Myrmecologische Nachrichten	7	95 - 102	Wien, September 2005

Web resources for myrmecologists

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Abstract

The world wide web provides many resources that are useful to the myrmecologist. Here I provide a brief introduction to the types of information currently available, and to recent developments in data provision over the internet which are likely to become important resources for myrmecologists in the near future. I discuss the following types of web site, and give some of the most useful examples of each: taxonomy, identification and distribution; conservation; myrmecological literature; individual species sites; news and discussion; picture galleries; personal pages; portals.

Key words: World wide web, data retrieval, myrmecology, ants, personal homepages, literature search, identification, distribution, conservation, picture galleries, portals

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Introduction

The internet has been with us for some twenty years now, during which time it has expanded in its use exponentially. For many of us, it has become the fastest way of obtaining the latest information about a whole range of subjects. By its very nature, however, the World Wide Web is impossible to understand in its entirety, and subject to several problems that are not shared by more traditional means of information dissemination. It does, however, provide many valuable resources for the myrmecologist.

In writing this paper my aim is to provide a brief starting point for tracking down *some* of the most useful myrmecological resources on the internet. It is impossible to be comprehensive, since even in the short space of time between writing this piece and its appearance in print many additional sources of information will be added, while several others will disappear. The only way to really assess what information is available to you on the internet is to try it out yourself and explore many of the paths and blind alleys that it contains. If I can provide a few signposts for where to start, and some helpful advice on how to avoid getting too lost, then this article will have fulfilled its purpose. The usefulness and popularity of particular web resources waxes and wanes, so I am confident that many of the specific recommendations that I make will soon be out of date, but hopefully the general principles will remain valid, although new technologies or threats are likely to also render these useless in time. Many internet pages give a date on which they were "last updated", which can give you an immediate idea of whether the site is being actively maintained, or whether the information that it contains may be outdated.

If you are a seasoned web-surfer, then you may want to jump straight to the table of web addresses and start exploring so as not to get too annoyed by my musings on the internet, while if you're a net novice, I hope you won't be discouraged by the jargon that inevitably creeps into this topic.

Information on the World Wide Web

The key feature of the Internet or World Wide Web is that it is almost entirely a self-organizing, distributed system. This is both its major strength and its major weakness. There are millions of web sites produced by everyone from primary school children to the world's largest businesses and governments, connected together by *links*. Apart from some fairly basic checks by the companies and institutions that host web sites for such things as pornographic content and incitement to terrorism, the content of internet pages can be almost anything. This means that sites may contain useful information, but they may also contain information that is incorrect or downright misleading.

Finding useful information within this vast network is difficult, and requires a certain amount of lateral thinking. The starting point for many people is a *search engine*, which is a type of web page that can be used to look up web pages in an index of key words extracted from web sites. Perhaps the most common search engine is "Google™" (http://www.Google.com), and this and other general search engines can be a useful way of tracking down web pages, but their lack of specificity can lead to problems. For example, searching for "*Nothomyrmecia*" in Google™ returns 682 pages on which this word occurs, which even for this small genus will take some time to check through for relevance. Searching for "*Myrmica*" returns about 19,000 pages, which are certainly impractical to search through one by one, and searching for "*Formica*" returns more than 1,000,000 pages. This last search is a prime example of how the lack of specificity of general search engines can be a problem, since the majority of the pages found have nothing to do with ants, but mention laminated plastics. The order in which pages found by search engines is presented is not random; the first pages presented are usually those which have most links from other pages, and since there are more companies and individuals that have to deal with laminated plastics than ants, it's not surprising that these show up first in the listings. It is also impor-

tant to remember that not all web pages are indexed in search engines, either because of the way they are made, or because the automatic "web crawlers" that are used by the search engine companies to gather the indexing information do not happen to go down that particular path.

