

## **Annex IX**

### **Development of the HAB Reference Database**

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### Development of the HAB Reference Database

#### 1. Purpose of Database development

The purpose of HAB Reference Database is to establish a focal storage of information and reference materials (papers, reports, data, etc.) which can be used as resources for scientific analysis on red tide and HAB.

It is hoped that this database will promote further studies of red tide and HAB in NOWPAP area, by helping WG3 experts and researchers in each countries to deepen their understanding and analysis on HAB issues. Also, it is anticipated that the study results will play an important role in making recommendations for policy makers, and in providing information to citizens.

#### 2. Expected uses of the database (Significance of the database)

##### 2.1 Search on the location of the reference

Information on where you can obtain the material can be searched by HAB Reference Database.

The result of the search will show the Title, Author, and Location of the reference. If further details are needed, the original document can be obtained by contacting the appropriated organization.

##### 2.2 Exploitation of Research Areas

For everyone who is dedicated to research on HAB, what theme has been studied so far and being studied now is always an interesting topic. As already mentioned, HAB Reference Database enables you to search the references by Year of Publication, Categories, and Species. By specifying the Year of Publication, the hottest themes of that year can be confirmed.

If anyone is just starting to get involved in HAB studies, an unexploited area and themes can be searched using the database. For someone who's already had some experience in a certain topic, it is possible to see how much study has been or has not been done in other countries in NOWPAP area, and that information can be used effectively for their own research.

##### 2.3 Understanding Status of HAB studies and Taking Necessary Measures

The database is constructed as a joint effort by 4 countries. The amount of information on certain study area or on certain species indicates that these topics have been vigorously studied in that country. If that type of information can be drawn on a map, it would enable us to see the overall status of HAB studies in NOWPAP area. It can be used effectively to facilitate discussions and reciprocal visits among experts in NOWPAP members.

Issues which are currently only observed in one part of NOWPAP area may also arise in other countries in future. The information obtained from the database will be of great help for each country in considering what necessary measures need to be taken to prevent or tackle these possibilities.

### 3. Contents of Database

#### 3.1 Status of data collection ▪ categorization

Members of Secretariat and WG3 from each country are working on collection of references to be stored in the database and data input.

Table 1 shows the current status of documents collected and categorized.

The collected documents have been provided to the experts in WG3 for categorization. Numbers in the lower cell in Table 1 show how many of the collected documents have already been classified into categories (to be mentioned in detail hereinafter). It has not been possible to categorize the documents that are not available in hard copies.

This year, resources on *Cochlodinium* will be collected mainly.

Table 1 Current status of collected and categorized documents (As of end of Sept, 2004)

Status	Japan	Korea	China	Russia
Number of collected documents	519	456	291	71
Number of collected documents available in hard copies	350	391	248	70

## 3.2 Image of Database

### 3.2.1 Database location

Database is located on CEARAC Website.

URL: <http://emecs.metocean.co.jp/metadb/>

Only WG3 members can browse PDF files of each material at this time.

### 3.2.2 Prototype

#### (1) Outline

Figure 1 shows the constructed HAB Reference Database. Search operation is to be done on the left frame, while its result is shown on the right frame.

**HAB Reference Database**

**[Country]**  
A country that the senior author's organization belongs to  
How to use: Choose an appropriate country, if any, from the pull-down menu.

**[Year]**  
Year of publication  
How to use: Type the year (e.g. 2000) or duration (e.g. 1990 ~ 2000, 1990 ~, ~ 2000) to search, if any.

**[Category]**  
Type of content  
How to use: Choose an interested category from the pull-down menu, if any.

Respective categories include topics as shown in a table below. Possible keywords found in literature are also listed up in the table.

Category	Explanation of Category
<b>Occurrence and Monitoring</b>	<ul style="list-style-type: none"> <li>Information on HAB occurrence (location, duration, etc.)</li> <li>Monitoring on natural plankton population (mass, cyst, dormant cell, resting cell, mortality, etc.)</li> <li>Monitoring activity on red tide and shellfish toxins (PSP, DSP, damage, etc.)</li> <li>Plankton enumeration technique, etc</li> </ul>
<b>Mechanism and Environment</b>	<ul style="list-style-type: none"> <li>Mechanism of HAB initiation (nutrient, cyst germination, cyst formation, etc.)</li> <li>Mechanism of toxin production and accumulation</li> <li>Environmental condition related to HAB (precipitation, radiation, etc.)</li> <li>Inter-species relationship involving HAB species and algicidal organism (growth inhibition, algicidal bacteria, etc.)</li> <li>Antifungal/antivirus metabolites, etc.</li> </ul>
<b>Physiology</b>	<ul style="list-style-type: none"> <li>Plankton physiology and ecophysiology (sperm formation, intracellular bacteria, etc.)</li> <li>Growth rate measurement (nutrient requirement, etc)</li> <li>Histology (histological analysis, etc.)</li> <li>Toxin production (axenic culture, etc.), etc</li> </ul>
<b>Taxonomy</b>	<ul style="list-style-type: none"> <li>Morphology of plankton species (species-specific DNA probe, ultrastructure, etc.)</li> <li>Molecular biological species identification (monoclonal antibody, etc.)</li> <li>Cyst identification</li> <li>DNA sequencing, etc.</li> </ul>
<b>Mitigation and Management</b>	<ul style="list-style-type: none"> <li>Economic loss of HAB (Death en mass of cultured fish and bivalves, etc.)</li> <li>Numerical simulation on HAB dispersion</li> <li>Prediction method for HAB occurrence</li> <li>Countermeasures against HAB (algicidal bacteria, algicidal virus, clay spraying, etc.), etc.</li> </ul>
<b>Others</b>	<ul style="list-style-type: none"> <li>Toxin chemistry (HPLC, toxin composition, structural analysis of toxic substance, etc.)</li> <li>Effect on fish, shellfish, and mouse (oxygen radicals, etc.)</li> <li>Pathology of fish/shellfish</li> <li>Enumeration technique for bacteria</li> <li>Distribution of cyst, etc.</li> </ul>

\*Terms which is closely related to the explanation in bullets are written in brackets. These terms are also used in publication title and in contents. They can also be the Keyword to be used when searching the reference using "Word(s) in Title".

In addition, HAB Reference Database has picked-up the species names of the target plankton of each study. This will help you search your concerned information on certain plankton species.

**[Organism]**  
Name of biological species to search  
How to use: Choose a genus from pull-down menu for the genus list. Then choose species from the species list. Choosing spp. means to search all of the species of the pre-set genus. "And/Or" search is applicable.

**[Word(s) in Author]**  
Word(s) to search in the box for title of the thesis

Members Login

Figure 1 an overall structure of HAB Reference Database

(2) Explanation of search categories

① Country

“Country” means a country where the organization (ex. laboratory, universities, etc.) in which the head author belongs to. Authors who studied abroad and later started working at a laboratory in the home country after graduation might be categorized into several countries.

