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SCIENCE



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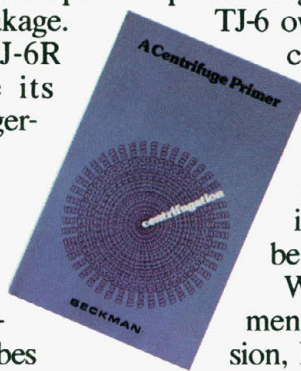
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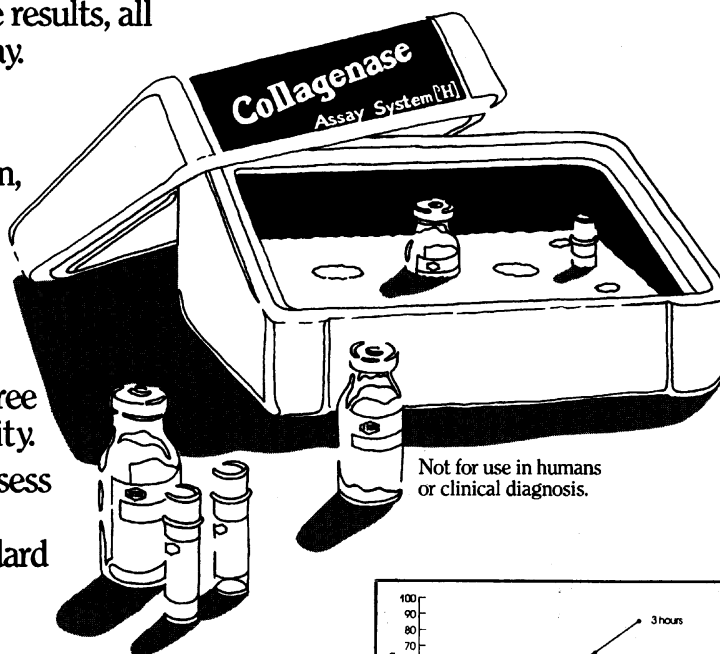
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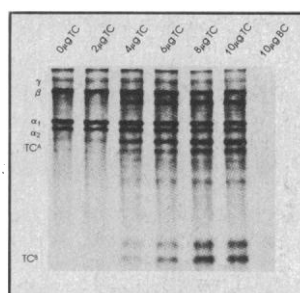


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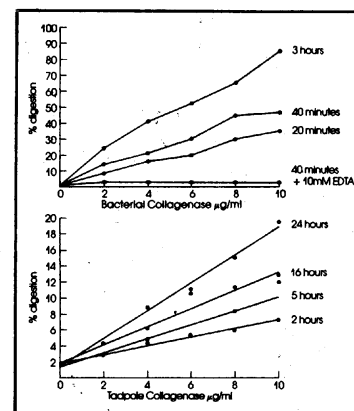
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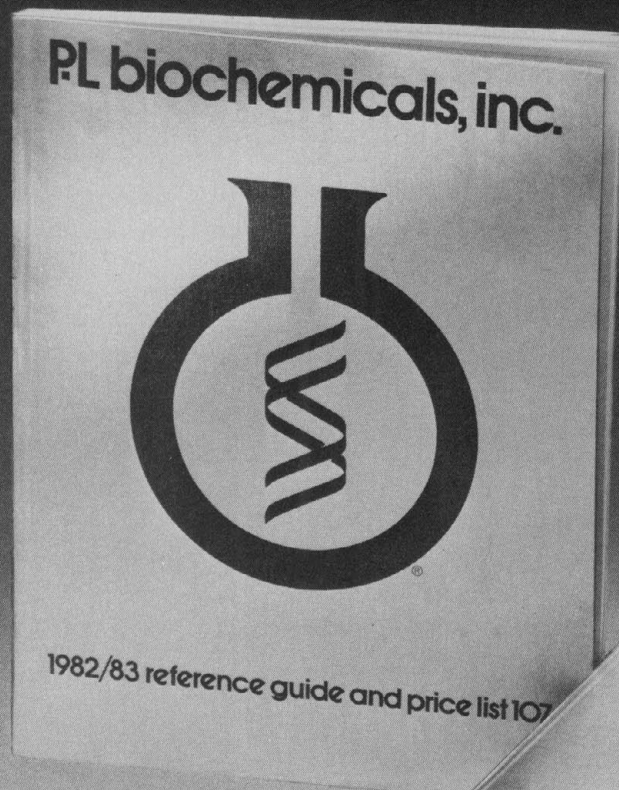
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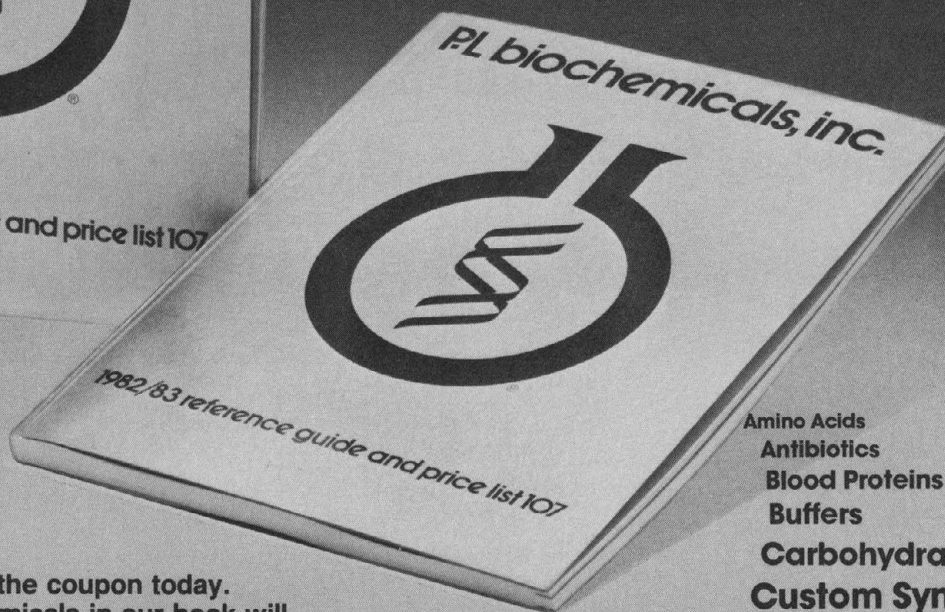
COVER

