

# **A Prospective View of Citation Indexing and Information Retrieval In the 21<sup>st</sup> Century**

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About five years ago, I addressed this chapter of ASIS&T about the future role of the information scientist.<sup>1</sup> But tonight I want to talk to you about my past career as an information scientist.

In the 1950s, research scientists typically scanned a dozen or so journals they personally received, including abstracting journals like *Chemical Abstracts* or *Biological Abstracts*. Most visited libraries regularly where they could scan the latest journals. In those days, journals were much more affordable. Ironically, a survey of the local American Chemical Society by Russ Ackoff in Philadelphia found that the average member subscribed to more journals than they read. Russ Ackoff also found that half of the papers in core journals will be read by 1% or less and no report is likely to be read by more than 7%.<sup>2</sup> However, that data is now 35 years old.

It was the time of the reprint culture.<sup>3</sup> Authors exchanged reprints generously. It was not unusual to mail reprints regularly to one's "invisible college." The now ubiquitous Xerox machine was not yet widely available and photostats were expensive and cumbersome. In those days it was common for journals to be circulated to the company research staff. When this became too cumbersome, many libraries circulated contents pages. This eventually led to the birth of *Current Contents*. In those days, correspondence by snail mail was the norm, as was the use of printed indexing and abstracting services. The pace of research and publication was significantly slower. Once published, however, the time to deliver journals and reprints, including transatlantic steamship delivery was rather quick. Rudi Schmid, University of California, Berkeley, described the remarkable speed of intercontinental and transcontinental mail transit times from Europe to California from 1852 to 1941.<sup>4</sup> While it has been modernized in many respects,

the postal system was considered somewhat archaic. After World War II, the introduction of telephone, fax, and then email enforced that impression. Nevertheless, most print journals still use snail mail for domestic distribution but air-cargo services are used for international distribution.

Online access to indexing and abstracting services was introduced in the 70s. For example, *SSCI* was file number 7 in 1972. Twenty-five years later, full-text journal articles began to appear on-line. Now they are provided routinely. The integration of the journal literature with A&I services through linking services presents a completely transformed situation. Readers are now almost instantly accessing journal contents pages, abstracts, and full text. You can browse the current literature on-line and, in real time, go backward and then forward again into related documents via cited references. As full-text archives increase their chronological scope, you will be able to search and peruse the literature without ever entering the library, if you are a researcher at an institution that covers the costs of these capabilities.

Ancillary to these developments is the issue of digital libraries, open access, as well as individual and institutional archiving. Today we can access a significant part of the last decade of the literature electronically. In five to ten years, this will extend to much of the significant journal literature of the twentieth century, that is, the 1,000 or more most-consulted and higher impact journals. These journals account for over 80% of the literature cited. The cost of conversion of full texts of several million articles from back runs of legacy journals will not be trivial, but there is evidence libraries are willing to support these costs as was demonstrated by the successful launch of JSTOR and other legacy projects. To supplement these efforts, Dana Roth at Caltech and I have discussed the idea of creating files of perhaps ten to thirty thousand of the most-cited papers.<sup>5</sup> While many of the highest impact journals of science are currently available, electronically complete archives are relatively rare. Many of the most-cited journals identified by ISI's *Journal Citation Reports*<sup>®</sup> are electronically accessible if your library has electronic site licenses. I find that Drexel or Penn can help me find a large percentage of my needs for current and back issue journals.

An alternative interim step is to use email to contact authors for access to articles not yet available on the web. Papers often can be found on the author's personal home page. This type of self-archiving is key to Steve Harnad's idea of open access. He wants each institution to assume that responsibility but creating digital libraries of faculty papers is a formidable task. In the meantime, it would be enormously helpful if university web sites provided a standardized means of locating not only faculty email addresses, but also their CV's and publication lists. These would include bibliographies and include up-to-date URLs for the papers and books listed. It is significant that *Current Contents* and the *Web of Science* now include author email addresses which is a logical extension of the address directories *Current Contents* provided from 1960 until the present.

The creation of large digital libraries seems inevitable, since technology and outsourcing continue to reduce the cost of conversion from paper. Large-scale conversions to PDF files are possible at costs from 5 to 50 cents per page.

Whatever the cost, there is a separate issue when discussing free access to the public. Clearly, there is a tacit desire to archive everything that has been published – perhaps 50 to 100 million papers and books. In the meantime, as long as we have a situation that is half-electronic and half-paper, authors will provide equally half-baked retrospective coverage of the literature. Authors take the path of least resistance. For some younger authors if it is not electronic, it does not exist.

The announcement of Google Scholar in cooperation with Stanford and other universities will do for arts and humanities scholars what full text links for journal articles have accomplished.

### **Searching Full Text**

While alerting and SDI services were available 40 years ago, it is now rather routine for publishers to announce forthcoming articles electronically. This can significantly reduce the time between actual publication and citation by others. The time lag between submission and publication of articles is rapidly diminishing as is the work of preparing and editing manuscripts. The need to standardize formats for electronic documents is evident as is the desire to standardize electronic manuscripts per se. One can rely on the services of Reference Manager or other citation management systems to produce articles and citations in any journal style required without having to completely retype manuscripts. These systems have increased the efficiency of producing original manuscripts. Furthermore, the increased use of personal web pages displaces the need to go directly to the library for a lot of archival material. Like other authors, I have "self-archived" most of what I have published in my career. Howard Lenhoff suggested that retired scholars do this systematically, and even include the work they have not published.<sup>6</sup> I estimate this would cost the average well-published author about \$5,000. BioMedCentral now offers universities a service for doing this with current material. It could easily be extended to archival stuff.

But we could do much more to take advantage of the new technologies. It should be routine for editors to be able to feed bibliographies in manuscripts into a database to verify the accuracy of every paper or book reference cited, thus reducing the annoying typos and other errors that do occur. Right now this has to be done one reference at a time and perhaps five to ten percent of citations have errors or typos depending upon how you define an error.

The time consuming process of refereeing has been improved. Using electronic access facilitates the paperwork involved. Email receipt of PDF or Word manuscripts provides a stimulus to potential referees to act promptly. Eliminating snail mail makes the process less costly, and thereby increases the number of referees one can consult. But the situation is not perfect, I recently experienced when we could not read the illustrations in a PDF manuscript, necessitating the use of snail mail.

### **Sending Full Texts**

Searching full texts of documents presents new and interesting problems. Information scientists have been studying full-text searching for fifty years. John O'Connor was one of the pioneers.<sup>7</sup> Early on he recognized the need to create artificially intelligent searching systems. Personal experience with large-scale files, including even my own, demonstrates the blessings and the dilemmas of full-text searching. For the rare word or phrase, it can be extremely efficient. For the frequently occurring term, it can be highly frustrating. Twentieth-first century users will demand more sophisticated methods for refining full-text searches. Google does not really solve the problem. I have experienced this lately both with my own website and a new one covering 4,000 Citation Classics ([www.citationclassics.org](http://www.citationclassics.org)). Google and other search engines do not display results in a manner that is conducive to quick selection unless the output is limited.

Regardless of the search engine used, the speed of access to electronic files is crucial to their effective use. If you must wait 20 seconds to display the context of a retrieved document, then scanning a large list retards the process of information recovery. I experience the elation and frustration of full-text when I use the Verity system to search my own publications. To take full advantage of its word-for-word indexing, I need to be able to instantly pop up the context in which the term occurs, not just the title of the paper in which it is contained. This is possible with CiteSeer, the autonomous citation index developed by Steve Lawrence et al.<sup>8</sup> I imagine that future Google searching will take advantage of his experience since he left NEC in Princeton to work for them. The recent announcement of Google Print is a harbinger of that.

### **SDI Profiling and Clipping Services**

Many years ago, I wrote a letter to the *New York Times* about push-pull technology. It was not published in the *Times* but did appear in a paper I published in *JASIST*.<sup>2</sup> I can not take the time to read the letter. The key point was that in 1965 Irv Sher and I published a paper on the *Automatic Subject Citation Alert*, the first commercially available computer-based system for selective dissemination of information (SDI).<sup>9,10</sup>

While newspaper and magazine clipping services have existed since the beginning of the last century, the *ASCA* personal alerting system for the first time dealt with the huge body of scientific and scholarly literature. Personal alerting services have not proven to be a howling financial success. They can only survive as by-products of systems that derive their success from searching.

Thirty-five years after launching *ASCA*, it is difficult to estimate the extent to which SDI is used. I see minimal evidence of this in academia. Certain institutions like Stanford have made it popular by using the ISI database in combination with SDI software developed by Los Alamos National Laboratory. Information professionals have an important educational task to make users "profile" conscious so that they will embrace these SDI systems. In particular, they must learn to take full advantage of citation as well as keyword profiling. While not called citation profiling, this capability has been incorporated in the Highwire system.<sup>11</sup> For each new article one encounters, the user can automatically include its citation as part of an alerting profile. And most of you are aware of the now ubiquitous Google and Yahoo news alerts.

### **Foreign Language Translation**

A significant amount of interesting literature is still published in foreign languages. The ability to use on-line translation dictionaries facilitates the ability to read foreign language material. Using pop-up windows to translate individual words or phrases, much as one uses a spell checker, can be extremely time saving. Given a real-time word-for-word look-up system, I can read or scan most papers in German, Spanish, or French with minimum difficulty. A great deal of editorial comment is still expressed in foreign languages so this translation capability is important to those who wish to take into account opinions expressed by foreign authors.<sup>12</sup> Foreign editors should take advantage of these translation facilities to produce online multi-lingual versions of their editorials and articles since there is not the serious space limitation as with print.

As a final thought on the matter of machine translation, the work of Watters & Patel, among others, indicates that Systran leaves much to be desired.<sup>13</sup>

### **Information Nirvana**

In the early days of my career, I referred to the coming information nirvana.<sup>14</sup> This was yet another metaphor for the *World Brain* of H.G. Wells and the dreams of the early encyclopedists. Each new generation of information technology advancements brings with it a need for new refinements.

The notion of the automatic review of the literature has been in the minds of information scientists for a long time. Whether we can ever obtain artificially intelligent literature reviews, remains to be seen. Displaying lists of citations surrounded by contextual text is just one step in that direction.<sup>15</sup> For this reason, the interpretive role of information scientists, especially in pharmaceutical companies is still essential. Automatic or computer assisted reviewing, if it ever arrives, will simply make them more productive.

Research scientists, especially in the life sciences, need to parse scientific documents so that key phrases used in various combinations can lead to interesting correlations. Sher used phrase analysis to create Keywords Plus.<sup>16</sup> This sort of parsing is common to computational linguistic programs. New systems of

artificial intelligence will facilitate the indexing needed in evaluative medicine or bioinformatics. The pharmaceutical and biotechnology industries are now dependent upon a whole new sub-industry involving structure-function determination and correlation.

As mentioned earlier, the pioneer in discussing this type of a posteriori intelligence was John O'Connor. The intelligent automaton, even if a document never mentions the word toxic or toxicity, should be able to conclude that it concerns an aspect of toxicity.<sup>7</sup>

Another expression of the AI challenge is implicit in the distinction I made in 1965<sup>17</sup> between an automated system of compiling citation indexes, and a system which is able to read a text and supply relevant cited references. An experiment with a group of graduate students, demonstrated that the need for a cited reference in a text is perceived quite differently depending upon the reader's experience and sophistication. Given a paper I had published in the *Journal of Chemical Documentation*,<sup>18</sup> the students were asked to insert a mark wherever they thought a reference was needed. The number of references per document recommended varied from 15 to 75, but averaged about 35 which in fact was close to what I had actually used.<sup>19</sup>

From the preceding remarks, it will not be surprising that I hold in high esteem the work of Don Swanson in attempting to create an artificially intelligent agent for generating correlations between disease elements and potential therapies.<sup>20,21</sup>

All such experiments emphasize the unique role played by the critical review in the progress of science. This role is needed increasingly even as we gain easier access to the primary literature. It is the aposteriori use of the literature that paves the way to discovery. That is what the IR game is all about. Information systems should facilitate the process of making new connections. In the meantime, human, mainly laboratory-based researchers, continue this creative process of reviewing. Organizations like *Annual Reviews*, *Nature Reviews*, *Trends* journals, and others already provide a rich supply of such reviews. The huge output of review articles and their high impact demonstrates, I believe, their value to the scientific community.