Choose a country name from the list as shown in Figure 2.

The screenshot shows the HAB Reference Database search interface. On the left, there are search criteria: Country (dropdown menu), Year (dropdown menu), Organism (radio buttons for 'Or' and 'And', and three dropdown menus for Genus1, Species1, Genus2, Species2, Genus3, Species3), Word(s) in Author (text input), Word(s) in Title (text input), and Display per page (dropdown menu set to 20). There are 'Search' and 'Reset' buttons, and a 'Members Login' button.

The main content area is titled 'HAB Reference Database' and contains the following sections:

- [Country]**: A country that the senior author's organization belongs to. How to use: Choose an appropriate country, if any, from the pull-down menu.
- [Year]**: Year of publication. How to use: Type the year (e.g. 2000) or duration (e.g. 1990 ~ 2000, 1990 ~, ~ 2000) to search, if any.
- [Category]**: Type of content. How to use: Choose an interested category from the pull-down menu, if any. Respective categories include topics as shown in a table below. Possible keywords found in literature are also listed up in the table.

Category	Explanation of Category
<b>Occurrence and Monitoring</b>	<ul style="list-style-type: none"> <li>Information on HAB occurrence (location, duration, etc.)</li> <li>Monitoring on natural plankton population (mass, cyst, dormant cell, resting cell, mortality, etc.)</li> <li>Monitoring activity on red tide and shellfish toxins (PSP, DSP, damage, etc.)</li> <li>Plankton enumeration technique, etc</li> </ul>
<b>Mechanism and Environment</b>	<ul style="list-style-type: none"> <li>Mechanism of HAB initiation (nutrient, cyst germination, cyst formation, etc.)</li> <li>Mechanism of toxin production and accumulation</li> <li>Environmental condition related to HAB (precipitation, radiation, etc.)</li> <li>Inter-species relationship involving HAB species and algicidal organism (growth inhibition, algicidal bacteria, etc.)</li> <li>Antifungal/antivirus metabolites, etc.</li> </ul>
<b>Physiology</b>	<ul style="list-style-type: none"> <li>Plankton physiology and ecophysiology (sperm formation, intracellular bacteria, etc.)</li> <li>Growth rate measurement (nutrient requirement, etc)</li> <li>Histology (histological analysis, etc.)</li> <li>Toxin production (axenic culture, etc.), etc</li> </ul>
<b>Taxonomy</b>	<ul style="list-style-type: none"> <li>Morphology of plankton species (species-specific DNA probe, ultrastructure, etc.)</li> <li>Molecular biological species identification (monoclonal antibody, etc.)</li> <li>Cyst identification</li> <li>DNA sequencing, etc.</li> </ul>
<b>Mitigation and Management</b>	<ul style="list-style-type: none"> <li>Economic loss of HAB (Death en mass of cultured fish and bivalves, etc.)</li> <li>Numerical simulation on HAB dispersion</li> <li>Prediction method for HAB occurrence</li> <li>Countermeasures against HAB (algicidal bacteria, algicidal virus, clay spraying, etc.), etc.</li> </ul>
<b>Others</b>	<ul style="list-style-type: none"> <li>Toxin chemistry (HPLC, toxin composition, structural analysis of toxic substance, etc.)</li> <li>Effect on fish, shellfish, and mouse (oxygen radicals, etc.)</li> <li>Pathology of fish/shellfish</li> <li>Enumeration technique for bacteria</li> <li>Distribution of cyst, etc.</li> </ul>

\*Terms which is closely related to the explanation in bullets are written in brackets. These terms are also used in publication title and in contents. They can also be the Keyword to be used when searching the reference using "Word(s) in Title".

In addition, HAB Reference Database has picked-up the species names of the target plankton of each study. This will help you search your concerned information on certain plankton species.

- [Organism]**: Name of biological species to search. How to use: Choose a genus from pull-down menu for the genus list. Then choose species from the species list. Choosing spp. means to search all of the species of the pre-set genus. "And/Or" search is applicable.
- [Word(s) in Author]**: Word(s) to search in the box for title of the thesis

Figure 2 Search method of HAB Reference Database (Country)

②Year

“Year” means the year of publication for each reference.

Operating Instruction: Type the year or duration. You can search materials with either beginning or end year of duration. When you do not fill this box, all materials stored in the database will be the objects for searching.

③Category

“Category” shows a field of each material’s content (Details of categorization are described hereinafter). Some materials are categorized into several categories.

Choose a category from the list as shown in Figure 3.

The screenshot shows the HAB Reference Database search interface. On the left is a search sidebar with fields for Country, Year, Category, Genus, and Species, along with search buttons. The main content area displays the selected 'Category' and its explanation, including a table of categories and their descriptions.

**HAB Reference Database**

**[Country]**  
A country that the senior author's organization belongs to  
How to use: Choose an appropriate country, if any, from the pull-down menu.

**[Year]**  
Year of publication  
How to use: Type the year (e.g. 2000) or duration (e.g. 1990 ~ 2000, 1990 ~, ~ 2000) to search, if any.

**[Category]**  
Type of content  
How to use: Choose an interested category from the pull-down menu, if any.

Respective categories include topics as shown in a table below. Possible keywords found in literature are also listed up in the table.

Category	Explanation of Category
<b>Occurrence and Monitoring</b>	<ul style="list-style-type: none"> <li>Information on HAB occurrence (location, duration, etc.)</li> <li>Monitoring on natural plankton population (mass, cyst, dormant cell, resting cell, mortality, etc.)</li> <li>Monitoring activity on red tide and shellfish toxins (PSP, DSP, damage, etc.)</li> <li>Plankton enumeration technique, etc</li> </ul>
<b>Mechanism and Environment</b>	<ul style="list-style-type: none"> <li>Mechanism of HAB initiation (nutrient, cyst germination, cyst formation, etc.)</li> <li>Mechanism of toxin production and accumulation</li> <li>Environmental condition related to HAB (precipitation, radiation, etc.)</li> <li>Inter-species relationship involving HAB species and algicidal organism (growth inhibition, algicidal bacteria, etc.)</li> <li>Antifungal/antivirus metabolites, etc.</li> </ul>
<b>Physiology</b>	<ul style="list-style-type: none"> <li>Plankton physiology and ecophysiology (sperm formation, intracellular bacteria, etc.)</li> <li>Growth rate measurement (nutrient requirement, etc)</li> <li>Histology (histological analysis, etc.)</li> <li>Toxin production (axenic culture, etc.), etc</li> </ul>
<b>Taxonomy</b>	<ul style="list-style-type: none"> <li>Morphology of plankton species (species-specific DNA probe, ultrastructure, etc.)</li> <li>Molecular biological species identification (monoclonal antibody, etc.)</li> <li>Cyst identification</li> <li>DNA sequencing, etc.</li> </ul>
<b>Mitigation and Management</b>	<ul style="list-style-type: none"> <li>Economic loss of HAB (Death en mass of cultured fish and bivalves, etc.)</li> <li>Numerical simulation on HAB dispersion</li> <li>Prediction method for HAB occurrence</li> <li>Countermeasures against HAB (algicidal bacteria, algicidal virus, clay spraying, etc.), etc.</li> </ul>
<b>Others</b>	<ul style="list-style-type: none"> <li>Toxin chemistry (HPLC, toxin composition, structural analysis of toxic substance, etc.)</li> <li>Effect on fish, shellfish, and mouse (oxygen radicals, etc.)</li> <li>Pathology of fish/shellfish</li> <li>Enumeration technique for bacteria</li> <li>Distribution of cyst, etc.</li> </ul>

