

Author's Preface to Second Printing

In the Preface to the First Printing of this volume I wrote:

“..[I] hope to find some reader who may appreciate the volume
as a guided tour through the vast literature on the subject.”

I am glad, after such a long time (about twenty years) to have discovered that my book received much more attention than expected.

I wish to thank Catriona Byrne, the Mathematical Editor of Springer-Heidelberg, who kindly insisted that the book be reprinted, thus making it available again after many requests that could be not satisfied, since the original printing was sold out.

I have taken the opportunity, in this second printing, to correct all detected misprints. I have also included reference data to papers in the bibliography that have meanwhile been published.

Vincenzo Capasso

Milan, May 2008

"Non con soverchie speranze ...,
né avendo nell'animo illusioni
spesso dannose, ma nemmeno con
indifferenza, deve essere accolto
ogni tentativo di sottoporre al calcolo
fatti di qualsiasi specie."
(Vito Volterra, 1901)

Author's Preface

It is now exactly twenty years since the first time I read the first edition of the now classic book by N.T.J. Bailey, *The Mathematical Theory of Epidemics* (Griffin, London, 1957). With my background in Theoretical Physics, I had been attracted by the possibility of analyzing with mathematical rigor an area of Science which deals with highly complex natural systems. Anyway, in the preface of his book, Bailey stated that the discipline was already old about fifty years, in the modern sense of the phrase, by dating the beginnings at the work by William Hamer (1906) and Ronald Ross (1911).

This monograph was started after a suggestion by Simon A. Levin, during an Oberwolfach workshop in 1984, to organize better my own ideas about the mathematical structures of epidemic systems, that I had been presenting in various papers and conferences. He had been very able to identify the "leit motiv" of my thoughts, that a professional mathematician can contribute in the growth of knowledge only if he is capable of building up a fair and correct interface between the core subject of a specific discipline and the most recent "tools" of Mathematics.

The scope of this monograph is then to make them available to a large audience, in a possibly accessible way, powerful techniques of modern Mathematics, without obscuring with "magic symbols" the intrinsic vitality of mathematical concepts and methods.

"I non iniziati ai segreti del Calcolo e dell'Algebra si fanno talora l'illusione che i loro mezzi siano di natura diversa da quelli di cui il comune ragionamento dispone." (Volterra, 1901).

Clearly I did not go much further than my wishful thinking, but still hope to find some reader who may appreciate the volume as a guided tour through the vast literature on the subject. I wish to specify that the list of references includes only the ones explicitly quoted in the text. I apologize for my ignorance of papers directly related with this monograph.

The contribution of Dr. R. Caselli is warmly acknowledged for all the numerical simulations and their graphical representation included in the monograph.

It is now time to thank Si for his encouragement and patience. Also for her very gentle patience I wish to thank Dr. C. Byrne (Mathematical Editor of Springer-Verlag) who has been waiting and supporting this project for such a long time.

I shall not forget to thank the Director and the staff of the Mathematical Centre at Oberwolfach for providing me, during a wonderful month in the summer of 1990, the right scientific environment for producing the core of this monograph.

Thanks are due to the numerous Colleagues who carefully read parts of the manuscript, and gave me relevant advice ; in particular I thank Edoardo Beretta, Carlos Castillo-Chavez, Andrea di Liddo, Herb Hethcote, Mimmo Iannelli, John Jacquez, Simon Levin, Stefano Paveri-Fontana, Andrea Pugliese, Carl Simon.

I also wish to thank S. Levin and coauthors for the use of Figures 3.1, 3.3 and Tables 3.1-3.5; J. Jacquez and coauthors for Figures 3.5, 3.6; H. Hethcote and coauthors for Table 3.6.

Finally I would like to thank my research advisor at the University of Maryland (College Park) Grace Yang, for the key role played in introducing me to this very challenging area of scientific research, and Jim Murray for making me familiar with reaction-diffusion systems.

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Vincenzo Capasso

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