Leo Fleming (Harvard) and Olav Sorenson (UCLA) have recently referred to this inventive process as combinatorial.<sup>22</sup>

Twenty years ago, ISI and *Annual Reviews* established the National Academy of Sciences Award in Recognition of this role.<sup>23</sup> However, the nature of scholarly reviews is undergoing change in two directions. The minireview is now quite popular but at the same time, even larger more comprehensive reviews are appearing sometimes in the form of mini-databases.

Perhaps the most significant advance in reviewing has been made by the Cochrane Collaboration Centers which form the basis for modern evidence-based medicine.<sup>24</sup> The success of those enterprises may now be applied to other fields besides medicine as e.g. the new Campbell Collaboration to judge outcomes in social engineering.<sup>25</sup> For those interested, please contact Robert Boruch at the University of Pennsylvania ([robertb@gse.upenn](mailto:robertb@gse.upenn)). Electronic journals and databases will aid these systems of synthesis and should significantly reduce publication bias since space in on-line journals will not be a limiting factor.<sup>26</sup> All necessary backup data, even for negative results, can now be stored electronically. This has recently been highlighted in the press by the consortium of medical journal editors.<sup>27</sup> Those of you in Pharma will know exactly what I mean.

### **Information Discovery and Recovery**

This leads to the following observation. Information retrieval concerns both information discovery and information recovery.<sup>28,29</sup> While closely related, the latter process of information recovery should approach perfection in the years to come. We should rarely have difficulty in recovering papers we have encountered in the past. Information discovery systems, however, will remain a daunting challenge for decades to come since they involve the injection of human intelligence difficult to match in AI systems. Recognizing how long it has taken to reach the present state of the art, I doubt that many of us will still be here when these breakthroughs occur.

In the meantime, I have tried to make a further dent in this process. As I described earlier today, the ability to select the significant literature from a large mass of retrieved documents is essential to this process including the ability to provide reviews that are not only topically but also historically correct. For those of you who are not yet

familiar with *HistCite*, I refer you to my web page on algorithmic historiography: (<http://garfield.library.upenn.edu/algorithmichistoriographyhistcite.html>)

However, for this occasion, I prepared a special search on the subject of mononucleosis which happened to be on my mind at the time.

The first step is to do a search in the *Web of Science*. Suppose you want to review the present literature on this topic.

### SLIDE 1: WOS SEARCH

**Web of Science®**

WELCOME ? HELP CITED REF SEARCH STRUCTURE SEARCH SEARCH HISTORY ADVANCED SEARCH

General Search >> [View your search history/combine sets](#)

CHANGE SETTINGS

**Selected database(s) and timespan:**  
Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1990-2004  
Enter terms or phrases separated by the operators AND, OR, NOT, or SAME, and then press SEARCH.  
The search will be added to the search history. [[>> View your search history](#)]

SEARCH CLEAR

**mononucleosis**

**TOPIC:** ⓘ Enter one or more terms. Searches within article titles, keywords, or abstracts.  
*Example:* neural network\* AND ozone ([More examples](#))

mononucleosis ☒ Title only

**AUTHOR:** ⓘ Enter one or more author names (see [author index](#) ⓘ).  
*Example:* O'BRIAN C\* OR OBRIAN C\*

**GROUP AUTHOR:** ⓘ Enter one or more group names (see [group author index](#) ⓘ).  
*Example:* CERN

**SOURCE TITLE:** ⓘ Enter full journal titles (see [full source titles list](#) ⓘ).  
*Example:* Cancer\* OR Journal of Cancer Research and Clinical Oncology

**ADDRESS:** ⓘ Enter abbreviated terms from an author's affiliation (use [abbreviations help](#)).  
*Example:* Yale Univ SAME hosp

Restrict search by languages and document types:

All languages	All document types
English	Article
Afrikaans	Abstract of Published Item

SEARCH CLEAR

You conduct a standard keyword search and simply indicate you want to download the first 500 records.



## SLIDE 2: TEXT FILE OF WOS RECORDS

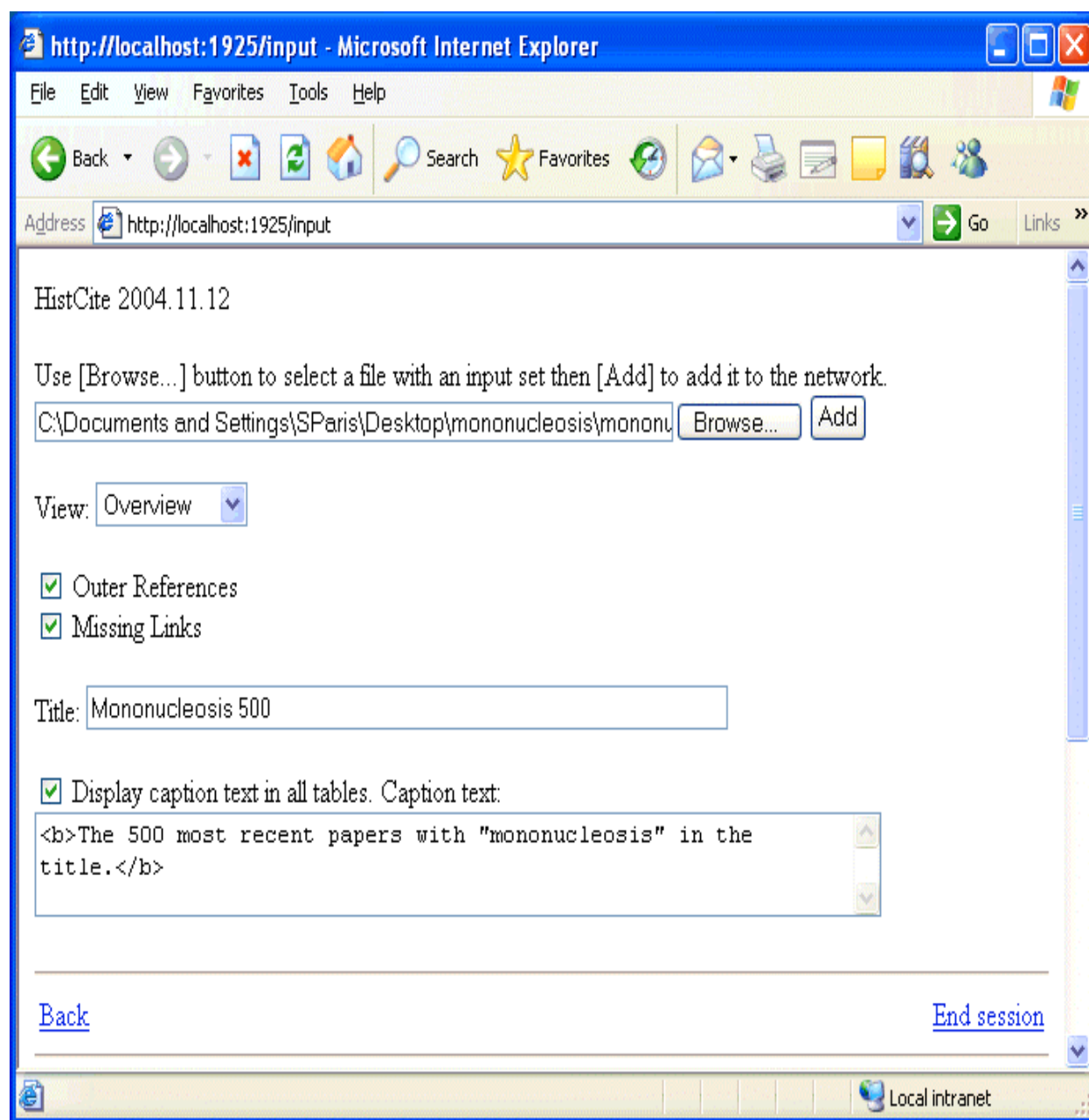
```

FN ISI Export Format
VR 1.0
PT J
AU Yoshie, K Ohta, M Okabe, N Komatsu, T Umemura, S
TI Gallbladder wall thickening associated with infectious
mononucleosis
SO ABDOMINAL IMAGING
LA English
DT Article
DE gallbladder; infectious mononucleosis; ultrasonography;
computed tomography
AB Acute infectious mononucleosis is a typical self-limited
  lymphoproliferative illness characterized by fever, tonsillar
  pharyngitis, and lymphadenopathy in adolescents and young
  adults.
  Thickening of the gallbladder wall is rarely observed. We
  report a case
  of infectious mononucleosis in which marked thickening of the
  gallbladder wall was detected by ultrasonography and computed
  tomography.
C1 Yugawara Kousei Nenkin Hosp, Dept Gen Internal Med, Kanagawa
2590396, Japan.
  Komatsu Clin, Kanagawa 2590314, Japan.
  Yokohama City Univ, Sch Med, Dept Internal Med 2, Kanazawa Ku,
  Yokohama, Kanagawa 236004, Japan.
RP Yoshie, K, Yugawara Kousei Nenkin Hosp, Dept Gen Internal Med,
438
  Miyakami, Kanagawa 2590396, Japan.
EM kyoshie@kd5.so-net.ne.jp
CR HAMMOND DI, 1987, J CLIN ULTRASOUND, V15, P558
  HOAGLAND RJ, 1975, PRIMARY CARE, V2, P295
  HORWITZ CA, 1983, MEDICINE, V62, P256
  ODOHOVAN N, 1996, POSTGRAD MED J, V72, P299
  SAINSBURY R, 1994, J PEDIATR GASTR NUTR, V19, P123
  YAMADA K, 2001, J CLIN ULTRASOUND, V29, P322
NR 6
TC 0
PD NOV-DEC
PY 2004
VL 29
IS 6
BP 694
EP 695
GA 858NV
UT ISI:000224199900012
ER

```

Once these are identified and a marked list created, a .txt file is exported in the ISI format.

**SLIDE 3: FIRST PAGE OF HISTCITE INTERFACE.**



The address for this saved file is used to start the *HistCite* process.

#### SLIDE 4: CHRONOLOGICAL FILE

Once the file is retrieved, *HistCite* generates the chronological file – in this case beginning with 1990 papers.

[Missing Links?](#) [Citation Matrix](#) [Graphs](#) [Glossary](#) [HistCite Guide](#) [About](#)

### 500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE


Nodes: 500, [Authors](#): 1834, [Journals](#): 253, [Outer References](#): 5094, [Words](#): 1240

Collection span: 1990 - 2004

View: Overview. Sorted by **year, source, volume, issue, page**.

