

A National Oceanographic Partnership Program Award

Expansion of CephBase as a Biological Prototype for OBIS

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<http://www.cephbase.utmb.edu>

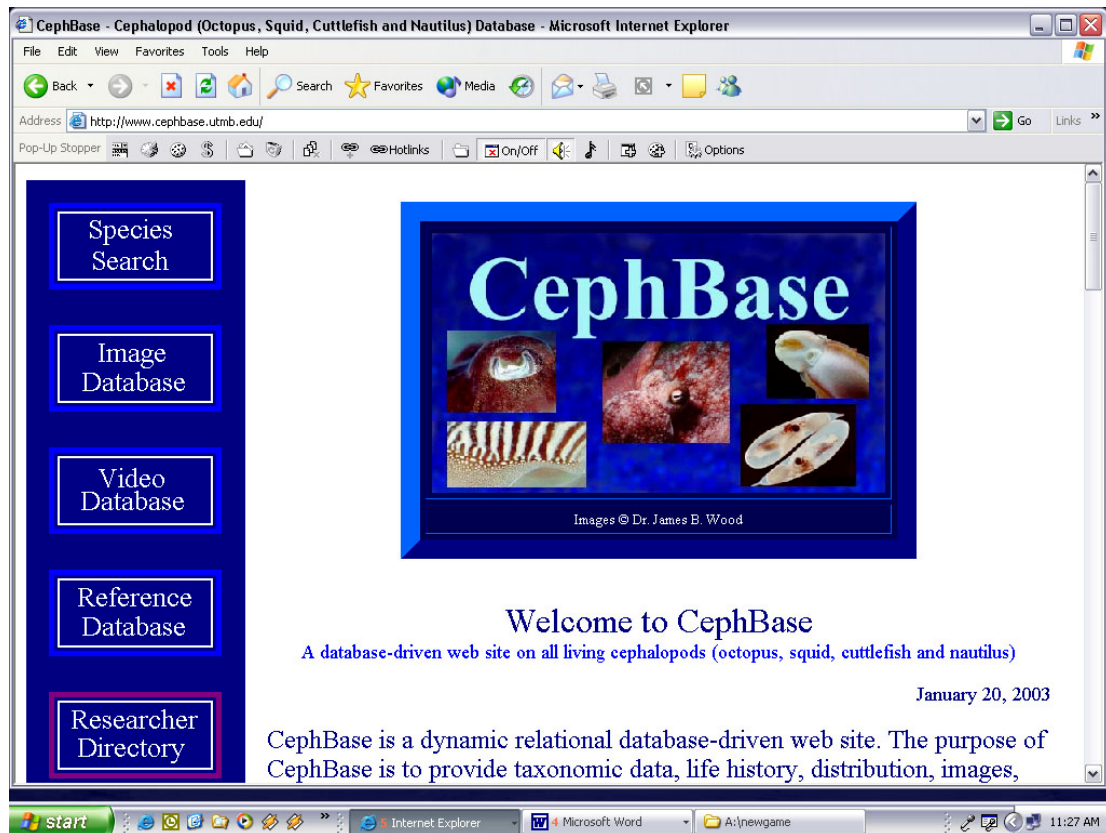


Figure 1. Screen shot of the CephBase homepage.

Long-term goals

CephBase is a dynamic relational database-driven web site. The purpose of CephBase is to provide taxonomic data, life history, distribution, images, videos, references and scientific contact information on all living species of cephalopods (octopus, squid, cuttlefish and nautilus) in an easy to access, user-friendly manner.

Objectives

To expand CephBase, a user-friendly online relational database on Cephalopods.

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Approach and work plan

CephBase was a two-year project to create a dynamic database driven web site. The data is stored in a MS Access database and served from a Cold Fusion V server. CephBase includes full taxonomic data for all living species of cephalopods and is global in scope. Currently there are 1521 images, 144 video clips and 5450 references online. Newly added resources include prey and predator databases, several links for cephalopods with genetic information in [GenBank](#), and life history data.

