Primary Literature Identification (Sciences)

- Primary Research Literature
- Peer Review
- What's Not a Primary Research Article?

This handout specifically addresses Primary Sources in Science. For information about locating Scholarly and Peer-Reviewed journals in general, see Identifying Scholarly Journals.

Primary Research Literature

In the sciences, primary literature reports on research conducted by the authors.

When you see an article in a scientific journal, there are several clues that it is primary literature. The most important clues are 1, 2, 4, and 5 below.

1. The authors are identified.

   ![Biological Conservation](https://www.elsevier.com/locate/biocon)

   Community and ecosystem consequences of giant knotweed (*Polygonum sachalinense*) invasion into riparian forests of western Washington, USA

   [Lauren S. Urgenson, Sarah H. Reichard, Charles B. Halpern.
   *College of Forest Resources, University of Washington, Box 352 100, Seattle, WA 89185-2100, USA
   *University of Washington Botanic Gardens, Box 3541 15, Seattle, WA 89185-2100, USA]

   **Abstract**

   The invasive, non-native herb, giant knotweed (*Polygonum sachalinense*), is becoming common in riparian corridors throughout North America and Europe. Despite its prevalence limited study of its ecological impacts. We investigated the effects of knotweed invasion and diversity of forest understory plants, and the quantity and nutrient quality in riparian forests in western Washington, USA. Among 39 sampling locations, knot

2. The authors’ affiliations are identified. These are usually universities or scientific institutions.

   ![Biological Conservation](https://www.elsevier.com/locate/biocon)

   Community and ecosystem consequences of giant knotweed (*Polygonum sachalinense*) invasion into riparian forests of western Washington, USA

   [Lauren S. Urgenson, Sarah H. Reichard, Charles B. Halpern.
   *College of Forest Resources, University of Washington, Box 352 100, Seattle, WA 89185-2100, USA
   *University of Washington Botanic Gardens, Box 3541 15, Seattle, WA 89185-2100, USA]

   **Abstract**

   The invasive, non-native herb, giant knotweed (*Polygonum sachalinense*), is becoming common in riparian corridors throughout North America and Europe. Despite its prevalence limited study of its ecological impacts. We investigated the effects of knotweed invasion and diversity of forest understory plants, and the quantity and nutrient quality in riparian forests in western Washington, USA. Among 39 sampling locations, knot

3. Sometimes the abstract shows evidence that the article is about the author's own research:
4. **The authors explain how they did their research.** Look for a “Methods,” “Materials and Methods,” or “Experimental” heading within the article. In shorter articles, often called brief reports, short communications, or letters, there won't be any internal headings but if you read carefully, you will find a brief explanation of how the authors did their research.

   **2. Methods**

   2.1. Study species

   Giant knotweed (*P. sachalinense* F. Schmidt ex Maxim) is one of three closely related congeners that include Japanese knotweed (*P. japonicum*) and Korean knotweed (*P. orientale*).

5. **The authors report their findings.** Look for a “Results” heading within the article.” In shorter articles, often identified as brief reports, short communications, or letters, there won’t be any internal headings, but if you read the article you will find that the authors report their findings.

   **3. Results**

   3.1. Abundance and richness of understorey plants

   Knotweed stem density ranged from 0.0 to 8.8 stems m$^{-2}$ (mean of 3.1 stems m$^{-2}$) among transects (Table 1). Multiple regression models yielded significant negative relationships between knotweed stem density and each of the understory species:

6. **The authors identify the references they used as background for their research.** Science advances by building on previous research, and it's important to acknowledge the work that has gone on before. Note that secondary literature, such as review articles also have references. (For more on review articles, see What’s Not a Primary Research Article below.) However, the absence of any references is a strong clue that you are not looking at a primary article.

   **References**


7. **Primary articles often contain graphs and tables.** However, secondary literature, such as review articles may also have graphs and tables.

**Peer Review**

Primary articles are often peer reviewed (sometimes called “refereed”). However, secondary literature, such as review articles may also be peer reviewed.

**Peer review** means that the article was read and critiqued by other experts on the topic at the request of the editor of the journal. Often the peer reviewers will ask for clarifications or changes to the article. Once the authors have completed their revisions, the article is accepted. You can often determine that an article is peer reviewed by looking at the article for the date received and the date accepted or date published. The article
was peer reviewed in the interval between those dates.

- Sometimes the indication appears **just below the authors and affiliations**.