Providing information on the internet is done for many reasons. For companies and governments the pay-off is obvious; customers can be attracted (and often buy) on-line, and essential information can be disseminated very cheaply. For myrmecologists, the reasons are generally more altruistic, with individuals providing information about what they are doing, sharing their interests or trying to provide a service that will be useful to others for its own sake. This means, however, that myrmecological sites tend not to be heavily advertised, so that finding the information that they contain is less easy than for commercial sites. However, because myrmecologists have shared interests in these sites, they usually have links to other myrmecological sites. This means that a productive strategy, once one has found a useful site, is often to look for a "links" page on that site and follow those rather than starting again from scratch. There are several sites that are nothing more than a collection of links to other sites, which at first may seem rather uninformative, but which in reality are often the most useful starting points for finding information.

The self-organized nature of the internet means that although there are few *inherent* quality controls on the information that is available, quality control is an emergent property of the system. For example, if a myrmecologist who has her own web site visits another site and is impressed by the content, she is much more likely to make a link to it, whereas if she notices that the information it contains is misleading, it will receive no links. On the majority of sites there are also mechanisms where visitors can provide feedback on the quality of the site, and inform the site's builder of errors, which it will repay the site's builder to correct. The criteria for assessing the success of a site is generally the number of visitors that it attracts, or how high up it appears on search-engine listings, both of which are increased by other sites linking to that site.

As the internet has grown, it has developed in many ways; what used to be largely an activity of individuals pursuing their own hobbyhorses has become increasingly recognized as a good way for universities and grant funding bodies to disseminate their research. Maintaining a web site may be relatively cheap in comparison with other methods of spreading information, but it is still quite costly in terms of hours spent in updating, and in the hardware needed to run the site if it is visited frequently. Web sites that were initially run by individuals in their spare time have often required specific funding and staffing to maintain and expand their usefulness, so that multi-author web sites are now the norm. Having said that, it is noticeable that the web sites that are currently most useful in providing information are, without exception, derived from the work of a single individual who set them up originally as a labour of love. The problem of trying to provide access to scattered information in a single location has been addressed with web portals. These share some of the features of search engines, but are linked to specific web sites that provide similar databases of information, and allow all of the databases to be searched from a single web site. At the other end of the spectrum is the phenomenon of Web logs or "Blogs", where individuals, rather than trying to maintain a comprehensive and objective web site, provide their own very personal view of a subject through frequent personal comments on the field. Both of these approaches have their uses and have been adopted by myrmecologists.

Myrmecological web sites

The most useful web sites for myrmecologists tend to be those that provide interactive ways of accessing information that would otherwise be tedious to obtain. In other words, they provide a single place where a database of information can be searched and extracted. The type of information that is sought by myrmecologists is quite varied, but there are several major themes that are particularly suited to information retrieval on the internet:

Taxonomy, identification and distribution. The correct identification of species and their relatives and identifying where they are found on earth is the basis of almost all biology, particularly studies of ecology, conservation and biodiversity. The internet sites that fall into this broad category essentially supplement or replace the field guides and keys that occupy a large part of most myrmecologists' bookshelves. Internet sites dealing with these topics have several advantages over printed works, however, the primary ones being that they can more easily be kept up-to-date and that they can be consulted interactively, only presenting the relevant portions of information. A new, and as yet experimental, class of web sites that will probably become of increasing importance and usefulness are those that allow the input of measurements or other non-traditional taxonomic characters from which identification is carried out based on discriminant analysis.

Conservation. Ants make up a large part of the planet's biodiversity, but like any other large group, many of the species are rare, threatened or endangered. For conservationist, taxonomic sites can be of great importance for identifying such species, but they do not normally provide specific information on habitat requirements and other information vital for conservation. Ant colonies also have several features, in particular their long life, ease of discovery and often specific ecological requirements that make them useful indicator species for conservationists working on other groups.

