Euler and Gauss. Such illustrations make one wonder what modern science would look like had nothing from these books ever appeared!

Practically every article contains information on terminology and notation proposed by Euler. All are in use in modern mathematics. This observation can be extended. It is emphasized that Euler's courses present the first educational literature in the modern sense of the word. Euler was the first author to discuss proofs and not to hide the motivation behind his demonstrations. Finkel, Boyer and Alexanderson note that Euler not only shares his way of thinking openly but also warns about possible mistakes. Even Euler's commentaries on his book about artillery were translated from German into English and French.

The second volume, *The Early Mathematics of Euler*, is intended as a mathematical biography. It presents the original and fascinating story of mathematics in the St Petersburg period of Euler's life, before his departure to Berlin. C. Edward Sandifer attempts to take readers back into the past and is highly successful in achieving this. The time from 1725 to 1741 is divided into the periods 1725–1727, 1728, 1729–1731, and so on. Each section starts with information on world events, events in Euler's life, the sum of Euler's work during the period, and Euler's mathematical papers appearing in the period. The author then gives an account of every article. Such a presentation creates a distinctive narrative atmosphere—an attractive aspect of the work that has significant merit.

One can see how early the huge circle of Euler's interests was formed. These include arithmetic and algebra (continued fractions, the remainder theorem, etc.), geometry and topology (lune of Hippocrates, the problem of Königsberg bridges, etc.), number theory (Fermat's little theorem, Diophantus's problems, prime numbers, Euler's function), differential equations and the calculus of variations, infinite series and products (Cauchy's criterion, the zeta function, etc.), astronomy and geography, mechanics and the theory of music, and many more.

These books will undoubtedly be received with interest, and with gratitude to the editor William Dunham and the author C. Edward Sandifer.

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DOI:10.1017/S0013091508225137

Martin Nowak *Evolutionary dynamics: exploring the equations of life* (Belknap Press/Harvard University Press, Cambridge, MA, 2006), 384 pp, 978 0 674 02338 3 (hardback), £21.80.

Martin Nowak is well known for his work in evolutionary game theory, evolution of language and carcinogenesis. In the book under review, he presents highlights of his multifaceted research.

In the preface he writes,

> The life sciences, and biology in particular, are on the brink of an unprecedented theoretical expansion. Every university is currently aiming to establish programs in mathematical biology and to offer its students an interdisciplinary education that spans fields as diverse as mathematics, molecular biology, linguistics and computer science. At the borders of such disciplines, progress occurs. Whenever the languages of two disciplines meet, two cultures interact, and something new happens.

I think this passage conveys the careless triumphalism that characterizes mathematical biology, as well as its siblings, bioinformatics and systems biology. It also gives a good taste of what Nowak's style is like.

Nonetheless, it is true that biology is awash with data that stubbornly resist being converted into knowledge and understanding. Hence the two main modes of deploying the exact sciences in biology: one that is data led and attempts to find patterns in the deluge of information coming from high throughput techniques; and one that is hypothesis led, which tries to isolate important elements in a sea of detail, somehow organize them in a mathematical model and use that as a guide to further experimentation, that is, to more data collection. Nowak is, of course, in the hypothesis-led field.

The question one could ask is whether in a mathematical biology programme one should use his book to give students an 'interdisciplinary education'. I do not think so. The book covers Darwinian evolution; quasispecies (an important topic in virology); evolutionary game dynamics ('...evolutionary game dynamics is the most comprehensive way to look at the world'); the Prisoner's dilemma; a stochastic description of, and game theory in, finite populations; applications of graph theory to population dynamics; evolutionary game dynamics on a lattice; evolution of virus pathogenicity, of human cancer and, finally, of language. The mathematics used is not too taxing: primarily differential equations, some probability theory (elementary Markov chains, say) and some combinatorics.

Throughout there is a bizarre confusion of models and reality. Assumptions that are being made are presented as gospel truth and no serious attempt is ever made to discuss them. This is especially true in the chapter on language, which is based on a very narrow Chomskian view of language development and use.

Of particular interest to me personally was the chapter on cancer. It is very disappointing. The question asked, what is the most probable order of mutations that leads to the malignant state, is no longer on the main cancerological agenda [**1**]. Issues of epigenetics [**3**] and tissue specificity are never mentioned (but then epigenetics is suspiciously Lamarckian, is it not). It seems to me that in biomathematics 'two cultures interacting' very frequently reduces to mathematicians learning just enough biology to be able to justify writing down some equations.

The volume by Wodarz and Komarova [**5**], which overlaps with Nowak's cancer chapter to a suspiciously large degree, is no better. So, given the demands of 'programs in mathematical biology', how do we give students the coveted interdisciplinary education? My suggestion is to teach them some bona fide mathematics at the level of [**4**], for example, and to then build a course around a thoughtful, biologically up-to-date book written by a practising biologist who does not have pretensions to have found the 'equations of life' but who has an interest in understanding general principles. In a previous generation, such a biologist would have been a C. H. Waddington or a J. B. S. Haldane. Nowadays, biologists with a synoptic view are harder to find. I wholeheartedly recommend J. A. Davies's book [**2**]: it is a cornucopia of challenging problems. I do not believe that any of these would be solved by a system of ordinary differential equations. Indeed, it is only when we work out what we mean by a solution, that 'something new' will happen.

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https://doi.org/10.1017/S0013091508225137 Published online by Cambridge University Press