



Darwin Initiative Annual Report



Darwin Project Information

Project Ref Number	16008
Project Title	Conservation of fungi - a voice for vulnerable and unprotected organisms
Country(ies)	Argentina, Armenia, Cuba, India, Saudi Arabia, South Africa, Ukraine
UK Contract Holder Institution	BioNET-INTERNATIONAL
Host country Partner Institution(s)	Universidad de Buenos Aires [& others]
Other Partner Institution(s)	
Darwin Grant Value	£289,860
Start/End dates of Project	1 June 2007 / 31 March 2010
Reporting period (1 Apr 200x to 31 Mar 200y) and annual report number (1,2,3..)	1 April 2008 to 31 March 2009, annual report 2
Project Leader Name	D.W. Minter
Project website	www.cybertruffle.org.uk/darwin-microfungi
Author(s) and main contributors, date	D.W. Minter, 7 April 2009

1. Project Background

Problem addressed. Despite ample evidence of serious decline in many populations, fungi are almost completely unprotected worldwide. Most conservation law covers only animals and plants. Most protected areas lack policies to manage fungi in their care. The need for fungal conservation is rarely vocalized, so most policymakers are unaware of the issue. The few existing resources are directed only to Basidiomycetes, mainly in Europe and Australasia. For other fungi - microfungi - the conservation gap is total. In 1992, the Rio Convention year, Britain led the world in systematic mycology. Since then, our professional experts in microfungi have declined by over 85%, and average age has increased from 42 to 55. The picture is similar in other countries with previously strong mycological traditions. Urgent action is required to pass on expertise before it is gone forever, but countries with potential to develop future mycology lack key resources. **Location.** This project works worldwide (but with key partners in Argentina, Armenia, Cuba, India, Saudi Arabia, South Africa and Ukraine). **Project purpose.** To initiate a global movement for biodiversity conservation of microfungi (a huge array of organisms covered by the *Convention on Biological Diversity* [CBD], but currently with no explicit protection anywhere in the world) by three key outputs:

- 1 establishing three [World Conservation Union](#) [IUCN]-compatible Specialist Groups (for [1] non-lichen-forming ascomycetes & conidial fungi, [2] rusts & smuts, and [3] chromistans, chytrids, myxomycetes & zygomycetes), working through them to prepare global conservation plans for fungi covered by each;
- 2 in co-operation with the IUCN's [Sampled Red List Project](#) and compatible with its [red list assessment criteria](#), preparing and publishing global conservation status assessments for over 800 sample species of microfungi as baseline information for the CBD's [2010 Biodiversity Target](#);

- 3 building capacity for conservation of microfungi and their sustainable use, prioritizing Africa, by training mycologists, enhancing web-based informational resources for mycology and recycling used equipment.

Mid-term review. The present project was selected by the Darwin Initiative for a mid-term review, which was carried out in October 2008. The reviewer's report suggested that the work of enhancing web-based informational resources for mycology was so extensive and significant that it could be recognized separately as a fourth output (although there was no explicit recommendation to change the project's logframe). All of that work can be found on the **Cybertruffle** server (www.cybertruffle.org.uk), which is now one of the world's largest internet resources for information about fungi. Throughout this report, there are frequent references to websites on that server. Three of the websites are particularly relevant to the current project: *Cyberliber* (www.cybertruffle.org.uk/cyberliber), the digital library for mycology, *Cybernome* (www.cybertruffle.org.uk/cybernome), providing nomenclatural and taxonomic information about fungi and their associated organisms, and *Robigalia* (www.cybertruffle.org.uk/robigalia), providing information about the occurrence and distribution of fungi and their associated organisms. Those websites and their databases were described and discussed in section 3.1.3 of last year's report. The reader is accordingly invited and advised to visit and explore the *Cybertruffle* websites to understand fully their significance in the work of this project.

2. Project Partnerships

Partnership between the UK lead institution and host country partner(s). All original partners representing the UK lead institution and all host countries continue to be involved. There was, however, one change in personnel: Dr Gretel White (UK) stepped down from her project role [public relations / advocacy; identification of further and post-project potential donors and preparation of proposals to them] because of other pressing work commitments.

Management structure. Management of all partners has been by direct contact with Dr Minter, and there have been no changes to this structure during the reporting period.

Management of relationships. There has been frequent and active e-mail contact between the UK Project Leader and project partners in all of the participating countries. The main overseas partner, Dr Andrea Romero (Argentina), met Dr Minter once during the year (Buenos Aires & Mar del Plata, Argentina, November 2008). Dr Mayra Camino (Cuba) met Dr Minter two times (Egham & Whitby, UK & Yalta, Ukraine, October 2008; Havana, Cuba, February 2008). Dr Tykhonenko (Ukraine) met Dr Minter four times (Kiev, Ukraine, October 2008; Whitby, UK, October 2008, Kiev, Ukraine, December 2008, Egham & Whitby, UK, March 2009). Dr Rong (South Africa) met Dr Minter one time (Gordons Bay, Cape Province, South Africa, January 2009). In the year 2008-2009, contact with Dr Nanagulyan (Armenia), Dr Sankaran (India) and Dr Al-Cashgari (Saudi Arabia) was only by e-mail.

Developments. In each partnership there have been distinct developments.

