Genesis of ACS Electronic Journals

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August 30, 2005
Herman Skolnik Award Symposium
230th ACS National Meeting
Washington, D.C.
Outline

• Pre-computer journal production
• 1970’s Technology
• Early electronic journal publishing
• Crucial technical advancements
• Early online journal experiments
• The Internet & World Wide Web
• Looking to the future
Pre-computer Journal Production

- ACS journals at Mack Printing Company
- Monotype (hot-metal)—one letter at a time
Pre-Computer Journal Production: Monotype
Computer-assisted Photocomposition

- Photon Composition System
- Followed by I&EC Quarterlies

See “A Century of Chemistry” by Ken Reese (Editor), ACS, 1976.
**12-Acetyldehydroabietonitrile (1b)**

To a solution of 26.8 g of dehydroabietonitrile (Hercules Inc.) in 200 ml of tetrachloroethylene cooled to 0° (dry atmosphere) was added 10 ml of acetyl chloride and 26.5 g of aluminum chloride. The mixture was stirred at 0° for 24 hr, poured into water and extracted with CHCl₃. The washed and dried extract was evaporated; the residue was recrystallized from methanol-water, yield 27.5 g of 1b, mp 157.5-158°, [α]D²⁵ + 97.0° (c, 0.320; 95% ethanol), ir bands at 2247 (nitrile) and 1692 cm⁻¹; nmr signals at 1.18 (C-10 methyl), 1.26d (J=6.5 Hz, isopropyl), 1.40 (C-4 methyl), 2.50 (methyl ketone), 7.00 and 7.26 ppm (aromatic protons).

**Anal. Calcd for C₂₂H₂₉NO:**  C, 81.69; H, 9.04; N, 4.33.
**Found:**  C, 81.61; H, 9.19; N, 4.54.
J 124 Composition at Chemical Abstracts Service

• 1975: Inorg. Chem. on J124
  – An extension of CA’s production
  – Automated page layout
  – “Blind” batch-mode editing
  – Data element identification
  – Hyphen & dashes: - – —
  – Italic ν & Greek ν
Xyvision Composition at Chemical Abstracts Service

  - Greater human intervention than *J124* (temporarily suspended in 1989 due to high labor costs)
  - Problems with hyphenation, placement of graphics, display math and tables
  - 200+ Utilities
Crucial Technical Advancements

- Computers
  - Hardware
  - Software
- Telecommunications
## Computers: Evolution of Intel Microprocessors

<table>
<thead>
<tr>
<th>Date</th>
<th>CPU</th>
<th>Transistors (M)</th>
<th>GHz</th>
<th>MIPS</th>
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<td>1971</td>
<td>4004</td>
<td>0.0023</td>
<td>0.0001</td>
<td>0.06</td>
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<tr>
<td>2005</td>
<td>Pentium 4</td>
<td>55</td>
<td>3</td>
<td>10,500</td>
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<tr>
<td>2007</td>
<td>80986</td>
<td>1,000</td>
<td>24</td>
<td>125,000+</td>
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Computers: Evolution of Disk Drives

- 1955: IBM 350 Disk File was first hard drive. 50-24” platters. 5 MB total capacity

- 1979: Alpha Micro, 5-17” platters. 75 MB total capacity. $32,000 or $427,000/GB

- 2005: 250 GB, single platter drive. $140 or $0.56/GB
What if car prices followed prices of disk drives...

- 1979: The average price of a car was $6,800 ($18,000 in today's dollars).
- What would the 2005 average car price be?
If car prices followed prices of disk drives...

The 2005 average car price would be ... 2.4¢
ACS Member Special! (Booth 1025)

Mercedes-Benz 2005 SLR McLauren

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• 207 MPH
• 0-60 < 3.8 seconds
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Evolution of Telecommunications

• 1980: 30 characters/second. Acoustic coupler. (0.00024 Mbits/second)

• 1984: STN International 56 KB dedicated lines. (0.056 Mbits/second)
Evolution of Telecommunications (cont.)

• 2005: Broadband. 1-3 Mbits/second

• Currently broadband telecommunications available to most scientists

• Last mile problem?
Ushuaia, Argentina
USHUAIA
fin del mundo

Municipalidad de Ushuaia
Cámara de Turismo de Ushuaia
¿Cheeseburger with your JACS, Señor?
Computers: Software

- Internet
- Web Browsers
- GML, SGML, HTML, XML, CML, etc.
- Database management systems
- Business systems
Early Online Journal Experiments

- 1980: 1000 articles from J. Med. Chem. on BRS.
- 1982: All 16 ACS journals on BRS
Early Online Journal Experiments (cont.)

• 1983-6 ACS journals on STN International
  – Inverted file & Display file
  – 40 bits (5 bytes) for proximity
  – SLART (Simultaneous Left And Right Truncation)
  – Browse Index
  – No graphics, tables or math
  – Architecture still used for fulltext files (USPATFULL) on STN
Early Online Journal Experiments (cont.)

- 1989-95: CORE Project
- 1992-97: Red Sage Project
The World Wide Web Arrives

- 1996: *J. Phys. Chem.* available (100th anniversary)
- 1997: All 26 ACS journals available
- 2002: ACS Journal Archives available (aka ACS Legacy Archives)
Gazing Into the Future…
The Future

• The Internet and Web are truly exceptional
• No obvious break-through technologies on the horizon
• Advancements in scientific communication likely the result of incremental discoveries and developments
The Future (cont)

- Moore’s Law to continue...
  but
- Quantum computers
  - Sprintronic Science & Applications Center (SpinAPs): Stanford/IBM-Almaden
  - Vectis Link Encryptor (from id Quantique)
    - Uses qubits for communicating
      - 100 km range
  - Magio QPN Security Platform (from MagiQ)
The Future (cont)

- Holographic data storage
  - Terabytes/platter (3D storage)
  - Rapid access (10 µs)
  - Rapid parallel searching
  - (See C&EN, June 27, 2005, pp. 31-32)
- 30 GB card for $1 from Optware (end 2006)
- 300 GB disc (WORM) with a transfer rate of 20 MB/sec from InPhase (2006). Up to 1 TB with 1 GB transfer rate.
The Future (cont)

- Expansion of broadband telecommunications
  - 3, 5, 10… Mbits/second using cable & DSL
  - 5/2, 15/2 and 30/? Mbits/second using FTTP
  - Efforts to expand in U.S. rural areas and less-developed countries
The Future (cont)

• Potential collaborations in publishing experiments
  – Publishers, editors & scientists with:
    • universities (centers of excellence)
    • software companies
    • telecommunications companies
    • government agencies
  – Publishers of primary & secondary products have a unique advantage
Acknowledgements

• Mike Bowen, John “Tom” Keys, Richard Love, David Martinsen & Jeffrey Spring

• Mostafa El-Sayed, Gordon Hammes & Hans Neurath

• Chemical Abstracts Service; Cornell University, Bellcore; OCLC; University of California–San Francisco & Bell Laboratories
Thank You!