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#### CHRONOLOGICAL

#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	0	0	 <a href="#">1</a> 1990 AMERICAN FAMILY PHYSICIAN 42(6):1599-1606 <b>AXELROD P; FINESTONE AJ</b> <i>Infectious-Mononucleosis in Older Adults</i>	<a href="#">7</a>	15
2	0	31	<a href="#">2</a> 1990 AMERICAN JOURNAL OF CLINICAL PATHOLOGY 93(5):698-702 <b>ABBONDANZO SL; SATO N; STRAUS SE; JAFFE ES</b> <i>Acute Infectious-Mononucleosis - CD30 (KI-1) Antigen Expression and Histologic Correlations</i>	<a href="#">2</a>	37
3	0	30	<a href="#">3</a> 1990 AMERICAN JOURNAL OF CLINICAL PATHOLOGY 93(6):776-783 <b>STEEPER TA; HORWITZ CA; ABLASHI DV; SALAHUDDIN SZ; SAXINGER C; et al.</b> <i>The Spectrum of Clinical and Laboratory Findings Resulting from Human Herpesvirus-6 (HHV-6) in Patients with Mononucleosis-Like Illnesses Not Resulting from Epstein-Barr-Virus Or Cytomegalovirus</i>	<a href="#">5</a>	91
4	0	15	<a href="#">4</a> 1990 AMERICAN JOURNAL OF CLINICAL PATHOLOGY 94(2):222-223 <b>RIDKER PM; ENDERS GH; LIFTON RP</b> <i>False Positive Mononucleosis Screening-Test Results Associated with Klebsiella Henatic-</i>	<a href="#">2</a>	4

			<i>Abscess</i>		
5	0	0	<a href="#">5</a> 1990 AMERICAN JOURNAL OF DISEASES OF CHILDREN 144(4):438-439 PRIMOS WA; LANDRY GL; SCANLAN KA <i>The Course of Splenomegaly in Infectious-Mononucleosis</i>	0	0
6	0	24	<a href="#">6</a> 1990 AMERICAN SURGEON 56(10):601-605 <b>SAFRAN D; BLOOM GP</b> <i>Spontaneous Splenic Rupture Following Infectious-Mononucleosis</i>	<a href="#">7</a>	20
7	0	0	<a href="#">7</a> 1990 ANNALS OF NEUROLOGY 28(3):461-462 <b>LAHAT E; ESHEL G; ARLAZOROFF A</b> <i>Alice In Wonderland Syndrome and Infectious-Mononucleosis in Children</i>	0	0
8	0	0	<a href="#">8</a> 1990 ANNALS OF NEUROLOGY 28(3):462-462 <b>ALI A</b> <i>Acute Autonomic Neuropathy Associated with Infectious-Mononucleosis</i>	0	0
9	0	8	<a href="#">9</a> 1990 ARCHIVES FRANCAISES DE PEDIATRIE 47(10):764-765 <b>MAY A; GAGNADOUX MF</b> <i>Nephrotic Syndrome Complicating Infectious-Mononucleosis</i>	<a href="#">1</a>	1
10	0	5	<a href="#">10</a> 1990 BRITISH JOURNAL OF OPHTHALMOLOGY 74(12):750-750 <b>ATKINSON PL; ANSONS AM; PATTERSON A</b> <i>Infectious-Mononucleosis Presenting As Bilateral Acute Dacryocystitis</i>	<a href="#">3</a>	4

**SLIDE 5: LCS SORT**

By clicking on LCS, or Local Citation Score, we see the most-cited papers in the local collection.

[Missing Links?](#) [Citation Matrix](#) [Graphs](#) [Glossary](#) [HistCite Guide](#) [About](#)

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View: Overview. Sorted by LCS.

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### LCS SORT

#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	<a href="#">2</a>	38	<a href="#">83</a> 1992 BLOOD 80(2):452-458 <b>UEHARA T; MIYAWAKI T; OHTA K; TAMARU Y; YOKOI T; et al.</b> <i>Apoptotic Cell-Death of Primed CD45RO+ LYMPHOCYTES-T in Epstein-Barr Virus-Induced Infectious-Mononucleosis</i>	<a href="#">17</a>	180
2	<a href="#">3</a>	31	<a href="#">230</a> 1996 JOURNAL OF INFECTIOUS DISEASES 174(2):324-331 <b>TYNELL E; AURELIUS E; BRANDELL A; JULANDER I; WOOD M; ET AL.</b> <i>Acyclovir and prednisolone treatment of acute infectious mononucleosis: A multicenter, double-blind, placebo-controlled study</i>	<a href="#">16</a>	34
3	<a href="#">2</a>	43	<a href="#">238</a> 1996 NATURE MEDICINE 2(8):906-911 <b>CALLAN MFC; STEVEN J; KRAUSA P; WILSON JDK; MOSS PAH; ET AL.</b> <i>Large clonal expansions of CD8(+) T cells in acute infectious mononucleosis</i>	<a href="#">16</a>	221
4	0	51	<a href="#">97</a> 1992 MAYO CLINIC PROCEEDINGS 67(9):846-853 <b>FARLEY DR; ZIETLOW SP; BANNON MP; FARNELL MB</b> <i>Spontaneous Rupture of the Spleen Due To Infectious-Mononucleosis</i>	<a href="#">15</a>	27
5	0	0	<a href="#">70</a> 1991 PEDIATRIC ANNALS 20(4):206-& <b>CHETHAM MM; ROBERTS KB</b> <i>Infectious-Mononucleosis in Adolescents</i>	<a href="#">14</a>	16
6	0	23	<a href="#">51</a> 1991 CLINICAL AND EXPERIMENTAL IMMUNOLOGY 83(3):447-451 <b>MIYAWAKI T; KASAHARA Y; KANEGANE H; OHTA K; YOKOI T; et al.</b> <i>Expression Of CD45R0 (UCHL1) BY CD4+</i>	<a href="#">12</a>	53

			<i>and CD8+ T-Cells As a Sign ff Invivo Activation in Infectious-Mononucleosis</i>		
7	<a href="#">4</a>	15	<a href="#">162</a> 1994 JOURNAL OF CLINICAL MICROBIOLOGY 32(1):259-261 <b>LINDERHOLM M; BOMAN J; JUTO P; LINDE A</b> <i>Comparative-Evaluation Of 9 Kits For Rapid Diagnosis Of Infectious-Mononucleosis And Epstein-Barr Virus-Specific Serology</i>	<a href="#">11</a>	19
8	0	15	<a href="#">92</a> 1992 JOURNAL OF LARYNGOLOGY AND OTOLOGY 106(11):989-991 <b>STEVENSON DS; WEBSTER G; STEWART IA</b> <i>Acute Tonsillectomy in the Management of Infectious-Mononucleosis</i>	<a href="#">10</a>	13
9	<a href="#">1</a>	23	<a href="#">188</a> 1995 BLOOD 85(3):744-750 <b>ANAGNOSTOPOULOS I; HUMMEL M; KRESCHER C; STEIN H</b> <i>Morphology, Immunophenotype, and Distribution of Latently and/or Productively Epstein-Barr Virus-Infected Cells in Acute Infectious-Mononucleosis - Implications for the Interindividual Infection Route of Epstein-Barr-Virus</i>	<a href="#">10</a>	105
10	0	15	<a href="#">66</a> 1991 JOURNAL OF INFECTIOUS DISEASES 164(4):788-792 <b>VANDERHORST C; JONCAS J; AHRONHEIM G; GUSTAFSON N; STEIN G; et al.</b> <i>Lack of Effect of Peroral Acyclovir for the Treatment of Acute Infectious-Mononucleosis</i>	<a href="#">9</a>	35

**SLIDE 6: GCS SORT**

By clicking on GCS, or Global Citation Score, we see the papers most-cited globally on mononucleosis in this brief. ??

[Missing Links?](#) [Citation Matrix](#) [Graphs](#) [Glossary](#) [HistCite Guide](#) [About](#)

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**GCS SORT**

#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	<a href="#">2</a>	43	<a href="#">238</a> 1996 NATURE MEDICINE 2(8):906-911 <b>CALLAN MFC; STEVEN J; KRAUSA P; WILSON JDK; MOSS PAH; ET AL.</b> <i>Large clonal expansions of CD8(+) T cells in acute infectious mononucleosis</i>	<a href="#">16</a>	221
2	<a href="#">2</a>	38	<a href="#">83</a> 1992 BLOOD 80(2):452-458 <b>UEHARA T; MIYAWAKI T; OHTA K; TAMARU Y; YOKOI T; et al.</b> <i>Apoptotic Cell-Death of Primed CD45RO+ Lymphocytes-T in Epstein-Barr Virus-Induced Infectious-Mononucleosis</i>	<a href="#">17</a>	180
3	<a href="#">1</a>	23	<a href="#">188</a> 1995 BLOOD 85(3):744-750 <b>ANAGNOSTOPOULOS I; HUMMEL M; KRESCHER C; STEIN H</b> <i>Morphology, Immunophenotype, and Distribution of Latently and/or Productively Epstein-Barr Virus-Infected Cells in Acute Infectious-Mononucleosis - Implications for the Interindividual Infection Route of Epstein-Barr-Virus</i>	<a href="#">10</a>	105
4	0	30	<a href="#">3</a> 1990 AMERICAN JOURNAL OF CLINICAL PATHOLOGY 93(6):776-783 <b>STEEPER TA; HORWITZ CA; ABLASHI DV; SALAHUDDIN SZ; SAXINGER C; et al.</b> <i>The Spectrum of Clinical and Laboratory Findings Resulting from Human Herpesvirus-6 (HHV-6) in</i>	<a href="#">5</a>	91

			<i>Patients with Mononucleosis-Like Illnesses Not Resulting from Epstein-Barr-Virus Or Cytomegalovirus</i>		
5	<a href="#">1</a>	31	<a href="#">144</a> 1993 NEW ENGLAND JOURNAL OF MEDICINE 329(3):168-171 <b>AKASHI K; EIZURU Y; SUMIYOSHI Y; MINEMATSU T; HARA S; et al.</b> <i>Severe Infectious-Mononucleosis Like Syndrome and Primary Human Herpesvirus-6 Infection in an Adult</i>	<a href="#">7</a>	82
6	<a href="#">5</a>	82	<a href="#">269</a> 1997 JOURNAL OF EXPERIMENTAL MEDICINE 185(9):1641-1650 <b>TRIPP RA; HAMILTONEASTON AM; CARDIN RD; NGUYEN P; BEHM FG; ET AL.</b> <i>Pathogenesis of an infectious mononucleosis-like disease induced by a murine gamma-herpesvirus: Role for a viral superantigen?</i>	<a href="#">8</a>	79
7	<a href="#">2</a>	47	<a href="#">116</a> 1993 BLOOD 82(2):521-527 <b>TAMARU Y; MIYAWAKI T; IWAI K; TSUJI T; NIBU R; et al.</b> <i>Absence of BCL-2 Expression by Activated CD45RO+ T-Lymphocytes in Acute Infectious-Mononucleosis Supporting Their Susceptibility To Programmed Cell-Death</i>	<a href="#">4</a>	65
8	0	57	<a href="#">38</a> 1990 PSYCHOSOMATICS 31(2):129-137 <b>GREENBERG DB</b> <i>Neurasthenia in the 1980s - Chronic Mononucleosis, Chronic Fatigue Syndrome, and Anxiety and Depressive-Disorders</i>	0	60



**SLIDE 7: JOURNALS**

Ranked journal list of papers in collection

**500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE  
RANKED SOURCE LIST**

Total: 253

View: Overview. Sorted by **number of publications (Pubs)**.