- **Argentina.** A symposium on fungal conservation was held at the *VI Congreso Latino-Americano de Micología* (Mar del Plata, November 2008), with Dr Romero and Dr Minter as joint organizers. As a result of that symposium, the *Asociación Latino-Americana de Micología* decided at its plenary business meeting to establish a continental level fungal conservation group, and appointed a steering committee to organize it. Agreement has been reached to add all mycological publications from the journal *Darwiniana* to the *Cyberliber* website, and PDFs have been provided by the Editorial Board to facilitate this.
- **Armenia.** Dr Nanagulyan has continued work on the Armenian versions of *Cybernome* and *Robigalia* which are now nearly ready to be made publicly available. Keyboarding of fungal records relating to Armenia has continued.
- **Cuba.** During this year of the project, Cuban mycologists have continued to abstract mycological information needed for conservation status evaluations from key journals. Dr Camino presented the keynote address, "Fungal conservation in a world of changing climates" at the sixth *International Congress for Systematics & Ecology of Myxomycetes* (Yalta, Crimea, Ukraine, October 2008). A workshop on the impacts of climate change on fungi was held in February 2008 with additional British Council support. Cuban mycologists

have continued to prepare draft national-level fungal species conservation status evaluations.

- **India.** Dr Sankaran has been preparing Hindi versions of *Cybernome* and *Robigalia*, which are now nearly ready to be put on-line. The work to digitize the checklist of fungi of India produced in the 1980s by Bilgrami & co-workers has progressed. The Indian component of this digitizing work has the following components: scanning to produce JPG images of each page, processing with OCR software to obtain text, correction of the text, editing the text to a format suitable for reading into a database. That work has been completed for the main body of the text, and is in progress for the bibliographic portion. The digitized main body of the text has been read into a database and is now being edited by Dr Minter in the UK. Work on the on-line version of the *Fungi on Eucalyptus* book (published in paper form with Dr Minter over ten years ago when Dr Sankaran was a Darwin Fellow) is complete and English and Spanish versions are available on-line. The English version can be viewed at www.cybertruffle.org.uk/eucfung/eng.
- **Saudi Arabia.** Dr Al-Cashgari has helped to prepare Arabic versions of *Cybernome* and *Robigalia*. The dictionaries are nearly ready. Work on the fixed pages of *Cybernome* is complete, and is currently being tested. Work on the fixed pages of *Robigalia* has not yet begun. The Arabic version has been particularly challenging, as the script reads from right to left.
- **South Africa.** With Darwin Initiative support, Dr Rong organized the sixth *African Mycological Congress* (Gordon's Bay, Cape Province, South Africa, January 2009) and a new website for the *African Mycological Association* with its own domain name. A workshop on evaluation of conservation status of fungi using **IUCN** criteria was held during the Congress. At its plenary meeting, the *African Mycological Association* decided to establish a continental level fungal conservation group. Over 40,000 records of fungi relating to South Africa are now being edited.
- **Ukraine.** Further workshops on using **IUCN** criteria to evaluate the conservation status of fungi were held, including one in October 2008 at the sixth *International Congress for Systematics & Ecology of Myxomycetes*. Dr Tykhonenko is now joint editor of *Cyberliber*.

Partnerships with other UK or Regional partners. During this reporting period, the **IUCN** has agreed to adopt the three prototype Specialist Groups established by this project. The three Specialist Groups are thus now part of the formal structure of the **IUCN's** Species Survival Commission. This development, which was not expected during the lifetime of the project, represents highly significant progress.

Other collaboration. The second year of this project has seen continued collaboration with other partners beyond those formally listed. Close co-operation with *IndexFungorum* (www.indexfungorum.org/Names/Names.asp) the *de facto* world nomenclator for fungi is perhaps the most important (*Cyberliber*, as described in section 3.1.3 of this report, provides the literature backing for *IndexFungorum*), but collaboration continues with partners in Austria, Brazil, Chile, China, the Dominican Republic, France, Georgia, Mexico, Poland, Puerto Rico, Trinidad & Tobago, the USA and Venezuela (see the report for 2007-2008), and there is new collaboration with Belarus, Bulgaria, Germany, Morocco, Poland, Slovakia and Russia. The main developments during the last year are listed below.

- **Belarus.** The website for the mycological journal *Mycena* is hosted by the *Cybertruffle* server, and PDFs of the works from that journal are available to download from that website.
- **Brazil.** The scientists believed to hold copyright of the serial publication *Atas do Instituto de Micologia, Universidade do Recife* have kindly permitted this historical journal to be made available through the *Cyberliber* website.
- **Bulgaria.** The Editorial Board of *Mycologia Balcanica* has kindly agreed that back numbers of its journal may be added to the *Cyberliber* website, and has supplied PDFs to facilitate this. These are currently awaiting processing.
- **Germany.** The Editor of *Rheinlands-Pfälzisches Pilzjournal* has kindly permitted back numbers of this journal to be made available on the *Cyberliber* website.
- **Mexico.** The Editorial Board of *Revista Mexicana de Micologia* has kindly permitted back numbers of this journal to be made available on the *Cyberliber* website. Work on this has not yet begun.

- **Morocco.** Dr M. Haimed, a Moroccan mycologist, is kindly assisting Dr Al-Cashgari with preparation of the Arabic version of the *Cybernome* website (still at trial stage).
- **Poland.** Various Polish mycologists in Łódź are actively contributing scanned digitized literature for the *Cyberliber* website. In particular, the Editorial Board of *Acta Mycologica*, Poland's main scientific journal for mycology, has kindly given permission for scanned images of its volumes to be added to the *Cyberliber* website on the *Cybertruffle* server. To date, 16 volumes of this journal have been made available.
- **Russia.** The Editorial Board of *Микология и Фитопатология* [*Mycology and Phytopathology*] has kindly agreed that back numbers of its journal from the Soviet Period can be added to the *Cyberliber* website [this is the prime Russian-language mycological journal]. Work to scan these issues has now begun.
- **Slovakia.** The Editorial Board of *Catathelasma* has kindly agreed that back numbers of this journal can be added to the *Cyberliber* website, and has supplied PDFs to facilitate this.
- **USA.** Following agreement from the Editorial Boards of *Mycotaxon* and *Mycologia*, two of the world's most prestigious mycological scientific journals, based in the USA, scanned images of their journals are being added to the *Cyberliber* website on the *Cybertruffle* server. To date, 91 volumes of *Mycotaxon* and 67 volumes of *Mycologia* have been made available.

