Today...

- **Scientific Publication Cycle**
  - Scope/Purpose of Journals
  - Types of Articles
- **Review Articles**
- **Citation searching**
- **Patents**
Scientific Publication Cycle

The Scientific Publication Cycle

- Access Cycle
- Publications Cycle
- Knowledge Cycle
- Time Cycle

- No Access
- Limited Public Access
- Library
- Personal Web Pages

- Textbooks (Online)
- Lab Notebooks, Research Diaries
- Letters, Memo, Notes, Grant Proposals

- Popular Magazines, Books, Newspapers, Online & Electronic
- Popular" Magazines, Books, Newspapers, Online & Electronic
- Conference Proceedings, Magazines

- Develop Idea
- Research
- Present Research
- Conferences, Power, Proceedings, Magazines

- Popular, General
- Scholarly Articles in Journals
- Technical Reports, Dissertations, Theses, Research Papers

- Bibliographies, Guides to the Literature

- Indexes: Xerox, Agis, Basic, Life Sciences, Science Citation Index

http://www.lib.washington.edu/subject/environment/int220/pubcycle.jpg
Scope/Purpose of Journals

- All of science: Nature, Science, PNAS
- All of a discipline (chemistry): Journal of the American Chemical Society, New Journal of Chemistry, Angewandte Chemie
- Specialized area: European Journal of Mass Spectrometry, Photochemical and Photobiological Sciences, Heterocycles

Types of Articles

- **Original Articles/Papers** or **Research Articles/Papers**
  - Original research conducted by the authors; “From the lab notebook to the page;” Usually first appearance of the results; Often peer-reviewed

- **Letters** or **Communications**
  - Short (usually) and sweet articles that discuss important findings; Not as detailed as a research article; Published quickly; May be more theoretical

- **Reviews**
  - Summarizes a particular topic over time – recent trends, advances in the field, evolving theories, etc.; Many articles are cited in support; No original research is communicated; Like a lengthy introduction or background section of an article

- **News**
  - Discusses events in industry or academia; May mention specific articles; Very brief; May be written by non-scientists.
Letters or Communications

- Accounts of Chemical Research
- ChemComm (Chemical Communications)
- Inorganic Chemistry Communications
- Organic Letters
- Tetrahedron Letters

Reviews

- Annual Review of Biochemistry
- Applied Spectroscopy Reviews
- Chemical Reviews
- ChemSocRev (Chemical Society Reviews)
- Critical Reviews in Analytical Chemistry
News (Trade Publications)

- Chemical and Engineering News
- The Chemical Engineer
- Chemistry in Australia
- Chemistry World
- Chemistry and Industry

Review Articles
If you were not familiar with the topic, where would you start?

**Research articles on “density functional theory”**
- Time-dependent density functional theory study on electronic excited states of the hydrogen-bonded solute-solvent phenol-(H₂O)(n) (n=3-5) clusters
- Density Functional Theory Modeling of the Proposed Nitrite Anhydrase Function of Hemoglobin in Hypoxia Sensing
- Density functional theory study of La₂Ce₂O₇: Disordered fluorite versus pyrochlore structure
- Ti(N) Decoration of Single-Wall Carbon Nanotubes and Graphene by Density Functional Theory Computations

If you were not familiar with the topic, where would you start?

**Review articles on “density functional theory”**
- Density functional theory for predicting polymeric forces against surface fouling
- Calculation of Magnetic Circular Dichroism Spectra with Time-Dependent Density Functional Theory
- Recent Developments in Classical Density Functional Theory
- Dispersion interactions in density-functional theory
- Time-dependent density-functional theory for molecules and molecular solids
Finding Background Information: Review Articles

- Provides another way to find articles (extensive bibliographies and additional keywords)
- Condenses unfamiliar (and familiar) topics into a more readable format
- Helps narrow down your topic by finding an area to focus your research
- Good place to start if you have not been given anything

Finding Review Articles...

- Use “Refine” features in Web of Science or SciFinder after you put in your keywords or author.
How do you **usually** use a bibliography or list of references?

**Traditional search**

1998 paper

1982 paper

1957 paper
How does cited reference searching work?

Cited reference search

- A way to track research concepts forward in time
- Identifies related topics and papers, regardless of “keyword” indexing
- Identifies other areas of research where a concept or theory is being applied or discussed
Question

- What other problems or issues might you have if someone simply stated, “My article has been cited over 100 times”?

Citation indexing: Problems

- Is someone citing it because it is good or bad?
- People can cite themselves (self-citation) or their boss— inflating the numbers
- Databases cannot cover all publications—not a “true” count. (Will see this in WoS and SciFinder.)
- Foreign authors may be cited more in foreign publications—missed citations
Web of Science:
Built for Citation Searching

http://purl.lib.purdue.edu/db/db257

A full record in Web of Science...

Palladium-catalyzed alkylnylation

Author(s): Negishi, E. (Author), Watanabe, L. (Author)

Source: CHEMICAL REVIEWS Volume: 103 Issue: 5 Pages: 1979-2017 DOI: 10.1021/cr200377i Published: MAY 2003

Times Cited: 487 (from Web of Science)

Cited References: 279 [view related records] [compiled Citations Map]

Document Type: Review

Language: English

Keywords Plus: CROSS-COUPLED REACTION, CARBON BOND FORMATION, TRANSITION-METAL CATALYSIS, STEREODEFINED EXOCYCLIC ALKENES, ESPERIMEN CALCINOLOGY CLASS, STEREOSELECTIVE GROUP TRANSFER, HIGHLY SELECTIVE SYNTHESIS, ORGANO-ALUMINUM COMPOUNDS, ACETYLENIC REAGENTS, AMID CAPTURE PROCESSES

Reprint Address: Negishi, E (reprint author), Purdue Univ, Herbert C Brown Lab Chem, W Lafayette, IN 47907 USA

Address(es):
1. Purdue Univ, Herbert C Brown Lab Chem, W Lafayette, IN 47907 USA

Publisher: AMER CHEMICAL SOC, 1155 16TH ST, NW, WASHINGTON, DC 20036 USA

Web of Science Category: Chemistry, Multidisciplinary

Subject Category: Chemistry

ID Number: 679KY

ISSN: 0009-2690

...Times Cited and References
Can sort search results by times cited...

