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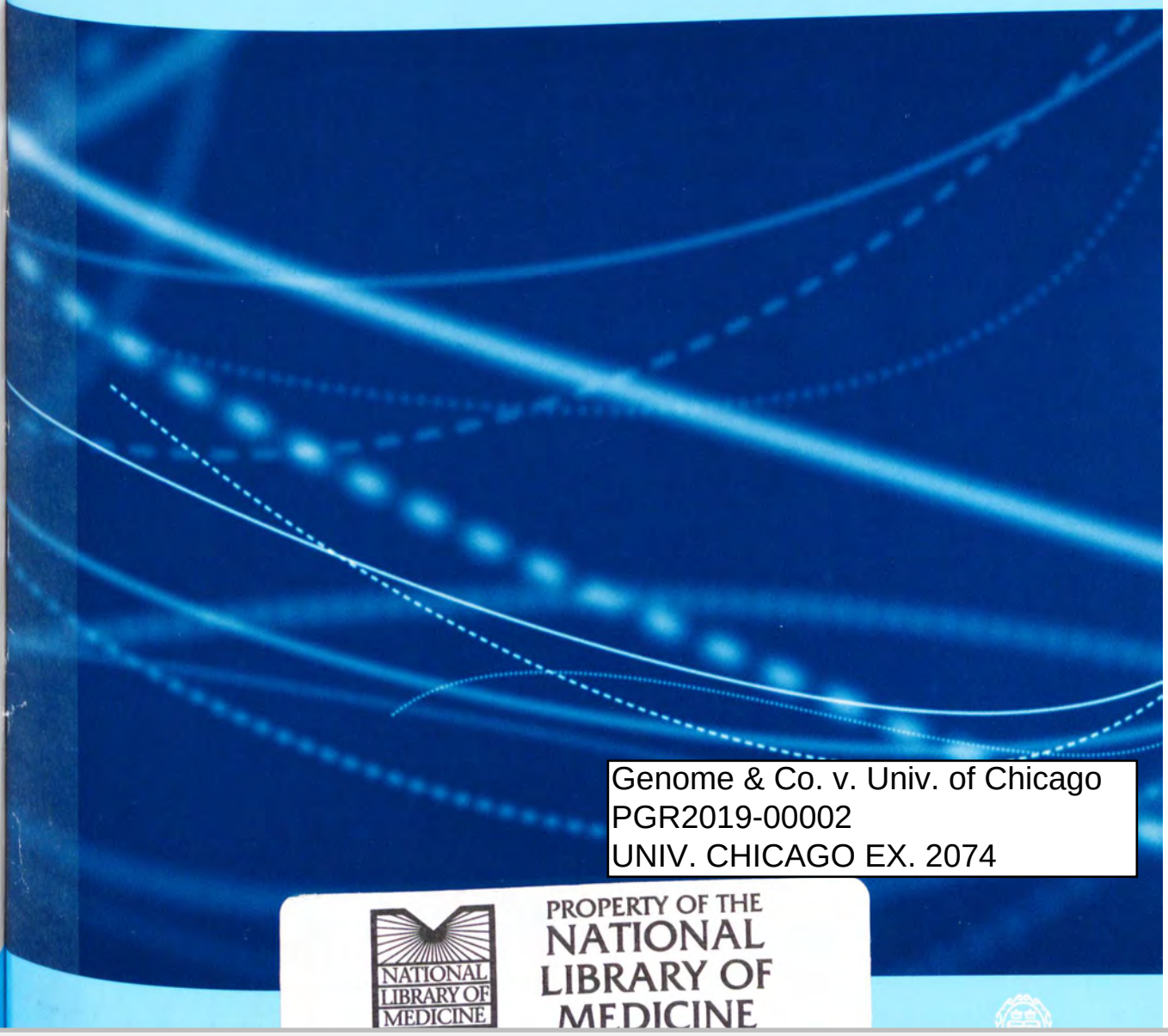

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Editorial

As coeditors of *Biostatistics*, we wish to encourage the practice of making research published in the journal reproducible by others. The following invited piece by Roger Peng sets out our policy on this; Roger will be assuming the role of Associate Editor for reproducibility as set out in his piece.

While we consider reproducibility to be a desirable goal, we wish to emphasise that our policy is to encourage our authors to consider this as an opportunity that they may wish to take, rather than as a requirement that we impose upon them. All submissions to the journal will continue to be reviewed using our established system; the issue of reproducibility will be considered only when a paper had been accepted for publication on the basis of its scientific merit as judged by our peer-review process.

PETER J. DIGGLE, SCOTT L. ZEGER

Reproducible research and *Biostatistics*

ROGER D. PENG
Johns Hopkins University

1. INTRODUCTION AND MOTIVATION

The replication of scientific findings using independent investigators, methods, data, equipment, and protocols has long been, and will continue to be, the standard by which scientific claims are evaluated. However, in many fields of study there are examples of scientific investigations that cannot be fully replicated because of a lack of time or resources. In such a situation, there is a need for a minimum standard that can fill the void between full replication and nothing. One candidate for this minimum standard is "reproducible research", which requires that data sets and computer code be made available to others for verifying published results and conducting alternative analyses.

The need for publishing reproducible research is increasing for a number of reasons. Investigators are more frequently examining weak associations and complex interactions for which the data contain a low signal-to-noise ratio. New technologies allow scientists in all areas to compile complex high-dimensional databases. The ubiquity of powerful statistical and computing capabilities allows investigators to explore those databases and identify associations of potential interest. However, with the increase in data and computing power comes a greater potential for identifying spurious associations. In addition to these developments, recent reports of fraudulent research being published in the biomedical literature have highlighted the need for reproducibility in biomedical studies and have invited the attention of the major medical journals (Laine *and others*, 2007). Even without the presence of deliberate fraud, it should be noted that as analyses become more complicated, the possibility of inadvertant errors resulting in misleading findings looms large. In the examples of Baggerly *and others* (2005) and Coombes *and others* (2007), the errors discovered were not necessarily simple or obvious and the examination of the problem itself required

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