3. Project progress

The project is in most aspects either on schedule or a little ahead of schedule. The exception is the training courses for African students (see **section 6 Other comments on progress not covered elsewhere** below). This last year has seen major successes: recognition and adoption of the three new specialist conservation groups by the **IUCN**, several workshops on fungal conservation, the first draft red-list evaluations of 1500 randomly sampled ascomycete species, a huge increase in size of the *Cybertruffle* databases, particularly *Cyberliber*, and three international congresses organized with support from this project. For information about use of the *Cybertruffle* server websites, see **section 8 Dissemination** of this report.

3.1 Progress in carrying out project activities

3.1.1. Formation of specialist conservation groups

The specialist groups set up in the first year of the project have now formally been adopted by the **IUCN** and incorporated in its Species Survival Commission. As a result, the **IUCN** now has five fungal Specialist Groups where, before this project, there were only two. In addition and entirely as a result of the activity of the new groups, the Species Survival Commission of the **IUCN** now recognizes the fungi as separate from animals and plants, and lists the fungal Specialist Groups as a separate and independent category. Formal adoption of these groups by the **IUCN** within the lifetime of the project is a significant and exciting achievement.

During the past year, membership of each Specialist Group remained stable. Adoption of the three groups by the **IUCN** will, however, mean that further group members need to be identified and invited to join. To debate activities, the **IUCN** has proposed a formal meeting of chairs of all of the five fungal conservation expert groups in October 2009. That meeting will be organized by Dr Minter under the auspices of this project. The Specialist Group websites now need to be updated following adoption of each group by the **IUCN**. In particular, it may be desirable to arrange for each group to have an independent domain name: currently they are all hosted under the *Cybertruffle* domain name.

During the current reporting period, and entirely as a direct result of the activity of this project, continental-level fungal conservation groups have been established for the first time in Africa, North America and South America. The African group was set up by the *African Mycological Association* at its congress in Gordon's Bay, Cape Province, South Africa, January 2009. The North American group was set up by the *Mycological Society of America* at its annual meeting in State College, Pennsylvania, August 2008. In South America, the *Asociación Latino-Americana de Micología* at the *VI Congreso Latino-Americano de Micología* (Mar del Plata,

Argentina, November 2008) agreed to establish a continental-level fungal conservation group, and appointed a working party to realize that aim. These new groups represent a major infrastructural advance in fungal conservation, and complement existing groups in Europe (the oldest) and Australasia. It means that now, of inhabited continents, only Asia lacks a continental-level fungal conservation group.

3.1.2. Sampled red lists of fungi

As reported last year, the number of IUCN-compatible conservation status evaluations planned to be produced through this project was increased from the 800 species originally promised to 900 (the minimum sample size acceptable to the IUCN's [Sampled Red List Project](#)) themselves derived from a larger pool of 1500 species (representing the IUCN's ideal sample size). As noted last year, the species being sampled were ascomycetes and their conidial states. Work is now in progress to ensure that each sampled name represents a different organism, and that as many as possible synonyms are also identified (this is important because the nomenclature of fungi is notoriously unstable) [means of verification: www.cybertruffle.org.uk/darwin-microfungi/names_1500.htm].

At the time of writing this report, draft evaluations have been made for all 1500 names in the larger pool. For this first draft the following standard information sources were used:

- records from the main mycological catalogues (Index of Fungi, Lamb, Petrak's Lists, Saccardo's Sylloge, Zahlbruckner etc.);
- fully edited records in the *Robigalia* database of the *Cybertruffle* website [www.cybertruffle.org.uk/robigalia] - more than 685,000 records - including digitized data from major checklists of fungi of Brazil, the Caribbean, Chile, Georgia, Patagonia, Slovakia, Ukraine, the UK, the USA, Venezuela, *Eucalyptus* and pines, and from major fungal reference collections including **KW**;
- partially edited records in the queue database of material waiting to be added to the *Robigalia* database [these are not available on-line] - more than 520,000 records, including digitized data from major treatments of fungi of Botswana, China, Ethiopia, Kazakhstan, India, Somalia, South Africa, Sudan, data from *Микология и Фитопатология* [*Mycology and Phytopathology*, the main Russian language mycological journal], and the **IMI** fungal reference collection which is global in scope;
- digitized indexes of major mycological serial publications (*Annales Mycologici*, *Mycologia*, *Mycological Papers*, *Mycotaxon*, *Sydowia*, *Transactions of the British Mycological Society*) - work on digitizing these indexes is incomplete, but currently stands at about 430,000 records.

For 75% of the names there were fewer than 5 records; for 90% of the names there were fewer than 10 records; for 95% of the names there were fewer than 20 records; only about 2% of all names were represented by more than 50 records, and less than 1% of all names by more than 100 records. Only two names were represented by more than 500 records. These figures show the sort of distribution which might be expected of a random sample of poorly recorded organisms.