\*Terms which is closely related to the explanation in bullets are written in brackets. These terms are also used in publication title and in contents. They can also be the Keyword to be used when searching the reference using "Word(s) in Title".

In addition, HAB Reference Database has picked-up the species names of the target plankton of each study. This will help you search your concerned information on certain plankton species.

**[Organism]**  
Name of biological species to search  
How to use: Choose a genus from pull-down menu for the genus list. Then choose species from the species list. Choosing spp. means to search all of the species of the pre-set genus. "And/OR" search is applicable.

**[Word(s) in Author]**  
Word(s) to search in the box for title of the thesis

Figure 3 Search method of HAB Reference Database (Category)

#### ④ Organism

“Organism” shows name of biological species referred in the documents. Synonym may not be searched.

Operating Instruction: Choose a genus from “genus list” (as shown in Figure 4), and all the species in that genus will appear as “species list”. Then choose a species from the “species list”.

When you choose “spp.” on the species list, all species belonging to the chosen genus will become the target for searching. Species and genus you can see in the list are confined to those registered in the database. “And/Or” search is also possible.

The screenshot shows the HAB Reference Database search interface. On the left, there are search criteria: Country (dropdown), Year (range), Category (dropdown), Organism (radio buttons for 'Or' and 'And'), Genus1 (dropdown), Species1 (dropdown), Genus2, Species2, Genus3, Species3, Word(s) in (text), Word(s) in Title (text), and Display per page (dropdown set to 20). There are Search and Reset buttons, and a Members Login button.

The main content area is titled "HAB Reference Database" and contains the following sections:

- [Country]**: A country that the senior author's organization belongs to. How to use: Choose an appropriate country, if any, from the pull-down menu.
- [Year]**: Year of publication. How to use: Type the year (e.g. 2000) or duration (e.g. 1990 ~ 2000, 1990 ~, ~ 2000) to search, if any.
- [Category]**: Type of content. How to use: Choose an interested category from the pull-down menu, if any. Respective categories include topics as shown in a table below. Possible keywords found in literature are also listed up in the table.

Category	Explanation of Category
<b>Occurrence and Monitoring</b>	<ul style="list-style-type: none"> <li>Information on HAB occurrence (location, duration, etc.)</li> <li>Monitoring on natural plankton population (mass, cyst, dormant cell, resting cell, mortality, etc.)</li> <li>Monitoring activity on red tide and shellfish toxins (PSP, DSP, damage, etc.)</li> <li>Plankton enumeration technique, etc.</li> </ul>
<b>Mechanism and Environment</b>	<ul style="list-style-type: none"> <li>Mechanism of HAB initiation (nutrient, cyst germination, cyst formation, etc.)</li> <li>Mechanism of toxin production and accumulation</li> <li>Environmental condition related to HAB (precipitation, radiation, etc.)</li> <li>Inter-species relationship involving HAB species and algicidal organism (growth inhibition, algicidal bacteria, etc.)</li> <li>Antifungal/antivirus metabolites, etc.</li> </ul>
<b>Physiology</b>	<ul style="list-style-type: none"> <li>Plankton physiology and ecophysiology (sperm formation, intracellular bacteria, etc.)</li> <li>Growth rate measurement (nutrient requirement, etc.)</li> <li>Histology (histological analysis, etc.)</li> <li>Toxin production (axenic culture, etc.), etc.</li> </ul>
<b>Taxonomy</b>	<ul style="list-style-type: none"> <li>Morphology of plankton species (species-specific DNA probe, ultrastructure, etc.)</li> <li>Molecular biological species identification (monoclonal antibody, etc.)</li> <li>Cyst identification</li> <li>DNA sequencing, etc.</li> </ul>
<b>Mitigation and Management</b>	<ul style="list-style-type: none"> <li>Economic loss of HAB (Death en mass of cultured fish and bivalves, etc.)</li> <li>Numerical simulation on HAB dispersion</li> <li>Prediction method for HAB occurrence</li> <li>Countermeasures against HAB (algicidal bacteria, algicidal virus, clay spraying, etc.), etc.</li> </ul>
<b>Others</b>	<ul style="list-style-type: none"> <li>Toxin chemistry (HPLC, toxin composition, structural analysis of toxic substance, etc.)</li> <li>Effect on fish, shellfish, and mouse (oxygen radicals, etc.)</li> <li>Pathology of fish/shellfish</li> <li>Enumeration technique for bacteria</li> <li>Distribution of cyst, etc.</li> </ul>

\*Terms which is closely related to the explanation in bullets are written in brackets. These terms are also used in publication title and in contents. They can also be the Keyword to be used when searching the reference using "Word(s) in Title".

In addition, HAB Reference Database has picked-up the species names of the target plankton of each study. This will help you search your concerned information on certain plankton species.

- [Organism]**: Name of biological species to search. How to use: Choose a genus from pull-down menu for the genus list. Then choose species from the species list. Choosing spp. means to search all of the species of the pre-set genus. "And/Or" search is applicable.
- [Word(s) in Author]**: Word(s) to search in the box for title of the thesis

Figure 4 Search method of HAB Reference Database (Organism-1)

