Module on Scientific Literature & Communication (Total 40%)

This Module is made up of the following assessment items:

1. Log of Learning Activities (Searching for references & referencing style) – Marks out of 20 (5%)
2. E-poster – Marks out of 100 (15%)
3. Seminar- Marks out of 100 (20%)

Module Aims:
The module is designed to assist you in developing skills in scientific communication informatics. To develop this skill, the module will teach you how to search for relevant scientific literature, limit / narrow the literature using search definition and download the information as database records e.g. EndNote and Word), aggregate this information and prepare scientific communiqué e.g documents and presentations (posters, seminars, videos). communications on biodiversity informatics and.

You will develop an understanding on how to search for important scientific information, aggregate and summarise this information and communicate the most important points to your fellow classmates by using either a poster and an oral seminar presentation or or by using a video presentation which you have developed. Posters and oral seminars are popular at scientific conferences and videos are popular for online teaching / communication. The exposure to appropriate tools and technology (multimedia) for communication is not only important in conveying a scientific message but is also an important tool for career development and, for example, it can be used at interviews.

Powerpoint is a very powerful aid for conveying your message to your audience. Most of you would have some experience of presenting a seminar using powerpoint. You can also use Powerpoint to produce a template for posters. You may have seen scientific brochures which can be regarded as A4 / A3 version of posters. Posters are usually presented at an informal session (a tea and / or lunch break). So most posters are viewed casually and within a small time frame. However, seminars are formal and focused and have more details than the posters. In addition, speakers have to adhere to a strict timeline. Therefore, the format for, and content of, the poster is somewhat different to that of a seminar.

As computer technologies improve so do the audio visual tools (multi media) and what was achievable in the past by movie producers can now be achieved by almost anyone who has an interest in this multi-media (movie) presentations (most of you would play computer games and would appreciate the multimedia experience!!).

Module Activities:
The module offers four activities as outlined below. You can elect to either complete activities 1, 2 and 3 OR complete activities 1 and 4.

Activity 1. Assignment of a topic from Appendix 1 & scientific literature search
Activity 2. Creating a poster: Information aggregation and written presentation on the topic
Activity 3. Presenting a seminar: Information aggregation and oral presentation using Powerpoint
Activity 4. Creating and presenting a video instead of a poster and a seminar

Schedule for Module Activities:
Week 1. Students will be given a pre-assigned special topic for their poster and seminar presentation. Instructions on how to search for scientific literature and useful ways by which broad literature searches on a topic of interest can be narrowed and focussed to a more specific sub-topic will be demonstrated. In addition, tips on scientific poster and seminar presentation will also be provided.

Weeks 2 & 3. Students will develop search definitions for searching literature and perform literature searches. Further demonstration and discussions on the utility of the searches will be held during the workshop.

Week 4. Students will tweet (remember the 140 character tweet limit) or email their search definitions. This is a pass / fail assessment item

Weeks 5 to 7. Students will continue to develop their skills for literature search and discuss their findings

Week 8. Students will email their final search definitions and the literature. They will cite 10 formatted references which will be most likely used in their poster and seminar presentations. This forms part of the
assessment for the course and is worth 5%

Week 11. Students should submit an electronic version of the poster by Friday, week 11 and a hard copy of the poster is to be handed in it has been shown to the class during the seminar presentation (see below).

Weeks 12 and 13: Students will present seminars and submit posters. Both posters and seminars will be presented at the same time. At the beginning of this activity state your name and the title of your poster while holding up the poster to the class for approximately a minute. This will allow your fellow classmates to view the poster from a distance. You will than give the poster to me and continue with the seminar presentation. The seminar is for 10 min. duration.

Alternative, students can opt to present a video that is made by them on the topic. The video should be of 10 min. duration

**Presence and Participation:**
It is compulsory for all students to attend the activities associated with this module. In addition, all students should also be present during the poster / seminar / video presentation unless there are valid extenuating circumstances. Non-attendance could result in student getting a zero mark. Following the conclusion of each presentation, there will be a 5 min question time. It is expected that each student will participate during this time by asking questions or by providing feedback to the presenters. Please state your name before you ask a question or provide feedback so that a note can be made on your contribution.