Although numbers of records alone are not a reliable guide (the species may, for example, have been very recently described, with no time to generate records), the figures suggest that over 90% and perhaps even 95% of all species in the list are likely to be evaluated by this project as data deficient. Before finalizing these draft evaluations, however, it will clearly be desirable to complete digitizing the indexes of the major mycological journals, and to amend the standards so that they take into account further data sources. These will include literature sources listed for relevant genera in the 10th edition of the *Dictionary of the Fungi*, internet resources (Genbank, Google, the GBIF website, the New Zealand Landcare fungal website, the USDA fungal website) and digitized indexes of other publications, particularly for lichen-forming species. It is also clear that, for practical purposes, there should be explicit standards to determine a cut-off point, so that species with less than a specified level of information about them are automatically evaluated as data deficient. That will enable evaluators to concentrate on species with more information (although some of these too may eventually be evaluated as data deficient).

3.1.3. Enhanced capacity for conservation of microfungi

Courses, workshops, meetings. During the period covered by this report, workshops on how to evaluate fungi using **IUCN** criteria have been held in Argentina (November 2008), South Africa (January 2009) and Ukraine (October 2008). The workshop in Ukraine was led by Dr Mayra Camino (Cuba) who had been trained through an earlier workshop of this project. Each workshop lasted one day, and numbers of participants varied from 15-40. Through these workshops, mycologists from the following countries were trained in **IUCN**-compatible conservation status evaluations of fungi: Argentina, Belgium, Brazil, China, Cuba, France, Japan, Lithuania, Namibia, Philippines, Russia, South Africa, Spain, Switzerland, Ukraine, the UK, the USA, Venezuela. A workshop on fungi and climate change led by Dr Julio Mena Portales was held in Havana (February 2009). In addition, this project contributed significantly to the organization of the Sixth International Congress on Systematics & Ecology of Myxomycetes (Ukraine, October 2008), where project participant Dr Mayra Camino provided the keynote address, and to the organization of the Sixth Congreso Latino-Americano de Micología, where project participant Dr Andrea Romero was co-President of the Congress and, jointly with Dr Minter, led a workshop on fungal conservation.

Equipment. Several of each of the following (laptop computers, specialized book scanners, memory-sticks, digital cameras, rechargeable batteries and battery chargers, and digital camera memory cards), plus one GPS device have been purchased and delivered to beneficiaries among the project participants. For Cuba, where internet access remains problematical, three 32 gigabyte memory sticks, each with a full copy of *Cyberliber*, have been delivered. Dr Minter's trip in February 2009 was the first visit to Cuba on which he was not confronted with a crisis in computer equipment. A new hard disk has been added to the *Cybertruffle* server.

Web-based information resources. The number of scanned images of pages of mycological publications available on *Cyberliber* has now reached more than 206,000, an increase of more than 70,000 over last year. *Cyberliber* continues to be the single largest internet resource dedicated to mycological literature. Many more images have been scanned and are in the editing queue. The *Robigalia* website on the *Cybertruffle* server provides on-line information about fungi from, effectively, every country in the world, with individual specialist websites for Brazil, Chile, Cuba, the Dominican Republic, Georgia, Puerto Rico, Trinidad & Tobago, Ukraine and Venezuela. The last year has seen intensive work editing the queue of over half a million records waiting to be added to the *Robigalia* website. There has also been intensive work to digitize the indexes of main mycological journals, and it is hoped these will soon become available on-line. The website for the *African Mycological Association* was developed using support from this Darwin Initiative project [www.africanmycology.org].

3.2 Progress towards Project Outputs

The project remains on-track to achieve all promised outputs by its close. Output-level assumptions have not changed. The measureable indicators, as described in the logframe, are in italics, followed by brief comments with means of verification in square brackets.

Measurable indicators for Output 1.

Group websites fully functional, with visible history of activity by each group. Each group has its own website where its activities can be viewed [www.cybertruffle.org.uk/ascos; www.cybertruffle.org.uk/rustsmut; www.cybertruffle.org.uk/moulds].

Groups recognized by IUCN or mycological societies. The **IUCN** has formally recognized the three groups established by this project [www.iucn.org/about/work/programmes/species/about_ssc/specialist_groups/directory_specialist_groups]. See also the website of the *Mycological Society of America* where the downloadable newsletter contains information about establishment of the North American continental level group [[http://msafungi.org/wp-content/uploads/Inoculum/59\(4\).pdf](http://msafungi.org/wp-content/uploads/Inoculum/59(4).pdf)].

Action plans for each group available on internet. Action plans have been begun, but are not yet on-line. The meeting to be organized by the **IUCN** in October 2009 under the auspices of this project will provide a forum for peer review of those plans.

Evidence of work begun to implement action plans. Awaiting action plans.

Measurable indicators for Output 2.

Red list websites with sampled red lists as described in proposal, compatible with the IUCN Sampled Red List project. A first attempt has been made to evaluate the conservation status of all species in the sampling list (i.e. not just the 800 promised in the project proposal, nor the 900 needed to meet the sampled red list minimum sample size, but all 1500 needed to meet the sampled red list ideal sample size). A lot has been learned from that first attempt. In particular, it has identified the need to access more source information. As a result, a decision has been made not to publish those first drafts, and work has continued to concentrate on improving access to source information.

Measurable indicators for Output 3.

