriculture Research Institute (Port Moresby): This collaboration has developed into a major partnership with PTC, with the Darwin project continuing to provide specimens, literature and insect identifications to the National Agriculture Insect Collection, which is a part of the Institute. This collaboration has also enabled Darwin project leaders to assist with international contacts and advice on grant proposal writing.

- University of Papua New Guinea (Port Moresby): two students from the Biology Department have received training at PTC, one of which has now progressed on to a Masters research programme (resident at PTC). V. Novotny participated in teaching a field course in ecology for postgraduate students (organised jointly with the University of Technology) in December 2003.
- University of Technology (Lae): one M.Sc. student is resident at PTC, where he is receiving training and assistance with his M.Sc. research as a part of the Darwin project.
- Department of Environment and Conservation of the PNG Government: during the course of the Darwin project, PTC has established a collaboration that includes providing the department with information relevant to conservation issues in PNG.

The PTC parataxonomists funded by the Darwin project continue to have informal collaboration and active contact with the following conservation NGOs based in PNG:

- Simbu Bioresearch Group: We have assisted this NGO with setting up a village laboratory.
- WWF - projects in Madang and Moro: Two PTC parataxonomists assisted with their biodiversity survey in Southern Highlands.
- Tree Kangaroo Conservation Project (administered in collaboration with Roger Williams Park Zoo, Rhode Island, USA).
- Bismarck-Ramu Group.
- Wildlife Conservation Society , country project based in Goroka.

7. Impact and Sustainability

The collaborations listed above indicate that the project is well known in the NGO community as well as the academic research community in PNG.

A major component of the project exit strategy is the successful development of a parataxonomist team that is financially self-sustaining, funded through conducting biodiversity contract surveys. Evidence that we are making good progress towards this objective is given by the contracts that PTC has been able to attract:

- A survey in Tanggugh (lowland forest in Indonesian part of New Guinea) was commissioned by British Petroleum, to help assess the environmental impact of gas extraction.
- A survey for the Misima Mine to study differences between undisturbed primary forest and re-vegetated areas after gold mining and to assess the success of the mine re-vegetation programme.
- Parataxonomist assistance with the Southern Highlands survey by WWF.
- A survey in Gulf Province is being negotiated with the Partners with Melanesians NGO.

These contracts demonstrate the excellent profile that PTC is developing within PNG and give us confidence that PTC is rapidly becoming known as the principal source of expertise on PNG biodiversity.

8. Post-Project Follow up Activities (max 300 words)

The present Darwin project has opened up a new, and in our opinion very exciting, opportunity to develop further our educational and training activities in PNG, which would be eminently suitable for Darwin Post-Project funding.

Our experience from having two resident MSc. students (one of them sponsored by the Darwin project) based at PTC to do research for their dissertations is proving to be very successful. They are the only students presently working on MSc degrees in biology in the entire country. Only a very low proportion of the PNG population can study at university, particularly for Honours and MSc degrees. They face severe financial constraints, as well as a lack of research facilities and expertise.

PTC is ideally suited to assist local Honours and MSc students in their dissertation research (the optimum would be five resident students). It provides one of the best laboratory facilities and information resources for ecological research in the country and, more importantly, research expertise and active research programmes, which could be joined by students. The combination of Darwin-trained parataxonomists and university students has proved to be particularly fruitful, as their respective skills are complementary: the parataxonomists have good practical research skills while the students have a deeper theoretical understanding of research. Also, the local and overseas scientists associated with PTC provide an excellent environment in which the students can acquire new research skills.

UK expertise in training postgraduate students in PNG and the UK would be crucial for such a programme. The success with training parataxonomists in the UK during the present Darwin project suggest that similar training visits would be even more beneficial for PNG postgraduate students.

Post-project funding would allow us to use experienced parataxonomists in a new role of assisting postgraduate students and to start a unique postgraduate training programme in PNG, recruiting students from the University of PNG and the University of Technology, with both of whom we have very good collaborative relationships. We are confident that, in due course, we would be able to secure funding from other sources, such as Australian Aid and other overseas developmental programmes, to continue the training programme beyond the Darwin post-project funding period.

