

A short guide for production of line-drawings with Adobe Illustrator®

Jason D. Williams
Biology Department
Hofstra University
Hempstead, NY 11549
Email: biojdw@hofstra.edu

Use of computer illustration programs in the production of line-drawings from drawing tube sketches or digital images is ultimately a time-saving alternative for inking drawings with technical pens. Brief methods for producing plates (from original sketches to final touches) with Adobe Illustrator are described below. While illustrations can be created with a mouse, the use of a graphics tablet and stylus (e.g., 9 x 12 Wacom® tablet) greatly aid in the process. Examples of plates produced with the techniques described below can be found in Williams (2001, 2004, 2007). Other papers demonstrating techniques for creating illustrations from drawing tube sketches or from digital pictures can be found in Coleman (2003, 2006). Those without experience with Adobe Illustrator will most likely need to consult additional manuals or texts (e.g., Illustrator 10 for Dummies) to learn the basics of the program. Anyone with questions, comments, or suggestions are encouraged to contact me.

The technique in 20 steps

1. Scan original drawing tube sketch (150-300 dpi, grayscale; Fig. 1A).
2. Open the above file with Adobe Illustrator (version 10 or latest “Creative Suites” (CS) version). Immediately save the file *with a new name*.
3. Under the LAYERS pallet double-click on the scanned image layer and label as ORIGINAL or TEMPLATE, change the opacity to 50%, and turn off the print option. Click on OK and then lock the template layer so that it cannot be modified.
4. Create a new layer in the LAYERS pallet and label as TRACE.
5. Set line width at 0.5-1.0 pt (0.5 pt is usually best) in the STROKE pallet options. Line width can later be changed. In the TOOLS pallet make sure STROKE is set to black and FILL is set to none (i.e., shows red cross).
6. In the TRACE layer, begin tracing the original sketch using the Pen tool and stylus with drawing tablet (Fig. 1B). The best results are achieved when traced at a high magnification of the original image (~400X; use command+/- to zoom in or out). Set anchor points as appropriate. Always click on the previous anchor point with the pen tool in order to set curves correctly. Undo [command+Z(Mac), option+Z(PC)] when anchor points are not set correctly. During tracing, it is helpful to keep one hand on the command+Z buttons to quickly undo the last point if not positioned correctly. Hold down the space-bar to get the hand tool and reposition the layer as needed. *Save the file repeatedly while working*.
7. After tracing the sketch you can add stippling using the Brush tool. Create a new layer in the LAYERS pallet and label as Stipple. Go to the Brushes pallet and create New Calligraphic Brush and in the pop-up menu give it a title (e.g., stipple 1). Set the

Angle and Roundness as fixed and then change the Diameter to 0.5-0.75 pt and set to fixed. If a drawing tablet is available, stippling can be added with the stylus as if you were using a regular pen; otherwise the mouse is used to create stippling.

8. Pigmentation of specimens can be added in the same manner as stippling. Typically a larger diameter after brush as needed.

9. Internal structures can be created as a separate layer and indicated in dashed lines by choosing a dashed line under the STROKE pallet (set dash and gap at 0.5-1 pt). Features that need to be shaded can be selected with the Selection tool (arrow) and then under the TOOLS pallet the FILL can be set to various shades of gray.

10. To add in chaetae that taper to a fine point, you must create a new Art Brush. First, use the Pen tool to trace a chaeta (taper from two points at base of chaeta to one point at top). If the chaeta is at an angle, use the rotate tool to make it vertical. While the trace of the chaeta is selected, go to Brushes pallet and create a New Art Brush and in the pop-up menu give it a title (e.g., chaeta 1). In the pop-up menu make sure that the direction of the brush is parallel with the chaeta (keep other options as listed). With the brush or pen tool you can now create chaetae. In the original trace of the chaeta, your pen STROKE should be set to black and FILL should be set to white. However, when using the brush tool to make chaetae with your new Art Brush you need the STROKE set to black and FILL set to none (i.e., shows red cross). With these settings, overlapping chaetae will appear opaque and can be layered.

11. A scale bar should be added. Click on the Rectangle tool and insert an appropriately sized rectangle (once the rectangle is added the exact dimensions can be set in the TRANSFORM pallet; ~4 pnt width is appropriate; the length is determined by the stage micrometer that you use) (Fig. 1C).

12. Print the image and check for accuracy. Make sure all lines are connected and follow the original sketch or digital picture. Correct any mistakes. Anchor points can be added, deleted, and curves changed by clicking and holding down on the pen tool and selecting the appropriate pen tool. If whole sections need to be deleted, select with the Selection tool (arrow) and delete. The Scissors tool may be required to cut out these sections if in the middle of a continuous line.

13. Before combining multiple images (such as the one above) into a final plate you can select all layers and group them to avoid moving only part of the image. Select all (command+A) and under the OBJECT menu click on group (command+G).

14. To produce a final plate, select new file under the FILE menu. Set the file size at 8.5 x 11 inches or dimensions required by the journal. Save file with appropriate name (e.g., PLATE 1).

15. Open first image to be added to the plate. Select the grouped object and then copy (command+C) and paste (command+V) into PLATE 1. You can paste each object into a separate layer with an appropriate name (e.g., anterior end). Repeat this with each object to be combined in PLATE 1.