Names of mycologists trained. The following list, not exhaustive, illustrates the range of countries and the calibre of scientists reached by this project's training: Dr R. Barreto (Brazil, now Chair of the Brazilian Fungal Conservation Group), Ms M. Cabarroi (Cuba), Dra M. Camino Vilaró (Cuba, now Chair of the IUCN Specialist Group for Mildew, Mould & Myxomycete Conservation), Dr R. Castañeda Ruíz (Cuba), Dr T.E. de la Cruz (Philippines), Dr A. Fidalgo (Cuba), Mr M. Gregory (UK), Dr V.P. Hayova (Ukraine, now Secretary of the European Council for Conservation of Fungi), Dra S. Herrera (Cuba), Dra T. Iturriaga (Venezuela, now on the steering committee for the Latin American Fungal Conservation Group), Dr K. Jacobs (South Africa, now on the South African Fungal Conservation Group), Ms T.V. Kryvomaz (Ukraine), Dra S. Maldonado (Cuba), Dr J. Mena Portales (Cuba, now on the steering committee for the Latin American Fungal Conservation Group), Dr A. Mercado (Cuba, deceased), Dra G. Recio (Cuba), Dra A. Romero (Argentina, now on the steering committee for the Latin American Fungal Conservation Group), Dr I. Rong (South Africa, now on the South African Fungal Conservation Group), Dr Yu.Ya. Tykhonenko (Ukraine), Dr A. Wood (South Africa).

Equipment delivered. Since the start of this project, over a dozen laptop computers, six scanners, one GIS device, several memory flash drives, and six digital cameras have been delivered to participants. In addition, for Cuban participants, three 32 gigabyte memory flash drives have been delivered, each containing a full copy of the Cyberliber website (the internet is still very problematical in Cuba). Over the last fifteen years of more or less continuous Darwin Initiative projects, several hundred computers, cameras, digital cameras, printers, scanners, microscopes and other pieces of equipment, plus hundreds of books and journals have been delivered to participants in a wide range of countries. Dr Minter's trip in February 2009 was the first visit to Cuba on which he was not confronted with a crisis in computer equipment.

Country websites for fungi established. Limited only by the number of records in the *Cybertruffle* database, the *Robigalia* component of the *Cybertruffle* server provides searchable access to information about fungi for every country in the world, not just (as originally proposed) for the countries participating in the current project. That information is provided in ten different languages.

3.3 Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Total to date	Number planned for this reporting period	Total planned from application
Established codes								
4C; 4D	postgraduates trained through courses							42
6A; 6B	workshops	6	3			9		8
7	conservation assessment guidance notes		1			1		1
8	UK partner 8 weeks each year in host countries	7	8			15		24
9	conservation plans, for ascomycetes, rusts, smuts, chromistans, chytrids, myxomycetes and zygomycetes		1			1		7
9	800 individual species global red list assessments		1500			1500		800
10	extensive field guide style information for microfungi, available on-line							1
11B	7 papers submitted to peer-reviewed journals	1	12			13		7
12B	3 existing databases freely available as an international resource for on-line interrogation	3				3		3
14B	project presented at global mycological congresses		1			1		2
14B	project presented at continental level mycological congresses	2	2			4		5
15; 16	press releases, electronic newsletters etc.	3	3			6		unspecified
17A	3 international Specialist Groups	3				3		3

Code No.	Description	Year 1 Total	Year 2 Total	Year 3 Total	Year 4 Total	Total to date	Number planned for this reporting period	Total planned from application
	established to conserve microfungi							
20								
23								
New - Project specific measures								

Table 2 Publications

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
paper in serial publication	Additions to the myxomycete biota of Cuba. 1. M. Camino, G. Moreno, A. Castillo, D.W. Mitchell & D.W. Minter, 2008 [Mycotaxon 106: 75-102]	Mycotaxon Ltd		
paper in serial publication	Two new anamorphic fungi and some microfungi recorded from 'El Avila', Venezuela. R.F. Castañeda Ruíz, T. Iturriaga, D.W. Minter, G. Heredia Abarca, M. Stadler, M. Saikawa & R. Fernández, 2009 [Mycotaxon 107: 225-227]	Mycotaxon Ltd		
serial publication	Andrianova, T.V. & Minter, D.W. <i>Mycosphaerella oxyacanthae</i> . IMI Descriptions of Fungi and Bacteria 1741	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Mycosphaerella rubi</i> . IMI Descriptions of Fungi and Bacteria 1742	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria agrimoniicola</i> . IMI Descriptions of Fungi	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	

Type (eg journals, manual, CDs)	Detail (title, author, year)	Publishers (name, city)	Available from (eg contact address, website)	Cost £
	and Bacteria 1743			
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria aucupariae</i> . IMI Descriptions of Fungi and Bacteria 1744	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria crataegi</i> . IMI Descriptions of Fungi and Bacteria 1745	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria gei</i> . IMI Descriptions of Fungi and Bacteria 1746	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria magnusiana</i> . IMI Descriptions of Fungi and Bacteria 1747	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria potentillica</i> . IMI Descriptions of Fungi and Bacteria 1748	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria tormentillae</i> . IMI Descriptions of Fungi and Bacteria 1749	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	
serial publication	Andrianova, T.V. & Minter, D.W. <i>Septoria ulmariae</i> . IMI Descriptions of Fungi and Bacteria 1750	CABI, Wallingford	ISSN 0009-9716. www.cabi.org	

3.4 Progress towards the project purpose and outcomes

The project purpose is "to initiate a global movement for biodiversity conservation of microfungi". Before this project began, there was very little structured activity anywhere in the world working for fungal conservation, and virtually none for conservation of microfungi. Since the start of this project and largely as a result of the work of this project, new formal groups have been established for fungal conservation at continental level in Africa, North America and South America and, at a national level, in Brazil. In addition, three specialist groups for conservation of microfungi have been established through this project and have now been adopted by the **IUCN**. Furthermore, following training of mycologists, draft **IUCN**-compatible conservation status evaluations have been made of 1500 randomly selected microfungi.