9. Outputs, Outcomes and Dissemination

The following Project Outputs are additional:

- 6A/B: In addition to their training in the UK, two parataxonomists visited the institutions of other collaborators with PTC where they were given additional two weeks of training in relevant techniques: Smithsonian Training Institute, Panama; Department of Plant Biology, University of Minnesota, USA and Institute of Entomology of the Czech Academy of Sciences, Czech Republic.
- 6 A/B: Since it has became clear in the course of the project that our new concept of 'bush laboratories' as centres for biodiversity surveys and environmental education based in villages is promising, we decided to establish one such facility in a new location, in Mu Village, Chimbu Province.

The main mechanisms for dissemination of this project are (i) the production and distribution of environmental leaflets, distributed both to remote rainforest villages and as pdf files on a CD to local NGOs and universities (ii) organisation of training and collaborative environmental projects in villages: an eco-tourism project and bush laboratories, (iii) a butterfly farming course for villagers, and (iv) development of web-pages. These activities are considered to be core elements of PTC's work and an

important part of maintaining its profile and its ability to attract funding within PNG. Consequently, they will be continued after the Darwin project finishes, funded by locally- and internationally-derived contract work. The Darwin project has already ensured that the expertise needed for these activities is now available locally in the country, at PTC.

Table 1. Project Outputs (According to Standard Output Measures)

Code No.	Quantity	Description
4A	1	1 PNG MSc student trained for 12 months at PTC, working on his thesis
5	13	13 parataxonomists received one year training in PNG
6A/B	2/4	Specialist training of 2 parataxonomists for 4 weeks in UK (Univ. Sussex, Cardiff Museum & Royal Botanic Gardens at Kew)
6A/B		15 landowners from one village assisted with ecotourist project throughout the year
6A/B		10 persons from 2 villages assisted with their 'bush laboratory' projects throughout the year
6A/B	12/1	12 persons attended 1 week Butterfly farming course organised by PTC
7	50	Education leaflets on biodiversity conservation and other environmental topics
11A	2	Scientific papers in peer-reviewed journals
11B	1	Manuscript to be submitted to a peer-reviewed journal
14B	3	See details above - in total, 5 parataxonomists and 1 student presented 3 talks and 3 posters
		Completion of one biodiversity survey and processing of the material (Misima, Milne Bay Province, coastal rainforest)

Table 2: Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (e.g. contact address, website)	Cost £
Research Paper #1	Basset, Y., Novotny, V., Miller, S.E., Weiblen, G.D., Missa, O. & Stewart, A.J.A. (2004) Conservation and biological monitoring of tropical forests: the role of parataxonomists. *Journal of Applied Ecology* 41, 163-174	Blackwell Scientific Publications	Project Leader or PTC (as .pdf file)	Nil
Research Paper #2	Novotny, V., Miller, S. E., Cizek, L, Leps, J., Janda, M., Basset, Y., Weiblen, G. W. & Darrow, K. (2003) Colonizing aliens: caterpillars (Lepidoptera) feeding on Piper aduncum and P. umbellatum in rainforests of Papua New Guinea. *Ecological Entomology* 28, 704-716.	Blackwell Scientific Publications	Project Leader or PTC (as .pdf file)	Nil
Research Paper #3	Pokon, R. Host specificity of root-feeding larvae (Chrysomelidae, Coleoptera) in a lowland rainforest in New Guinea. Manuscript to be submitted to *Journal of Tropical Ecology*		Project Leader or PTC (as .pdf file)	Nil
Educational Leaflets #1-50	See Appendix 1	N/A	PTC	Nil

- The publication Basset *et al*. (2004) is particularly important in the context of this project as it provides the most detailed information so far on the potential of

research assisted by parataxonomists. It features the PTC parataxonomist project as one of the most prominent such projects world-wide. This paper had two companion papers on the same topic in the same issue of the Journal of Applied Ecology (Goldstein, PZ, 2004, J. Appl. Ecol. 41, 175-180 and Janzen, D.H., 2004, J. Appl. Ecol. 41, 181-187). We hope that these prominently published papers will have a major impact on the use of parataxonomists elsewhere in the tropics.

