**Science Information Literacy**

**Purpose:**

One of the primary ways that scientists communicate their results to other scientists is through the publication of articles in “peer-reviewed” scientific journals. These articles, which are also casually referred to as “papers,” often contain a large amount of jargon (technical words specific to a particular research area) and are written in a very dry, formal style that can make them seem inaccessible to a general audience. However, understanding the general format of a scientific article can help the non-specialist reader find the important points in even a very technical scientific paper.

Communication of scientific results to the general public is also very important and “popular science” publications will often write summaries of more technical peer reviewed articles that are simplified for non-scientists or non-specialists. However, not all of these summaries accurately represent the original scientific work, so it is important to be able to check what you read in a general science summary with what is reported in the original scientific article. A good general audience summary will help you better understand and interpret the original article.

**Background:**

Before completing the challenges, read the PDF titled “Whitesides' Group: Writing a Paper” by Prof. George Whitesides. [*Adv. Mater.*, **2004**, *16*, 1375-1377. doi.org/10.1002/adma.200400767.] This is a guide to the format of a scientific article that was written by a well-known chemist who has published over 1300 scientific papers.

In addition, please watch the following video, which describes the nature of the peer review process—how submitted manuscripts get approved (or rejected) for publication in scientific journals.

<https://www.lib.ncsu.edu/tutorials/peerreview/>

**The Challenges:**

There are two challenges to the badge. When you have all the challenges completed, copy them into one Word or PDF document for submission.

**Challenge 1:**

The PDF titled “Room Temperature CO2 Reduction to Solid Carbon Species--Nature Communications” contains the published version of a recent peer-reviewed article in *Nature Communications* that has been annotated by numbering its parts. [*Nat. Commun.*, **2019**, *10*, 865. doi.org/10.1038/s41467-019-08824-8.] Read as much as you can reasonably understand to gain a general sense of what the report is about. Think about what type of information is contained in each of the main sections of the research article (abstract, introduction, results, discussion, methods, references).

After reading the article, answer each of the following questions (in your own words) and note which section(s) of the article and the paragraph number(s) where you found the information.

1. How many different research institutions were involved in the collaboration that produced this article? (ie. How many different universities do the authors come from?)

2. What were the main goals of the research?

3. Why is this research important?

4. What are the most significant outcomes of the research?

5. There is no “conclusions” section in this article. Where have the authors summarized their work and provided possible future directions?

6. The “methods” section of this paper is toward the end of the article. Why do you think this is the case? Where else do the authors describe how they conducted their experiments?

7. The article mentions “supplementary figures.” How many pages of supplementary data are provided with this article? Describe how you accessed this information.

**Complete Challenge 1 before beginning Challenge 2.**

**Challenge 2:**

Below are links to two summaries of the work in the *Nature Communications* article: a short summary article from the journal *Science* and a science podcast interview with one of the authors of the original research article. These summaries are targeted at a broader “science curious” general audience, rather than at professional scientists or experts in the same research field.

Summary article from *Science*: <https://www.sciencemag.org/news/2019/02/liquid-metal-catalyst-turns-carbon-dioxide-coal>

Researcher interview from The Naked Scientists podcast: <https://www.thenakedscientists.com/articles/interviews/technique-turns-carbon-dioxide-back-coal>

Read each of the summaries (there’s also audio for the podcast) and then answer the following questions.

1. Compare what you read in *Nature Communications* article to the summary from *Science* and the podcast interview. Based on what you read, is each of these summaries a good representation of the original research article and the potential importance of this research? Why or why not?

2. Having read the summaries, do you now understand the original journal article better? If so, what aspect of the original article do you now understand? If not, what kind of explanation do you think would have been helpful to include in the summaries?

3. The *Science* summary mentions a previously published article reported in *Nature Chemistry* in 2017. Do the authors of the *Nature Communications* paper cite this earlier article? In which part of the article do you think you would reference this earlier work?