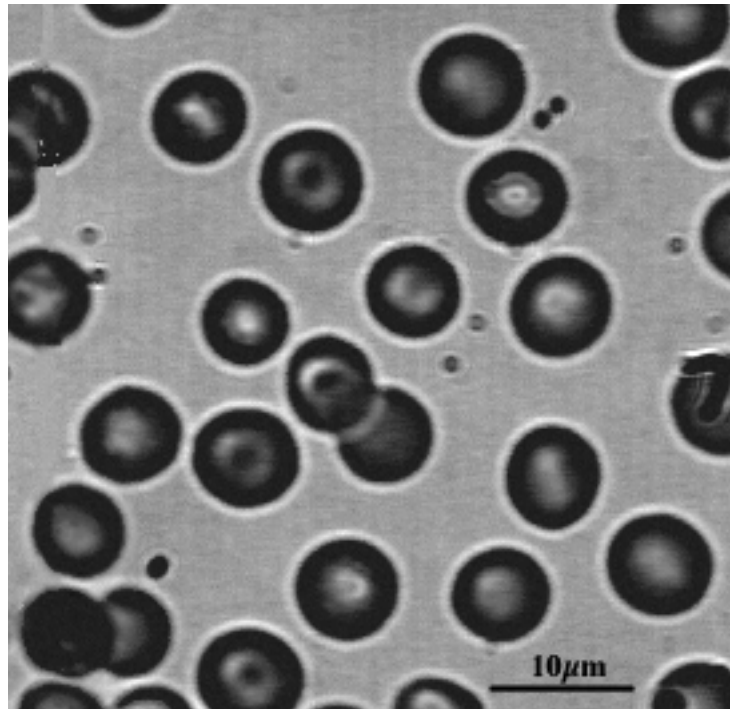


## Superimposing colored outlines to mark features

In many of the slides that I use in teaching I find it convenient for illustration to mark the features that are being measured in an image by superimposing colored outlines onto the original image (usually red, because it shows up well on grey scale images, or black on color images). This is easily set up as an action and illustrates some of the basic Photoshop operations.

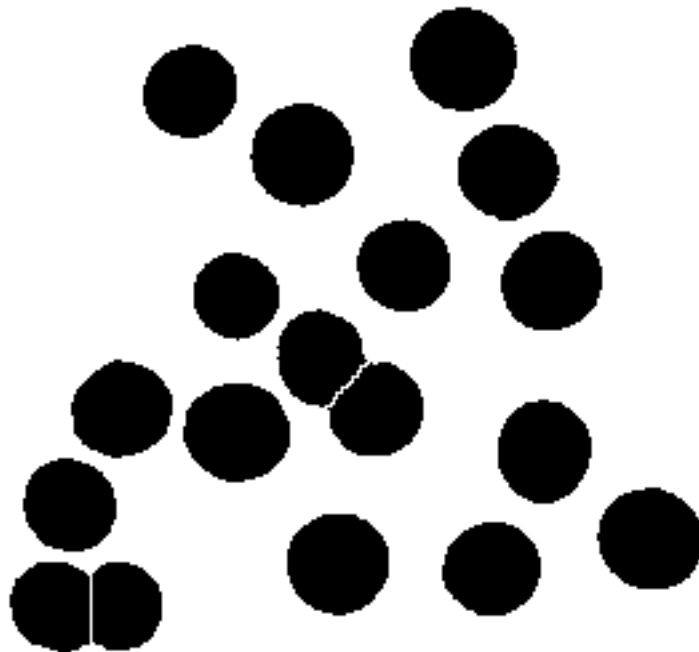
A typical situation is shown using the image of red blood cells. The original grey scale image in this example can be thresholded automatically [**IP\*Threshold->Bilevel**], followed by filling holes [**IP\*Morphology->Fill HOLES**], eliminating dirt and edge-touching features [**IP\*Measure Features->Reject**] and separating touching cells [**IP\*EDM->Watershed**]. That produces a binary image showing the features that will subsequently be measured.



The following sequence will mark the outlines of these features on the original image:

1. Invert the image [**Image->Adjustments->Invert**] so the outlines lie just outside the features and draw the outlines [**IP\*Morphology->Outlines**]

2. Copy this and revert to the original image [**Select->Select All, Edit->Copy, File->Revert**]



3. Paste the outlines onto the original, select the white area and erase it [**Edit->Paste, Select->Color Range->Highlights, Edit->Clear**]

4. Invert the selection so that the outlines are selected [**Select->Inverse**], convert the grey scale image to color if necessary [**Image->Mode->RGB Color**] (Note - this step can also flatten the image), set the pen color as desired, and fill the lines with color [**Edit->Fill->Foreground color**]. Finally remove the selection [**Select->Deselect**].