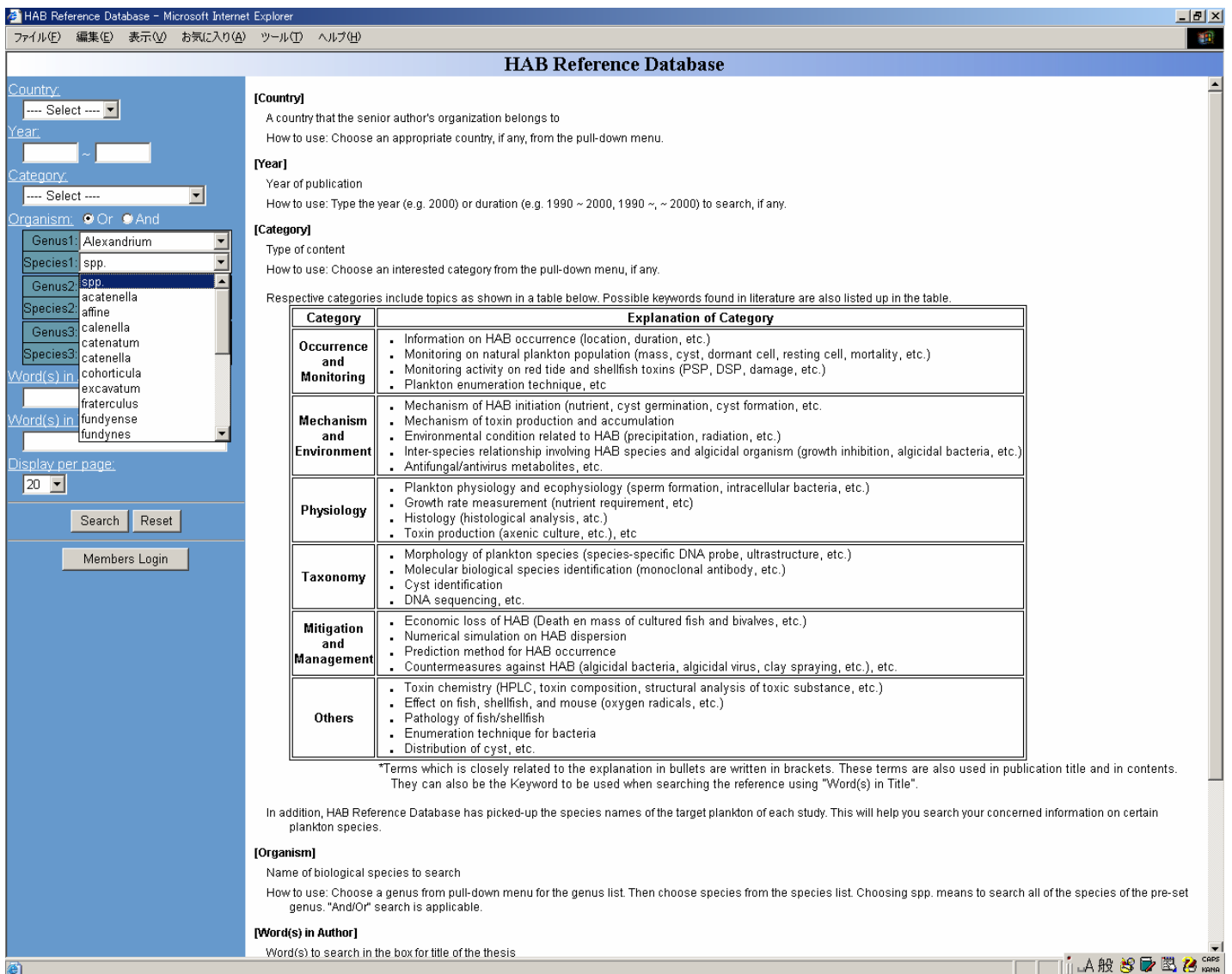


Figure 5 Search method of HAB Reference Database (Organism-2)

⑤ Word(s) in Author

All authors of each reference are targets for the search.

Operating Instruction: Type in a part of author's name. "And" search is available by typing in a space between words.

⑥ Word(s) in Title

Titles for each reference are targets for the search.

Operating Instruction: Type word(s) (a part of the title) to search. "And" search is available by typing in a space between words.



⑦ Display per page

“Display per page” shows the number of references displayed per page.

Operating Instruction: Choose a number of references to be shown on one page from the list as shown in Figure 6. When not all of the references are shown on one page, you can see the rest of the references by clicking “next” button on the research result frame.

**HAB Reference Database**

**[Country]**  
A country that the senior author's organization belongs to  
How to use: Choose an appropriate country, if any, from the pull-down menu.

**[Year]**  
Year of publication  
How to use: Type the year (e.g. 2000) or duration (e.g. 1990 ~ 2000, 1990 ~, ~ 2000) to search, if any.

**[Category]**  
Type of content  
How to use: Choose an interested category from the pull-down menu, if any.

Respective categories include topics as shown in a table below. Possible keywords found in literature are also listed up in the table.

Category	Explanation of Category
<b>Occurrence and Monitoring</b>	<ul style="list-style-type: none"> <li>Information on HAB occurrence (location, duration, etc.)</li> <li>Monitoring on natural plankton population (mass, cyst, dormant cell, resting cell, mortality, etc.)</li> <li>Monitoring activity on red tide and shellfish toxins (PSP, DSP, damage, etc.)</li> <li>Plankton enumeration technique, etc</li> </ul>
<b>Mechanism and Environment</b>	<ul style="list-style-type: none"> <li>Mechanism of HAB initiation (nutrient, cyst germination, cyst formation, etc.</li> <li>Mechanism of toxin production and accumulation</li> <li>Environmental condition related to HAB (precipitation, radiation, etc.)</li> <li>Inter-species relationship involving HAB species and algicidal organism (growth inhibition, algicidal bacteria, etc.)</li> <li>Antifungal/antivirus metabolites, etc.</li> </ul>
<b>Physiology</b>	<ul style="list-style-type: none"> <li>Plankton physiology and ecophysiology (sperm formation, intracellular bacteria, etc.)</li> <li>Growth rate measurement (nutrient requirement, etc.)</li> <li>Histology (histological analysis, etc.)</li> <li>Toxin production (axenic culture, etc.), etc</li> </ul>
<b>Taxonomy</b>	<ul style="list-style-type: none"> <li>Morphology of plankton species (species-specific DNA probe, ultrastructure, etc.)</li> <li>Molecular biological species identification (monoclonal antibody, etc.)</li> <li>Cyst identification</li> <li>DNA sequencing, etc.</li> </ul>
<b>Mitigation and Management</b>	<ul style="list-style-type: none"> <li>Economic loss of HAB (Death en mass of cultured fish and bivalves, etc.)</li> <li>Numerical simulation on HAB dispersion</li> <li>Prediction method for HAB occurrence</li> <li>Countermeasures against HAB (algicidal bacteria, algicidal virus, clay spraying, etc.), etc.</li> </ul>
<b>Others</b>	<ul style="list-style-type: none"> <li>Toxin chemistry (HPLC, toxin composition, structural analysis of toxic substance, etc.)</li> <li>Effect on fish, shellfish, and mouse (oxygen radicals, etc.)</li> <li>Pathology of fish/shellfish</li> <li>Enumeration technique for bacteria</li> <li>Distribution of cyst, etc.</li> </ul>

\*Terms which is closely related to the explanation in bullets are written in brackets. These terms are also used in publication title and in contents. They can also be the Keyword to be used when searching the reference using "Word(s) in Title".