- Parataxonomists were crucial in obtaining data for the Novotny *et al*. (2004) paper.
- Rapo Pokon, the Darwin sponsored MSc student resident at PTC, is finalising a manuscript from his dissertation research that will be submitted to the Journal of Tropical Ecology in 2004.

1. Project Expenditure

Table 3: Project expenditure during the reporting period (Defra Financial Year 01 April to 31 March)

Item	Budget (please indicate which document you refer to if other than your project schedule)	Expenditure	Balance

* PTC staff: Vojtech Novotny (partner in host country and Director of PTC); 13 current parataxonomists (John Auga, William Boen, Borenke Kaupa, Joseph Kua, Richard Kutil, Roll Lilip, Max Manaono, Markus Manumbor, Martin Mogia, Kua Nimai, Brus Isua, Kenneth Molem, Elvis Tamtiai).

We made some minor virements between budget categories as follows:
From: Staff Costs (£747), Printing (£69), Conferences (£62). Total: £878
To: Travel (£673), Other Equipment (£205). Total: £878

10. Monitoring, Evaluation and Lessons

Methods employed to monitor and evaluate the project this year

The following list outlines the indicators of achievements of the project:

- Training: After more than two years of continuous training, we have performed comprehensive testing of parataxonomists' skills in practical biodiversity assessment and theoretical ecology.
- Educational materials and presentations at national and international conferences by parataxonomists also indicate the extent to which training is instilling both the skills and the confidence that is required to contribute to such events.
- Environmental education and awareness: the sustained interest by village communities in various collaborative activities with PTC, including from village laboratories, educational displays, ecotourism projects and butterfly courses, indicate the extent to which grassroots people have developed awareness of, and concern about, environmental issues.
- Research: whilst the completion of survey fieldwork and the processing of the material is the immediate measure of progress, publications in peer-reviewed journals are a better long-term measure of the quality and impact of the research done.
- Exit strategy: the principal aim of the project (as defined in the original project application) is "*to transform biodiversity surveys from an overseas-driven to a local activity, relying on local experts with access to national biological collections who can establish rapport with both local grassroots landowners and international research communities"*. The success of the exit strategy is documented by the ability of PTC to attract work in the following areas:
  - full-economic-cost contracts to do biodiversity survey work
  - collaborative projects with PNG-based conservation NGOs
  - scientific research directed by PNG-based and overseas universities
  - training of PNG MSc. Students.

  We successfully collaborate with Misima Mines Ltd. on biodiversity surveys to assess the environmental impact of their activities and the success of their landscape restoration and revegetation programmes. Similar environmental impact assessments are now required by PNG law, so we can expect other mining and logging companies operating in PNG to require these services. The Darwin project is enabling PTC to consolidate and enhance its position so that it can successfully compete for these projects in future.

Lessons learned from this year's work in relation to future plans:

As this Darwin project nears completion, it is becoming increasingly clear that it is indeed possible to build a team of parataxonomists who can organise and perform biodiversity surveys, including fieldwork and subsequent sorting, documenting, databasing, and preparation of biological material. This was far from inevitable, since the concept of 'parataxonomists' had always received a mixed response amongst the biological research community. In the course of this project, we have also demonstrated the efficiency of parataxonomists as grassroots educators and have successfully tested the concept of village (bush) laboratories. Furthermore, the presence of the Darwin-sponsored MSc student at PTC has demonstrated that collaboration between parataxonomists and local students is exceedingly fruitful, as their skills are complementary; the parataxonomists have more practical skills while the university students have a broader and deeper theoretical understanding of the research issues.

11. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum)

■ **I agree for ECTF and the Darwin Secretariat to publish the content of this section**

After nearly three years of effort, there is now a fully trained and equipped team of parataxonomists (i. e. biodiversity technicians) formed in Papua New Guinea, capable of performing biodiversity surveys in remote rainforest areas of this tropical country. The parataxonomists were recruited from local village communities and trained in sampling methods and protocols for insect and plant surveys, in specimen preservation and documentation, including digital photography and computer databasing, and in survey organisation and logistics. The parataxonomists are thus a fully localised source of expertise on biodiversity surveys, producing data and material for nature conservation and sustainable forest use projects and national collections. They function as an ideal link between grassroots villagers, who own most of the rainforests in Papua New Guinea, and professional researchers, who provide taxonomic analysis of the collected specimens. The parataxonomists are also excellent grassroots educators on environmental issues as they combine experience from life in the village with several years of training by biologists, including stays at overseas research institutions on three continents. After Costa Rica, Papua New Guinea has now become, only the second tropical country with an extensive and long-term parataxonomist programme that should transform biodiversity surveying from an overseas-driven to a local activity. These surveys are urgently needed because New Guinea harbours five percent of the entire world's biodiversity and is also one of the last three areas with large areas of undisturbed rainforests left on the planet.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2003/2004

Project summary	Measurable Indicators	Progress and Achievements April 2003-Mar 2004	Actions required/planned for next period
Goal*:* To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve • The conservation of biological diversity, • The sustainable use of its components, and • The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources			
Purpose *(insert original project purpose statement)* Transform biodiversity surveys from an overseas-driven to a local activity, relying on local teams with sufficient expertise, equipment and access to biological collections, which can establish rapport with both local grassroots landowner and international research communities.	*(insert original purpose level indicators)* The intensity of biodiversity surveys in various parts of PNG and the role and share of local experts in the planning and implementation of these surveys; the flow of biological specimens to national vs. overseas collections; the role of local experts in data reporting, evaluation and interpretation.	*(report impacts and achievements resulting from the project against purpose indicators – if any)* PTC now recognised as principal source of expertise on biodiversity within PNG. Contracts attracted include surveys for Misima Mine Co and *Partners with Melanesians* NGO. Two parataxonomists received training in UK and experience of biodiversity studies in other tropical countries.	*(report any lessons learned resulting from the project & highlight key actions planning for next period)* Parataxonomists need training in project and financial management to become self-sufficient. Village-based laboratories can be used successfully for biodiversity survey work in remote areas using locally recruited trainees.
Outputs			
(insert original outputs – one per line) Establish a fully equipped team of parataxonomists, trained for and experienced in biodiversity surveys including building of biological collections and data analysis, which can collaborate with researchers as well as with local villagers, thus capable of providing survey data both to the scientific community and resource owners.	*(insert original output level indicators)* Biodiversity surveys accomplished by the parataxonomist team; biological specimens and research information generated by these surveys; flow of specimens to national collections resulting from these surveys; village educational programmes successfully completed by the parataxonomists.	*(report completed activities and outcomes that contribute toward outputs and indicators)* One biodiversity survey completed by the parataxonomist team, generating 6,000 specimens. Village education programmes completed in 6 villages, including butterfly farming course. Many educational leaflets produced and distributed; CD of entire PTC output over last 10 years distributed to c.50 institutions.	*(report any lessons learned resulting from the project & highlight key actions planning for next period)* Improvement in parataxonomists skills due to training should be tested periodically; recent tests indicate high level of competence. Use opportunity of final project wrap-up seminar (August 2004) to test value added and to focus team on future goals and sustainability.

Appendix 1: Leaflets produced by Darwin-funded parataxonomists in 2003/2004.