Myrmecological literature. Another area that is constantly expanding is the published literature on ants, and it is practically impossible to keep abreast of current developments without consulting abstracting databases of some kind. On-line databases, again because of their constant updating and interactivity, are currently the most effective way of keeping up with the literature. It is also important, however, not to lose site of the older published literature that may not be available in general on-line databases (that typically only abstract publications from around 1980 onwards), and there are now a couple of myrmecological web sites that are specifically addressing this problem.

Individual species sites. For some particular species or taxonomic groups, particularly pest and invasive species, there are specific sites that have been set up either by myrmecologists working on those particular species or by companies and organisations involved in their con-

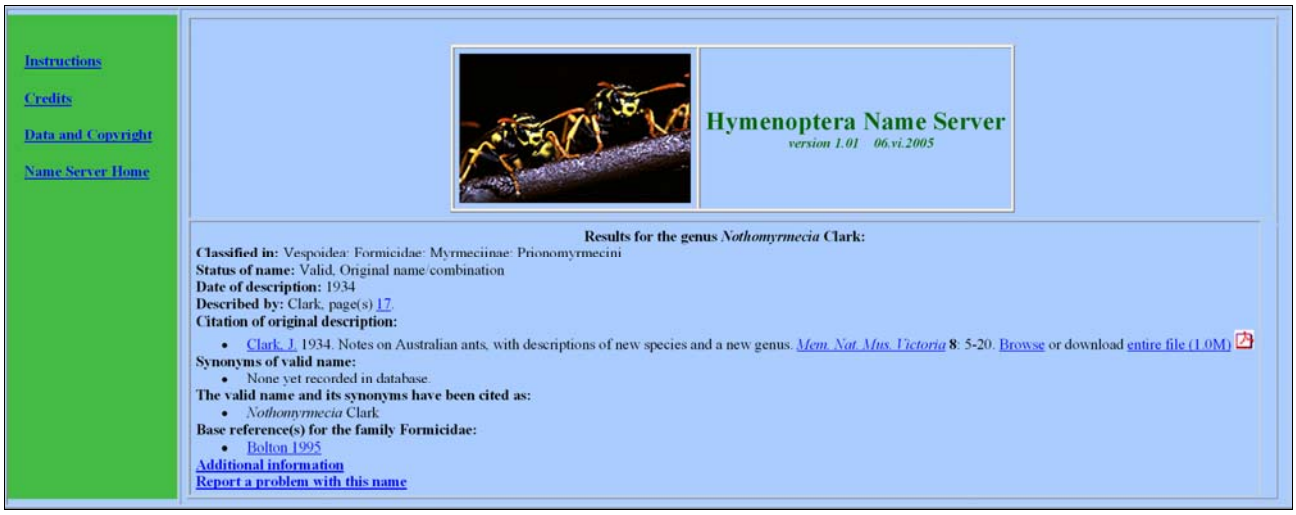

Fig. 1: Result of searching the Hymenoptera Name Server for "*Nothomyrmecia*".

trol. These are often the best repositories of information about those particular species.

News and discussion. The immediacy of the internet also makes it an ideal place to read about the latest developments in techniques, the latest discoveries, forthcoming events such as field courses and conferences, and job opportunities for the myrmecologist. The interactive nature of the internet also promotes discussion sites and allows the immediate consultation of experts from all corners of the globe.

Picture galleries. Compared with traditional printing techniques, it is very easy and ridiculously cheap to publish high quality pictures on the internet, and it is now the source that many people turn to if they want to find an image illustrating a particular species or behaviour.

Personal pages. Many myrmecologists and other social insect people maintain sites about their own research that contain much valuable information, often including accessible summaries of research findings and details of published papers, sometimes allowing direct access to PDF files of these publications. These can be some of the hardest sites to find.

A final category that I have included is **Portals**, an area in which we can expect to see a lot of growth in the next few years.

