

## Book review

### The sting is in the tale

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*Won for All* – Michael Ashburner  
(Cold Spring Harbor Laboratory  
Press, New York)  
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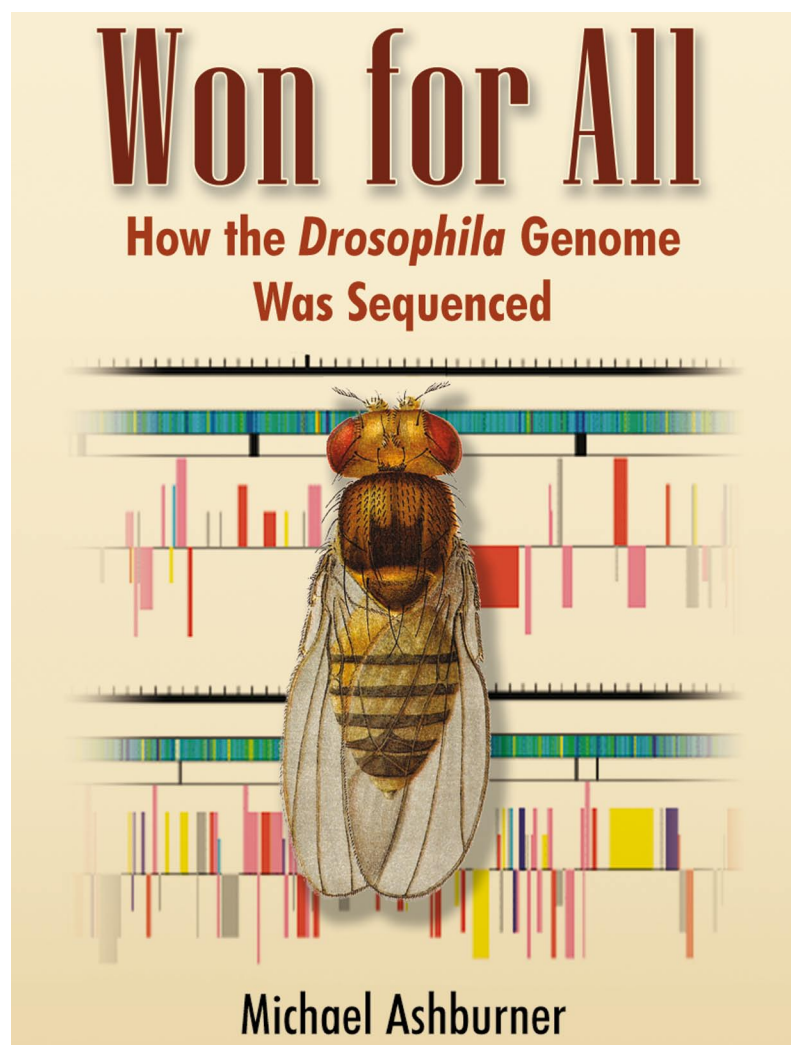
Research is driven as much by new technology as by new ideas. Just think of the way biology has changed out of all recognition during the last 35 years as a result of, amongst other things, DNA cloning, Southern blotting, microarrays, mass spectroscopy, and high throughput DNA sequencing. The pace of change shows no sign of slackening as we are promised the ability to sequence a mammalian genome for \$100,000 by the end of 2006, with the \$1,000 human genome sequence apparently in sight. At a *pro rata* rate a *Drosophila* genome sequence would then cost \$50, much the same as a batch of restriction enzyme.

A critical step on the way to these almost unimaginable achievements was the sequencing of the genome of the fruitfly *Drosophila*, *Drosophila melanogaster* to be precise. In almost a single bound, this took genome sequencing, at least for *Drosophila*, from a cottage industry to mass production, and in the process put many *Drosophila* researchers through emotions similar to those which I imagine were experienced by the hand-weavers of northern England when confronted by the dark satanic mill of the industrial revolution, although in this case the process turned out satisfactorily for all concerned. The story of what happened between the first appearance of the mill owner, Craig Venter, and publication of the 'complete' *Drosophila* genome sequence about eighteen months later, is the tale told by Michael Ashburner in '*Won for All*'.

There are in fact two parallel stories. The first is the story of the handloom weavers of *Drosophila* sequencing, whose relatively peaceful world is thrown into turmoil by the mill owner, but who prove indispensable to the project as only they have the power to interpret the coded messages spewing from the banks of ABI3700s (DNA sequencing machines) in the mill. The second is a collection of the mini-stories of the individuals whose paths intersect during the events of the main tale. These run alongside the main story and are told in the staccato voice of 150 footnotes that are like the diversions of a raconteur talking over a few drinks in the bar at the end of a long day at a conference. These stories are brought up to date in a Postscript which, like the credits

of films such as '*Chariots of Fire*' or '*Motor Cycle Diaries*' – motorcycles appear in surprising places in Ashburner's story – tells us what has happened to each character since the genome sequence was published. The footnotes are indispensable as they tell us about the characters involved and demonstrate the importance of scientific networks for research, but I have to say that I found them infuriating. There are so many that much of my time was spent finding where I had got to on a page before my eyes had moved to the latest footnote. If you have a good memory you might try reading the footnotes first and the text second.