**Allocations of Marks:**
1. Week 4. Submit literature search definitions by email or tweet (remember 140 character limit) – pass / fail
2. Week 8. Submit final search definitions and 10 formatted references by email – 5%
3. Poster – 15% and Seminar presentation 20% OR video presentation – 35%

The following will taken into consideration for marking:
- Scientific content
- Production (fonts size, aesthetics, color, layout, images)
  - Poster
  - Seminar
- Keeping the presentation to time
- Participation by asking questions and / or making positive contribution

**Biodiversity informatics- Searching scientific literature (10%)**

I. INTRODUCTION.
Biodiversity informatics is defined as "the creation, integration, analysis, and understanding of information regarding biological diversity". Biological diversity includes all life on our planet as described in the Tree of Life.

The ability to carry out a comprehensive, appropriate and specific literature search is the first and most important step in biodiversity informatics. An efficient and effective search will enable you to find out what is known about a specific topic you are interested in quickly and precisely. Though general web search engines are useful, they can turn up many items of information that have not been peer reviewed, and hence information contained in such searches may be incorrect. In addition, general search engines do not provide links between scientific literature and informatics. Therefore general web searches are regarded NOT be particularly useful for searching scientific literature.

Entrez is NCBI PubMed's “Biodiversity informatics search engine” - http://www.ncbi.nlm.nih.gov/Class/MLACourse/Original8Hour/Entrez/index.html#Top and is widely used by biologists. Entrez not only searches published scientific literature using a database such as PubMed but also provides useful links eg literature references on a particular taxon and sequence data in a database.

**Note:** PubMed comprises more than 21 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites. PubMed can also be accessed via EndNote. EndNote is a reference database manager and can be used in conjunction with Microsoft word to assist in writing assignments. EndNote is available to Griffith University students free of charge and information on the software is available at the library help desk or can be accessed through the University’s web pages.
About PubMed Entrez Browser
Click Entrez browser or copy and paste this URL http://www3.ncbi.nlm.nih.gov/Entrez/ into your web browser.
Some of the key features of the Entrez search engine are listed below:

1. Free and accessible to everyone
2. Clipboard feature allows for easy generation of subsets of hits
3. Related articles can help broaden a search to capture articles that would not appear in the initial term
4. Links to full text of textbooks – textbooks are useful starting point for background information
5. Allows access to nucleotide and protein databases

II. AN EXAMPLE ON HOW TO SEARCH NCBI USING ENTREZ
Below is an example of an Entrez search that uses Boolean Operators, the Clipboard, Limits, Related Articles, Books and Full Text on-line.

Example 1:
We are interested in developing a sensitive PCR test for detecting a newly isolated infectious bacterium from food. The initial target gene for the test is the 16S rRNA gene (but later we can also include other target genes involved in the pathogenesis process.) We are fortunate as the 16S rRNA gene as well as its genome of the bacterium have been sequenced and deposited in GenBank (one of the many databases that Entrez searches across).

Simply searching with the term “16S rRNA” on 24th July 2012 brings up the information shown in Figure 1. The first thing you will notice is the voluminous information across all databases.

The search can be narrowed by including the term bacteria: 16S rRNA AND bacteria. The term “AND” is one of three Boolean operators (AND, OR, NOT) used to limit and make the search more precise to the user needs. (We can add further terms to narrow the search (refer to NLM controlled vocabulary if you wish to find out more about the terminologies that can be used with Entrez search). The information is now less than what we started off with as indicated in Figure 2.

However the information is still too voluminous and needs to be limited. So we add another term and do a more specific search. We now include a technique called Real-Time PCR and target the 16S rRNA gene for detecting bacteria. The result of this search is shown in Figure 3.

1. Use of the Clipboard
Let us now look at some of the information on the response pages (Figures 1 to 3). Click on PubMed and as you scroll through the pages of hits, check the box adjacent to the reference number for the articles that look of interest. BEFORE you go to the next page, click the Send button (found at the top as well as the bottom of the page) and select Clipboard from the pull down menu menu. This will capture the checked references on a clipboard. You can turn to page two and repeat the process. Using the Send to clipboard pull down menu will add the checked references from the second page to the clipboard. (note: Items on the clipboard are only retained for eight hours).

You can now check the clipboard (faint blue heading in topmost grey band) to view the items on the clipboard. The default display shows author, article title and journal. For more information, change the Display pull-down menu from Summary to Abstract and click on the Display button. This will now display a full abstract.

2. Use of Limits
Clicking on the “Show Additional Filters” on the LHS panel of the page allows you to restrict your search in a number of ways.

a) Publication types: Allows you to restrict hits to specific types of articles or specific languages. Choosing Review Articles is very useful if you want to get an overview of what has been done on a specific topic. Try a new search e.g. VIP AND inflammation brings up over 180 articles. Click on the Limits tab and use the Publication Type pull down menu to select only Reviews and then click on Go button again. Now only 40 articles appear.

b) Subject limits: You can also limit on ages of experimental human subjects (e.g. pediatric vs gerontological). You can limit articles to humans or to animal studies or both, you can limit by gender, by age of subjects, by date of publication or specify article language. (note: if you do employ limits on one search, make sure you
unchck this box before proceeding with another search or the limits will still be applied to the subsequent searches.