Below I have picked out what I consider to be the most useful sites for myrmecologists at the moment, or those that have the greatest potential to become so in the near future. They are roughly classified under the themes given above, but often cover two or more of these general areas. Where appropriate I have used the same three ant genera, *Nothomyrmecia*, *Myrmica* and *Formica* as a basis for information searches, which cover a range of species diversity and geographical range. Where published papers are covered, I have also used two authors, Elmes and Seifert, as the basis of searches, representing myrmecologists who have an extensive record of publications on both ecological and taxonomic topics. The web addresses of all these sites can be found in Tab. 1, which can also be accessed as additional supplementary material on the Myrmecological News web site (http://www.oegef.at/myrmekologische. html) and from the links page of the Centre for Social Evolution at Copenhagen (http://www.bi.ku.dk/cse/).

The sites

1. Taxonomy, identification and distribution

antbase.org

"The pilot site of the Social Insects World Wide Web (SIWeb), with sister sites for social wasps, bees and termites being under construction or negotiation. The aim of the site is to provide free online access to all the information on the ant species of the world."

This site was set up by Donat Agosti and Norm Johnson, and is primarily a gateway for searching the "Hymenoptera Name Server" set up by Norm Johnson, which provides details of the classification of ant taxa (from subfamilies to subspecies), including synonyms and authorities. This in turn acts as a portal for searching for the taxon in several of the sites mentioned below. There is a searchable database of ant taxonomic literature, with PDF versions of many of the papers (particularly those not easily obtained in Libraries or elsewhere on the internet) available for download. For example, searching the Hymenoptera Name Server for *Nothomyrmecia* (Fig. 1), *Myrmica*, and *Formica* allows PDF versions of scans of the original descriptions of these genera to be examined or downloaded, and searching for "Elmes" in the "Author search" brings up 15 references, 7 of which have downloadable PDF files, while searching for "Seifert" retrieves 28 references, all with downloadable PDFs.

In the future this site will also provide online taxonomic keys and access to databases on ant biodiversity and biogeography directly, and as sources for the GBIF, SIS and ITIS portals (see below).

AntWeb

"Every ant tells a story. AntWeb provides tools for exploring the diversity and identification of ants (Hymenoptera: Formicidae). These tools have been developed to encour-

Fig. 2: Automontage frontal view of *Cephalotes clypeatus* (FABRICIUS, 1804), from AntWeb. (© California Academy of Sciences, 2002 - 2005).

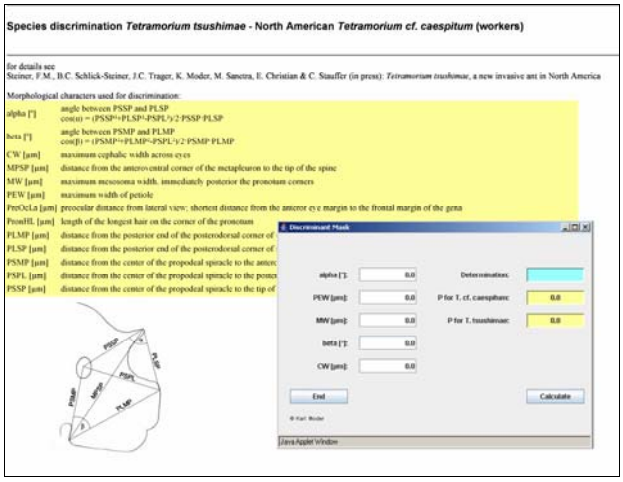

Fig. 3: Data entry mask of DiscANt, for online determination of *Tetramorium tsushimae* EMERY, 1925 vs. North American *T.* cf. *caespitum* (LINNAEUS, 1758).

age the study of ants, to facilitate the use of ants in inventory and monitoring programs, and to provide ant taxonomists with access to images of type specimens."

This site was set up by Brian Fisher and Phil Ward, and currently has information about the ant faunas of California and Madagascar, as well as information about worldwide ant genera. The prime asset of the site at the moment is the beautiful automontage images of mounted ant specimens (see Fig. 2 for an example), with complete collection data. Searching for *Nothomyrmecia*, *Myrmica*, and *Formica* retrieved such images for each genus, with one, 13, and 55 species respectively.