Narrowing or analyzing results...

...Analyze and Refine
Analyze feature

- Make sure the records you have are within the limits chosen to be analyzed.

Citation searching on SciFinder Scholar

- Similar to WoS, but limited to citing articles published since January 1, 1997

- Note: Citation search results can vary widely for papers in “crossover” disciplines, so search in both databases for post-1996 articles!
Citation Searching in SciFinder:

- To find who has cited an article since its publication, choose the article or articles you want, then choose “Get Related” → “Get Citing.”

Cited vs. Citing

- **Get Cited** references = items in the article bibliography (older articles)

- **Get Citing** references = items that cite the article you are interested in (newer articles)

Note: The “Citing references” choice corresponds to the WoS “Cited Reference” search
Analyzing Review Articles

- Can leave search results sorted by date (newest first) to find the latest review articles on your topic

  Or

- Can sort by times cited to find the most influential review articles, regardless of date

Patents
Why are patents important?

- Nearly 17% of the records in SciFinder are patents
- Most information in patents is not published elsewhere
- Patents must meet requirements for Novelty, Usefulness, and Non-obviousness
- Help avoid duplication in R&D
- Maintain current awareness
- Monitor competition
- etc.

Why do we need to search patents?

- Often patents are the only documents for the R&D activities of a company
- If you are going to work in the chemical industry, your job may depend on your knowing about patents!

<table>
<thead>
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<th>SciFinder Pubs.</th>
<th>Pfizer</th>
<th>3M</th>
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What are some limits to patents?

- No experimental proof of prototypes or proof of chemicals actually tested or synthesized—“paper patents”
- Many patents might be invalidated if challenged
- Classification system is difficult to navigate
- Titles can be very short and simple; not easily describing the invention
- In terms of chemical structures, patents may be too general (use of Markush groups)

Patentability of an invention

- In order to be patentable, an invention must be:
  - **Novel**: The invention in its entirety must not have been known or used before
  - **Useful**: The invention must be fit for some desirable practical purpose.
  - **Non-obvious** in light of the prior art; not apparent to someone with “ordinary skill in the art”
Is every invention/innovation published via patents?

- No, the other route is *trade secrets*.
- If not disclosed, they do not have the time limitations.
- So, if not disclosed, the information is not available!
- Can keep it secret indefinitely, but…
  - Depends on confidentiality
  - Can be reverse engineered

Three Types of Patents

- **Utility** patents. For new and useful processes, machines, articles of manufacture, compositions of matter, or any useful improvements thereof. (xxxxxxx) (20 yrs) (*chemical patents usually are utility patents*)

- **Design** patents. For new, original, and ornamental design for an article of manufacture. Protects only the appearance, not structure or utilitarian features. (Dxxxxxx) (14 yrs) (*Examples: iPod case; Koosh ball design*)

- **Plant** patents. For invention, discovery or asexual reproduction of distinct and new varieties of plants. (PPxxxxx) (20 yrs)
Example of a Utility Patent

- **US Patent 6,934,812**
- **Title:** Media player with instant play capability

Example of a Design Patent

- **US Patent D506,476**
- **Title:** Media Device
Other features of chemical patents

- Markush groups
- Variable points of attachment

What if I patent the Prozac molecule?
And then someone else finds the same pharmaceutical activity by simply adding another methyl group?

Markush groups in chemical patents

The intent is to cover as many variations as possible in patented chemical structures by (a) designating one or more generic groups attached to the core molecular structure or by (b) designating variable points of attachment to the core (or both).
Markush Groups in Patents

\[ R^1 = \begin{array}{c} \text{OR}^3 \\ \text{R}^3 \end{array} \quad \text{or} \quad \begin{array}{c} \text{OR}^3 \\ \text{R}^3 = \text{alkyl} \end{array} \]

Variable Points of Attachment (VPA)

\[ R = \text{Cl} / \text{Br} / \text{F} / \text{I} \]

may retrieve

\[ \text{Cl} \quad \text{Br} \quad \text{X} \]
Patent 5,866,572

The invention concerns quinazoline derivatives of the formula I,

wherein $X'$ is a direct link or a group such as CO, C($R^2$)$_2$ and CH(O$R^3$); wherein $Q'$ is phenyl, naphthyl or a 5- or 6-membered heteroaryl moiety and $Q'$ optionally bears up to 3 substituents; wherein $m$ is 1 or 2 and each $R^2$ may be a group such as hydrogen, halogeno and trifluoromethyl; and wherein $Q''$ may be phenyl or a 9- or 10-membered bicyclic heterocyclic moiety and $Q''$ optionally bears up to 3 substituents; or a pharmaceutically-acceptable salt thereof; processes for their preparation, pharmaceutical compositions containing them and the use of their receptor tyrosine kinase inhibitory properties in the treatment of proliferative disease such as cancer.

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- **Importance of:**
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  - Citation searching
  - Patents
Questions, help, problems?

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http://guides.lib.purdue.edu/chm494