



## From the Editor

### Inappropriate Manipulation of Digital Images

We, as microscopists, produce much of our data in the form of micrographs and macrophotographs. Image manipulation in science has been ongoing for many years, and I am sure those of us who are old enough can remember many hours in a darkroom changing paper grades or enlarger contrast filters to enhance structures in our images. Even then I was asked to stretch the ethical compass of imaging by dodging and burning to make a band on a western blot appear a bit darker; or to create a collage of cells by printing an image, cropping certain cells from the image, remounting the cropped cells into a plate of images, creating a negative of the collage of images, and going back into the darkroom to print all in a single plate to “emphasize” an experimental result. Fortunately, in the dark ages this typically included gutters cut with border tape between the images, making it obvious that the cells came from different microscope fields. Unfortunately, with the increased ease of use of digital imaging programs, inappropriate image manipulation has increased significantly. In 1995 the National Institutes of Health Office of Research Integrity reported 5.7% of research misconduct cases opened involved questionable images. However, by 2005, when digital processing of images was rapidly evolving, this increased to 44.1% of all misconduct cases opened. In a 2016 study of inappropriate image duplication, reviewing 20,621 papers in 40 journals, 782 papers were found to include at least one figure with inappropriate image duplication [1]. Note that this study examined only one form of improper use of images (duplication), and the overall problem is likely much worse. With all of the advantages that digital imaging provides, a major disadvantage is the ease with which an image can be manipulated. Despite the efforts of Cromey [2], Rossner [3], and others to bring awareness to the problem of inappropriate image manipulation, it continues to be a problem [4]. It is incumbent upon all of us to maintain a high ethical compass to ensure that our digital images relay only the information seen through the microscope and also to train our students and staff to do the same.

#### References

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- [4] R Prasad, (2019) [www.thehindu.com/sci-tech/science/127-papers-from-india-retracted-for-image-duplication-manipulation/article28422333.ece](http://www.thehindu.com/sci-tech/science/127-papers-from-india-retracted-for-image-duplication-manipulation/article28422333.ece)

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