The site also has information about and sign-up forms for the highly successful annual ant course that is jointly organized by the California Academy of Sciences and the Museum of Comparative Zoology at Harvard.

Japanese ant image database

"This Database, which has the goal of contributing to scientific research and to the diffusion of education with the latest knowledge on the classification of ants, consists principally of high-grade images compiled by the Japanese Ant Database Group (JADG), and can be used on the Internet and CD-ROM."

An on-line illustrated encyclopedia of Japanese ants. Each species has a page with several images, synonyms, a description and a distribution map for Japan. There are links for each species to the Hymenoptera Nameserver, FORMIS and ITIS. In addition, the site has an illustrated interactive key to Japanese ants and a gallery of images of Japanese ants in the field.

Australian Ants Online

"This site provides an overview of the fascinating and diverse Australian ant fauna. It includes information on all genera and many of the species known to occur on mainland Australia, Tasmania and nearby islands."

This site was set up and maintained by Steve Shattuck and Natalie Barnett, and has comprehensive details of the taxonomy, identification, and ecology of Australian ants as far as that is possible (to specific or generic level depending on taxa), using illustrated online keys, and with distribution maps for each genus. There are also downloadable keys to genera, and several pages dealing with the biology, distribution and collection of Australian ants. This site, not surprisingly, gives the most information on the biology and distribution of *Nothomyrmecia* of all the sites examined.

www.antbase.de

"A virtual museum of ants (Formicidae) of Malaysia, Mongolia and Germany. 297 ant species (60 genera) are shown in high resolution pictures, 60 scientific papers on Asian ants are currently in our library, and we have many more interesting information on ants."

This is a bilingual site (English/German) set up by Martin Pfeiffer, primarily dealing with the ants of Borneo, Mongolia and Germany. There are many photographs of ants in the field, and automontage images of mounted ant specimens. There is also a small, but expanding, library of PDF files of literature on Asian ants.

DiscANt

This is an example of the use of the interactive abilities of the web for identification of ants using non-traditional characters. This site allows two sibling species of *Tetramorium* to be distinguished based on morphometric characters that are entered into a "mask", from which it calculates the probability of membership of each species based on discriminant analysis (Fig. 3). This may seem very specialized, but it is a good example of a "technology demonstrator" showing how the interactivity of the internet can be harnessed in ways that simplify complex tasks.

2. Conservation

The IUCN Red List of Threatened Species

A site with information on the current species listed in the IUCN red data book, giving details of their status and year assessed, and allowing searches to be made in other conservation databases and image searches using Google™. Searching for Formicidae retrieved 158 species records, including *Nothomyrmecia macrops* (Critically endan-

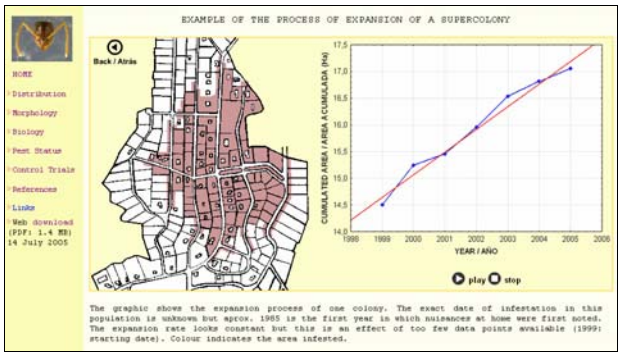

Fig. 4: Expansion process of a *Lasius neglectus* VAN LOON & al., 1990 supercolony in Seva (Spain), from the *Lasius neglectus* species site. Simulation of colony expansion from 1999 to 2005 is displayed by clicking "play".

gered), 14 *Myrmica* species (all Vulnerable), and 8 *Formica* species (Lower Risk and Vulnerable).

