

Preface

Since the very beginning, the relationship between humans and microorganisms has moved between love and hate. People have used bacteria and yeast to manufacture foods, even when they did not know what a microorganism was. Thanks to bacteria and fungi, we can produce wine, yogurt, beer, or bread. However, microorganisms have been also sources of illness, chaos, and destruction. For example, the bubonic plagues during the Middle Ages caused a dramatic decrease in the European population. Also, for centuries, doctors, physicians, and even, wise men treated patients and fought against infections without knowing their enemies or without having the right weapons.

The development of the initial microscopes allowed to identify the enemies; the bacteria and fungi could be observed, but not destroyed. Some researchers were able to find out how microorganisms spread between people and then, they could isolate the ill from the healthy individuals. The first clear and efficient step against infections was the development of vaccines. But, what did they have to do with the ill?

The twentieth century brought light into the darkness. The first drug against syphilis was developed, the salvarsan was the first active principle able to attack a microorganism, *Treponema pallidum*. Its unique problem was that salvarsan had arsenic inside and this could originate several side effects in the patients.

When Sir Alexander Fleming was able to understand what was happening in a contaminated Petri dish, he discovered penicillin, and the Antibiotic Era began officially. Then someone had the idea that the end of the infection illnesses was coming. A century and several active principles later, deaths by infections are almost 25 % of the total deaths per year around the world.

What did happen in the middle? The irrational and bad use of antimicrobial drugs exerted a selective pressure over microorganisms. Bacteria and fungi developed different mechanisms to avoid the antimicrobials, and humans with their bad behavior just selected them.

In the last 20 years, the number of new antimicrobials has been lower and lower, while the number of resistant microorganisms has become higher and higher. The classic techniques to develop new antimicrobials became less and less effective and pharmaceutical companies tried to put their efforts in other fields with a better ratio of profits, such as stroke injuries, hypertension, and so on. However, we still need new antimicrobials.

The search for new sources of antimicrobials, the design of more efficient research policies, and the use of new technologies are now mandatory. This is the goal of this book. During the different chapters, the reader will be able to find out the latest advances in the development of new antimicrobial drugs together with a recapitulation of new potential sources of drugs.

The aim of this book is twofold. It tries to be an accurate and extensive review of the actual state of the art in the field of antimicrobial research, but, on the other hand, it also tries to be the initial point for developing new alternatives and strategies in the fight against resistant microorganisms.

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