6. Nucleic acid analogs that halt viral replication (zidovudine, gancyclovir, vidorabine, and acyclovir).

The arrival of antibiotics was recognized as a beneficial turning point in medicine, which seemed finally to have prevailed over bacterial diseases. However, two serious disadvantages have occurred. One is connected with toxic side effects of many antibiotics, e.g., allergy, blood and nervous system diseases, hepatic injury, nephropathy, cardiotoxicity, retinotoxicity, and ototoxicity. Most antibiotics cause changes in the intestinal bacterial population and can result in infections from other microorganisms such as fungi as well as in colitis and diarrhea. The second disadvantage is connected with the emergence of antibiotic-resistant bacteria. Bacterial resistance is due to random genetic mutations that alter bacterial sensitivity to the drug and to chemically similar drugs. Many bacteria transfer their resistance to other bacteria of the same or different species. Indiscriminate use of antibiotics, overprescription, and failure to finish courses of drugs are considered among the reasons for the rise of drug-resistant bacteria. Another source of resistance seems to be overuse of antibiotics in veterinary medicine and animal husbandry. Antibiotics are used in prevention and treatment of animal diseases and, which is more dangerous, as growth promoters. All that results in the appearance of unsafe antibiotic residues or their metabolites in food. The monitoring of antibiotic residues should be an important task for government authorities. Antibiotic resistance is connected with increased mortality and health care costs. The postantibiotic era has approached in which infectious diseases we thought were under control are coming back. Prevention and control of these infections will demand the development of new antibiotics and/or vaccines and reasonable use of existing antibiotics.

The analytical methods for determining antibiotics can be based on microbiological, immunochemical, and physicochemical principles. The most popular methods of the latter group are chromatographic ones, mainly liquid chromatography, including high-performance liquid chromatography (HPLC) and thin-layer chromatography (TLC). HPLC offers high sensitivity and separation efficiencies. Usually, before HPLC analysis tedious sample pretreatment is necessary; this may consist of protein precipitation, ultrafiltration, partitioning, metal chelate affinity chromatography (MCAC), dialysis, matrix solid-phase dispersion (MSPD), or solid-phase extraction (SPE). TLC is cheaper and less complicated than HPLC, provides high sample throughput, and usually requires limited sample pretreatment. However, the method is generally less sensitive and less selective and gives poor resolution. Some of these problems can be solved by high-performance thin-layer chromatography (HPTLC) or forced-flow planar chromatography (FFPC). Reliability of TLC can also be achieved through automation, applying special techniques of development and scanning densitometry as a detection method, spraying the plate after development with appropriate reagents, or bioautography. There is also the possibility of coupling TLC with mass spectrometry (MS).

There are many reviews on chromatography of antibiotics (2–8) and on thin-layer chromatography (9–11) where TLC of antibiotics is included. The broadest review on TLC of antibiotics was written by Kreuzig (12).

This chapter deals with antibiotics used in both human and veterinary medicine. The chapter includes quinolones, nitrofurans, and sulfonamides, which are synthetic chemotherapeutic agents. Many antibiotics are obtained semisynthetically. Some of those of natural origin are currently synthesized for economical reasons. According to Lambert and O'Grady (13), the name "chemotherapeutics" can be used in parallel with "antibiotics," because old definitions cannot withstand the development in this field of pharmacotherapy.

My initial intention was to describe only recent papers. However, to give a full survey, some older but historically valid papers are also presented.

II. TLC OF ANTIBIOTICS

A. Penicillins

In 1928, Sir Alexander Fleming, a Scottish biologist, observed that *Penicillium notatum*, a common green mold, had destroyed *Staphylococcus* bacteria growing on a germ culture medium.