The Invasive Species Specialist Group

Another IUCN site, dealing specifically with the threats posed by invasive species, including maintenance of and access to the Global Invasive Species Programme database, as well as providing regular newsletters. Their "top 100 invasive species" include 5 ant species.

Ants as Bioindicators

A site set up by Alan Andersen of the CSIRO, Australia, giving an introduction to his own research on ants as bioindicators and giving links to additional information.

3. Myrmecological literature

There are many on-line general literature databases that can be used to find references to published myrmecological literature. However they usually have restricted access (requiring an expensive subscription), and only include literature published in the last few decades. Below, however, are two sites that are free to use, and have a rather different approach.

FORMIS – A master bibliography of ant literature

"FORMIS is a composite of several ant literature databases. It contains citations for a large fraction of the world's ant literature (about 32,000 references). FORMIS contains all known ant taxonomic literature (through 1996). It also contains comprehensive bibliographies of leaf-cutting ants, fire ants, and Russian wood ants"

Originally set up by Sanford Porter, and now largely maintained by Dan Wojcik, this is the most comprehensive database of myrmecological literature available. The database can either be searched via a web page, or downloaded as an EndNote file. This is very much a collaborative project in which myrmecologists are encouraged to submit their own literature records and to verify those that are already included.

Searching for *Nothomyrmecia* in the keyword search retrieves 83 references, *Myrmica* retrieves 1,561 references, and *Formica* retrieves 4,079 references. Searching for "Elmes" in the author search retrieves 91 references, while "Seifert" retrieves 46 references.

Google™ scholar

This is a new development from the "Google™" stable – a search engine for published literature. Using a similar approach to the way that search engines index web sites, this site indexes several literature databases and displays records based on how often they have been cited. Not all the records it returns are useful, sometimes just picking out fragments of text out of context and having several duplicates, but it can be a useful tool for picking out the most frequently cited publications on a particular topic. Searching for *Nothomyrmecia* returns 108 references, *Myrmica* retrieves 1,280, and *Formica* gives 7,250, including many references to laminated plastics.

4. Individual species sites

***Lasius neglectus* – a polygynous, sometimes invasive, ant**

A site maintained by Xavier Espadaler and Víctor Bernal, with frequently updated information about this recently recognized, invasive ant (Fig. 4).

Texas Imported Fire Ant Research and Management Project and **Imported Fire Ant and Household Insects**

Two examples of sites dealing with a pest species and its control in detail, designed mainly to provide information to the general public, but with several sections of interest to myrmecologists.

5. News and discussion

Notes from Underground

*"*Notes from Underground *is an informal place to exchange information in all of its forms about ants."*

This is an on-line magazine for myrmecologists dealing with a very broad range of topics. In the current issue, for example, there are announcements, scientific articles, field reports, requests for information and specimens, links, literature reviews, and a gallery of member's photographs. The content is rather heavily biased toward ants from the USA, but that reflects its current membership, which is, however, freely open to anyone with an interest in myrmecology.

The Ant Farm's and Myrmecology's Message Board

An example of a discussion forum used by both professional and amateur myrmecologists. After registering, anyone can contribute, so the quality of the information found in discussion forums is often very variable, but this one maintains a high standard. It also has a search feature, which makes finding information that others have posted easier (although the alternative search engine is more useful than the simple search engine). Searching for *Nothomyrmecia* retrieved 33 posts, *Myrmica* retrieved 292, and *Formica* retrieved 781 posts.

Ant News

A web-log (blog) dealing with myrmecological topics, by Christoph Strehl and Alex Wild. It is primarily a repository of information on the most recently published ant-related literature, with references, abstracts and occasional comments, plus information about courses, conferences etc.