Our NOPP funding has ended but we will continue to expand CephBase with a new project, Ceph School for the National Science Foundation National Science Digital Library. The goal of Ceph School is to create an online digital library suitable for teaching core concepts in life science in dramatic and dynamic ways.

CephBase

Dr. James B. Wood – Project manager, grant writing, database, image and web design

Catriona Day – Cold Fusion, database and web design

David Del Pino – IT support

John Forsythe – Head of video formatting

Paul DiMarco – Administration

Janelle Robinette – Student worker, library

Caitlin Shaw - Student worker, images

Dr. Philip Lee – Official PI

Others

Dr Mike Vecchione (NMFS)- taxonomy

Dr. Pauly- fisheries

Dr. Rainer Froese- FishBase

OBIS community

Work Completed

Expansion of the CephBase web site as outlined in the grant proposal; please take a look. In summary, CephBase has grown to include:

All 786 Living Cephalopod Species: 1521 Images, 144 Videos, 5457 References including: 3886 Lat/Long records, 644 Predator records, 1017 Prey records, 381 Cephalopod Workers in the Directory, 50 Collaborators, 69 FAQ's.

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The CephBase team encourages anyone interested to go to the website and view the user-friendly data for themselves. We are confident that users are easily able to navigate the site to find any life history information that they are searching for.

The CephBase team has also secured an NSF grant to further expand the project, creating a site designed for use by teachers and students.

Results

We have created a user-friendly scientifically accurate online database covering cephalopods. Scientists, students and teachers frequently use this site. To best judge the results; we invite you to take a look at the site.



Figure 2. One of the 1,500+ fully captioned images in CephBase. The species name is a hot link to additional information. Data specific to this image is in a table that users can scroll down to.

Impact and Applications

Economic Development

Cephalopods efficiently move energy up marine ecosystems and are commercially and environmentally important. They are becoming increasingly targeted by fisheries despite a lack of knowledge about their replacement rates. Traditional fisheries models are often inappropriate (Jackson et al. 2000, O'Dor and Hoar 2000). More information and access to it are needed for

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both conservation and fisheries management. This is where CephBase has been highly effective; it allows easy access to all information pertaining to cephalopods and their environment.

In addition, as fisheries decline, cephalopods are becoming an increasing component of the world's catch (O'Dor, Rodhouse & Dawe, 1997). Cephalopods have great potential for such a development (Global, 1991) due to their fast, efficient growth rate and short life span. They offer a hopeful alternative to other seafood resources that may be over fished. Between 1994 and 2000, mollusk capture production in inland waters and marine fishing areas rose nearly 15% while marine fish capture production declined 2% (Data retrieved from the downloadable statistical databases accessible at: <http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp>). In terms of estimated fisheries value, squid, cuttlefish and octopus accounted for 7.25% of the world total in 1997, even though they only accounted for nearly 3% of total catch.

Quality of Life

Humans have been consuming cephalopods for thousands of years; both Plato and Aristotle describe fishing methods (Lane 1960). Cephalopods provide man with low calorie protein containing unsaturated fatty acids that are thought to prevent heart disease (Okuzumi & Fujii, 2000).

Ecological data is given to fit cephalopods in global models. Predator and prey species are listed for 69 and 80 cephalopod species, respectively. Cephalopods also provide food for a number of commercially and environmentally sensitive species. These animals include many commercially and/or environmentally sensitive fish, marine mammals and birds. For example, tuna (*Thunnus alalunga* and *Thunnus albacores*), swordfish (*Xiphias gladius*), salmon (*Oncorhynchus nerka*) and cod (*Gadus callarias*) are among the many species of fish that rely upon cephalopods as a part of their diet (Grieg, 1933; Haimovici, Brunetti, Rodhouse, Csirke & Leta 1998; Nesis, 1998; Nigmatullin & Arkhipkin, 1998). Marine mammals such as pilot whales (*Globicephala malaena*), hooded seals (*Cystophora cristata*), harp seals (*Phoca groenlandica*), elephant seals (*Mirounga angustirostris*) and sperm whales (*Physeter macrocephalus*) consume cephalopods as well (Roper & Vecchione, 1993; Clarke & Goodall 1994; Hauksson & Bogason, 1995; Bjørke & Gjørseter, 1998; Clarke, Santos & Pierce, 1998). 52 families of Cetaceans were found to have cephalopods as a component of their diet and members of ten families of cephalopods were ingested (Clarke, 1996). 75-100 % of the diet of species in the families, Delphinidae, Phocaenidae, Physteridae and Ziphiidae, consisted of cephalopods. In the *Odontocetes* species, 60 of the 67 of the include cephalopods in their diet (Clarke, 1996).