General view of the excavation in 1970 into the east-west profile left by D. A. E. Garrod in the Tabun Cave on Mount Carmel. This 10-meter section yielded evidence of about 75,000 years of human development early in the last interglacial-glacial cycle. Removal of material in alternate 1-meter squares allowed close control of the complex natural stratigraphy. See page 1369. [A. J. Jelinek, Department of Anthropology, University of Arizona, Tucson 85721]

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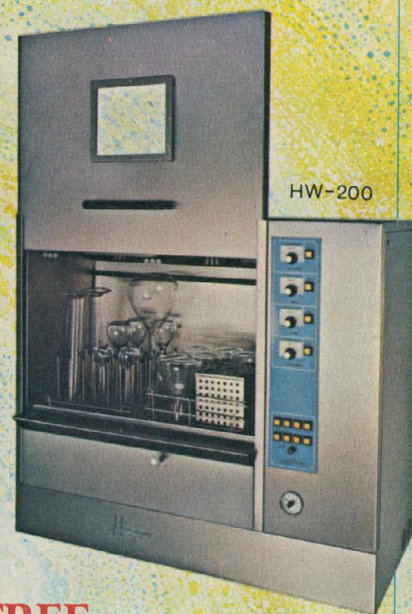
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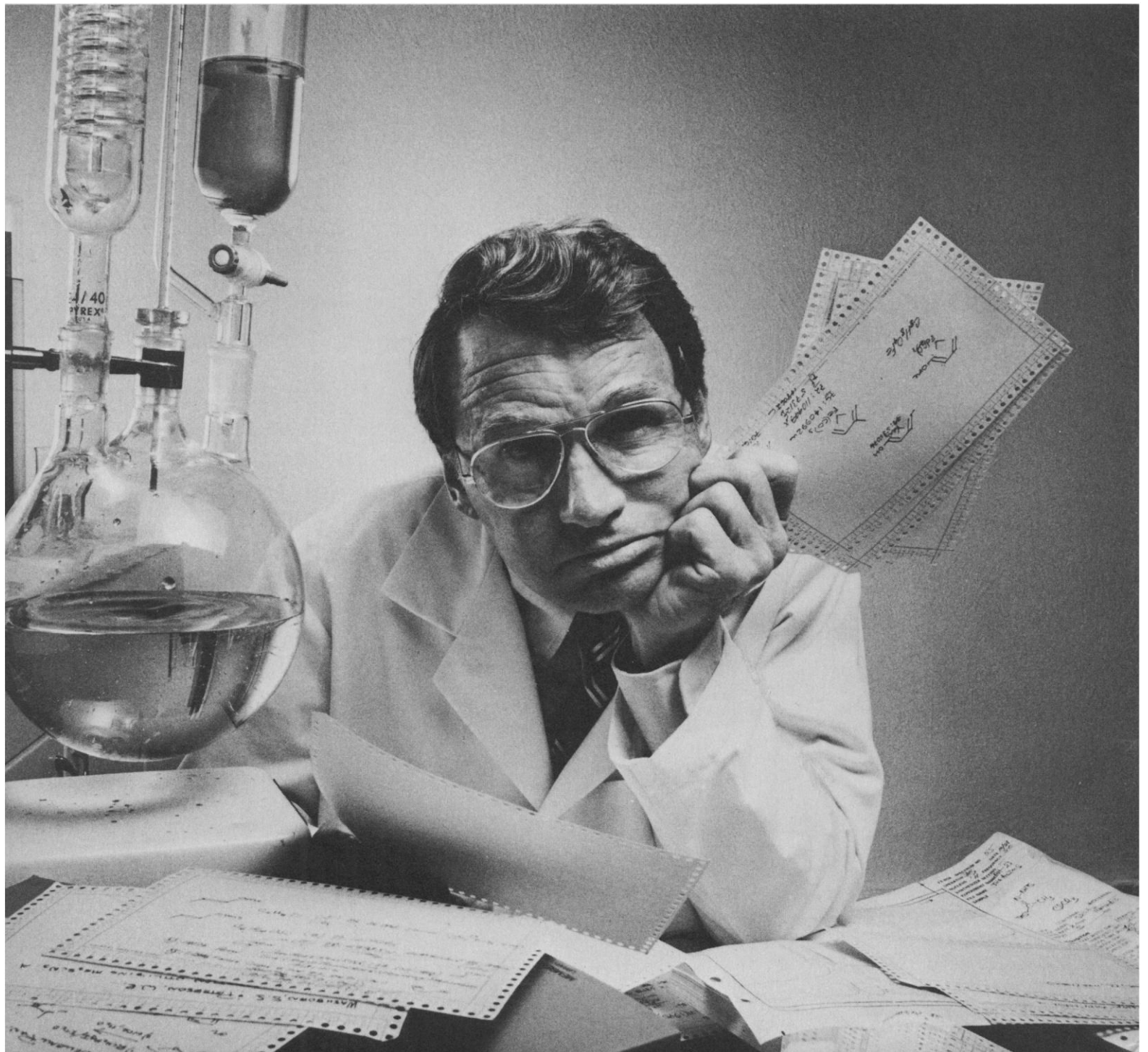
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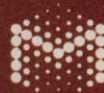
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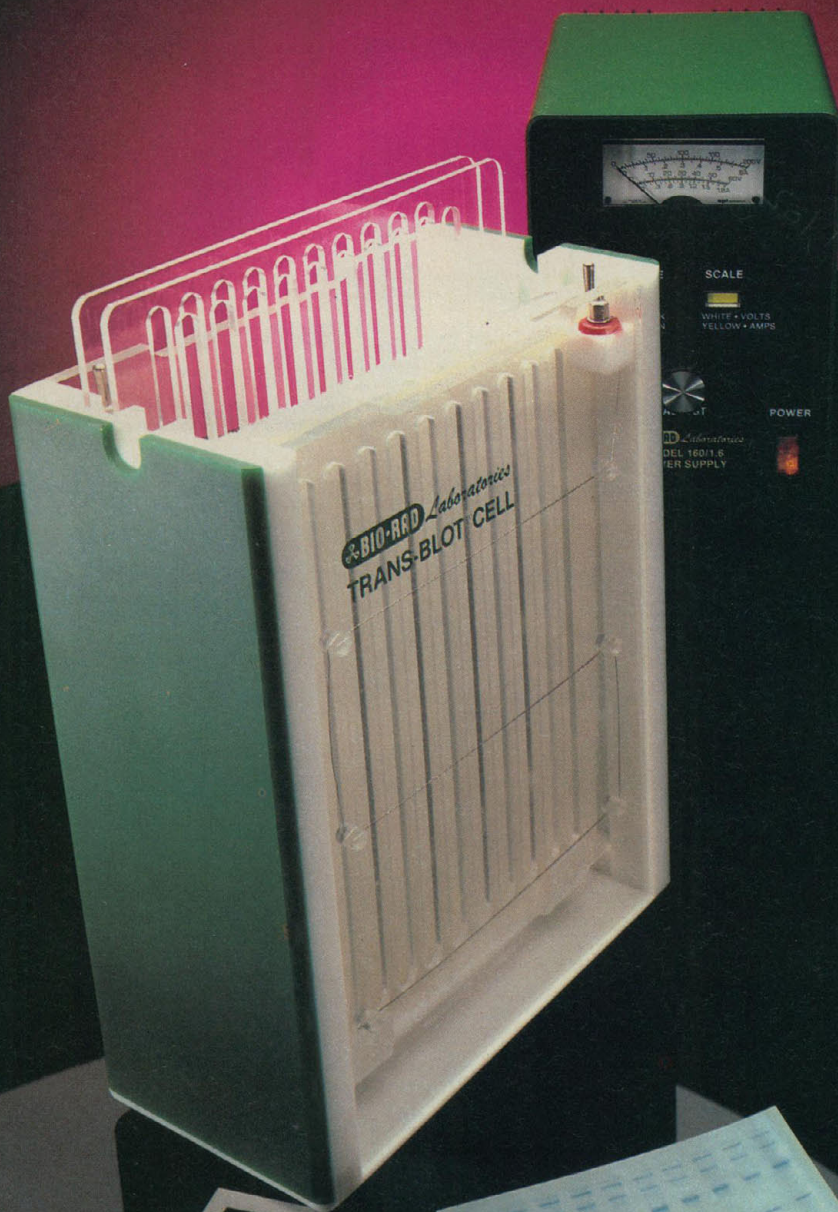
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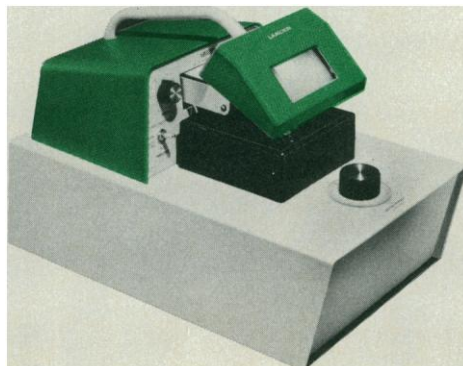
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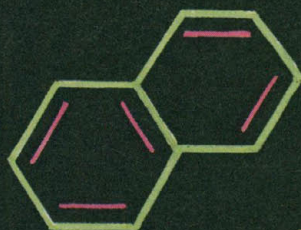
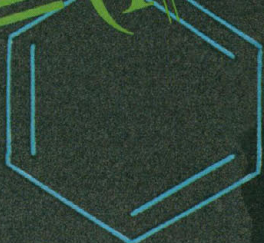
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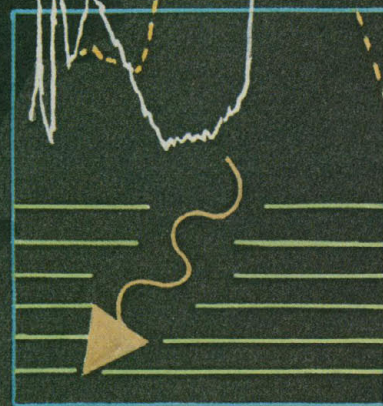