#	<u>Name</u>	<u>TLCS</u>	<u>TGCS</u>	<u>Pubs</u>
1	PEDIATRIC INFECTIOUS DISEASE JOURNAL	3	42	<u>16</u>
2	JOURNAL OF LARYNGOLOGY AND OTOTOLOGY	22	40	<u>15</u>
3	JOURNAL OF INFECTIOUS DISEASES	41	254	<u>14</u>
4	BLOOD	56	570	<u>12</u>
5	SCANDINAVIAN JOURNAL OF INFECTIOUS DISEASES	14	35	<u>11</u>
6	AMERICAN JOURNAL OF CLINICAL PATHOLOGY	12	138	<u>9</u>
7	CLINICAL AND EXPERIMENTAL IMMUNOLOGY	19	122	<u>8</u>
8	CLINICAL INFECTIOUS DISEASES	12	84	<u>8</u>
9	JOURNAL OF CLINICAL MICROBIOLOGY	18	83	<u>7</u>
10	PRESSE MEDICALE	4	6	<u>7</u>
11	JOURNAL OF MEDICAL VIROLOGY	0	59	<u>6</u>
12	LANCET	7	31	<u>6</u>
13	AMERICAN JOURNAL OF HEMATOLOGY	5	55	<u>5</u>
14	BRITISH JOURNAL OF HAEMATOLOGY	2	21	<u>5</u>
15	DEUTSCHE MEDIZINISCHE WOCHENSCHRIFT	2	17	<u>5</u>
16	NEW ENGLAND JOURNAL OF	12	130	<u>5</u>

	MEDICINE			
17	ARCHIVES OF PATHOLOGY & LABORATORY MEDICINE	12	28	<u>4</u>
18	CUTIS	10	25	<u>4</u>
19	HOSPITAL MEDICINE	2	2	<u>4</u>
20	INTERNATIONAL JOURNAL OF CANCER	4	86	<u>4</u>
21	INTERNATIONAL JOURNAL OF PEDIATRIC OTORHINOLARYNGOLOGY	5	8	<u>4</u>
22	PHYSICIAN AND SPORTSMEDICINE	7	10	<u>4</u>
23	REVUE DE MEDECINE INTERNE	0	4	<u>4</u>
24	AMERICAN FAMILY PHYSICIAN	15	31	<u>3</u>
25	AMERICAN JOURNAL OF PATHOLOGY	9	62	<u>3</u>

**SLIDE 8: AUTHORS**

Most-published authors including total citation counts.

**500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE  
RANKED ALL-AUTHOR LIST**

Total: 1834 View: Overview. Sorted by **number of publications (Pubs)**.

Page 1: 1 [2](#) [3](#) [4](#)



#	<a href="#">Name</a>	<a href="#">TLCS</a>	<a href="#">TGCS</a>	<a href="#">Pubs</a>
1	Blackman MA	15	146	<a href="#">6</a>
2	Hudnall SD	1	4	<a href="#">6</a>
3	Raisanen S	12	24	<a href="#">6</a>
4	Stenfors LE	12	24	<a href="#">6</a>
5	Woodland DL	15	146	<a href="#">6</a>
6	Berger C	2	24	<a href="#">5</a>
7	Knecht H	2	24	<a href="#">5</a>
8	McQuain C	2	24	<a href="#">5</a>
9	Tosato G	10	114	<a href="#">5</a>
10	Bye HM	3	11	<a href="#">4</a>
11	Furukawa S	4	34	<a href="#">4</a>
12	Herbst H	21	170	<a href="#">4</a>
13	Horwitz CA	17	139	<a href="#">4</a>
14	Matsubara T	4	34	<a href="#">4</a>
15	Misko IS	3	75	<a href="#">4</a>
16	Miyawaki T	34	302	<a href="#">4</a>
17	Okano M	8	119	<a href="#">4</a>
18	Ritter K	4	24	<a href="#">4</a>
19	Strickler JG	14	83	<a href="#">4</a>
20	Sullivan JL	6	79	<a href="#">4</a>
21	YABUTA K	4	34	<a href="#">4</a>
22	Yachie A	17	125	<a href="#">4</a>
23	Andersson J	23	111	<a href="#">3</a>
24	Askling J	5	32	<a href="#">3</a>
25	Auwaerter PG	8	9	<a href="#">3</a>

## SLIDE 9: OUTER REFERENCES

Most-cited papers that are not included in the collection, perhaps due to time limit of search.

### 500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE OUTER REFERENCES

Total: 5094 (top 100 shown).

Sorted by **LCS**.

#	<a href="#">LCS</a>	<a href="#">Reference</a>
1	<a href="#">29</a>	HENLE W, 1974, HUM PATHOL, V5, P551 <a href="#">WoS</a>
2	<a href="#">28</a>	HENLE G, 1968, P NATL ACAD SCI USA, V59, P94 <a href="#">WoS</a>
3	<a href="#">26</a>	SUMAYA CV, 1985, PEDIATRICS, V75, P1003 <a href="#">WoS</a>
4	<a href="#">25</a>	RUTKOW IM, 1978, ARCH SURG-CHICAGO, V113, P718 <a href="#">WoS</a>
5	<a href="#">23</a>	PENMAN HG, 1970, J CLIN PATHOL, V23, P765 <a href="#">WoS</a>
6	<a href="#">23</a>	TOMKINSON BE, 1987, J IMMUNOL, V139, P3802 <a href="#">WoS</a>
7	<a href="#">21</a>	STRAUS SE, 1993, ANN INTERN MED, V118, P45 <a href="#">WoS</a>
8	<a href="#">20</a>	SUMAYA CV, 1985, PEDIATRICS, V75, P1011 <a href="#">WoS</a>
9	<a href="#">19</a>	DEWAELE M, 1981, NEW ENGL J MED, V304, P460 <a href="#">WoS</a>
10	<a href="#">16</a>	JOHNSEN T, 1984, J LARYNGOL OTOL, V98, P999 <a href="#">WoS</a>
11	<a href="#">15</a>	WOLFE JA, 1980, ANN OTOTOLOGY RHINOLOG, V89, P430 <a href="#">WoS</a>
12	<a href="#">15</a>	SIXBEY JW, 1984, NEW ENGL J MED, V310, P1225 <a href="#">WoS</a>
13	<a href="#">12</a>	JOHNSON MA, 1981, AM J ROENTGENOL, V136, P111 <a href="#">WoS</a>
14	<a href="#">12</a>	ANDERSSON J, 1986, J INFECT DIS, V153, P283 <a href="#">WoS</a>
15	<a href="#">12</a>	CHEESEMAN SH, 1988, SEMIN HEMATOL, V25, P261 <a href="#">WoS</a>
16	<a href="#">12</a>	PETERS RM, 1986, AM J MED, V80, P123 <a href="#">WoS</a>
17	<a href="#">11</a>	EVANS AS, 1975, J INFECT DIS, V132, P546 <a href="#">WoS</a>
18	<a href="#">11</a>	MCLEAN ER, 1987, J PEDIATR SURG, V22, P1034 <a href="#">WoS</a>
19	<a href="#">11</a>	RICKINSON AB, 1996, VIROLOGY, P2397 <a href="#">WoS</a>
20	<a href="#">11</a>	REEDMAN BM, 1973, INT J CANCER, V11, P499 <a href="#">WoS</a>
21	<a href="#">11</a>	TIERNEY RJ, 1994, J VIROL, V68, P7374 <a href="#">WoS</a>
22	<a href="#">11</a>	OKANO M, 1988, CLIN MICROBIOL REV, V1, P300 <a href="#">WoS</a>
23	<a href="#">11</a>	MROCZEK EC, 1987, ARCH PATH LAB MED, V111, P530 <a href="#">WoS</a>
24	<a href="#">10</a>	GROSE C, 1975, NEW ENGL J MED, V292, P392 <a href="#">WoS</a>
25	<a href="#">10</a>	PAUL JR, 1932, AM J MED SCI, V183, P90 <a href="#">WoS</a>

**SLIDE 10: RANKED WORD LIST**

These word lists may need to be combined.

**500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE  
RANKED TITLE WORDS\***

Total: 1240, Word count: 3761, All words count: 5457

View: Overview. Sorted by **number of publications (Pubs)**.

Page 1: 1 [2](#) [3](#)

#	<a href="#">Word</a>	<a href="#">Pubs</a>	<a href="#">Percent</a>	<a href="#">TLCS</a>	<a href="#">TGCS</a>
1	MONONUCLEOSIS	<u>295</u>	59.0	267	1531
2	INFECTIOUS	<u>264</u>	52.8	261	1451
3	INFECTIOUS-MONONUCLEOSIS	<u>186</u>	37.2	343	2003
4	ACUTE	<u>82</u>	16.4	147	1097
5	EPSTEIN-BARR	<u>63</u>	12.6	95	853
6	VIRUS	<u>50</u>	10.0	37	333
7	PATIENTS	<u>49</u>	9.8	49	366
8	ASSOCIATED	<u>31</u>	6.2	16	116
9	SYNDROME	<u>31</u>	6.2	25	308
10	EPSTEIN-BARR-VIRUS	<u>29</u>	5.8	49	559
11	DIAGNOSIS	<u>27</u>	5.4	58	271
12	INFECTION	<u>27</u>	5.4	34	312
13	RUPTURE	<u>26</u>	5.2	63	127
14	SPONTANEOUS	<u>24</u>	4.8	55	112
15	DISEASE	<u>23</u>	4.6	19	266
16	CASE	<u>22</u>	4.4	15	58
17	SPLENIC	<u>22</u>	4.4	40	84
18	CELLS	<u>21</u>	4.2	49	540
19	EBV	<u>18</u>	3.6	14	142
20	PATIENT	<u>18</u>	3.6	11	61

\* excluding stopwords and 1 and 2-character words

**SLIDE 11: MISSING LINKS**

Explain editing procedure.

**500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE  
POTENTIALLY MISSED CITATIONS**

**8 nodes have citations that may potentially refer to other nodes.**

1 | [214](#) 1996 AMERICAN JOURNAL OF HEMATOLOGY 53(2):111-115  
Okano M; Gross TG  
*Epstein-Barr virus-associated hemophagocytic syndrome and fatal infectious mononucleosis*

---

PRANGE E, 1992, J PATHOL, V166, P133 may refer to [93](#) PRANGE-E-1992-V166-I2-P113-119

2 | [228](#) 1996 JOURNAL OF CLINICAL MICROBIOLOGY 34(12):3240-3241  
Gerber MA; Shapiro ED; Ryan RW; Bell GL  
*Evaluations of enzyme-linked immunosorbent assay procedure for determining specific Epstein-Barr virus serology and of rapid test kits for diagnosis of infectious mononucleosis*

---

LEVINE D, 1994, PEDIATRICS, V94, P592 may refer to [178](#) LEVINE-D-1994-V94-I6-P892-894

3 | [378](#) 2001 IN VIVO 15(5):373-380  
Krueger GRF; Bertram G; Ramon A; Koch B; Ablashi DV; Brandt ME; Wang GY; Buja LM  
*Dynamics of infection with human herpesvirus-6 in EBV-negative infectious mononucleosis: Data acquisition for computer modeling*

---

STEEPER TA, 1990, AM J CLIN PATHOL, V93, P766 may refer to [3](#) STEEPER-TA-1990-V93-I6-P776-783

4 | [428](#) 2002 POSTGRADUATE MEDICAL JOURNAL 78(921):433-+  
Pillai JM; Mitchener P; Smith S; Thomas DJB  
*Pleuritic pain and a rare complication - Spontaneous rupture of spleen secondary to infectious mononucleosis.*

---

FARLEY DR, 1992, MAYO CLIN P, V67, P61 may refer to [97](#) FARLEY-DR-1992-V67-I9-P846-853

5 | [452](#) 2003 JOURNAL OF MEDICAL VIROLOGY 71(4):569-577  
Wang GY; Krueger GRF; Buja LM  
*Mathematical model to simulate the cellular dynamics of infection with human herpesvirus-6 in EBV-negative infectious mononucleosis*

---

STEEPER TA, 1990, AM J CLIN PATHOL, V93, P766 may refer to [3](#) STEEPER-TA-1990-V93-I6-P776-783

6 | [468](#) 2003 PSYCHOLOGICAL MEDICINE 33(5):847-855  
Candy B; Chalder T; Cleare AJ; Peakman A; Skowera A; Wessely S; Weinman J; Zuckerman M; Hotopf M  
*Predictors of fatigue following the onset of infectious mononucleosis*

---

CANDY-B-2003-UNPUB-J-PSYCHOSOMATI

**SLIDE 12: MATRIX FOR CO-CITATION** And other mapping exercises.  
**500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE**  
**CITATION MATRIX**

Nodes: 500 Sorted by year, source, volume, issue, page.