6. Picture galleries

Picture galleries are major subsidiary parts of some of the sites already mentioned, particularly the *Japanese Ant Image Database*, *Antweb* and *Notes from Underground*. There are, however, a number of sites that are primarily photographic, and one in particular that deserves a closer look.

myrmecos.net

A photographic site showcasing the photography of Alex Wild, a myrmecologist at the University of California, Davis, who takes some of the best photographs I have seen of ants in the wild (e.g., Fig. 5).

7. Personal pages

There are too many sites maintained by myrmecologists to do justice to here, so I have confined myself to a couple of sites that are particularly useful.

Raghavendra Gadagkar

Raghavendra Gadagkar's home pages not only detail his social insect research, but have a searchable index of his extensive reprint collection, from which he is happy to send copies to anyone who does not have access to them from other sources. This currently consists of 32,700 articles, including 7 on *Nothomyrmecia*, 119 on *Myrmica*, and 246 on *Formica*.

John T. Longino

Jack Longino's home pages include extensive pages on the ants of Costa Rica, as well as embryonic pages dealing with the ants of the US state of Washington.

8. Portals

Myrmecology portal

"This year the myrmecology site is 10 years old. Starting as a loose collection of links in 1994 it has grown to a major portal to the science of ants. Almost 500 individuals are visiting Myrmecology every day."

This site, set up by Andre Schmidt is primarily a portal that can be used to retrieve information from many myrmecological sites, including most of the sites mentioned here. One can join the site, and post information and comments for potential inclusion on the news page. There are also on-line forums, a chat room, and user-contributed image galleries, as well as "AntDig", a search engine for myrmecological information. Using this gave 15 web pages for *Nothomyrmecia*, 45 for *Myrmica*, and 136 for *Formica*.

GBIF / ITIS / SIS

It was realized during the 1990's that one of the major problems in the conservation of biodiversity was that although there is a wealth of relevant information scattered across the globe, there is no way to get an overview of that information. Several initiatives have therefore been started with the aim of collating and making available the scattered data on species and their distributions that already exists in museum collections and individual databases. The three mentioned here have different backgrounds and sources of funding, but are essentially pursuing the same goal and are now doing so cooperatively. GBIF is the Global Diversity Information Facility, funded by several

Fig. 5: A worker of *Leptomyrmex darlingtoni* WHEELER, 1934, photographed in Mungkan Kandju National Park, Queensland, from myrmecos.net (© Alex Wild, 2004).

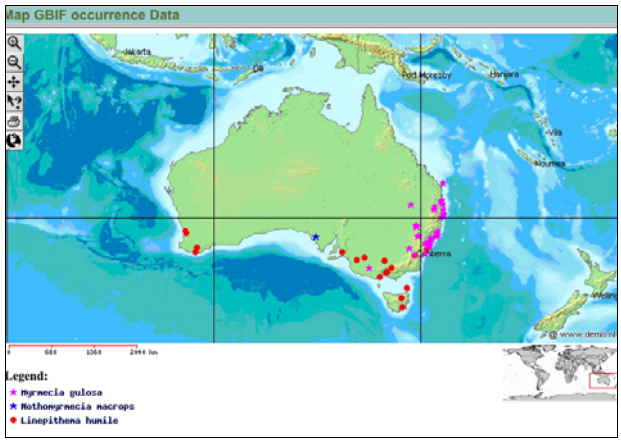

Fig. 6: Geographical distribution of *Nothomyrmecia macrops* CLARK, 1934, *Linepithema humile* (MAYR, 1868) and *Myrmecia gulosa* (FABRICIUS, 1775) in Australia, retrieved from GBIF.

multinational agencies and NGOs. ITIS is the Integrated Taxonomic Information System, which is primarily a North American initiative, funded in part by the USDA, while SIS is the Species Information Service, being established by the IUCN.

At the moment the number of myrmecological databases that they access is small, and geographically limited. For example, searching for *Myrmica rubra* retrieves only nine records from Italy and Austria. However, this situation is likely to change rapidly in the next few years, and some other geographical areas are quite well covered, as exemplified by a few Australian species shown in Fig. 6.