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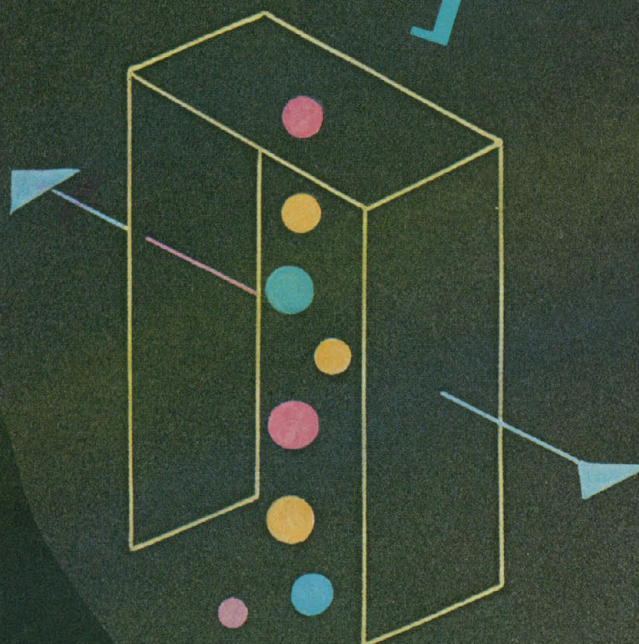
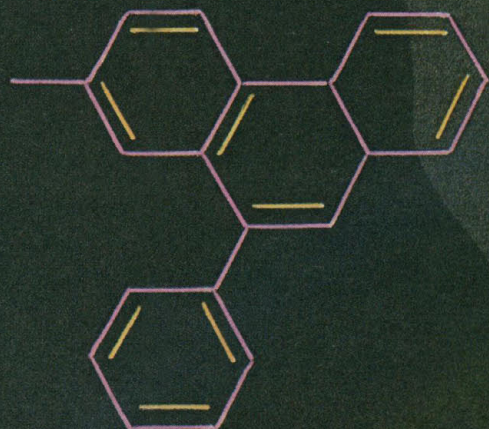
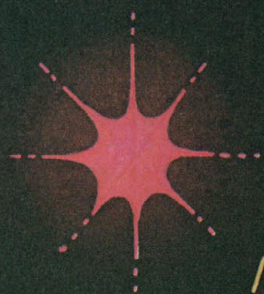
$$r = (I_{\parallel} - I_{\perp}) / (I_{\parallel} + 2I_{\perp})$$



$$S(\alpha, \beta, \theta, \omega) =$$



$$I(\alpha, \theta) = I_0 \left[\frac{2J_1(\alpha \sin \theta)}{\alpha \sin \theta} \right]^2$$