In addition, HAB Reference Database has picked-up the species names of the target plankton of each study. This will help you search your concerned information on certain plankton species.

**[Organism]**  
Name of biological species to search  
How to use: Choose a genus from pull-down menu for the genus list. Then choose species from the species list. Choosing spp. means to search all of the species of the pre-set genus. "And/OR" search is applicable.

**[Word(s) in Author]**  
Word(s) to search in the box for title of the thesis

Figure 6 Search method of HAB Reference Database (Display per page)

⑧ Search, Reset

By clicking the “Search” button after filling the research categories, the search will begin and result will be shown on the right frame. By clicking the “Reset” button, you can clear the search condition.

## 3.3 Categorization

### 3.3.1 Categorization of Reference Literatures

In Working Group 3 held in Oct. 2003, the categories to classify the collected reference materials have been decided as follows;

- Occurrence and Monitoring
- Mechanism
- Physiology
- Taxonomy
- Mitigation
- Others

When determining these categories for reference database on HAB, what was prioritized the most was to make the categories as simple as possible to enable each NOWPAP members to classify the references, in spite of differences in HAB characteristics and how they are understood in each of the countries. Themes in academic papers evolve as new social demands arise and new facts are discovered, and papers on HAB are no exception. These 5 categories are chosen as the most basic categories, and “others” is added to keep the possibility of new genre of information to be introduced in future.

When information on certain area are accumulated under “others” category, new database category can be added for that area.

Japanese references to be stored in the HAB database were classified into categories based on the type of information as summarized in Table 2.

CEARAC Secretariat is expecting to discuss the issues and points to be noted for categorizing the references, which would arise for 3 other member countries as well, in the next WG3 meeting.

Table 2 Explanation of Category for scientific publications

Category	Explanation of Category
Occurrence and Monitoring	<ul style="list-style-type: none"> <li>• Information on HAB occurrence (location, duration, etc.)</li> <li>• Monitoring on natural plankton population (mass, cyst, dormant cell, resting cell, mortality, etc.)</li> <li>• Monitoring activity on red tide and shellfish toxins (PSP, DSP, damage, etc.)</li> <li>• Plankton enumeration technique, etc</li> </ul>
Mechanism and Environment	<ul style="list-style-type: none"> <li>• Mechanism of HAB initiation (nutrient, cyst germination, cyst formation, etc.)</li> <li>• Mechanism of toxin production and accumulation</li> <li>• Environmental condition related to HAB (precipitation, radiation, etc.)</li> <li>• Inter-species relationship involving HAB species and algicidal organism (growth inhibition, algicidal bacteria, etc.)</li> <li>• Antifungal/antivirus metabolites, etc.</li> </ul>
Physiology	<ul style="list-style-type: none"> <li>• Plankton physiology and ecophysiology (sperm formation, intracellular bacteria, etc.)</li> <li>• Growth rate measurement (nutrient requirement, etc)</li> <li>• Histology (histological analysis, etc.)</li> <li>• Toxin production (axenic culture, etc.), etc</li> </ul>
Taxonomy	<ul style="list-style-type: none"> <li>• Morphology of plankton species (species-specific DNA probe, ultrastructure, etc.)</li> <li>• Molecular biological species identification (monoclonal antibody, etc.)</li> <li>• Cyst identification</li> <li>• DNA sequencing, etc.</li> </ul>
Mitigation and Management	<ul style="list-style-type: none"> <li>• Economic loss of HAB (Death en mass of cultured fish and bivalves, etc.)</li> <li>• Numerical simulation on HAB dispersion</li> <li>• Prediction method for HAB occurrence</li> <li>• Countermeasures against HAB (algicidal bacteria, algicidal virus, clay spraying, etc.), etc.</li> </ul>
Others	<ul style="list-style-type: none"> <li>• Toxin chemistry (HPLC, toxin composition, structural analysis of toxic substance, etc.)</li> <li>• Effect on fish, shellfish, and mouse (oxygen radicals, etc.)</li> <li>• Pathology of fish/shellfish</li> <li>• Enumeration technique for bacteria</li> <li>• Distribution of cyst, etc.</li> </ul>

**Note)** Terms which is closely related to the explanation in bullets are written in brackets. These terms are also used in publication title and in contents. They can also be the Keyword to be used when searching the reference using “Word(s) in Title”.

### 3.3.2 References which were difficult to categorize

Obscurity of the categorization for types of thesis as listed in the following table may need further consideration.

Table 3 Controversial publications for categorization

	Obscurity	Number of Thesis / Report	Code
1	Theses concerning the field of Toxin Chemistry were categorized as "Others".	16	J00013, J00016, J00019, J00047, J00057, J00101, J00130, J00131, J00139, J00141, J00142, J00218, J00223, J00251, J00272, J00274
2	Pathological influence of toxic substances on fish and shellfish was categorized as "Others", not as "Mechanism" nor "Physiology".	24	J00006, J00015, J00020, J00048, J00095, J00102, J00103, J00110, J00115, J00121, J00122, J00123, J00124, J00134, J00159, J00172, J00173, J00174, J00175, J00247, J00254, J00258, J00261, J00275
3	The process of geographical expansion of HAB due to anthropological transportation was categorized as "Mechanism,"	1	J00047
4	Results of distribution of resting cell or cyst in the sea bottom sediment were categorized as "Others", not as "Occurrence and Monitoring".	6	J00149, J00154, J00237, J00460, J00491, J00492
5	Generation of toxic substance in <i>Protogonyaulax</i> cell was categorized as "Physiology".	4	J00036, J00092, J00244, J00475

## Appendix

### Reference List stored in HAB Reference Database

Note) The list is summarized following the principles described below.

- Alphabetical order for each countries in which the organization of head author belongs to.
- The codes with alphabet (C, J, K, R) and 4 digit numbers written at the left of the list, such as "C00001", etc, are codes for references in PDF format.
- List is consisted of Author, Year of Publication, Title and Resource.
- In cases where there is uncertainty about the author, it would be shown as"et al." on the list.
- In cases where Titles and Resources, etc are not collected yet, it would be shown as "XXXX, XXX,XX" on the list.