Finally, for the first time, high quality, global level information about the occurrence of microfungi has been made available on-line through websites in the world's main languages.

These have demonstrated that it is possible to evaluate the conservation status of microfungi. The purpose level assumptions still hold true and the indicators remain adequate for measuring outcomes. What has become even more clear is that even in so-called developed countries, skills for identifying and monitoring fungi, and even mycologists themselves are critically endangered, and that urgent action is needed to prevent these resources from vanishing for ever.

3.5 Progress towards impact on biodiversity, sustainable use or equitable sharing of biodiversity benefits

This project deals with one of the simultaneously most important and most forgotten groups of organisms. The current reckless neglect of fungi in so many facets of biodiversity conservation worldwide means that for these organisms it is nigh impossible to apply the terms used by the Darwin Initiative to describe progress at the final goal level in any meaningful way.

The Darwin Initiative correctly recognizes that, for projects such as the present one, positive biodiversity impacts may take a number of years to be seen, and are likely to occur after the end of a project - in the case of the present project, probably many years after. As a result, it is much more important to dwell on the fact that Darwin Initiative support for this project has permitted the germination of an important idea, and the very first growth of a totally new movement. That movement will need to develop an infrastructure before it can become fully effective: that means global, continental, national and local bodies for fungal conservation, and separate organizations to provide the scientific evidence, and to raise the public voice so that fungal conservation features on the political agenda. The long term impact of this project on biodiversity conservation is potentially enormous, but only if other organizations, and not just the Darwin Initiative and the **IUCN**, can be persuaded to recognized the critical importance of its theme.

4. Monitoring, evaluation and lessons

In October 2008, the project was subject to a thorough external review initiated by the Darwin Initiative, and the reader is referred to the report of that review, which is available from the Darwin Initiative.

Internally, progress of the project is monitored by the project leader through regular and frequent contacts with participants, and measured by comparison with the logframe which has not changed during the lifetime of the project.

One important experience from this project is that there has been a change in the pool of skills required to realize the work. Skills which were appropriate and useful in earlier Darwin Initiative projects led by the leader of the current project - for example the ability to keyboard data - are now insufficient. Many additional, much more complex skills are now needed (a point noted by the external review). These do not only relate to the uncharted territory of making conservation status evaluations of fungi, but also include management of a linux server, control of MYSQL database software, use of the PERL programming language, web-design, and batch processing of digitized images. The project leader has had to teach himself all of these skills, so to speak, on the hoof, and then identify suitable team members and attempt to transmit as many of those skills as possible. In the past year significant efforts in that direction have seen some progress, but much more needs to be done, and plans for the last year of the project include further training of select participants. There is a feeling within the project that the range of skills needed for the work is enormous, and the fact that the project team is rising to supply them is even more remarkable.

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

The leader of the present project always notes issues raised in project reviews, and seeks to address them. The report of the external reviewers was studied and discussed with project partners. The main action has been to increase efforts to transmit new skills.

6. Other comments on progress not covered elsewhere

Project design. As the project has progressed, the critical importance of accessible information has become more and more clear. Without accessible information - and that now means the Internet - conservation status evaluations of any sort are not practical for groups of organisms like the fungi. As a result, more emphasis has been placed on strengthening the internet resources established through this project. In particular, efforts are being made to pass digitized species indexes of major journals through character recognition software to produce a database of information sources for as many fungal species as possible.

Training courses in Africa. These have been delayed by an unfortunate succession of factors, varying from civil unrest in Kenya, through difficulties in finding a suitable course location in northwest Africa, to time constraints on the part of the project leader associated with his moving house. Planning is now in progress for courses in at least three different locations in Africa (Kenya, Nigeria, South Africa), with target dates for the courses in autumn, winter and spring of 2009-2010. If at all possible, a fourth course will be held in north Africa.

Significant difficulties. The biggest risk facing the project was the relocation of the *Cybertruffle* server from London when the project leader moved house to the north of England. At the time of writing this report, that relocation has been successfully accomplished with minimal disruption to users.

7. Sustainability

At a scientific level, the profile of this project is high globally: for evidence of this and of efforts to promote the work of this project, see the following section. The fact that continental-level fungal conservation groups for Africa, North America and South America have been established during the lifetime of this project, principally as a result of the activity of this project, is clear evidence for an increasing interest and capacity for biodiversity conservation of fungi. The exit strategy, involving the three new specialist groups which have already been adopted by the **IUCN** is satisfactory. The long-term sustainability of these groups will be a matter for the **IUCN**. The *Cybertruffle* server and its websites are able to continue functioning even if there is no further external funding, although further development may not be possible under such conditions.

8. Dissemination

The main mode of dissemination of this project has been via websites on the *Cybertruffle* server. Since monitoring of those websites started on 6 September 2008 and up to the end of March 2009, almost 1 million pages were viewed by visitors from 188 different countries (the ten biggest users being the USA, Mexico, Spain, Venezuela, Chile, Germany, Italy, Brazil, the UK and Colombia). Dissemination through these websites is expected to continue after the end of this project, the server being under the curation of the leader of the present project.

9. Project Expenditure

Please expand and complete Table 3.

Table 3 Project expenditure during the reporting period (Defra Financial Year 1 April 2008 to 31 March 2009)

Item	Budget (please indicate which document you refer to if other than your project application or annual grant offer letter)	Expenditure	Variance
Rent, rates, heating, overheads etc			
Office costs (eg postage, telephone, stationery)			
Travel and subsistence			
Printing			
Conferences, seminars, etc			
Capital items/equipment (specify)			
Others (specify) audit equipment transport external review UK inflation			
Salaries (specify by individual) Minter White Camino Nanagulyan Romero Rong Sankaran Tykhonenko Commissioned work			
TOTAL			

Highlight any agreed changes to the budget and explain any variation in expenditure where this is +/- 10% of the budget. Have these changes been discussed with and approved by LTS?

10. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

[I agree for LTS and the Darwin Secretariat to publish the content of this section](#)

The main achievements have been (1) the establishment of the Cybertruffle website which already underpins work on fungal diversity at a global level (an article about this website has already been published in a Darwin Initiative newsletter) and (2) the adoption by **IUCN's** Species Survival Commission of the three new specialist groups for conservation of microfungi.

Annex 1 Report of progress and achievements against Logical Framework for Financial Year: 2008/09

Project summary	Measurable Indicators	Progress and Achievements April 2008 - March 2009	Actions required/planned for next period
<p>Goal: <i>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but constrained in resources to achieve</i></p> <p><i>The conservation of biological diversity,</i></p> <p><i>The sustainable use of its components, and</i></p> <p><i>The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources</i></p>		<p><i>(report on any contribution towards positive impact on biodiversity or positive changes in the conditions of human communities associated with biodiversity eg steps towards sustainable use or equitable sharing of costs or benefits)</i></p>	<p><i>(do not fill not applicable)</i></p>
<p>Purpose To initiate a global conservation movement for endangered microfungi.</p>	<p>Three specialist conservation groups exist, with conservation action plans prepared for fungi of each group; evidence of activity advocating and assisting in conservation of microfungi.</p> <p>Sampled red lists of microfungi exist, prepared in collaboration and compatible with the IUCN Sampled Red List project, providing baseline for CBD 2010 objective.</p> <p>Mycologists trained in conservation techniques; equipment delivered; country and literature websites provide mycological information relevant to conservation.</p>	<p>Three specialist groups exist, are functioning, and have been adopted by the IUCN.</p> <p>1500 names of microfungi have been randomly selected (incorporating subsets of 900 and 800 names), and draft evaluations have been prepared.</p> <p>Over 40 mycologists trained in conservation techniques through a series of workshops; equipment delivered; country and literature websites provide mycological information relevant to conservation</p>	<p>A meeting of specialist group chairs together with IUCN staff and, possibly, other interested mycologists will plan further actions of specialist groups</p> <p>Information resources will be improved then definitive evaluations will be produced.</p> <p>Training courses will be held for African and other mycologists; country and literature websites will be enlarged.</p>
<p>Output 1. Three specialist conservation groups (for [1] non-lichen-forming ascomycetes & conidial fungi, [2] rusts & smuts, and [3] chromistans, chytrids,</p>	<p>Group websites fully functional, with visible history of activity by each group. Groups recognized by IUCN or mycological societies. Action plans for each group available on</p>	<p>Websites fully functional; groups recognized by IUCN and mycological societies; action plans currently being prepared.</p>	

myxomycetes & zygomycetes), with conservation action plans prepared by each group for their fungi.	internet. Evidence of work begun to implement action plans.	
Activity 1.1 Form each expert group; debate activities; formalize web-sites; accumulate information and ideas for action plans; produce plans; communicate aims through media.		Groups all formed; formal web-sites now exist; information and ideas for action plans are being accumulated; activities to be debated in October 2009, with plans produced; aims advertized.
Output 2. Sampled red lists of microfungi, prepared in collaboration and compatible with the IUCN Sampled Red List project, providing baseline for CBD 2010 objective.	Red list websites with sampled red lists as described in proposal, compatible with the IUCN Sampled Red List project.	Red list websites with sampled red lists already exist; draft evaluations already prepared; definitive evaluations to be prepared when information resource is strengthened.
Activity 2.1. Establish list of red list sample species; prepare standards guide; commission suitable mycologists to work on each species; edit resulting work and publish on internet.		List of red list sample species has already been established; draft standards guide exists, to be refined in October 2009; suitable mycologists have been identified and commissioned to work on each species; results will be published on the internet.
Output 3. Enhanced capacity for microfungi conservation, prioritizing Africa, by training mycologists, delivering equipment and enhancing web-based informational resources.	Reports of training through workshops, courses and meetings; names of mycologists so trained; equipment delivered; country websites exist for fungi.	Training through workshops and meetings largely completed; workshops still to be organized; equipment mostly delivered, some still outstanding; country websites now already exist for fungi.
Activity 3.1. Courses, workshops, meetings; sourcing and transporting resources; database & internet work.		Training through workshops and meetings largely completed; workshops still to be organized; equipment mostly delivered, some still outstanding; country websites now already exist for fungi.

