

How to prepare a DNA sequencing chromatogram for publication

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▼ I present here a method of producing good-quality DNA sequencing chromatograms for publication. There are many programs with which chromatogram data from automated sequencing devices [e.g. ABI PRISM 377 (Applied Biosystems)] can be examined. I have investigated some of the most popular programs, namely EditView (Applied Biosystems), Sequence Navigator (Applied Biosystems) and Chromas (C. McCarthy; <http://www.technelysium.com.au/chromas2.html>). None of this software offers an easy way to manipulate the chromatogram for high-quality printing and for downstream processing by other graphics software.

The key to producing good-quality figures is handling the chromatogram as Postscript® files and not as bitmap images. Postscript files can generate the highest-resolution output on a particular printing device and are especially suitable for reproducing line drawings like a chromatogram. Although all sequence viewing or editing programs can display chromatograms on a computer screen and offer the user the ability to make a screen capture, images created in this way are inevitably jagged because of the relatively low resolution [96 dots per inch (dpi) at best] of the computer screen (Fig. 1a). None of the programs I tested allow a specific segment of a chromatogram to be exported as a postscript file. Only Chromas could produce good-quality printing of a selected portion (defined by the left and right cut-offs) of the chromatogram (Fig. 1b). The latest version, Chromas 2.01, allows users to print the chromatogram screen display to a file instead of to a printer. The file generated (a '.prn' file is a genuine Postscript file and is can be used for downstream processing. Earlier version of this program (1.62 and lower) did not have this function and a more tedious procedure to capture the Postscript codes is necessary (but not described here), using a virtual printer driver.

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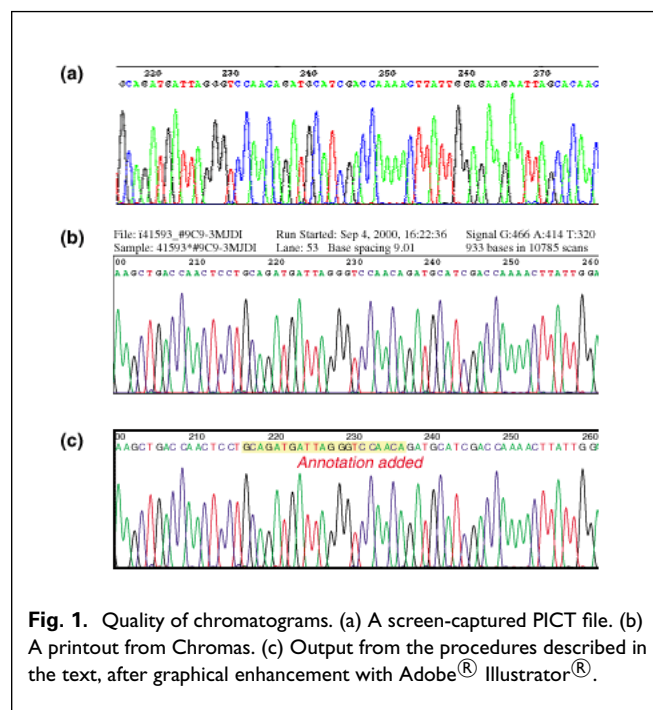


Fig. 1. Quality of chromatograms. (a) A screen-captured PICT file. (b) A printout from Chromas. (c) Output from the procedures described in the text, after graphical enhancement with Adobe® Illustrator®.

The Postscript chromatogram file can be imported into Adobe® Illustrator® (<http://www.adobe.com/products/illustrator/>) and processed. Once imported, all components of the chromatogram (e.g. annotations, comments, boundary boxes, curves, sequence readout, base numbering) become editable. The file edited in Illustrator can be directly printed on any Postscript printer and the output quality is limited only by the printer's capability. Most journals accept figures prepared in the Postscript format. Comparing Fig. 1b and Fig. 1c, one can see the following enhancements: the boundary box was thickened, the font was changed, a segment of sequence was highlighted and some annotation was added.

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Adobe Illustrator (commercial) is available on both Macintosh and Windows platforms.) Chromas 2.01 is shareware and is only available on the Windows platform. Thus, the

procedure described here will work for anyone who has a Windows-based PC or a Macintosh with Windows 95/98 emulator software.