Science Education and Communication

CephBase has been a demonstration project to initiate the process of consolidating life history, distribution, catch and taxonomic data on all living species of cephalopods (octopus, squid, cuttlefish and nautilus) to help define the goals of the Census of Marine Life. It provides contact information for almost all of the world's cephalopod specialists; part of our role is to encourage data sharing and consolidation among the marine sciences. Our goals were to provide reliable referenced data on cephalopods and to provide a platform for collaboration both within the cephalopod community and within all marine sciences. It provides scientists and novices alike a user-friendly, online relational database in which they can learn about the various aspects of cephalopod life history.

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Transitions

Science Education and Communication

CephBase interacts with various other programs/ agencies: FishBase (www.fishbase.org), Biogeoinformatics of Hexacorallia (www.kgs.ukans.edu/Hexacoral), OBIS-SEAMAP (Ocean Biogeographic Information System- in development), SeaMounts (<http://seamounts.sdsc.edu/>), GenBank (www.ncbi.nlm.nih.gov/Genbank/GenbankOverview.html) and the Sea Around Us Project. These partners help to disseminate the information found within CephBase.

Ceph School will allow students, teachers and resource managers, with no special software, access to current data used by scientists. Teachers are already using CephBase despite its intended audience of scientists, and through Ceph School we plan on giving them a new tool that they can use to enrich their life science, scientific research and design and technology classes.

This information is accessible and communicated globally via the Internet.

Consideration for Excellence in Partnering Award

Ocean Sector Diversity: Three of our employees are female, one is Native American.

Partner Involvement: We collaborate closely with FishBase, OBIS, Species 2000, Bioinformatics of Hexacorallia, The Sea Around Us, The Cephalopod Page, UTMB, NRCC. Most of our video clips and quality control of the taxonomy was done by our National Museum of Natural History partners.

Matching Contributions: UTMB professionally hosts our Cold Fusion server and Internet services at no cost. Individuals have donated numerous images to our image database.

Partner Long-Term Commitment: As outlined in the proposal, the NRCC has an interest in maintaining and expanding this project. Our seeking and obtaining additional funding to build on what we have created demonstrate this.

Success in Project Objectives: We have exceeded almost all of our objectives and encourage you to compare our proposal to what we have accomplished. Additionally, we have been opportunistically adding additional objectives that were not in the grant proposal, such as our reference database. Look here: <http://www.cephbase.utmb.edu/about/feedback.cfm> to see what others have said about our project.

Related projects

The Cephalopod Page (<http://is.dal.ca/~ceph/TCP/index.html>) Dr. Wood's personal page on cephalopods. CephBase has some collaborative links to this page.

The NRCC (National Resource Center of Cephalopods) page (<http://www.nrcc.utmb.edu/>).

OBIS portal (<http://www.iobis.org/>).

FishBase (<http://www.fishbase.org>) OBIS partner. We have dynamic links to fish predators and prey.

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Species 2000 partner. We provide Cephalopod data to them.

Bioinformatics of Hexacorallia (<http://www.kgs.ukans.edu/Hexacoral/>) An OBIS partner that has collaborated with mapping tools.

The Sea Around Us (<http://saup.fisheries.ubc.ca/>) partner. They co-funded some of our distribution and fisheries pages.

And numerous individuals as noted here: <http://www.cephbase.utmb.edu/helpers/helpers.cfm>

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