Annex 2 Project's full current logframe

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<p>Goal:</p> <p>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</p> <p>the conservation of biological diversity,</p> <p>the sustainable use of its components, and</p> <p>the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</p>			
<p>Purpose</p> <p>To initiate a global conservation movement for endangered microfungi.</p>	<p>Three specialist conservation groups exist, with conservation action plans prepared for fungi of each group; evidence of activity advocating and assisting in conservation of microfungi.</p> <p>Sampled red lists of microfungi exist, prepared in collaboration and compatible with the IUCN Sampled Red List project, providing baseline for CBD 2010 objective.</p> <p>Mycologists trained in conservation techniques; equipment delivered; country and literature websites provide mycological information relevant to conservation.</p>	<p>Group websites fully functional, with plans and visible history of activity by each group. Groups listed by IUCN Species Survival Commission or recognized by mycological societies; evidence of advocacy in media and internet.</p> <p>Red list websites with sampled red lists as described in proposal, compatible with the IUCN Sampled Red List project.</p> <p>Reports of workshops, courses and meetings; names of African (and other) trained mycologists; photographs of delivered equipment; country and literature websites functional.</p>	<p>IUCN Species Survival Commission / mycological societies remain willing to welcome / recognize new specialist groups for microfungi.</p> <p>Enough expert mycologists still exist to produce red lists; there is access to sufficient information; uniform quality standards can be enforced.</p> <p>Suitable African (and other) trainee mycologists can be found; they remain in the science after training; donated equipment can be sourced.</p>
<p>Outputs</p> <p>Output 1. Three specialist conservation groups (for [1] non-</p>	<p>Group websites fully functional, with visible history of activity by</p>	<p>View group websites; view websites of IUCN / mycological societies. View action</p>	<p>Specialist mycologists willing to form groups can be found. IUCN</p>

<p>lichen-forming ascomycetes & conidial fungi, [2] rusts & smuts, and [3] chromistans, chytrids, myxomycetes & zygomycetes), with conservation action plans prepared by each group for their fungi.</p> <p>Output 2. Sampled red lists of microfungi, prepared in collaboration and compatible with the IUCN Sampled Red List project, providing baseline for CBD 2010 objective.</p> <p>Output 3. Enhanced capacity for microfungus conservation, prioritizing Africa, by training mycologists, delivering equipment and enhancing web-based informational resources.</p>	<p>each group. Groups recognized by IUCN or mycological societies. Action plans for each group available on internet. Evidence of work begun to implement action plans.</p> <p>Red list websites with sampled red lists as described in proposal, compatible with the IUCN Sampled Red List project.</p> <p>Reports of training through workshops, courses and meetings; names of mycologists so trained; equipment delivered; country websites exist for fungi.</p>	<p>plans.</p> <p>View websites; check compatibility with IUCN criteria, and value for the CBD's 2010 Biodiversity Target.</p> <p>View assessments of trained mycologists and lists of delivered equipment; read reports of workshops, courses and meetings; assess country websites for fungi.</p>	<p><i>Species Survival Commission / mycological societies</i> remain willing to welcome / recognize new specialist groups for microfungi.</p> <p>Expert mycologists exist to produce lists; access to sufficient information possible; quality standards can be enforced.</p> <p>Suitable African (and other) trainee mycologists can be found; they remain in the science after training; donated equipment can be sourced.</p>
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Activities	Activity milestones (summary of project implementation timetable)	Assumptions
<p>Form each expert group; debate activities; formalize web-sites; accumulate information and ideas for action plans; produce plans; communicate aims through media.</p> <p>Establish list of red list sample species; prepare standards guide; commission suitable mycologists to work on each species; edit resulting work and publish on internet.</p> <p>Courses, workshops, meetings; sourcing and transporting resources; database & internet work.</p>	<p>Jul. 2007: trawls for group members. Sep. 2007: members named on websites. Autumn 2007: publicise websites; debate activities. Mar. 2008: main activities agreed; action plans format established; work communicating aims through media starts. Mar. 2009: first drafts. Nov. 2009: second drafts. Apr. 2010: plans published. Sep. 2007 - Apr. 2010: presentation of groups and their work at international conservation meetings and scientific congresses.</p> <p>Aug. 2007: list of sample species established; standards guide prepared, mycologists contracted. Sep. 2007: first red list workshops to prepare mycologists (Kiev, Havana). Oct. 2007: mycologists begin work on species. By Jul. 2008: 350 sample species assessed; locations of second phase red list workshops established. Sep. 2008: first editorial workshops (Kiev, Havana); second phase red list workshops. By Jul. 2009: 700 sample species assessed. Sep. 2009: second editorial workshops. By Apr. 2010: over 800 sample species assessed and all edited and published on internet.</p> <p>May 2007: trawl for first training course candidates. Aug. 2007: first training course candidates identified and selected. Nov. 2007: first training course held. Jan. 2008: trawl for second training course candidates. Mar. 2008: second training course candidates identified and selected. Jul. 2008: second training course held. Sep. 2008: trawl for third training course candidates. Nov. 2008: third training course candidates identified and selected. Jan. 2009: third training course held. Jun. 2009: fourth training course candidates selected from most able students of earlier courses. Oct. 2009: fourth training course held. May 2007: data capture of new records for African country websites started. Sep. 2007: country websites for Cuba and Ukraine established with working database interface. Jul. 2008: similar country websites established for Argentina, Armenia, India, Saudi Arabia and South Africa; target African countries for further country websites selected (probably Egypt, Ghana, Kenya, Libya, Malawi, Nigeria, Sierra Leone, Sudan, Tanzania, Uganda and Zambia). Nov. 2009: similar country websites established for selected target African countries. Apr. 2010: at least 100,000 African records keyboarded, edited and assimilated into databases and country websites. Cyberliber website providing free access to scanned images of over 200,000 pages of mycological literature (125,000 more than in January 2007).</p>	<p>As above; also viruses don't destroy data; internet remains a valid, effective and independent medium for dissemination of data; international air travel not seriously affected by terrorism; political problems don't prevent collaboration.</p>

Annex 3 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

None: see websites.

Checklist for submission

	Check
Is the report less than 5MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Y
Is your report more than 5MB? If so, please advise Darwin-Projects@ltsi.co.uk that the report will be send by post on CD, putting the project number in the Subject line.	N
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Y
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	N
Have you involved your partners in preparation of the report and named the main contributors	Y
Have you completed the Project Expenditure table fully?	Y
Do not include claim forms or other communications with this report.	