

In the preface to the first edition of this book seven years ago, we predicted that we were just beginning to see the usefulness of GFP. Although we expected many new uses for this molecule, we are amazed at the extent to which GFP, its derivatives, and similar fluorescent proteins have been used in biology today. A very approximate estimate of the general usefulness of these proteins can be seen in the number of journal articles that have citations to them. In 2004 roughly 50%, 35%, 60%, and 20% of the articles in *Cell*, *Development*, *Journal of Cell Biology*, and *Neuron*, respectively, mentioned or used these proteins (values were obtained by searching journal web site for articles with the words GFP, CFP, YFP or dsRed and then estimating the total number of articles published in the year). The fluorescent proteins are not only a general tool in basic biological research; they have also been used extensively by industry. As one unusual example, a group of entrepreneurs in the San Francisco Bay Area are pursuing a venture called Canary, Inc. which uses GFP as the basis for detecting landmines and other unexploded remnants of war. Another indicator of the growing use and importance of GFP is that this year saw the publication of the first book about GFP for the general public (Zimmer, 2005).

The last seven years have also seen the introduction of many new fluorescent proteins and derivatives. Perhaps the most striking change in the field has been the discovery of the coral fluorescent proteins (Matz et al., 1999). These proteins not only provide a wealth of new colors, but also demonstrate that these types of proteins exist in a wide range of organisms.

People continue to modify the fluorescent proteins and discover interesting new properties and uses. As the first edition was coming to press, we noted the GFP-based calcium sensors had just been developed. Now many more derivatives have been produced. One intriguing discovery was made by Ghosh et al., 2000. They split GFP into two separate polypeptides. Coexpression of these proteins alone did not yield any fluorescence. Remarkably however, fluorescence could be reconstituted when covalently linked interacting protein domains brought the two parts of GFP together. This discovery has already led to an alternative to fluorescence resonance energy transfer (FRET) as a way of examining protein-protein interactions and a combinatorial method of labeling cells.

These and other advances rendered the first edition of this book considerably out-of-date. In the hope of bringing these more recent discoveries to the attention of a general audience, we were persuaded to edit a second edition of this book. As we noted in the preface to the first edition, trying to evaluate the field of fluorescent proteins is very difficult, because it is a moving target. The field is changing all the time. This dynamic feature of the field reflects its strength, but also means that reviews will always be incomplete. For that reason, we are delighted that so many of our previous authors were gracious enough to consider updating and rewriting their contributions. In addition, we are delighted to include as new authors, researchers who have done so much to move the field in new directions.

As for the first editions, our editors at Wiley have been particularly supportive and diligent. These people include Luna Han, who first convinced us that this enterprise was

worthwhile, and Darla Henderson and Danielle Lacourciere, who saw this second edition to completion. We are grateful for their help.

Finally, we once again look forward to being astonished by even newer uses for this remarkable collection of proteins. Judging by the past, the future continues to look bright.

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