Andreas, M. (2003) Binatang em spesol. (Protect insects)
Andreas, M. (2003) Orchids: Lukim wanem spesol long lukautim bus?
Andreas, M. (2003) Tuna tin fish factory in Madang: Yu laikim wanem kain divelopmen?
Andreas, M. & Bito, D. (2004) Wamangu (E. Sepik) tradition: pasin bilong stretim hevi.
Bito, D. (2003) Ol kainkain snek bilong stik masis diwai. (Diversity of caterpillars feeding on Spathodea campanulata tree)
Boen, W. (2003) Wildlife facing extinction in PNG.
Boen, W. (2003) Butterfly Farming Manual. 15 pp
Boen, W. (2004) Hercules: Bikpela bataplai bilong nait (Hecules: a large moth)
Boen, W. (2004) Dispela i wanem kain developmen tru. (What kind of development?)
Boen, W. (2004) Bikpela bataplai bilong de (Bird wing) (Birdwings: giant butterflies)
Boen, W. (2004) Ol bataplai bilong Pikus diwai (Butterflies feeding on fig trees)
Boen, W. (2004) Comparison of forests in PNG and Europe.
Boen, W. (2004) New Guinea Binatang Research Center information leaflet.
Boen, W. (2004) Zoological and botanical gardens in developed countries.
Boen, W. (2004) A grassroots parataxonomist overseas.
Boen, W. (2004) Ton tree (Pomentia pinnata) hosts the richest insect fauna
Boen, W. (2004) Figs: the special plants for many living creatures on Earth
Boen, W. (2004) Hawkmoths (Sphingidae) in Papua New Guinea
Boen, W. (2004) Geometrid moths in Papua New Guinea
Boen, W. (2004) Macaranga plants and moths feeding on them
Boen, W. (2004) Kau Wildlife Management Area – wanpela spesol ples (Kau Wildlife Management Area, a special place)
Boen, W. (2004) Light trapping moths in New Guinea rain forest
Kutil, R. (2003) Yu save holim tumbana pasin bilong yu yet o nogat? (Do you keep your tradition?)
Kutil, R. (2003) Jayapura town life.
Kutil, R. (2003) Bai yu kisim pis olsem o nogat?
Kutil, R. & Auga, J. (2003) Traditional life style in Papua New Guinea. 10 pp.
Kutil, R. (2004) Hao bai yumi lukautim ol bus na wara (How to concerve our forests and waters)
Kutil, R. (2004) Wanpela kain habitat i stap long USA (An interesting habitat in USA)
Kutil, R. (2004) Various habitats across the world
Kutil, R. (2004) Lik katim anis bilong South America. (Leaf-cutter ants of South America)
Kutil, R. (2004) Wanem kain wok bilong lik katim anis (Life history of leaf-cutter ants)
Manumbor, M. (2003) Kapul bilong diwai o bilong graun?
Manumbor, M. (2003) Namba bilong trausel i go down (Turtles are disappearing)
Manumbor, M. (2003) Unique biological richness in Papua New Guinea
Manumbor, M. (2003) Lip i kisim hamas de? (How long does it take for a leaf to grow?)
Manumbor, M. (2003) Konsevesen em wonem samtink? (What is the meaining of conservation?)
Manumbor, M. (2004) School drop-outs: a stori
Manumbor, M. (2004) Kainkain bataplai bilong nait long Ohu Konseversen Eria (Moth diversity in Ohu Conservation Area)
Manumbor, M. (2004) Ohu Conservation Area
Mogia, M. (2003) Wanem binatang save kaikai diwai i dai (What insects kill trees?)
Mogia, M. (2003) Labelling insect specimens.
Mogia, M. (2003) Traditional ways of cooking food in PNG.
Mogia, M. (2003) Vegetation types on Mt. Giluwe.
Mogia, M. (2003) Some bark beetles of Madang, Papua New Guinea.
Mogia, M. (2003) Methods of collecting insects.
Mogia, M. (2003) Lukautim bus, graun, wara na olgeta ol animols.
Mogia, M. (2003) Kalsa em wanem samtink?
Mogia, M. (2003) Insect body parts.
Mogia, M. & Boen, W. (2004) PNG valuable insects.
Mogia, M. (2004) Rich diversity of Kau Wildlife Area.

Appendix 2: Responses to ECTF review of second annual report (April 2002-March 2003) (based on a submission to ECTF on 6th November 2003).