List of references stored in HAB Reference Database (China)

Code	Authors	Year	Title	Source	Category						Species Name											
					Occurrence and Monitoring	Mechanism and Environment	Physiology	Taxonomy	Mitigation and Management	Others	1	2	3	4	5	6	7	8	9	10		
C00207	Jin, D. X.	1964	Planktonic Diatoms of China Sea	in "Planktonic Diatoms of China Sea", Shanghai Science and Technology Press, Shanghai, 1-230.				1				<i>Melosira</i> spp.	<i>Pyxidicula</i> spp.	<i>Coccosinodiscus</i> spp.	<i>Aulacodiscaceae</i> spp.	<i>Thalassiosira</i> spp.	<i>Skeletonema</i> spp.	<i>Dactylosolen</i> spp.	<i>Leptocylindrus</i> spp.	<i>Guillardia</i> spp.	<i>Corethron</i> spp.	
C00208	Gao, Y., Ye, J. and Zhou, H.	1978	Taxonomy study on planktonic diatoms in seawaters near Xisha and Zhongsha archipelago	in "Reports of Investigations on Marine Organisms in Zhongsha and Xisha Islands, China", South China Sea Institute of Oceanology (ed by Academia Sinica), Science Press, Beijing, 1-10.				1				<i>Hyalodiscus</i> <i>stelliger</i>	<i>Cyclotella</i> <i>striata</i>	<i>Coccosinodiscus</i> <i>lineatus</i>	<i>Gosslerella</i> <i>tropica</i>	<i>Hemidiscus</i> <i>hardmannianus</i>	<i>Asterolampra</i> <i>vanheurckii</i>	<i>Asteromphalus</i> <i>heptactis</i>	<i>Stictocylus</i> <i>varicus</i>	<i>Biddulphia</i> <i>regia</i>	<i>Hemiaulus</i> <i>hauckii</i>	
C00209	Li, C.D. et al.	1996	Preliminary investigation on red tide organisms <i>Mesodinium rubrum</i> in Jiaozhou Bay.	in "Proceedings of the second meeting of Chinese Committee of SCOR-IOC HAB Working Group", Qingdao Press, 42-47. (in Chinese)		1						<i>Mesodinium</i> <i>rubrum</i>										
C00210	Liang S. et al.	1996	The study on the environment and red tides in Dapeng Bay, Ocean Press, 1-109.			1						<i>Nitzschia</i> <i>closterium</i>	<i>Skeletonema</i> <i>costatum</i>	<i>Alexandrium</i> <i>catenella</i>	<i>Alexandrium</i> <i>tamarense</i>	<i>Gymnodinium</i> <i>breve</i>	<i>Thalassionema</i> <i>nitzschoides</i>	<i>Thalassionema</i> <i>nordenskioldi</i>	<i>Pseudonitzschia</i> <i>sinica</i>	<i>Pseudonitzschia</i> <i>pinggens</i>	<i>Rhizosolenia</i> <i>acuminata</i>	
C00211	Liu, J., Zhang, S. and Wang, C.	1988	Investigation of a shellfish poisoning incident relative to red tide.	Mar. Environ. Sci., 7(1), 22-25.					1			<i>Gymnodinium</i> sp.	<i>Gymnodinium</i> <i>breve</i> Daris									
C00212	Liu, Y.	1989	in "Monograph of Study on Red Tide", J. Jinan Univ., 22-31.																			
C00213	Liu, Y.S.	1997	A study on eutrophication and red tide research in the offshore area, Science Press, Beijing, XX. (in Chinese with English abstract)			1						<i>Alexandrium</i> spp.										
C00214	Liu Y.T., Yang M.L., Chen R.W., Hu S.J., Jin G.Y.	1994	Study on paralytic shellfish poison in shellfish from Guangdong coast	Oceanol. Limnol. Sinica, 25, 220-225. (in Chinese with English abstract)					1			<i>Alexandrium</i> <i>tamarense</i>	<i>Gymnodinium</i> <i>breve</i>									
C00215	Li, D. D.	2003	Status of HAB monitoring in China with emphasis on the East China Sea.	in "Workshop on the Red Tide Monitoring in Asian Coastal Waters, Extended Abstracts", Ministry of Education, Culture, Sports, Science and Technology, Japan, 30-34.		1						<i>Akashiwo</i> <i>sanguinea</i>	<i>Alexandrium</i> spp.	<i>Ceratium</i> spp.	<i>Cochlodinium</i> <i>polykrikoides</i>	<i>Dinophysis</i> spp.	<i>Fragilidium</i> <i>mexicanum</i>	<i>Gonyaulax</i> <i>polygramma</i>	<i>Heterocapsa</i> <i>minima</i>	<i>Gyrodinium</i> <i>spirale</i>	<i>Katodinium</i> <i>glucum</i>	
C00216	Li, D. and Huang, W.	1999	Harmful Algal News, 19, 9.																			
C00217	Li, S. and Hodgkiss, I.J.	1999	An unusual year for the occurrence of harmful algae.	Harmful Algal News, 18, 1&3.		1						<i>Gyrodinium</i> spp.	<i>Alexandrium</i> sp.	<i>Ceratium</i> <i>furca</i>	<i>Mesodinium</i> <i>rubrum</i>							
C00218	Li, S. and Hodgkiss, I.J.	1999	Gambierdiscus toxicus a ciguatera fish poisoning producing species found in Hong Kong waters.	in "The 1st Conference on Harmful Algae Management and Mitigation, 10-14 May, 1999, Subic Bay, Philippines", 22.																		
C00219	Li, S.H. and Qi, Y.Z.	1995	Seasonal successional of phytoplankton in Dapeng Bay, South China Sea	J. Jinan Univ., 16(1), 118-120.		1						<i>Noctiluca</i> <i>scintillans</i>	<i>Prorocentrum</i> <i>micans</i>	<i>Prorocentrum</i> <i>sigmoides</i>	<i>Ceratium</i> <i>fissus</i>	<i>Ceratium</i> <i>tripos</i>	<i>Skeletonema</i> <i>costatum</i>	<i>Pseudonitzschia</i> <i>pinggens</i>	<i>Pseudonitzschia</i> <i>delicatissima</i>	<i>Pseudonitzschia</i> <i>sinica</i>	<i>Rhizosolenia</i> <i>styliformis</i>	
C00220	Morton, B. and Twentymen, P.R.	1971	The occurrence and toxicity of a red tide caused by <i>Noctiluca scintillans</i> (Macartney) Ehrenb. in the coastal waters of Hong Kong	Environmental Research, 4, 544-547.																		
C00221	Nie, D.S.	1936	Dinoflagellate of the Hainan region	Contr. Biol. Lab. Sci. Soc. China, 12, 29-73.		1						<i>Ceratium</i> spp.										