Ant resources for webologists

The parallels between the organization of the internet and the organization of social insect colonies are quite strik-

Tab. 1: URLs of the sites discussed in this article.

Taxonomy, identification and distribution	
antbase.org	http://www.antbase.org/
AntWeb	http://www.antweb.org/
Japanese ant image database	http://ant.edb.miyakyo-u.ac.jp/E/
Australian Ants Online	http://www.ento.csiro.au/science/ants/
www.antbase.de	http://www.antbase.de/
DiscANt	http://homepage.boku.ac.at/h505t3/DiscANt/
Conservation	
The IUCN Red List of Threatened Species	http://www.redlist.org/
The Invasive Species Specialist Group	http://www.issg.org/
Ants as Bioindicators	http://www.terc.csiro.au/research.asp?program=INVERTEBRATES&project=ANTSBIO
Myrmecological literature	
FORMIS	http://cmave.usda.ufl.edu/~formis/
Google™ scholar	http://scholar.Google.com/
Individual species sites	
Lasius neglectus	http://www.creaf.uab.es/xeg/Lasius/Ingles/index.htm
Texas Imported Fire Ant Research and Management Project	http://fireant.tamu.edu/
Imported Fire Ant and Household Insects	http://cmave.usda.ufl.edu/ifahi/
News and discussion	
Notes from Underground	http://www.notesfromunderground.org/
The Ant Farm's and Myrmecology's Message Board	http://p211.ezboard.com/bantfarm
Ant News	http://pogonomyrmex.blogspot.com/
Picture galleries	
myrmecos.net	http://www.myrmecos.net/
Personal pages	
Raghavendra Gadagkar	http://ces.iisc.ernet.in/hpg/ragh/
John T. Longino	http://www.evergreen.edu/ants/
Portals	
Myrmecology portal	http://www.myrmecology.info/portal/news.php
GBIF	http://www.gbif.org/
ITIS	http://www.itis.usda.gov/
SIS	http://www.iucn.org/themes/ssc/sis/

ing. Both are decentralized systems, where simple rules and feedback loops allow the emergence of higher level properties (such as foraging trails, policing and "Google™" rankings). They both rely on communication between their constituent members to work efficiently, but are, as a result, open to malicious attacks from parasites that exploit the same communication channels for their own ends (social parasites and computer viruses). The ways that ant colonies solve collective problems and face collective challenges have been optimized by natural selection, so it is not surprising that they are now providing inspiration for solutions to some of the emerging problems of the internet. "Ant colony optimization" is a hot topic in artificial intelligence circles, and has already been used, at least theoretically, to produce highly efficient routing algorithms for internet connections. How ant colonies cope with parasite attack is currently one of the expanding fields of myrmecology, and I would like to predict that one of the pay-offs of this research is likely to be the development of better ways of managing computer viruses.

Acknowledgements

I would like to thank Birgit Schlick-Steiner and Florian Steiner for the original idea behind this article, Alfred Buschinger and Herbert Zettel for useful comments and Xavier Espadaler, Brian Fisher, Karl Moder, Phil Ward, and Alex Wild for permission to include images from their web sites.

Zusammenfassung

Das Internet bietet viele Ressourcen, die für Myrmekologen hilfreich sind. Hier liefere ich eine knappe Einführung in die unterschiedlichen Kategorien von Informationen, die momentan im Internet zugänglich sind. Ich stelle außerdem jüngere Entwicklungen vor, die das Potenzial haben, in naher Zukunft wichtige Ressourcen für Myrmekologen zu werden. Die folgenden Kategorien diskutiere ich und veranschauliche sie anhand von Beispielen: Taxonomie, Determination und Verbreitung; Naturschutz; myrmekologische Literatur; Seiten zu einzelnen Arten; Neuigkeiten und Diskussionen; Photogallerien; persönliche Seiten; Portale.