As in all good stories there are goodies (the academics) and baddies (the suits) who in the end find that they need each



other to achieve their goal. There are also heroes and heroines and Ashburner identifies these as including Gerry Rubin and Suzi Lewis in particular. Heroes come in all shapes and sizes and, despite what Scott Hawley says in his Epilogue, they most definitely include Michael Ashburner. The heroes of mythology were no less fallible than the rest of us and, characteristically and endearingly, Ashburner reveals much about himself along the way (his love-hate relationship with airlines and airports, his indulgence in restaurants, his love of bird watching) and the story finishes with his being diagnosed with diabetes, the debilitating effects of which he must have had to endure during the dash to the finish. Of course, the sequence as published in March 2000 was not 'complete' in any sense, and will continue to be refined for some time to come.

Ashburner's story does not take long to tell, occupying a mere 53 pages. These are complemented by 14 delightful charcoal character sketches by Lewis Miller of the main protagonists, and six photographs, surprisingly few in the digital age; perhaps there wasn't time for more. One shows six Cambridge (England not Mass) Drosophilists, including a slightly manic Michael Ashburner leaning, Morgan-like, on a bench covered with bottles of *Drosophila*. This seems slightly out of place as only one of the other five is mentioned in the text, and then only in passing. It was originally published in *The Observer* (a UK Sunday newspaper) in 1988 to accompany an article extolling the virtues of *Drosophila* research in general, and *Drosophila* research in Cambridge in particular. Its year of publication is not unrelated to the story, however, as 1988 was the year that the forerunner of the genome sequencing project, the *Drosophila* genome mapping programme, began.

The length, or lack of it, of Ashburner's text was not a problem for me, a blessing in fact as I am a slow reader, but it clearly was for the publishers as the last third of the book

comprises extended essays by Scott Hawley and Ethan Bier. Scott Hawley's Epilogue gives a brief history of *Drosophila* research from Darwin, perhaps a little further back than necessary (my paraphrase of Dobzhansky would be "Nothing makes sense in biology except in the light of genetics"), to the present day. Ethan Bier provides an Afterword which highlights the sophistication of the techniques used by Drosophilists today, and shows how much they depend on the genome sequence.

Excellent though these essays are (I found in the Afterword some valuable references I had missed) I am not sure that they add much to Ashburner's rollicking tale and may be fairly heavy going for those not in the field. It did make me wonder at whom the book is targeted. The Epilogue and Postscript will be of interest to advanced undergraduates, research students, and others working with *Drosophila*. The main story should have much wider appeal, but at £11/\$19.95 for a hardbound volume who can complain?

'*Won for All*' will naturally be compared to Jim Watson's '*The Double Helix*' as both set out to give a realistic account of how an important piece of science was done. '*The Double Helix*' is more substantial and describes a more significant achievement, but '*Won for All*' is no less valuable for that. Science and society may have changed dramatically during the last 50 years, but scientists have not. The excitement and drama of the chase are as strong now as then and this comes through in '*Won for All*'. Hopefully it will inspire students to pursue a career in research just as '*The Double Helix*' inspired me when I read it in a day in 1968. In 1987 the BBC turned Watson's book into a truly gripping film '*Life Story*', and I can imagine the same being done with '*Won for All*'. Jeff Goldblum gave a memorable performance as Jim Watson. Who will play Michael Ashburner?

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## Primer

### Bird evolution

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Birds are in some ways like our doppelgängers perched on another branch of the tree of life. Many of their qualities – complex behavior, bipedality, endothermy, and highly visual nature – verge on those of humans while refracted through their feathery exterior. By contrast, dinosaurs are charismatic for a different set of reasons, perhaps arising from a resonance with the monstrous and mythical. Nonetheless, abundant and ever increasing evidence places birds as one surviving lineage of the diverse clade Dinosauria (Figure 1).

Prior to formulation of a theory of evolution, scientists had noted the anatomical similarities of birds and other dinosaurs. Shortly after Darwin's landmark publications, fossil flighted and feathered species such as *Archaeopteryx* were recognized as important early evidence supporting this theory. During the past 30 years novel methods and abundant new data have ever more firmly established the evolutionary relationship between birds and other dinosaurs. In this time, paleontology has largely moved beyond debate on the broad scale location of birds in the tree of life to more nuanced questions such as which taxa of dinosaurs are most closely related to birds and what morphological details mark the transition from non-flighted dinosaurs to extant birds. Insights have been reflexive, with new information from dinosaur fossils informing our understanding of the evolutionary basis for features of extant birds, and with new information on avian growth, physiology, locomotor strategies informing our interpretation of the dinosaurian fossil record.

#### Birds as dinosaurs

Any discussion of bird origins and early avian history must address semantic issues, including what we call a bird or a dinosaur, and what we mean by 'flight' and 'feathers'.