3. Use of Truncation
It is possible to employ the * to search for all terms that begin with a defined text string. For example, searching on myo* will search for all articles dealing with myoblast, myocyte, myocystitis, myopathy, etc up to 150 variations. Searching on myocyte* will search for myocyte or myocytes or myocytomia but not myocytoma.

4. Use of Related Articles
To the right of the journal entry, you can survey "related articles" (those that MEDLINE analyzes as related by virtue of shared keyword entries). These will be brought up not in publication date order, but in order of degree of relatedness. This can be a very useful tool to finding related publications that do not include your search terms in either title or abstract.

5. Use of Books
If you click on Links and scroll down to Books, you will bring up the title and abstract with a number of terms highlighted as links. These terms are linked to the collection of books whose full text is available on line via PubMed. This can be extremely useful for getting some fundamental background information on a subject. The number of full text books on line is increasing with each year.

6. Full Text On-Line
Most of the journals which give an icon indicating full text on-line actually require a Password to see the full text. However, some journals (e.g. Proc. Natl. Acad. Sci. USA) are actually available as full text in the form of a html or pdf document. One of the advantages of using OVID via the Tufts library is that a much wider selection of journals is available as full text on-line via Tufts and the OVID search engine indicates which journals are available.

7. Other Databases Accessible from Entrez
Entrez is powerful because it is actually a set of linked databases. With a given search term you can also search the DNA sequence databases, the protein structure databases, the online Mendelian Inheritance in Man (OMIM) database, and a number of others from one central page. If you are searching for a gene you can cross reference in OMIM to see if it is associated with any known human genetic disease (ONE CAVEAT: BE VERY CAREFUL IN PRINTING THESE - OMIM ENTRIES ARE LARGE AND CAN GIVE MORE THAN 50 PAGES OF HIGHLY TECHNICAL TEXT. It is better to cut and paste relevant material to a word processor).

III. EXERCISE - A Literature Search Using Entrez:
(i) Construct a literature search for research papers published on the topic that you have been assigned using Entrez. Send me (a) a list of search terms that you have used and the total number of hits for your search -- suggest using a table as given below.

<table>
<thead>
<tr>
<th>Number</th>
<th>Search Terms Used</th>
<th>Search Date</th>
<th>Numbers of Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
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<td>2</td>
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<td>5</td>
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</table>

(ii) List five articles (in the form of citations / references) you deem most interesting (based on reading of the abstracts). Use a consistent reference style. An example of a referencing style is given below:

(iii) Click on Books and you will see a number of terms in the abstract are now in the form of links. Click on the links and read the abstracts / content. Select one book / chapter of the book and display it in abstract display. Provide me with the abstract of this article.
Check to see how many review articles deal with your topic. List one review article you deem most interesting and state you reasons as to why you find this interesting.

IV. EXERCISE: Creating a Reference Database using EndNote and PubMed (FROM 2013)
Create a reference database in EndNote using PubMed. All Griffith University students can download EndNote software free of cost. Refer to http://libraryguides.griffith.edu.au/content.php?pid=265213&sid=2309040 for more details.

![NCBI Entrez Search Engine](image)

**Figure 1.** Entering the term “16S rRNA” in Entrez brings up voluminous information on this term as shown in Figure 1

**Note:**
1. The date for the search was 24th July 2012 Taking note of the date of the search is important as this information will change as new information is added to the databases on a daily basis.
2. Further terms can be added to narrow the search (refer to NLM controlled vocabulary if you wish to find out more about the terminologies that can be used with Entrez search)
Figure 2. Instructions for constructing focused searches are provided as tutorials or FAQ sheets in PubMed.

Figure 3. Note: Boolean operators have to be typed in all caps. They can also be grouped by use of parenthesis, e.g. say we want to obtain information on the use of 16S rRNA or Real Time PCR for quantitation. You could phrase this as: (16S rRNA OR Real Time PCR) AND diagnostic. How you group the parenthesis is important. Instructions for constructing focused searches are provided as tutorials or FAQ sheets in PubMed.
Creating a poster: Information aggregation and written presentation (15%)

Posters and seminars are popular at scientific conferences. Posters are usually presented at an informal session (a tea and/or lunch break). So most posters are viewed casually and within a small time frame. However, seminars are formal and focused and have more details than the posters. In addition, speakers have to adhere to a strict timeline. Therefore, the format and content of the poster is somewhat different to that of a seminar.

