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CC/NUMBERS 51-52
DECEMBER 23-30, 1985

Brewer J M & Ashworth R B. Disc electrophoresis. *J. Chem. Educ.* 46:41-5, 1969.
[University of Georgia, Athens, GA]

How disc electrophoresis, one of the most popular electrophoretic methods, works is presented in simple terms. A cheap and easily constructed apparatus is described. Step-by-step instructions and practical information are given for both the analytical and preparative procedures. [The *SCI*® indicates that this paper has been cited in over 175 publications, making it one of the most-cited papers ever published in this journal.]

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October 18, 1985

The article originated in my attempts to explain the mechanism of disc electrophoresis to biochemistry graduate students in my physical biochemistry course, and later to a very heterogeneous undergraduate introductory biochemistry class. I had used the method a great deal both on an analytical and preparative scale, but without understanding why it worked. (This was apparently true of many other users of the technique.) I had Ornstein's[1] paper on the electrochemical mechanism, but this was presented in terms of equations and I had already learned such presentations caused mass eye-glazing among students. So I sat down with the paper and after a couple of hours of concentrated thought had figured out why the technique worked and how I could present it in simple electrical terms using just words.

At the same time, my colleague, R.B. Ashworth, had decided that the prices for commercial disc electrophoresis apparatuses were unreasonable and, being handy in technical matters, constructed a cheap apparatus from lucite, rubber stoppers, and Nichrome wire. He had considerable practical experience with the technique, as well.

I had written up my simpleminded explanation for the physical biochemistry students. I also taught a techniques course for our graduate students, one of the techniques being disc electrophoresis. Consequently, I added a step-by-step description of how to do an analytical disc electrophoresis experiment, so I wouldn't have to keep telling people how to do it, and included Davis's[2] formulation for the reagents.

I eventually realized there might be some general interest in what I had prepared. Ashworth was willing to contribute his apparatus recipe, and I prepared some additional remarks about practical aspects of gel polymerization, purifying the chemicals, and some common pitfalls of the method. I had done a lot of work with Jovin and colleagues' preparative disc electrophoresis apparatus[3] and included directions for its use, as modified by my experience, so that the write-up evolved, with Ashworth's suggestions, into a brief review of the technique. We sent the article to a journal that was read by laboratory instructors and students, the *Journal of Chemical Education*. It was accepted without change.

The major virtue of the paper—it has its share of vices—is that it encompasses both the theoretical basis and practical applications of a very widely used technique, written by people with a great deal of practical experience in most of its aspects. As such, it is convenient to cite in a variety of contexts. Later, a further expanded and updated version appeared in our book[4] as a chapter on electrophoresis.

1 **Ornstein L.** Disc electrophoresis—I. Background and theory *Ann. NY Acad Sci* 121 321-49, 1964 (Cited 3,740 times.)
2 **Davis B J.** Disc electrophoresis—II. Method and application to human serum proteins *Ann NY Acad. Sci* 121 404-27, 1964 (Cited 15,250 times)
3. **Jovin T, Chrambach A & Naughton M A.** An apparatus for preparative temperature-regulated polyacrylamide gel electrophoresis. *Anal. Biochem.* 9 351-69, 1964 (Cited 505 times.)
4. **Brewer J M, Pesce A J & Ashworth R B.** *Experimental techniques in biochemistry* Englewood Cliffs, NJ. Prentice-Hall, 1974. 374 p.