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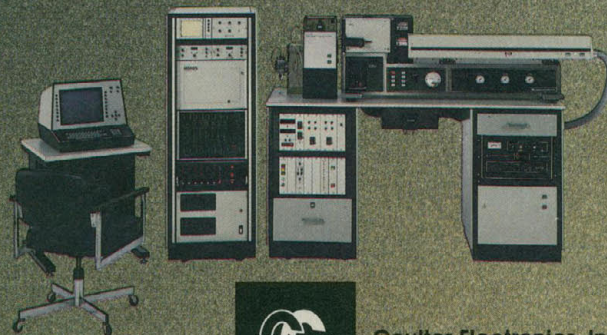
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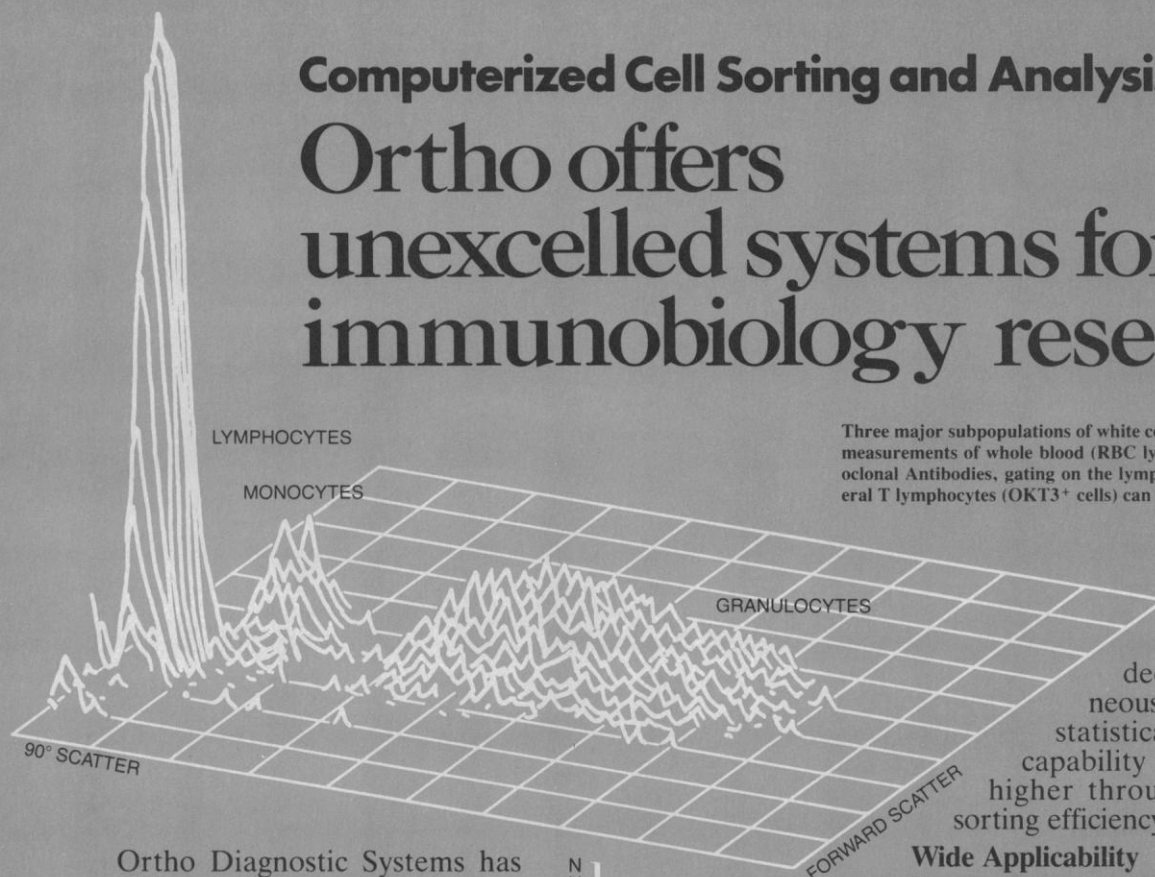