The following are suggestions to get you started on a poster:
1. Do extensive research on your topic.
2. Develop ideas.
3. Start early - Posters take time and thoughts to develop and put together.
4. Remember that only a few minutes are spent by readers (scientists) at each poster!!
5. What to look for in a poster:
   • The poster size should be limited to the size restriction of printers.
   • General Appearance
   • Easy or difficult to read, font size & color
   • Use water marks if possible
   • Aesthetics (look)
     o professional not too flashy
     o avoid “look great” but has no content
     o should have natural flow from one section to another

6. Content of the poster:
   • Poster Title
   • Authors
   • Address (Department / Institute) and contact address (E-mail)
   • Abstract
     o What was the problem about?
     o A summary of discovery
     o What is the conclusion?
   • Scientific content -
     o Use charts., pictures & figures where possible but do not over do this.
     o Do not make the content too wordy
     o Include the list of references used for the research topic

There many other ways for preparing posters but the following is a guide to setting out a poster using powerpoint.
1. Open Powerpoint. Select File from the pull down menu and than “page set up”. Set the following parameters for a poster canvas
   Slides sized for “Custom”
   Width “85 cm”
   Height “90 cm”

2. You can scale up or down the size of the page (zoom) for viewing purposes by editing the menu containing “100%”. For example, to view the whole page, use 14%. This is an extremely useful menu.

3. Now you are ready to add information to your poster for which will need the drawing “toolbox”. If you can't see the drawing tool box than switch it on by going to the pull down menu “View”, selecting “toolbox” and ticking the box called “Drawing.”
   o To insert text, select “insert” from th epull down menu and click in the text box.
   o For insert pictures, go to the pull down menu, select “Insert” and click on picture (from file or from the clipart which comes with powerpoint). If you wish you can also create your
own graphics, scan your figures and insert them or alternately copy pictures from the web. Some of the software for these purposes are available freely via the web whereas others are shareware or fully commercial. Grabit (available from http://www.shemes.com/index.php?p=download and tutorials at the URL http://www.shemes.com/grabit/) is a useful free software for grabbing / capturing pictures from your screen. However, there are other free software that will also do screen grabs but you will need to do a search for – use google with the terms free screen capture software)

**TIPS:**

- Draw and layout boxes on the canvas. Resize to suit your research material. Color the outline of the boxes and / or the text and / or the fill the box with color. However, you should always remember that too much color can spoil the poster.
- You will be shown some examples of posters during one of the sessions on poster presentation that were made using the above approach.
- Remember that if you were presenting the poster at a scientific meeting than your main aims are (a) attract an audience to your poster - eye-catching posters can be prepared by using a “Water mark” as a background back drop and (b) to communicate your research message to the audience.
- You can print the poster on an A3 page for proof reading. Final posters can be printed at e.g Office Works or at other stationary stores

**Presenting a seminar: Information aggregation and oral presentation using powerpoint (20%)**

The following are some tips that will assist you in preparing and delivering a seminar. Remember that your seminar will be different from that of your poster.

1. **The requirement:**
   - Research the topic, present the topic in front of the class and teach your audience on this topic.

2. **Approaching your topic:**
   - Research your topic. If you understand your topic it will become an enjoyable and stimulating experience for you. In addition, when you present your topic, you will enjoy teaching others about what you have learned, making the entire experience both educational and entertaining.

3. **Entertain your audience:**
   - Science presentations should not be all all about facts. You can incorporate a bit of humour or “did you know” type facts. This will make the presentation more interesting and if more people become interested than this will also keep you thinking creatively.

4. **Present your presentation intelligently:**
   - Place yourself to one side of the visual aid so that you can explain your presentation. Ensure that the font size of the slides are legible.

5. **Organize your information:**
   - Separate and organize your information – keep a sheet of paper that describes the research done, another sheet that contains facts and information and the visual aid that works with your information. Keep prepared notes for the seminar available but avoid reading these notes during presentation.

6. **Mention real world applications:**
   - You should not only copy what is present in the textbooks or papers but to make the presentation more interesting think of ways how your presentation can relate to everyday life.

**Creating and presenting a video (35%)**

You can elect to choose a multimedia presentation in the form of a movie instead of a seminar and a poster. In this case the video should run for at least 25 mins.
For creating a video, you will need to put together a selection of images, videos and audio sound using a video editor in the form a movie. The following information will assist you in developing your multimedia skills.