**Evidence for massive clonal growth in the invasive weed *Fallopia japonica* (Japanese Knotweed)**

MICHELLE L. HOLLINGSWORTH*

Royal Botanic Garden, 20A Inverleith Row, Edinburgh, EH3 5LR

JOHN P. BAILEY

Biology Department, University of Leicester, University Road, Leicester, LE1 7RH

Received December 1999; accepted for publication May 2000

- Here's another possibility for indication of peer review **near the start of an article**:

*Community and ecosystem consequences of giant knotweed (*Polygonum sachalinense*) invasion into riparian forests of western Washington, USA*

Lauren S. Urgenson*a,*, Sarah H. Reichardb,*, Charles B. Halpernc

*aCollege of Forest Resources, University of Washington, Box 352100, Seattle, WA 98195-2100, USA

*bUniversity of Washington Botanic Gardens, Box 354115, Seattle, WA 98195-1115, USA

**ARTICLE INFO**

- Sometimes the peer review information is at the **bottom of the first page** of the article:

**ABSTRACT**

The invasive, non-native herb, giant knotweed (*Polygonum sachalinense*), is becoming problematic in riparian corridors throughout North America and Europe. Despite its prevalence, its effects on ecosystems and riparian vegetation have not been well-studied. A review of the literature suggests that the invasive species affects vegetation through competition, niche displacement, and resource distribution. The species reduces native plant diversity and alters ecosystem processes, including nutrient cycling and water availability.


- Sometimes it is **at the end of the article** after the references:
Even if you cannot find any dates, the journal could be a peer reviewed journal. Try entering the journal title into Google. The publisher's website for the journal is usually among the first several results. Publishers are proud to publish peer reviewed journals and will usually indicate peer review in their websites. Look for links like "About this Journal," or "Librarian information." Here's an example:

What's Not a Primary Research Article?

- News reports about research—though the report may have information you can use to find the primary research article.
- Encyclopedia articles—never report original research.
- Review articles. These are surveys of the literature on specific topics that summarize and explain the research of others and/or the previously published work of the authors, and are considered secondary sources. They often look very similar to primary research articles, but they are not. Here's how to tell:
  - No "Methods," "Materials and Methods," or "Experimental" section or details. (Compare to #4 in the section on primary research articles above.)
  - No "Results" section or details. (Compare to #5 in the section on primary research articles above.)
  - The authors reference other sources throughout the paper. (In primary research articles, most references to others' work are generally confined to the introduction and discussion sections.)
- Databases like Science Direct may indicate review articles.

**Review Article**

Adaptive evolution in invasive species

Trends in Plant Science, Volume 13, Issue 6, June 2008, Pages 288-294
Peter J. Prentis, John R. U. Wilson, Eleanor E. Dormontt, David M. Richardson, Andrew J. Lowo

**NOT a primary research article.**

Natural products in crop protection

Biorganic & Medicinal Chemistry, Volume 17, Issue 12, 15 June 2009, Pages 4022-4034
Franck E. Dayan, Charles L. Cantrell, Stephen O. Duke

**A primary research article.**

Journals may highlight review articles. Look for a header on the first page of the article.
Sometimes the article title contains the word review:

A review of the biology and ecology of three invasive perennials in New York State: Japanese knotweed (Polygonum cuspidatum), mugwort (Artemisia vulgaris) and pale swallow-wort (Vincetoxicum rossicum)

Leslie A. Weston¹,³, Jacob N. Barney¹ & Antonio DiTommaso²
¹Department of Horticulture, Cornell University, Ithaca, NY, 14853, USA. ²Department of Crop and Soil Sciences, Cornell University, NY 14853, USA. ³Corresponding author*

Received 13 December 2004. Accepted in revised form 1 March 2005

Sometimes the abstract or summary mentions that the article is a review:

Summary

Interactions between plants and soil biota resist invasion by some nonnative plants and facilitate others. In this review, we organize research and ideas about the role of soil biota as drivers of invasion by nonnative plants and how soil biota may fit into hypotheses proposed for invasive success. For example, some invasive species benefit from being introduced into regions of the world where they encounter fewer soil-borne enemies than in their native range. Other invasives encounter the opposite. In this review, we organize research and ideas about the role of soil biota as drivers of invasion by nonnative plants and how soil biota may fit into hypotheses proposed for invasive success. For example, some invasive species benefit from being introduced into regions of the world where they encounter fewer soil-borne enemies than in their native range. Other invasives encounter the opposite. In this review, we organize research and ideas about the role of soil biota as drivers of invasion by nonnative plants and how soil biota may fit into hypotheses proposed for invasive success. For example, some invasive species benefit from being introduced into regions of the world where they encounter fewer soil-borne enemies than in their native range. Other invasives encounter the opposite.

Sometimes the information is found in the introductory section:

Evolutionary genetics of invasive species

Carol Eunmi Lee

The evolutionary genetics of invasive species has been relatively unexplored, but could offer insights into mechanisms of invasions. Recent studies suggest that the invasion success of many species might depend more heavily on their ability to respond to natural selection than on broad physiological tolerance or plasticity. Thus, these studies stress the importance of genetic architecture, selection upon which could result in evolutionary adaptations and possibly speciation. For instance, epistatic interactions and the action of a few genes could facilitate invasion success. These findings emphasize the utility of understanding the genetic and evolutionary processes that allow species to adapt and invade new environments.

Identifying primary research and peer review articles gets easier with practice. If you have questions about an article, just ask.

Ask a Librarian