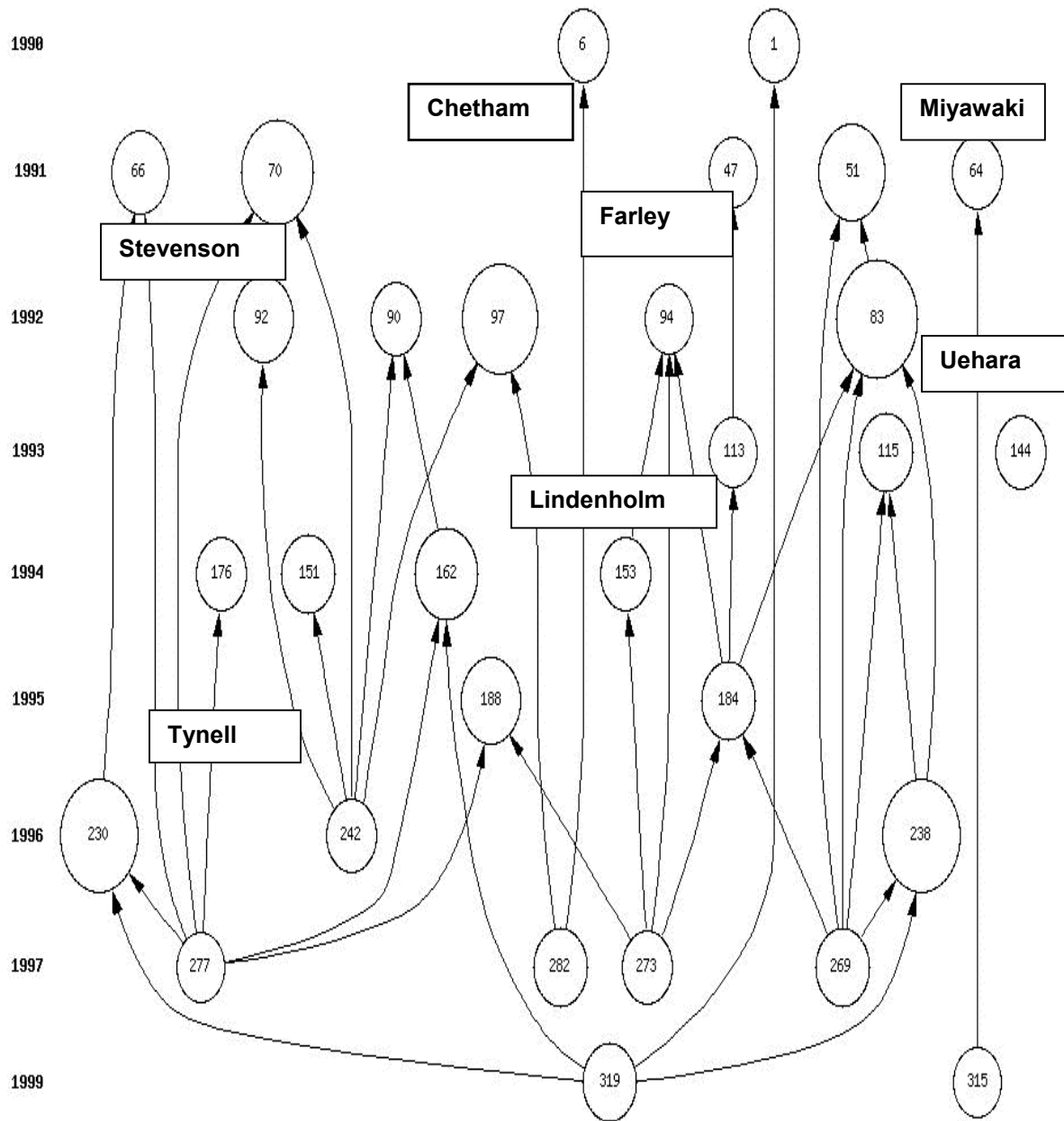
Page 1: 1 [2](#)

cited nodes	LCR	NCR	Nodes	LCS	GCS	citing nodes
	0	0	<a href="#">1</a> 1990 AXELROD P	<a href="#">7</a>	15	<a href="#">130</a> <a href="#">131</a> <a href="#">319</a> <a href="#">337</a> <a href="#">380</a> <a href="#">444</a> <a href="#">474</a>
	0	31	<a href="#">2</a> 1990 ABBONDANZO SL	<a href="#">2</a>	37	<a href="#">153</a> <a href="#">410</a>
	0	30	<a href="#">3</a> 1990 STEEPER TA	<a href="#">5</a>	91	<a href="#">131</a> <a href="#">144</a> <a href="#">206</a> <a href="#">287</a> <a href="#">438</a>
	0	15	<a href="#">4</a> 1990 RIDKER PM	<a href="#">2</a>	4	<a href="#">44</a> <a href="#">150</a>
	0	0	<a href="#">5</a> 1990 PRIMOS WA	0	0	
	0	24	<a href="#">6</a> 1990 SAFRAN D	<a href="#">7</a>	20	<a href="#">119</a> <a href="#">123</a> <a href="#">130</a> <a href="#">253</a> <a href="#">282</a>
	0	0	<a href="#">7</a> 1990 LAHAT E	0	0	
	0	0	<a href="#">8</a> 1990 ALI A	0	0	
	0	8	<a href="#">9</a> 1990 MAY A	<a href="#">1</a>	1	<a href="#">279</a>
	0	5	<a href="#">10</a> 1990 ATKINSON PL	<a href="#">3</a>	4	<a href="#">108</a> <a href="#">111</a> <a href="#">185</a>
	0	10	<a href="#">11</a> 1990 OKANO M	<a href="#">3</a>	37	<a href="#">22</a> <a href="#">145</a> <a href="#">154</a>
	0	18	<a href="#">12</a> 1990 RITTER K	<a href="#">2</a>	4	<a href="#">130</a> <a href="#">290</a>
	0	5	<a href="#">13</a> 1990 SEUFFERT HM	0	0	
	0	0	<a href="#">14</a> 1990 STANLEY MW	<a href="#">1</a>	3	<a href="#">496</a>
	0	2	<a href="#">15</a> 1990 VERUCCHI G	0	0	
	0	10	<a href="#">16</a> 1990 SUMIMOTO S	<a href="#">3</a>	6	<a href="#">130</a> <a href="#">438</a> <a href="#">460</a>
	0	7	<a href="#">17</a> 1990 ENK A	0	0	
	0	7	<a href="#">18</a> 1990 THOMAS DM	0	1	
	0	23	<a href="#">19</a> 1990 LEWIN N	<a href="#">1</a>	4	<a href="#">267</a>
	0	3	<a href="#">20</a> 1990 PETRALLI D	<a href="#">1</a>	1	<a href="#">222</a>
	0	18	<a href="#">21</a> 1990 PFREUNDSCHUH M	<a href="#">1</a>	38	<a href="#">159</a>
<a href="#">11</a>	<a href="#">1</a>	51	<a href="#">22</a> 1990 FALK K	<a href="#">2</a>	37	<a href="#">273</a> <a href="#">456</a>
	0	3	<a href="#">23</a> 1990 ULDALL A	<a href="#">4</a>	6	<a href="#">131</a> <a href="#">162</a> <a href="#">242</a> <a href="#">359</a>
	0	36	<a href="#">24</a> 1990 STRICKLER JG	<a href="#">5</a>	24	<a href="#">83</a> <a href="#">237</a> <a href="#">365</a> <a href="#">394</a> <a href="#">418</a>
	0	24	<a href="#">25</a> 1990 GORGIEVSKIHRISOHO M	0	34	

**SLIDE 13: LCS HISTORIOGRAPH OF INITIAL FILE**  
 (Names are printed for those w/LCS scores 11 and above)

Historiograph of most-cited LCS papers in “mononucleous” collection. The numbers refer to nodes.

**HISTORIOGRAPH OF MOST-CITED LCS PAPERS IN MONO 500 COLLECTION (1990-2004)**

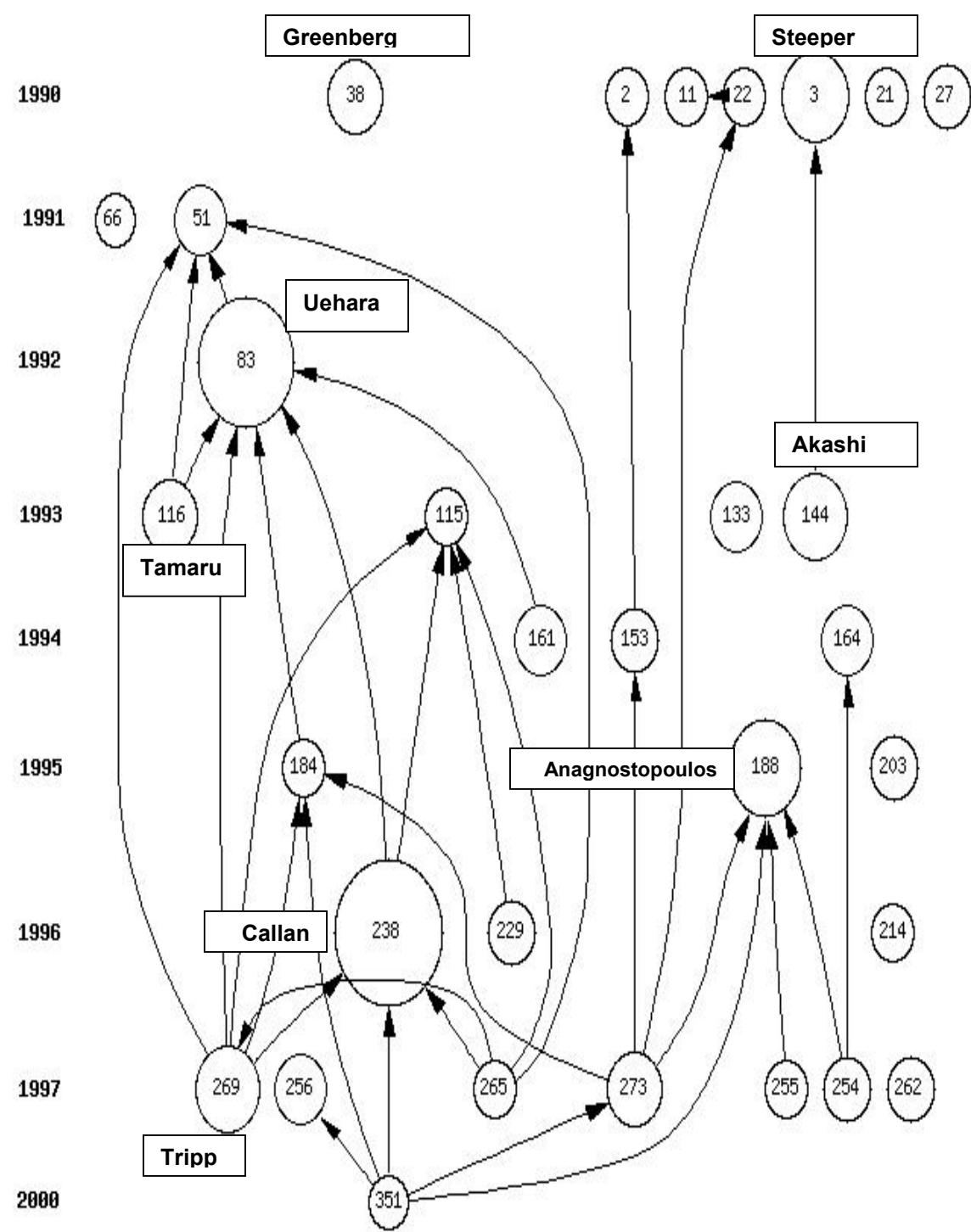




**SLIDE 14: GCS HISTORIOGRAPH OF INITIAL FILE**  
(Names are printed for those w/GCS scores 79 and above) Historiograph based on GCS counts.