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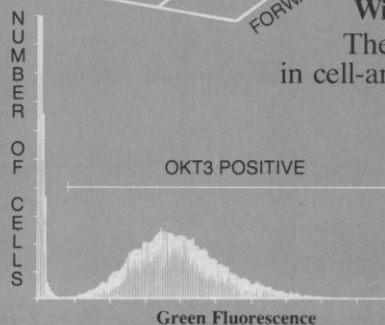
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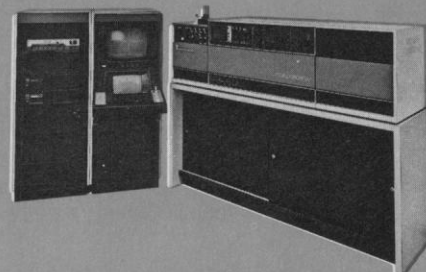
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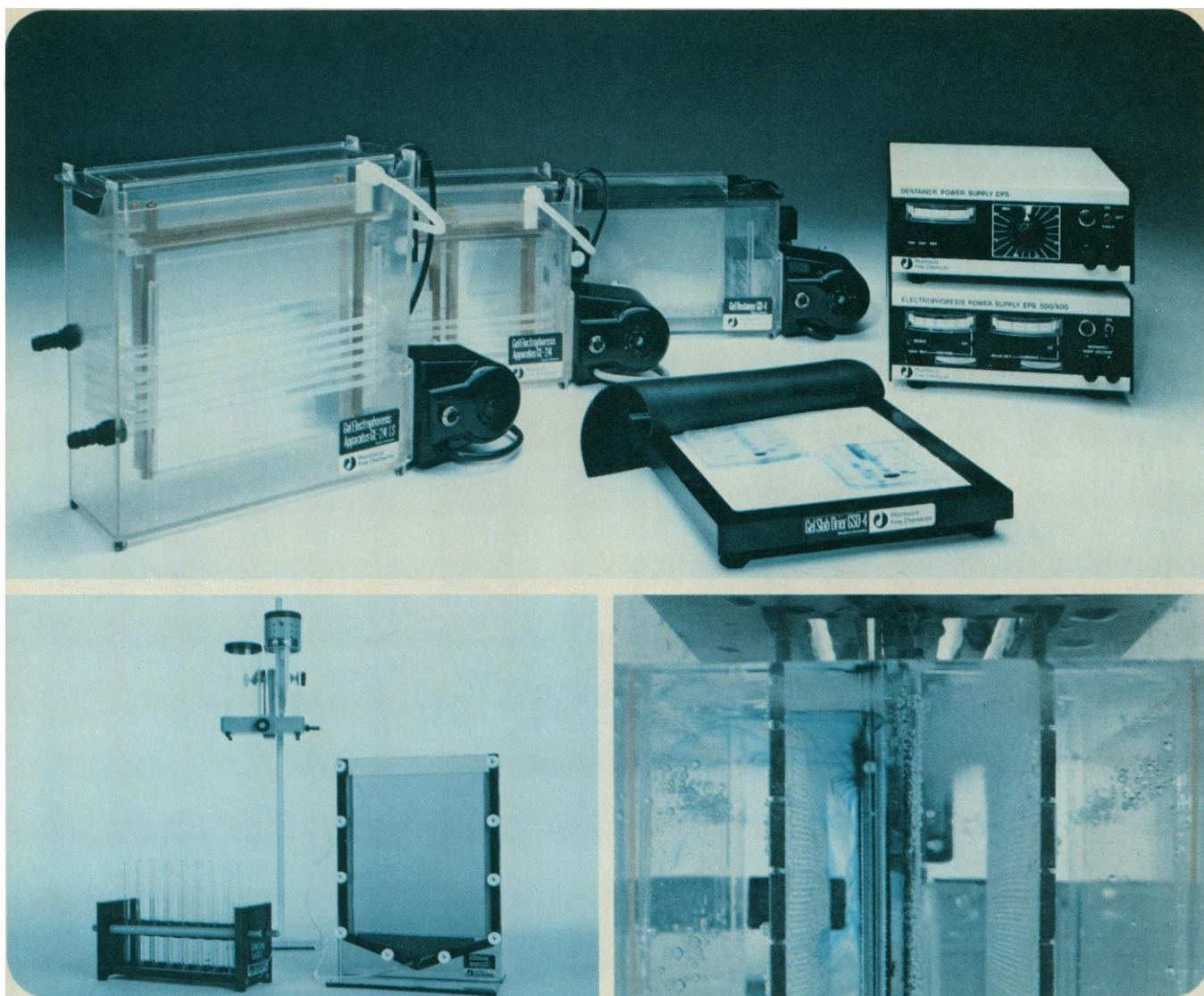