1. OpenShot is an awesome free video editing software but is only available for the linux OS (there is currently no Windows version). Openshot 1.4.2 is the most current version at the time of writing (24th July 2012) and can be downloaded from https://launchpad.net/openshot/+milestone/1.4.2
I use OpenShot but if you have time you could also look at the plethora of alternate video editors at the URL http://alternativeto.net/software/openshot/

2. Lightworks is for the Windows OS and is also free. The manual can be viewed downloaded from http://www/softwarecrew.com/2010/12/edit…, and the software from http://www.lightworksbeta.com/
# List of Assignment Topics

Below is a list of topics for this module. You are required to select a topic from this list (or one will be pre-assigned to you) and submit the three assessment items by the time lines indicated in the course profile.

<table>
<thead>
<tr>
<th>No</th>
<th>Assignment Topic</th>
<th>Relevance (pathogen, industrial importance, basic scientific understanding)</th>
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<tbody>
<tr>
<td>1</td>
<td><em>Staphylococcus aureus</em></td>
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<td>2</td>
<td><em>Mycobacterium leprae</em></td>
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<td>3</td>
<td><em>Helicobacter pylori</em></td>
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<td>4</td>
<td><em>Chlamydia trachomatis</em></td>
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<td>5</td>
<td><em>Yersinia pestis</em></td>
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<td><em>Neisseria meningitidis</em></td>
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<td><em>Deinococcus radiodurans</em></td>
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<td><em>Clostridium botulinum</em></td>
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<td><em>Rhizobium leguminosarum</em></td>
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<td>10</td>
<td><em>Legionella pneumophila</em></td>
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<td>11</td>
<td><em>Vibrio cholera</em></td>
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<td>12</td>
<td><em>Bacillus thuringiensis</em></td>
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<td><em>Streptococcus pneumoniae</em></td>
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<td><em>Xanthomonas campestris</em></td>
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<td><em>Lactobacillus acidophilus</em></td>
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<td>16</td>
<td><em>Corynebacterium glutamicum</em></td>
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<td>17</td>
<td><em>Leuconostoc mesenteroides</em></td>
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<td>18</td>
<td>Extra-planetary life (Astrobiology)</td>
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<td>19</td>
<td>Origin of Life</td>
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<td>20</td>
<td>Tree of Life based on rRNA analysis</td>
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<td>21</td>
<td>Extreme environments as microbial habitats</td>
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<td>22</td>
<td>Recent developments in automated DNA Sequencing</td>
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<td>23</td>
<td>Genome Evolution</td>
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<td>Synthetic gene technologies and tailor-made enzymes</td>
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<td>25</td>
<td>Gut microbiome</td>
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<td>26</td>
<td>Prebiotics and Probiotics</td>
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<td>27</td>
<td>Skin microbiome</td>
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<td>28</td>
<td>Microbial inhibitors and enzymes in cleaning products</td>
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<td>29</td>
<td>Microbiology of built environments</td>
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<td>30</td>
<td>Two-component signal transduction system in biofilms</td>
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<td>31</td>
<td>Microbial degradation of aromatic pollutants</td>
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<td>32</td>
<td>Anaerobic lithotrophic microbes (including metal transforming bacteria)</td>
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<td>33</td>
<td>Emerging pathogens in response to environmental changes (e.g., climate change)</td>
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<td>34</td>
<td>Nosocomial infections</td>
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<td>35</td>
<td>Molecular methods for detecting pathogenic microbes causing food spoilage and poisoning</td>
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<td>36</td>
<td>Pathogens as bioterrorism weapons</td>
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<td>37</td>
<td>Detail a microbiology process for beer or yoghurt production</td>
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<td>38</td>
<td>Second-generation biofuel enzymes</td>
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<td>39</td>
<td>Food preservation techniques</td>
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<td>40</td>
<td>Rumen microflora and their important role</td>
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<td>41</td>
<td>Digestion in termite guts</td>
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<td>42</td>
<td>Nanopore technology for DNA sequencing</td>
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<td>43</td>
<td>Microbial Genome Database</td>
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<td>44</td>
<td>Modern Microbial Taxonomy</td>
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<tr>
<td>45</td>
<td>Rules for naming microorganisms</td>
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<tr>
<td>46</td>
<td>Microbial Fuel Cell (MFC)</td>
<td></td>
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<tr>
<td>47</td>
<td>Fecal Microbiota Transplant (FMT)</td>
<td></td>
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