C00222	Qi Y.Z., Hong Y., Lv S.H., Chu J.H., Zhong J.P., Zhu C.J., Li Y.Q., Liang S., Li	1994	Outbreak of <i>Chattonella marina</i> red tide and its relations to ecological parameters in Dapeng Bay, South China Sea	Oceanol. Limnol. Sinica, 25, 132-138.		1						<i>Chattonella</i> <i>marina</i>										
C00223	Qi, Y.Z., Hong, Y. and Zheng, L.	1996	Dinoflagellate cysts from recent marine sediments of the South and East China Seas.	Asian Marine Biology, 13, 87-103.		1						<i>Alexandrium</i> <i>tamarense</i>	<i>Gymnodinium</i> <i>catenatum</i>	<i>Cochlodinium</i> sp.	<i>Lingulodinium</i> <i>polyedra</i>	<i>Gonyaulax</i> <i>scriptae</i>	<i>Scrippsiella</i> <i>trochoidea</i>	<i>Protoperidinium</i> spp.				
C00224	Qi, Y.Z., Hong, J.Q., Lianfeng, Y., Shiyuan, L., Hanjie, W., Yan, W.,	2003	The management and monitoring of red tides on the coasts of the south China Sea.	in "Workshop on the Red Tide Monitoring in Asian Coastal Waters, Extended Abstracts", Ministry of Education, Culture, Sports, Science and Technology, Japan, 39-40.		1			1													
C00225	Qi, Y.Z., Huang, W.J. and Qiu, X.H.	1991	Population dynamic time series models of <i>Noctiluca scintillans</i> in Da-peng Bay South China Sea	J. Jinan Univ., 12(3), 96-103.		1						<i>Noctiluca</i> <i>scintillans</i>										
C00226	Qi, Y.Z. and Lu, S.H.	1995	The ecological characteristics of phytoplankton in Dapeng Bay, South China Sea	J. Jinan Univ., 16(1), 111-117.		1						<i>Actinopterychus</i> <i>undulatus</i>	<i>Alexandrium</i> <i>leei</i>	<i>Amphora</i> sp.	<i>Amphora</i> <i>arenaria</i>	<i>Ceratium</i> <i>macroceros</i>	<i>Chaetoceros</i> <i>abnormis</i>	<i>Chaetoceros</i> <i>erinitus</i>	<i>Chaetoceros</i> <i>socialis</i>	<i>Coccosinodiscus</i> <i>divinus</i>	<i>Coccosinodiscus</i> <i>radiatus</i>	
C00227	Qi, Y.Z. and Zhang, J.P.	1995	in "Estuarine Shallow Estuaries and Lagoons (ed by McComb, A.J.)", 31-40.			1						<i>Noctiluca</i> <i>scintillans</i>	<i>Gymnod.</i> sp.	<i>Skeletonema</i> <i>costatum</i>	<i>Chaetoceros</i> <i>decipens</i>	<i>Chaetoceros</i> <i>costatum</i>						
C00229	Qi, Y.Z. and Zhu, C.J.	1994	A comparative study of nitrate uptake kinetics by two red tide causative algae	Asian Mar. Biol., 11, 103-106.			1					<i>Prorocentrum</i> <i>micans</i>	<i>Chaetoceros</i> <i>lorenzianus</i>									
C00230	Qi, Y.Z. et al.	1988	Dynamic eutrophication model for assessing a red tide bloom in Shekou Bay, South China Sea.	in "3rd Internat. Phycol. Congress Abstracts, Melbourne, Australia", XX.		1						<i>Noctiluca</i> <i>scintillans</i>	<i>Gymnodinium</i> sp.	<i>Skeletonema</i> <i>costatum</i>								
C00231	Qian, H.L., Liang, S.	1999	Study on the red tide in the Pearl River Estuary and its near water.	Marine Environment Science, 18(3), 69-74. (in Chinese)		1						<i>Alexandrium</i> <i>catenella</i>	<i>Alexandrium</i> <i>tamarense</i>	<i>Gonyaulax</i> <i>polyedra</i>	<i>Gonyaulax</i> <i>polygramma</i>	<i>Gymnodinium</i> <i>catenatum</i>	<i>Cochlodinium</i> sp.	<i>Pyrodinium</i> <i>bahauense</i>	<i>Gymnodinium</i> <i>breve</i>	<i>Dinophysis</i> <i>caudata</i>	<i>Prorocentrum</i> <i>minimum</i>	
C00232	Qian, S., Wang, X. and Chen, G.	1983	The phytoplankton of the Jiaozhou Bay	J. Shandong Coll. Ocean., 13, 39-56.		1						<i>Coccosinodiscus</i> spp.	<i>Melosira</i> <i>sulcata</i>	<i>Actinopterychus</i> spp.	<i>Thalassiosira</i> spp.	<i>Skeletonema</i> <i>costatum</i>	<i>Rhizosolenia</i> spp.	<i>Chaetoceros</i> spp.	<i>Biddulphia</i> spp.	<i>Nitzschia</i> spp.	<i>Peridinium</i> spp.	
C00233	Siu, G.K.V., Young, M.L.C. and Chan, D.K.O.	1997	Environmental and nutritional factors which regulate population dynamics and toxin production in the dinoflagellate <i>Alexandrium catenella</i>	Hydrobiologia, 352, 117-140.		1						<i>Alexandrium</i> <i>catenella</i>										
C00234	SOA	1975	The Specification for Oceanographic Survey, Ocean Press, XX. (in Chinese)																			
C00235	Sun, X.X., Song, X.X., et al.	1999	A study on the coagulation of clay-MMH system with red tide organisms.	Marine Science, 2, 46-49. (in Chinese)					1			<i>Heterosigma</i> <i>akashwo</i>	<i>Nitzschia</i> <i>closterum</i>									
C00236	Tian, J. and Dong, J.	1983	A primary investigation of organic pollutions and red tide organisms in the sea area nearby estuary of Huanghe River	Mar. Environmental Science, 2(1), 46-53. (in Chinese)		1						<i>Skeletonema</i> <i>costatum</i>	<i>Noctiluca</i> <i>miliaris</i>	<i>Prorocentrum</i> <i>minimum</i>	<i>Oscillatoria</i>	<i>Trichodesmium</i>	<i>Nitzschia</i> <i>taraxoa</i>	<i>Nitzschia</i> <i>seriata</i>	<i>Rhizosolenia</i> <i>etigera</i>			
C00237	Tseng, C.K. and Zou, J.Z.	1984	A preliminary study of the red tide organisms in BOHAI gulf	in "Proc. Ocean. and Limnol. Environ. Poll. Symp.", Science Press, Beijing, 98-99.		1						<i>Prorocentrum</i> <i>minimum</i>	<i>Noctiluca</i> <i>scintillans</i>	<i>Skeletonema</i> <i>costatum</i>								