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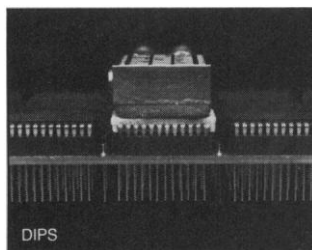
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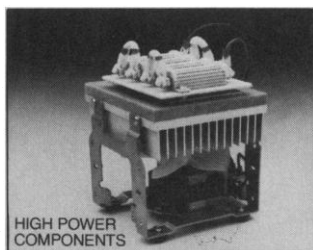
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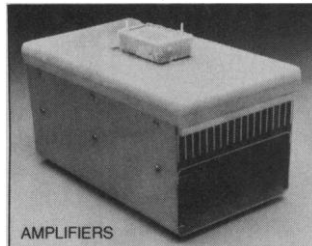
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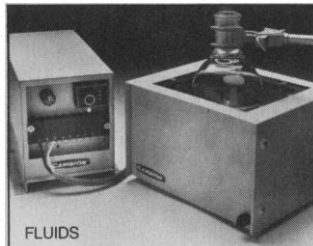
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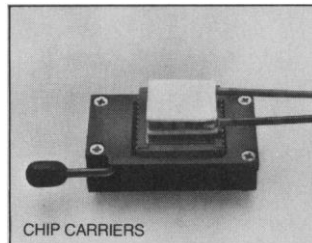
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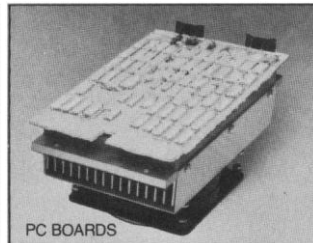
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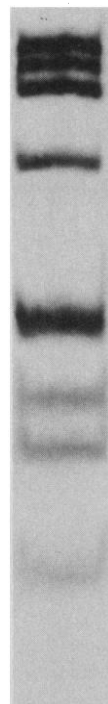
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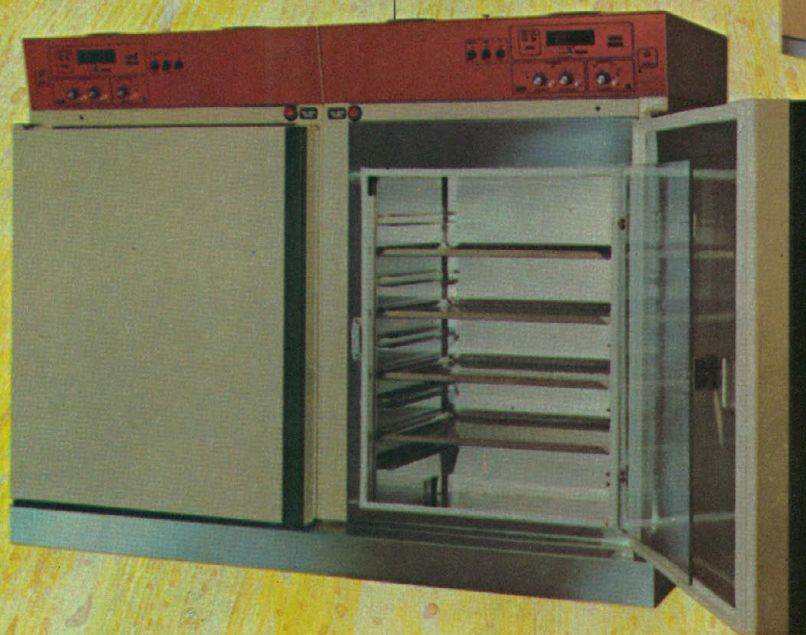
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On-line Databases Vital for Scientific Research