Having gotten an idea of the key authors and journals in this field, we can also view an initial historiograph of the topic. It will be apparent that the chronological scope of this map is limited due to the limited time span of the initial *WOS* search, 1990 to the present. In other words, all the key papers in the past have not necessarily been included. Here is where outer references come in. Looking at the Outer Reference file we can look up the source records for these most-cited papers. Having done that, we can add those papers to the collection in order to create a new *HistCite* file with greater chronological depth.

**HISTORIOGRAPH OF MOST-CITED GCS PAPERS IN MONO 500 COLLECTION (1990-2004)**



## SLIDE 15: CHRONOLOGICAL FILE INCLUDING 10 PAPERS ADDED FROM THE OUTER REFERENCES

In order to increase the chronological depth of the historiograph, we must look up the source records for a selection of papers in the outer references. We do not have the ability to do this live, so we have simply to add the data into the .txt file and created a new *HistCite* collection as shown in Slide 15. As you can see the file now begins with 1968 with the classic paper by Henle et al.

### THE 500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE. AND THE FOLLOWING PAPERS ADDED FROM THE OUTER REFERENCES

HENLE W, 1974, HUM PATHOL, V5, P551  
HENLE G, 1968, P NATL ACAD SCI USA, V59, P94  
SUMAYA CV, 1985, PEDIATRICS, V75, P1003  
RUTKOW IM, 1978, ARCH SURG-CHICAGO, V113, P718  
PENMAN HG, 1970, J CLIN PATHOL, V23, P765  
TOMKINSON BE, 1987, J IMMUNOL, V139, P3802  
STRAUS SE, 1993, ANN INTERN MED, V118, P45  
SUMAYA CV, 1985, PEDIATRICS, V75, P1011  
DEWAELE M, 1981, NEW ENGL J MED, V304, P460  
JOHNSEN T, 1984, J LARYNGOL OTOL, V98, P999

Nodes: 510, [Authors](#): 1849, [Journals](#): 255, [Outer References](#): 5329, [Words](#): 1249 Collection span: 1968 - 2004 -  
View: [Overview](#). Sorted by **year, source, volume, issue, page**.

Page 1: 1 [2](#) **CHRONOLOGICAL**

#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	0	26	<a href="#">1</a> 1968 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 59(1):94-& <b>HENLE G; HENLE W; DIEHL V</b> <i>Relation Of Burkitts Tumor-Associated Herpes-Type Virus To Infectious Mononucleosis</i>	<a href="#">31</a>	1109
2	0	83	<a href="#">2</a> 1970 JOURNAL OF CLINICAL PATHOLOGY 23(9):765-& <b>PENMAN HG</b> <i>Fatal Infectious Mononucleosis - Critical Review</i>	<a href="#">25</a>	122
3	<a href="#">1</a>	86	<a href="#">3</a> 1974 HUMAN PATHOLOGY 5(5):551-565 <b>HENLE W; HENLE GE; HORWITZ CA</b> <i>Epstein-Barr Virus Specific Diagnostic Tests In Infectious-Mononucleosis</i>	<a href="#">31</a>	492
4	<a href="#">1</a>	26	<a href="#">4</a> 1978 ARCHIVES OF SURGERY 113(6):718-720 <b>RUTKOW IM</b> <i>Rupture Of Spleen In Infectious-Mononucleosis - Critical-Review</i>	<a href="#">25</a>	66
5	0	20	<a href="#">5</a> 1981 NEW ENGLAND JOURNAL OF MEDICINE 304(8):460-462 <b>DEWAELE M; THIELEMANS C; VANCAMP BKG</b> <i>Characterization Of Immunoregulatory T-Cells In EBV-Induced Infectious Mononucleosis By Monoclonal-Antibodies</i>	<a href="#">20</a>	303
6	<a href="#">1</a>	18	<a href="#">6</a> 1984 JOURNAL OF LARYNGOLOGY AND OTOTOLOGY 98(10):999-1001 <b>JOHNSEN T; KATHOLM M; STANGERUP SE</b> <i>Otolaryngological Complications In Infectious Mononucleosis</i>	<a href="#">16</a>	20
7	<a href="#">2</a>	48	<a href="#">7</a> 1985 PEDIATRICS 75(6):1003-1010 <b>SUMAYA CV; ENCH Y</b> <i>Epstein-Barr Virus Infectious-Mononucleosis In Children .I. Clinical And General Laboratory Findings</i>	<a href="#">27</a>	87

**SLIDE 16: NEW LCS SORT OF 500 MOST RECENT PAPERS WITH ADDED OUTER REFERENCES**  
By clicking on LCS, we have incorporated these older papers into the collection.

**THE 500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE.  
AND THE FOLLOWING PAPERS ADDED FROM THE OUTER REFERENCES:**

HENLE W, 1974, HUM PATHOL, V5, P551  
HENLE G, 1968, P NATL ACAD SCI USA, V59, P94  
SUMAYA CV, 1985, PEDIATRICS, V75, P1003  
RUTKOW IM, 1978, ARCH SURG-CHICAGO, V113, P718  
PENMAN HG, 1970, J CLIN PATHOL, V23, P765  
TOMKINSON BE, 1987, J IMMUNOL, V139, P3802  
STRAUS SE, 1993, ANN INTERN MED, V118, P45  
SUMAYA CV, 1985, PEDIATRICS, V75, P1011  
DEWAELE M, 1981, NEW ENGL J MED, V304, P460  
JOHNSEN T, 1984, J LARYNGOL OTOL, V98, P999

Nodes: 510, [Authors](#): 1849, [Journals](#): 255, [Outer References](#): 5329, [Words](#): 1249

Collection span: 1968 - 2004

View: Overview. Sorted by LCS.

**LCS SORT**

Page 1: 1 [2](#)



#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	0	26	<a href="#">1</a> 1968 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 59(1):94-& <b>HENLE G; HENLE W; DIEHL V</b> <i>Relation Of Burkitts Tumor-Associated Herpes-Type Virus To Infectious Mononucleosis</i>	<a href="#">31</a>	1109
2	<a href="#">1</a>	86	<a href="#">3</a> 1974 HUMAN PATHOLOGY 5(5):551-565 <b>HENLE W; HENLE GE; HORWITZ CA</b> <i>Epstein-Barr Virus Specific Diagnostic Tests In Infectious-Mononucleosis</i>	<a href="#">31</a>	492
3	<a href="#">2</a>	48	<a href="#">7</a> 1985 PEDIATRICS 75(6):1003-1010 <b>SUMAYA CV; ENCH Y</b> <i>Epstein-Barr Virus Infectious-Mononucleosis In Children .1. Clinical And General Laboratory Findings</i>	<a href="#">27</a>	87
4	0	83	<a href="#">2</a> 1970 JOURNAL OF CLINICAL PATHOLOGY 23(9):765-& <b>PENMAN HG</b> <i>Fatal Infectious Mononucleosis - Critical Review</i>	<a href="#">25</a>	122
5	<a href="#">1</a>	26	<a href="#">4</a> 1978 ARCHIVES OF SURGERY 113(6):718-720 RUTKOW IM <i>RUPTURE OF SPLEEN IN INFECTIOUS-MONONUCLEOSIS - CRITICAL-REVIEW</i>	<a href="#">25</a>	66
6	<a href="#">2</a>	25	<a href="#">9</a> 1987 JOURNAL OF IMMUNOLOGY 139(11):3802-3807 <b>TOMKINSON BE; WAGNER DK; NELSON DL; SULLIVAN JL</b> <i>Activated Lymphocytes During Acute Epstein-Barr Virus-Infection</i>	<a href="#">23</a>	134
7	<a href="#">2</a>	46	<a href="#">8</a> 1985 PEDIATRICS 75(6):1011-1019 <b>SUMAYA CV; ENCH Y</b> <i>Epstein-Barr Virus Infectious-Mononucleosis In Children .2. Heterophil Antibody And Viral-Specific Responses</i>	<a href="#">21</a>	72
8	<a href="#">3</a>	107	<a href="#">122</a> 1993 ANNALS OF INTERNAL MEDICINE 118(1):45-58 <b>STRAUS SE; COHEN JI; TOSATO G; MEIER J</b> <i>Epstein-Barr-Virus Infections - Biology, Pathogenesis, And Management</i>	<a href="#">21</a>	205

**SLIDE 17:** New GCS SORT OF 500 MOST RECENT PAPERS WITH ADDED OUTER REFERENCES  
And by clicking on GCS, we sorted the file by Global Citation Score.  
I will skip over the listings by author and journal and proceed to the maps that include the core papers.

**THE 500 MOST RECENT PAPERS WITH "MONONUCLEOSIS" IN THE TITLE.  
AND THE FOLLOWING PAPERS ADDED FROM THE OUTER REFERENCES:**

HENLE W, 1974, HUM PATHOL, V5, P551  
HENLE G, 1968, P NATL ACAD SCI USA, V59, P94  
SUMAYA CV, 1985, PEDIATRICS, V75, P1003  
RUTKOW IM, 1978, ARCH SURG-CHICAGO, V113, P718  
PENMAN HG, 1970, J CLIN PATHOL, V23, P765  
TOMKINSON BE, 1987, J IMMUNOL, V139, P3802  
STRAUS SE, 1993, ANN INTERN MED, V118, P45  
SUMAYA CV, 1985, PEDIATRICS, V75, P1011  
DEWAELE M, 1981, NEW ENGL J MED, V304, P460  
JOHNSEN T, 1984, J LARYNGOL OTOL, V98, P999

Nodes: 510, [Authors](#): 1849, [Journals](#): 255, [Outer References](#): 5329, [Words](#): 1249  
Collection span: 1968 - 2004  
View: Overview. Sorted by **GCS**.  
Page 1: 1 [2](#)