C00238	Wang, C.C.	1936	Dinoflagellate of the Gulf of Pe-hai	Cont. Nat. Res. Inst. Academia Sinica, 7, 128-171.		1						<i>Noctiluca</i> <i>scintillans</i>	<i>Diploptopsis</i> <i>minor</i>	<i>Peridiniopsis</i> <i>rotunda</i>	<i>Peridinium</i> spp.	<i>Gonyaulax</i> spp.	<i>Pyrophacus</i> <i>horologium</i>	<i>Ceratium</i> spp.	<i>Dinophysis</i> spp.			
C00239	Wang, K. F. and Nie, D. S.	1932	A survey of the marine protozoa of Amoy	Contr. Biol. Lab. Sci. Soc. China, 9, 285-385.		1						<i>Peridinium</i> spp.	<i>Ceratium</i> spp.	<i>Goniodoma</i> <i>acuminatum</i>	<i>Diplopsalis</i> <i>lenticula</i>							
C00240	Wang, H.Q.	1989	Characteristics of bloom lives in sea fields of Dalian Bight	Environ. Sci. China, 2, 1-10. (in Chinese)		1						<i>Heterosigma</i> <i>akashwo</i>	<i>Skeletonema</i> <i>costatum</i>	<i>Prorocentrum</i> sp.	<i>Thalassiosira</i> <i>nordenskioldi</i>							
C00241	Wang, S.S. and Feng, G.C.	1994	Structural analysis of the essential factors associated with the <i>Noctiluca scintillans</i> red tide in Dapeng bay	Oceanol. Limnol. Sinica, 25, 146-151.		1						<i>Noctiluca</i> <i>scintillans</i>										
C00242	Wang, Y.J., Li, L.L. and Lu, T.S.	1989	High performance liquid chromatographic determination of dissolved free amino acids by precolumn derivatization in seawater	Mar. Sci., 2, 43-47. (in Chinese)						1												
C00243	Wang, Z. D., Peng, Y.H. and Liu, Y.S.	1990	in "Proceedings of First International Conference on Marine Biology of Hong Kong and South China Sea, Hong Kong, 28 October to 3 November", N/A.																			
C00244	Williamson, G.R.	1970	Hong Kong Fish. Bull., 1, 43-49.																			
C00245	Wong, P.S. and Wu, R.S.S.	1987	J. Shore. Manage., 3, 1-21.																			
C00246	Xu, C.Y.	1982	Surveys on the causal organisms of red tide in Dalian Wan	Jour. Fish. China, 6, 173-180.		1						<i>Mesodinium</i> <i>rubrum</i>	<i>Skeletonema</i> <i>costatum</i>	<i>Peridinium</i> spp.	<i>Gymnodinium</i> spp.	<i>Gyrodinium</i> sp.						
C00247	Xu, J.S.	1990	Dynamic factors and feature analysis of geomorphic development of coastal zone in western Bohai bay	Marine Bulletin, 9(2), 58-64.		1																
C00248	Yang, Z.B. and Hodgkiss, I.J.	1999	Massive fish killing by <i>Gyrodinium</i> sp.	in "Harmful Algae News", IOC of UNESCO, 18, 4-5.		1						<i>Gyrodinium</i> sp.										
C00249	Yang, Z.B. and Hodgkiss, I.J.	2001	Early 1998 massive fish kills and associated phytoplankton in port shelter waters, Hong Kong.	in "Harmful Algal Blooms 2000 (eds by Hallegraeff, G.M., Blackburn, S.J., Bolch, C.J. and Lewis, R.J.)", IOC of UNESCO, 70-73.		1						<i>Gyrodinium</i> sp.	<i>Gyrodinium</i> <i>sanguineum</i>	<i>Alexandrium</i> spp.	<i>Gymnodinium</i> <i>catenatum</i>	<i>Prorocentrum</i> <i>triestinum</i>	<i>Scrippsiella</i> <i>trochoidea</i>	<i>Ceratium</i> <i>furca</i>	<i>Prorocentrum</i> <i>dentatum</i>			
C00250	Yoo, K.I. and Lee, J.B.	1985	Bull. Environ. Sci. Res. Inst. for Environmental Sciences, Han Yang Univ., 6, 117-127.																			
C00253	Yang, Y.K. and 5 others	1997	Long-term changes in hydrography, nutrients and phytoplankton in Tolo Harbour, Hong Kong	Hydrobiologia, 352, 107-115.		1																
C00254	Zhang, S.J., Yang, Q.L., Qiu, H.H., Lin, Q.F.,	1994	Red tide and its control. Ocean Press, Beijing, 1-236. (in Chinese)			1	1	1	1	1		<i>Prymnesium</i> <i>parvum</i>	<i>Heterosigma</i> <i>akashwo</i>	<i>Asterionella</i> <i>japonica</i>	<i>Chaetoceros</i> <i>atlanticus</i>	<i>Coccosinodiscus</i> <i>gigas</i>	<i>Rhizosolenia</i> <i>alata</i>	<i>Dinophysis</i> <i>acuminata</i>	<i>Gymnodinium</i> <i>mikimotoi</i>	<i>Noctiluca</i> <i>scintillans</i>	<i>Prorocentrum</i> <i>dentatum</i>	
C00255	Zhang, S.J., Xu, K.C., Chen, Q.H. and Zheng, Z.W.	1988	Observation of a red tide in xigang area XiaMen	Acta Oceanol. Sinica, 10, 602-608. (in Chinese)		1						<i>Chattonella</i> <i>antiqua</i>	<i>Gymnodinium</i> spp.									
C00256	Zhao, D.	2000	Paper collection of monitoring and assessment on HAB disaster in Bohai Sea.	Ocean Press, Beijing. (in Chinese)		1	1			1		<i>Ceratium</i> <i>furca</i>										
C00257	Zheng, L., Qi, Y.Z. and Lu, Y.M.	1995	Studies on the cysts of red - tide organisms in Dapeng Bay	J. Jinan Univ., 16(1), 121-126.		1						<i>Alexandrium</i> <i>tamarense</i> ( <i>Le</i> ) <i>Chattonella</i> <i>marina</i> Hara et	<i>Gymnodinium</i> <i>catenatum</i> <i>Gra</i>	<i>Porodinium</i> <i>bahamense</i>								
C00258	Zheng, Z.	1978	Study on the red tide organisms—a new aspect of the marine planktology	Nature Journal, 1(2), 118-121. (in Chinese)						1		<i>Noctiluca</i> <i>miliaris</i>	<i>Trichodesmium</i> <i>erythraeum</i>	<i>Gymnodinium</i> <i>nelsoni</i>	<i>Gymnodinium</i> <i>splendens</i>	<i>Gymnodinium</i> <i>veneficum</i>	<i>Gymnodinium</i> <i>mikimotoi</i>	<i>Gymnodinium</i> <i>breve</i>	<i>Gonyaulax</i> <i>minima</i>	<i>Gonyaulax</i> <i>monilata</i>	<i>Gonyaulax</i> <i>catenella</i>	
C00259	Zhou, L.Z., Dong, J.P., Qiu, B.P.	1983	The eutrophication and red tide in Bohai Sea.	Marine Environ. Sci., 2(2), 41-54. (in Chinese)		1						<i>Noctiluca</i> <i>miliaris</i> <i>Sarria</i>										





















