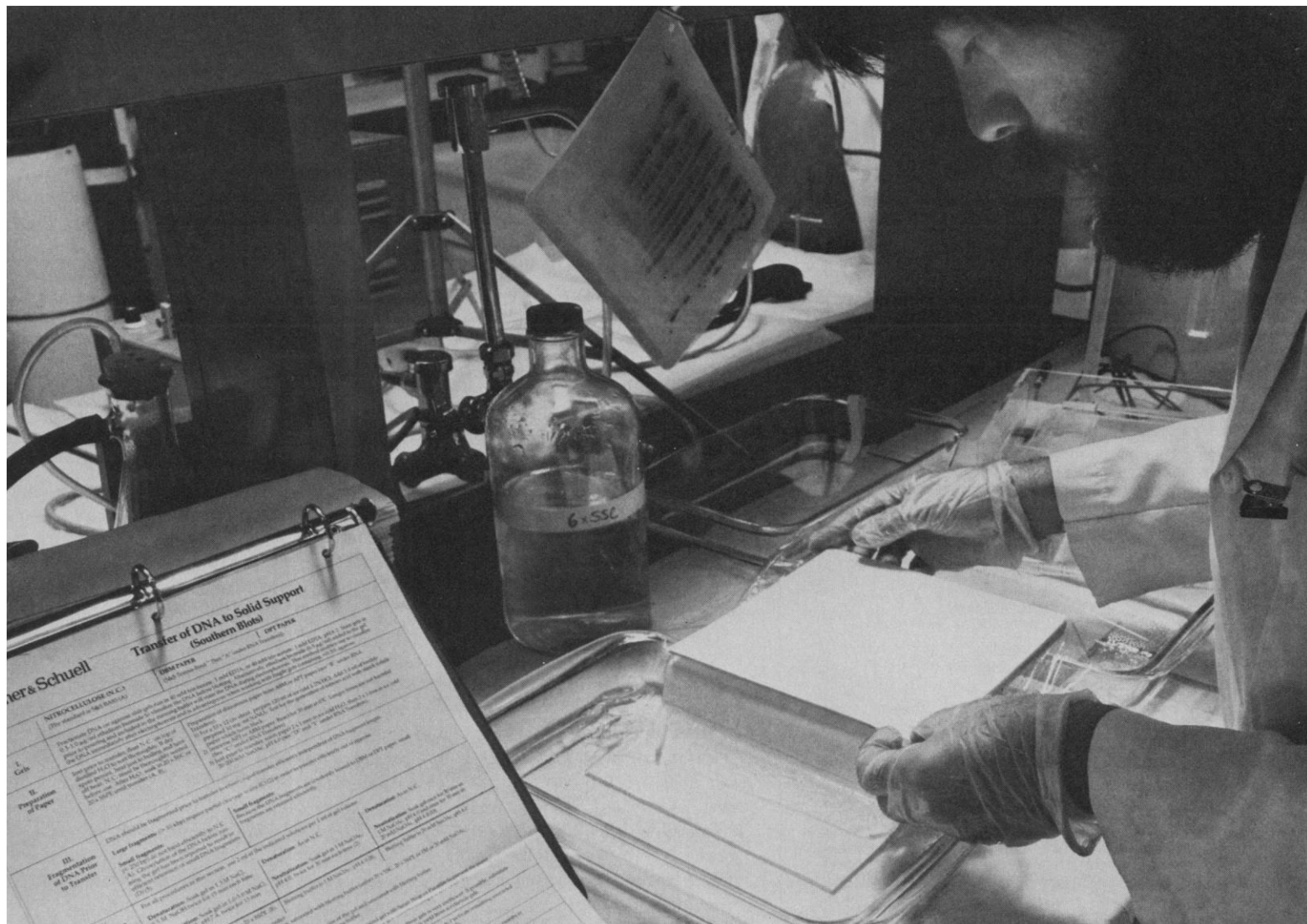
Most academic scientists are aware of the existence of computerized databases, but only a small fraction use them. Those who do are finding that the development of machine-readable databases has revolutionized the process of information retrieval, especially for locating published scientific literature. In the 1980's the use of these databases is likely to increase dramatically, as scientists have more experience with the excellent results obtainable from on-line literature searching. A typical database can be accessed by typing search requests into a terminal which is linked to a remote computer. The end product of a brief interactive session with the computer is a list of references to the published literature. Today more than 100 databases, covering most areas of science, are available to clientele of research libraries. While many of these databases are already available in hard copy (paper abstracts or indexes), most observers recognize that on-line information retrieval is markedly superior to manual searching, even of the same sources.

The advantages are many. The computer is very adept at searching long files. On-line searching offers greater flexibility than manual systems, since natural language supplied by a scientist as well as controlled language taken from various thesauri can be used as access terms to find references. Another advantage is that single- and multiple-word terms, or even truncated terms, can be input into the computer. The procedure is enhanced by the way in which the computer processes this input with the use of Boolean logic. Two or more words can be linked together with AND or OR logic, as in a Venn diagram. Where the concepts overlap, the computer can pick out specific references which satisfy the search strategy. On-line databases offer a special advantage for multidisciplinary research problems, which bring together several subjects; here a scientist need not be familiar with the other fields to effect a successful search. As final benefits, on-line databases contain up-to-date information and the scientist obtains a customized printout of the search results for future consultation.

Unfortunately, there remain several obstacles to the full utilization of on-line databases. First there is the element of cost, as libraries must subscribe to the databases from commercial sources. Often the cost of a search exceeds \$30, and it may be even more when several databases are involved. The cost problem might be solved by the parent institution agreeing to fund the library for this service in much the same way as for more traditional reference services. Another funding option is through research grants. On-line searching could be considered part of the fixed cost of doing research, like books and microfilm, and thus be included in the university's overhead. The overhead monies generated from grants could then be used to fund on-line searches. Scientists might also consider including on-line library expenses in their grant proposals and then charge the grants directly.

A second problem is the delivery method for this service. In most libraries, a scientist must go through an intermediary (usually a librarian) for terminal access, search formulation, and search execution to complete an on-line search. This can be inconvenient, as librarians are not always available to help. Further, the scientist must interpret the research problem to the librarian before a search can be done. A logistical problem also exists in many libraries. Library computer terminals are often located at inconvenient points on campus or are too few in number to be readily available. Clearly, scientists need to be trained to do their own on-line literature searches. They can use other terminals, which are often available in their offices and laboratories, and do the searches at their convenience.

The number of databases will continue to grow in the future. The kinds of information available on-line will increasingly expand beyond bibliographic data to include more numerical and other data. On-line information retrieval will be indispensable to productive research. Scientists must seek to understand and adopt this new technology.—JOHN SANDY, *General Libraries, University of Texas, Austin 78712*



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