16. Using the Selection tool (arrow) move images to their approximate final position (to view a grid, go under the VIEW menu and select show grid).

17. To reduce or enlarge images within the plate, select images with Selection tool (make sure all parts of the image are selected **as well as the scale bar**) and then double-click on the Scale tool. Set the scale percentage at the required amount. After images are scaled, the scale bars will need to be redrawn in order to make widths constant

among images. You can also change the scale of the images by clicking on the bounding box and reducing the size. However, be careful to hold the shift button down so that the dimensions of the image are constrained (i.e, they do not become distorted).

18. Add in text by using the Text tool (Times bold, 24 pt font works fine). Once added, the text can be moved with the Selection tool. In addition, the text and/or images can be aligned by selecting objects to be aligned (hold Shift key down to select multiple objects) and then under the ALIGN pallet selecting the appropriate alignment. Objects can be rotated if needed by selecting and then clicking on the rotation tool.

19. Save plate and print. Check accuracy and alignment, make any necessary changes.

20. Submit for publication with the rest of your manuscript!

References

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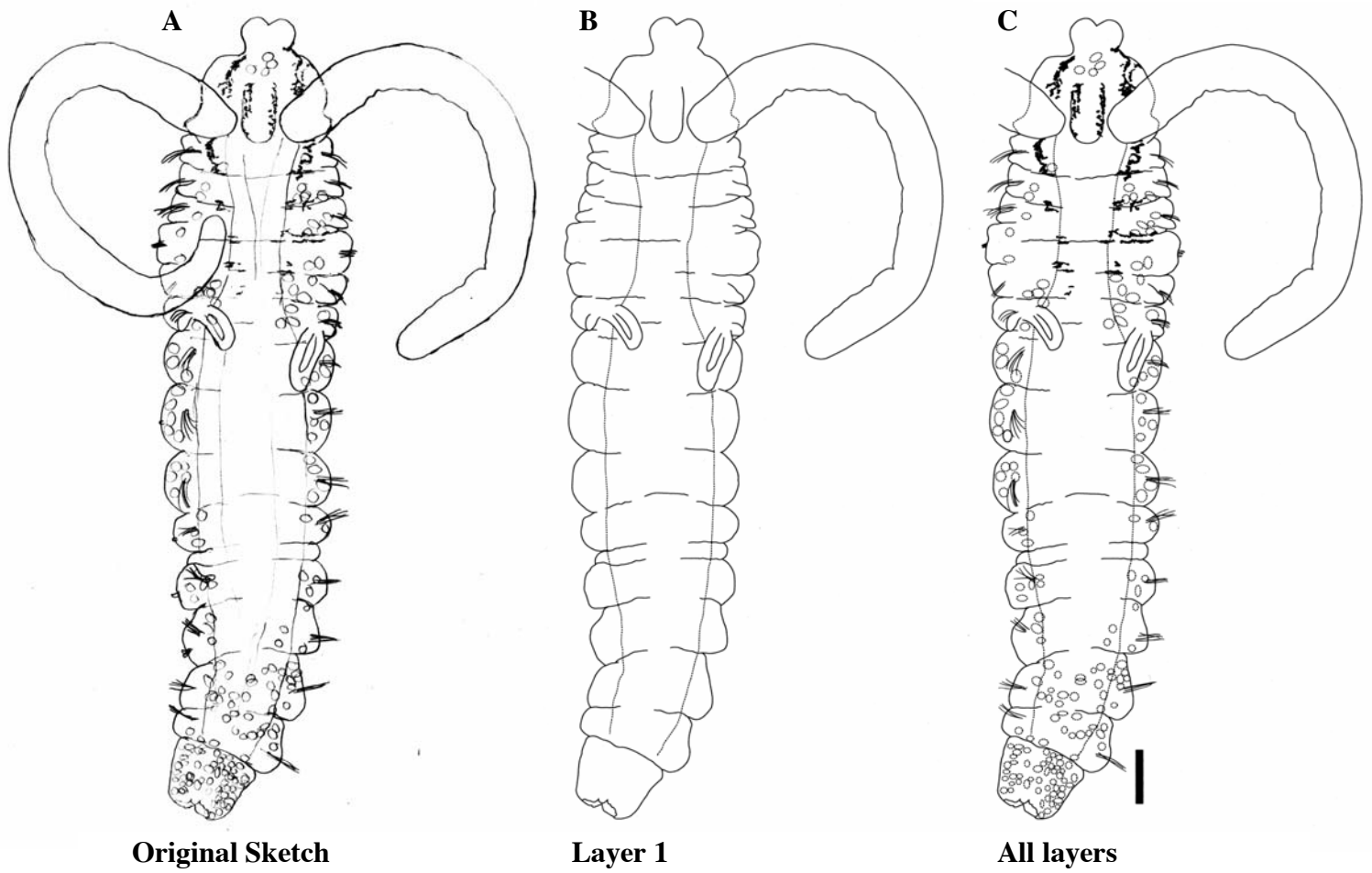


Fig. 1. A-C, Example of line-drawing production with Adobe Illustrator[®] based on *Polydorella dawydoffi* Radashevsky, 1996 as illustrated in Williams (2004). A, Dorsal view, scan of original drawing tube sketch. B, Layer one, body outline. C, All layers (note pigmentation, setae, cells, scale bar; outline of digestive tract is shown by dotted line). Scale = 100 μ m.