**GCS SORT**

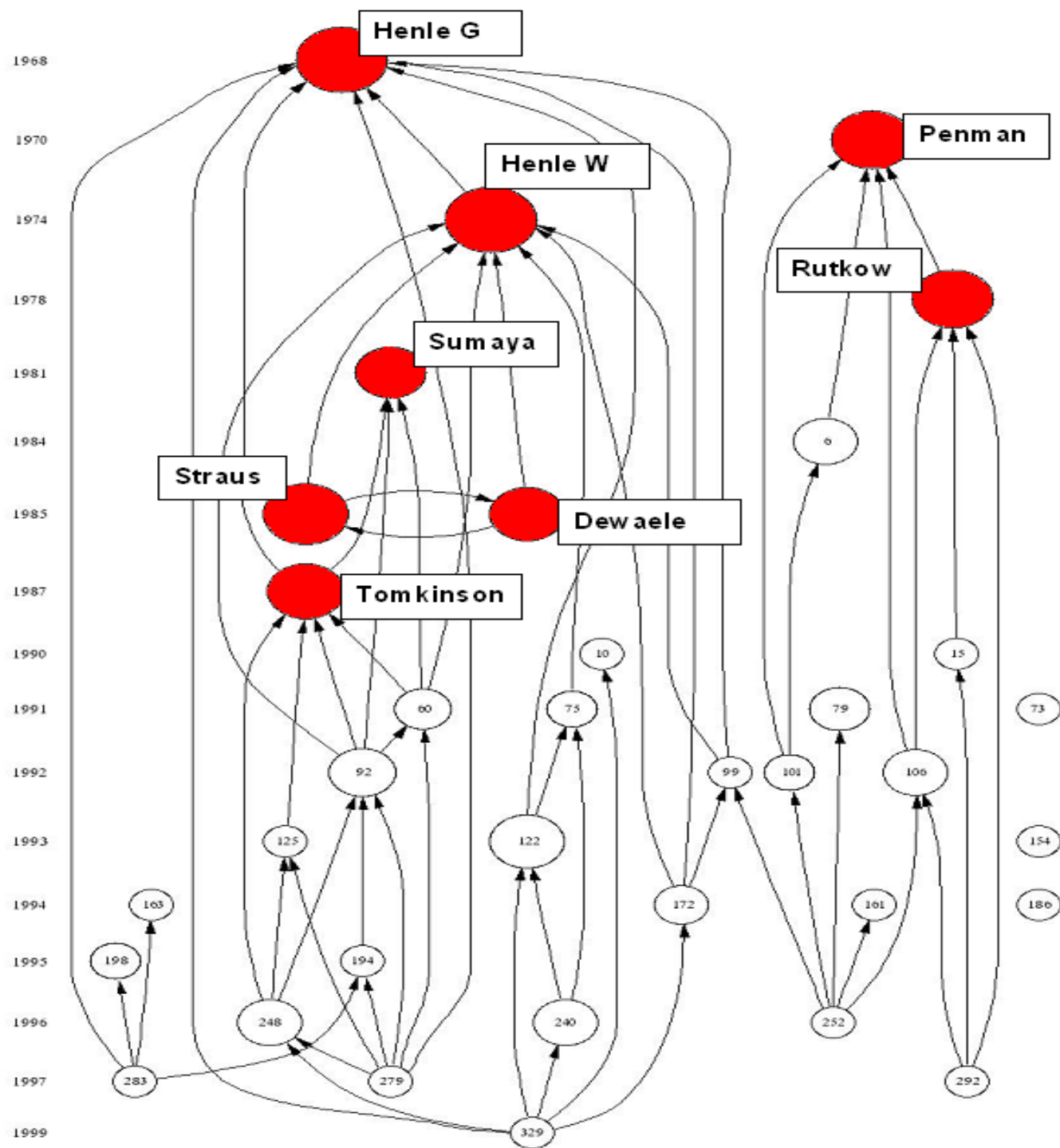


#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	0	26	<a href="#">1</a> 1968 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 59(1):94-& <b>HENLE G; HENLE W; DIEHL V</b> <i>Relation Of Burkitts Tumor-Associated Herpes-Type Virus To Infectious Mononucleosis</i>	<a href="#">31</a>	1109
2	<a href="#">1</a>	86	<a href="#">3</a> 1974 HUMAN PATHOLOGY 5(5):551-565 <b>HENLE W; HENLE GE; HORWITZ CA</b> <i>Epstein-Barr Virus Specific Diagnostic Tests In Infectious-Mononucleosis</i>	<a href="#">31</a>	492
3	0	20	<a href="#">5</a> 1981 NEW ENGLAND JOURNAL OF MEDICINE 304(8):460-462 <b>DEWAELE M; THIELEMANS C; VANCAMP BKG</b> <i>Characterization Of Immunoregulatory T-Cells In EBV-Induced Infectious Mononucleosis By Monoclonal-Antibodies</i>	<a href="#">20</a>	303
4	<a href="#">3</a>	43	<a href="#">248</a> 1996 NATURE MEDICINE 2(8):906-911 <b>Callan MFC; Steven J; Krausa P; Wilson JDK; Moss PAH; et al.</b> <i>Large clonal expansions of CD8(+) T cells in acute infectious mononucleosis</i>	<a href="#">16</a>	221
5	<a href="#">3</a>	107	<a href="#">122</a> 1993 ANNALS OF INTERNAL MEDICINE 118(1):45-58 <b>STRAUS SE; COHEN JI; TOSATO G; MEIER J</b> <i>Epstein-Barr-Virus Infections - Biology, Pathogenesis, And Management</i>	<a href="#">21</a>	205
6	<a href="#">5</a>	38	<a href="#">92</a> 1992 BLOOD 80(2):452-458 <b>UEHARA T; MIYAWAKI T; OHTA K; TAMARU Y; YOKOI T; et al.</b> <i>Apoptotic Cell-Death Of Primed CD45RO+ Lymphocytes-T In Epstein-Barr Virus-Induced Infectious-Mononucleosis</i>	<a href="#">17</a>	180
7	<a href="#">2</a>	25	<a href="#">9</a> 1987 JOURNAL OF IMMUNOLOGY 139(11):3802-3807 <b>TOMKINSON BE; WAGNER DK; NELSON DL; SULLIVAN JL</b> <i>Activated Lymphocytes During Acute Epstein-Barr Virus-Infection</i>	<a href="#">23</a>	134
8	0	83	<a href="#">2</a> 1970 JOURNAL OF CLINICAL PATHOLOGY 23(9):765-& <b>PENMAN HG</b> <i>Fatal Infectious Mononucleosis - Critical Review</i>	<a href="#">25</a>	122

**SLIDE 18:** LCS MAP 500 COLLECTION WITH OUTER REFERENCES ADDED (In Red)  
(Names are printed for those w/LCS scores 23 and above)

This is the LCS map. The size of the circles is proportional to citation frequency. The red circles identify the newly added outer references.

**HISTORIOGRAPH OF MOST-CITED LCS PAPERS IN MONO 500 COLLECTION  
WITH OUTER REFERENCES ADDED**



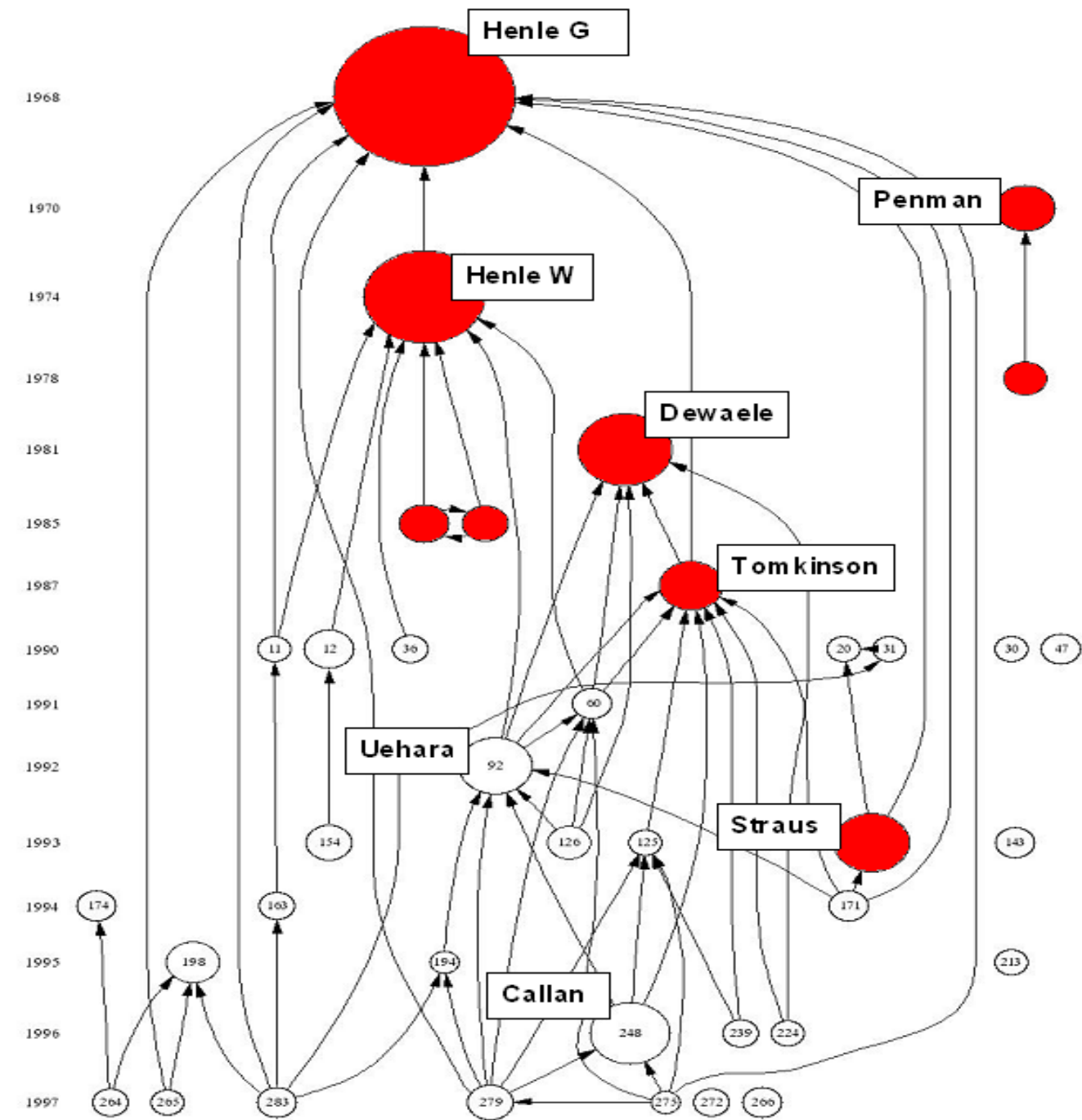
**SLIDE 19: GCS MAP 500 COLLECTION WITH OUTER REFERENCES ADDED (In Red)**  
(Names are printed for those w/GCS scores 134 and above)

The red circles identify the newly added outer references. This is further elaborated by displaying the GCS map where the classic by Henle is shown at the top followed by yet another Henle paper (#3), etc.

Depending upon the subject matter involved, there will always be a tradeoff one can make by increasing the size of the *WOS* output file.

Then to determine if the map would change significantly we included the latest 1000 papers (instead of 500) and produced a new series of tables and maps.

**HISTORIOGRAPH OF MOST-CITED GCS PAPERS IN MONO 500 COLLECTION WITH OUTER REFERENCES ADDED**



**SLIDE 20: 999 PAPERS WITH OUTER REFERENCES ADDED**  
(Red indicates new outer references added.)

The changes introduced by going from 500 to 1,000 papers are significant in that a larger group of the older core papers is identified. That is not surprising considering that an additional period of 24 years of source data is included. However, they do not really offset the centrality of the two Henle papers we identified in the first iteration.

I won't take you through the entire repertoire of slides this time, but will show you the two new maps that result from this additional iteration.

