Preface

Recent outbreaks of swine influenza and avian influenza, along with the remaining and in some cases expanding threats from HIV, dengue virus, and the viruses causing hepatitis, have reinforced the need for rapid, accurate, and cost-effective diagnosis of viral disease.

Since the first edition of this book, there have been several major changes in the virus diagnostic laboratory. The first edition contained protocols for a number of techniques, including electron microscopy, ELISA, virus neutralisation, haemagglutinin inhibition, and electrophoresis, but nearly all the chapters in this current edition describe protocols involving nucleic acid detection, most often utilising some form of the polymerase chain reaction (PCR). We also included a chapter on the then emerging technology of robotics, and now every well-founded diagnostic microbiology laboratory will contain several robotic analyzers, releasing the staff to give more informed scientific support to clinicians. Moreover, reliable and sophisticated robots which can carry out in vivo analysis, including mammalian cell culture, are readily available, and bespoke systems can be designed and purchased from several manufacturers.

This second edition contains two chapters which also aim to look to the future. Over-the-counter analytical systems for pregnancy testing and blood sugar analysis are now commonplace. Several companies are developing microfluidics systems which could be applied to similar devices to detect viral infection in blood spots, urine, and saliva. Many modern diagnostic protocols can provide detailed information on small samples within a few minutes, and the much longer turn-around times experienced by most clinicians are nearly always due to transportation times and the need for careful identification of samples. Consequently point-of-care (POC), or point-of-collection diagnostic devices, especially if they are hand-held, are very attractive, and we have asked Drs. Christopher C. Blyth, Robert Booy, and Dominic E. Dwyer to discuss these issues in Chap. 22. The objection that many have raised to POC devices is the validation of the readouts. The rapid sophistication of mobile phone technology may provide the answer, enabling diagnostic cassettes to be plugged into a mobile phone-like device and the data and its interpretation being sent to and from a central laboratory or data analysis centre within minutes. This is not new technology, we all use it every time we use a credit card and a mobile phone. If these technologies become widely available and popular, professional national microbiology laboratories may see their roles change or even expand in the future. In the clinical setting, they would be providing confirmatory tests and data validation, with nearly all routine analyses being carried out at the bedside. Moreover, these laboratories could also find themselves providing an entirely new kind of service, data validation and clinical advice for members of the general public who have purchased over-the-counter tests and submitted data through a mobile phone network.

Over the past decade or so, the use of mathematical modelling has become increasingly important in assessing the severity of disease outbreaks, either at the local level or internationally. These models have become increasingly sophisticated as computing power has risen exponentially. Modelling can also be used to identify critical bottlenecks in the
delivery of prophylactic and therapeutic measures and help both local hospitals and gov-
ernments plan in advance. But of course, any model is only as good as the data used to
populate it and closer links between the diagnostic laboratory and the mathematicians will
be an important factor in controlling infectious diseases in the future. Therefore, we have
asked Steve Leach to discuss the power and limitations of mathematical models in Chap. 23
of this edition.

The past few years have seen dramatic changes in the virus diagnostic laboratory, and
as the threats to public health from infectious diseases remain ever present, the next few
years are likely to bring more significant change. New viral diseases will almost certainly
appear, but we can also expect to see the appearance of technologies that can only be
imagined today.

London, UK
Middlesex, UK

John R. Stephenson
Alan Warnes
Diagnostic Virology Protocols
Stephenson, J.R.; Warnes, A. (Eds.)
2011, XIII, 470 p., Hardcover
ISBN: 978-1-60761-816-4
A product of Humana Press