**Writing a Microbiology Resource Announcement (MRA)**

Writing a scientific manuscript describing the full set of characteristics of a newly identified phage and submitting that manuscript to the BioRxiv pre-print repository is a great way to culminate the SEA-PHAGES year-long experience. Manuscripts submitted to BioRxiv become indexed and searchable via Pubmed and can therefore be readily referenced – an important opportunity for external recognition of the scientific contribution of you and your students.

This QUBES resource provides several documents to support you in writing a relatively short and easily developed manuscript that can be submitted to BioRxiv (for free) and also to the journal Microbial Resource Announcement (MRA, for a fee). This QUBES resource includes:  
  
1. Templates for Data Collecting and Writing

2. Suggested Framing for Writing an MRA with students in the SEA-PHAGES course

3. Other Tips

**1. Templates for Data Collection and Writing**

Three templates are included in this QUBES resource to assist students and faculty in the process of data collection and drafting an MRA.

1. **MRA Data Collection Template.** The MRA Data Collection Template is an editable Excel file that we recommend using to collect all the information that will need to be included as part of the MRA. The file is organized with a series of tabs; each tab corresponds to information required for different sections of the MRA. It is suggested that data collection be completed before writing the MRA. Faculty can complete this task themselves, or preferably assign it to a few or groups of students, and have the students double-check the information in the template.
2. **MRA Template.** The MRA Template is an editable Microsoft Word document that outlines the various sections of an MRA and the information required for each section. On the left side of the document, a series of comments provide additional guidance for each section, to ensure the all the required information for a given section is included. The comments also include sample text from previously published MRA (with hyperlinks) to help students craft paragraphs that describe their data. The MRA Template is designed to be used with the MRA Data Collection Template.  
   *Note: The template is designed so that you have the option to submit your manuscript to a preprint server, such as BioRxiv, or a journal that charges a lower publication fee than MRA.*
3. **MRA Faculty Checklist.** The MRA Faculty Checklist is designed as a tool for faculty to double-check their final MRA draft. Before submission of the MRA to the SEA for review, faculty should use this checklist to ensure all required information is included in the MRA.

**2. Suggested Framework for Writing an MRA in a SEA-PHAGES Course**

* There are many ways to incorporate writing an MRA into the SEA-PHAGES course. Faculty could require each student to draft an MRA. The MRA could be a graded assignment or extra credit. Alternatively, writing an MRA could be optional, with authorship as motivation for participation.
* The goal of writing and publishing an MRA should be discussed as a major course outcome at the start of the semester. Faculty should check the [seaphages.org](http://seaphages.org) website for up-to-date information regarding deadlines for submitting an MRA at the reduced rate.
* As genome(s) are being annotated, faculty and students can begin to collaboratively fill out the MRA Data Collection Template. The completed MRA Data Collection Template can then be used by students working on writing the MRA using the MRA Template. Alternatively, the MRA Data Collection Template can be completed after annotation and set the tone for the writing process.
* Students should be given a deadline to complete their MRA draft (timeline determined by faculty).
* For classes working collaboratively to write an MRA, students may peer review student writing and determine consistencies and novel findings (students highlight best/favorite components in each other’s work).
  + Alternatively, if the MRA is for a class grade, faculty and students can evaluate the drafts and provide feedback using the MRA Rubric included in this QUBES resource. Faculty could also choose to award points for the peer review.
  + The class then comes together to finalize the MRA (can do it in a commonly shared Google docs document)
* Students and faculty check the final MRA draft using the MRA Faculty Checklistbefore submission to the SEA for internal review (see note at the beginning of this document).

**3. Other Tips**

**3a. Genomes to Include in an MRA**

* A single MRA may include information for many annotated genomes even though they are not in the same cluster. Faculty could also consider publishing an MRA for a single phage or a group of related phages (e.g., same cluster). Additionally, faculty could consider working collaboratively with another SEA-PHAGES school.

**3b. Resources for Improving Scientific Writing**

* The MRA is very short and is not a complex writing assignment. Students should be encouraged to read 1-2 recent MRAs as examples before writing their own MRA. Sample MRAs are included as hyperlinks in the MRA Template. Please note that MRAs written before fall 2022 may not contain all the required information, as the guidelines for the MRA have since changed. Students and faculty are encouraged to use the sample MRAs in the MRA Template or other recent MRAs published by SEA institutions as examples.
* Campus writing centers or online writing resources (Purdue OWL) can be valuable aids to assist students in the writing process.

**3c. Assessment**

* If writing an MRA as a graded assignment, the MRA Rubric can assist students in peer grading or faculty grading.

**3d. Publication Cost**

* The HHMI SEA program engages with ASM MRA on behalf of SEA faculty for discounted publication fees. For example, in 2022, ASM accepted 40 submissions at a discounted fee of $150 per article. To learn if you can submit your manuscript to MRA at a discounted rate, contact the SEA Team.
* Potential sources of funds may include the Dean or Department Chair.
* Other options for cost-sharing include working with other SEA institutions to write a collaborative MRA and share the cost, student UG research funds, or student government funds.