[Missing Links?](#) [Citation Matrix](#) [Graphs](#) [Glossary](#) [HistCite Guide](#) [About](#)

**The 999 most recent papers with "mononucleosis" in the title  
and the following papers added from outer references:**

HENLE W, 1974, HUM PATHOL, V5, P551  
HENLE G, 1968, P NATL ACAD SCI USA, V59, P94  
**REEDMAN BM, 1973, INT J CANCER, V11, P499**  
DEWAELE M, 1981, NEW ENGL J MED, V304, P460  
RUTKOW IM, 1978, ARCH SURG-CHICAGO, V113, P718  
**TOSATO G, 1979, NEW ENGL J MED, V301, P1133**  
**HENLE G, 1966, J BACTERIOL, V91, P1248**  
PENMAN HG, 1970, J CLIN PATHOL, V23, P765  
**REINHERZ EL, 1980, J IMMUNOL, V125, P1269**  
**EVANS AS, 1975, J INFECT DIS, V132, P546**



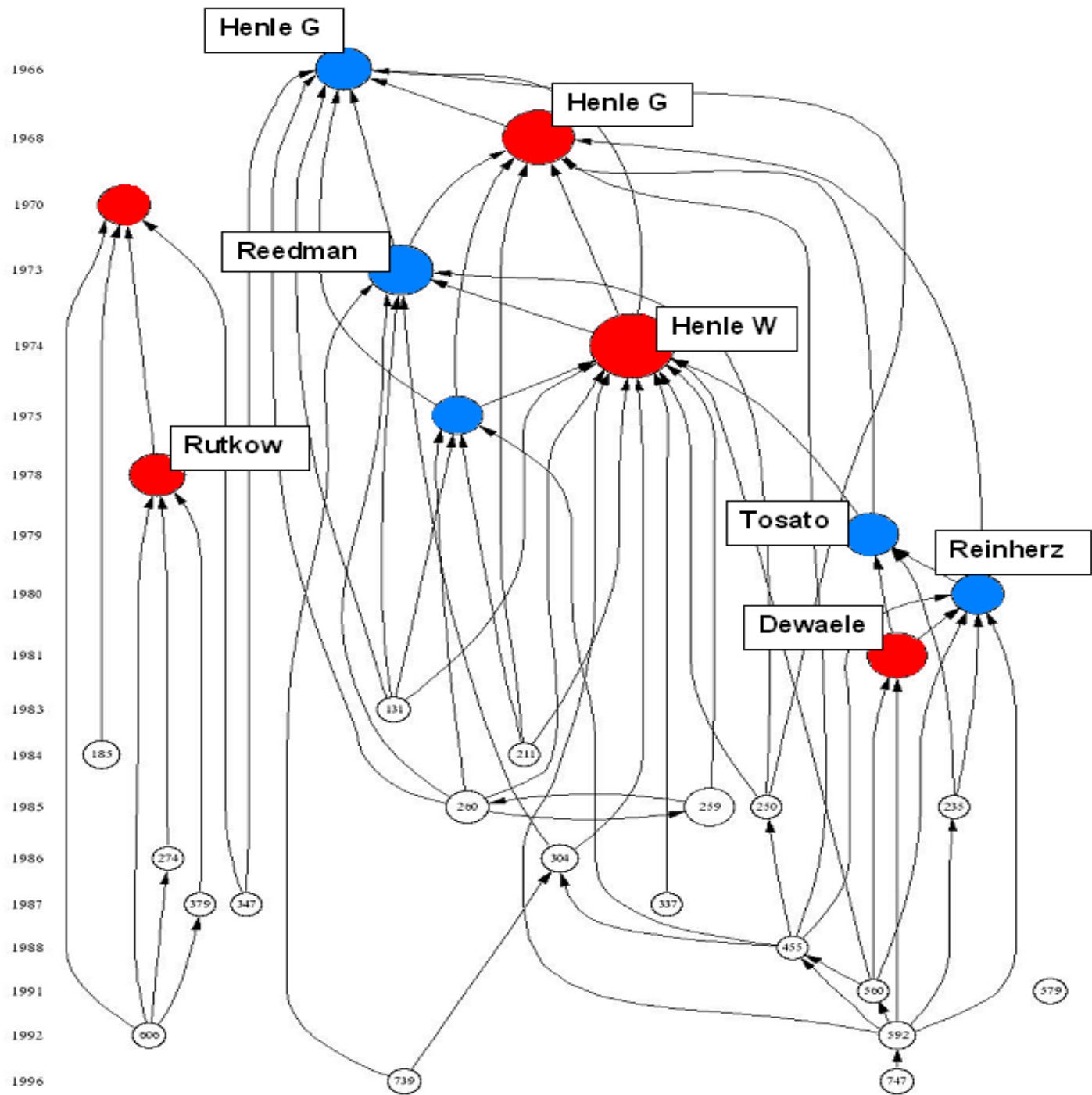
#	<a href="#">LCR</a>	<a href="#">NCR</a>	<a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>	<a href="#">LCS</a>	<a href="#">GCS</a>
1	0	23	<a href="#">1</a> 1966 JOURNAL OF BACTERIOLOGY 91(3):1248-& <b>HENLE G; HENLE W</b> <i>Immunofluorescence in Cells Derived from Burkitts Lymphoma</i>	<a href="#">41</a>	1553
2	<a href="#">1</a>	26	<a href="#">2</a> 1968 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA 59(1):94-& <b>HENLE G; HENLE W; DIEHL V</b> <i>Relation of Burkitts Tumor-Associated Herpes-Type Virus To Infectious Mononucleosis</i>	<a href="#">67</a>	1109
3	0	83	<a href="#">3</a> 1970 JOURNAL OF CLINICAL PATHOLOGY 23(9):765-& <b>PENMAN HG</b> <i>Fatal Infectious Mononucleosis - Critical Review</i>	<a href="#">37</a>	122
4	<a href="#">2</a>	49	<a href="#">4</a> 1973 INTERNATIONAL JOURNAL OF CANCER 11(3):499-520 <b>REEDMAN BM; KLEIN G</b> <i>Cellular Localization of an Epstein-Barr Virus (EBV)-Associated Complement-Fixing Antigen in Producer and Non-Producer Lymphoblastoid Cell Lines</i>	<a href="#">54</a>	1676
5	<a href="#">3</a>	86	<a href="#">5</a> 1974 HUMAN PATHOLOGY 5(5):551-565 <b>HENLE W; HENLE GE; HORWITZ CA</b> <i>Epstein-Barr Virus Specific Diagnostic Tests in Infectious-Mononucleosis</i>	<a href="#">87</a>	492
6	<a href="#">3</a>	34	<a href="#">6</a> 1975 JOURNAL OF INFECTIOUS DISEASES 132(5):546-554 <b>EVANS AS; NIEDERMAN JC; CENABRE LC; WEST B; RICHARDS VA</b> <i>Prospective Evaluation of Heterophile and Epstein-Barr Virus-Specific IGM-Antibody Tests in Clinical and Subclinical Infectious-Mononucleosis - Specificity and Sensitivity of Tests and Persistence of Antibody</i>	<a href="#">32</a>	106
7	<a href="#">1</a>	26	<a href="#">7</a> 1978 ARCHIVES OF SURGERY 113(6):718-720 <b>RUTKOW IM</b> <i>Rupture of Spleen in Infectious-Mononucleosis - Critical-Review</i>	<a href="#">38</a>	66
8	<a href="#">2</a>	26	<a href="#">8</a> 1979 NEW ENGLAND JOURNAL OF MEDICINE 301(21):1133-1137 <b>TOSATO G; MAGRATH I; KOSKI I; DOOLEY N; BLAESE M</b> <i>Activation of Suppressor T-CELLS During Epstein-Barr-Virus-Induced Infectious-Mononucleosis</i>	<a href="#">39</a>	315



**SLIDE 21: LCS MAP OF 999 PAPERS WITH OUTER REFERENCES**  
(Names are printed for those w/LCS scores 35 and above)

Red circles were in the 500 Mono collection. Blue circles were added for 999 collection.

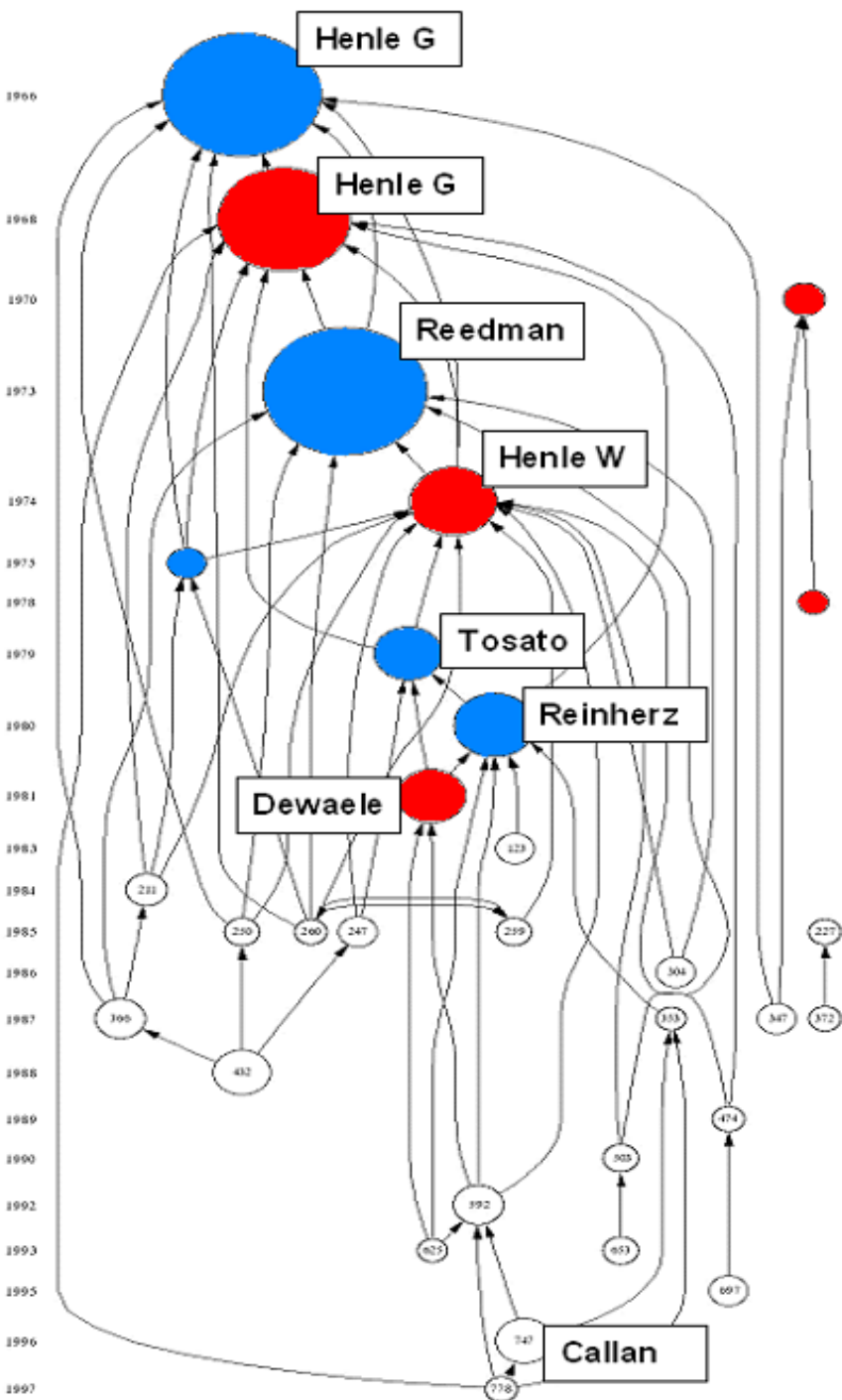
**HISTORIOGRAPH OF MOST-CITED LCS PAPERS IN MONO 999 COLLECTION  
WITH OUTER REFERENCES ADDED**



**SLIDE 22: GCS MAP OF 999 PAPERS WITH OUTER REFERENCES**  
(Names are printed for those w/GCS scores 303 and above)

Red circles were in the 500 Mono collection. Blue circles were added for 999 collection.

**HISTORIOGRAPH OF MOST-CITED GCS PAPERS IN MONO 999 COLLECTION  
WITH OUTER REFERENCES ADDED**



And if you are so inclined, join our volunteer group of *HistCite* evaluators and receive free access to the software.

Thank you for your attention.

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<http://www.garfield.library.upenn.edu/essays/V1p033y1962-73.pdf>