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Noneuclidean Geometry. Herbert Meschkowski. Translated from the second German edition by A. Shenitzer. Academic Press, New York, 1964. viii + 104 pp. Illus. Paper, $2.45; cloth, $5.50.

This little book might have been written at the end of the 19th century. Granted that Hilbert's axioms for Euclidean geometry complete the edifice whose foundations were laid by Euclid, nevertheless the fact remains that they started a whole new train of thought which was early developed by Veblen and many others. One of Hilbert's chief accomplishments was to show the significance of Pappus' and Desargues' theorems, neither of which is mentioned here. Nevertheless, projective ideas are involved in the notion of cross-ratio which is introduced in chapter 4.

One result of the author's approach is to exclude the reader from contact with those exciting ideas which are easily illustrated in Fano's finite geometry, and which have stimulated so much recent research. Moreover, the idea of Euclidean geometry as a limiting case of hyperbolic or elliptic geometry is not developed. Finally, the choice of the Poincaré model of hyperbolic geometry, to which the author devotes so much attention, automatically limits the interpretation of ultra parallelism which comes out much more clearly in the Cayley-Klein model, briefly referred to in chapter 2.

In fact, in my opinion, any attempt to describe non-Euclidean geometry within such a limited frame of reference is of questionable value. In order to define angle and distance almost all of the machinery used so beautifully by Klein in his *Vorlesungen über Nicht-Euklidische Geometrie* must be introduced—everything except $i = \sqrt{-1}$, which loses its terror when one solves the simplest quadratic equation!

On the positive side of the ledger, chapters 1, 2, and 3 are excellent and could well be included in every high school text on geometry. Clearly the author enjoyed writing them. The translation is well done, with supplementary notes in appropriate places.

The volume contains the following chapters: "Proofs and definitions"; "Hilbert's system of axioms"; "From the history of the Parallel Postulate"; "Lemmas"; "The Poincaré model"; "Elementary theorems of hyperbolic geometry"; "Constructions"; "Trigonometry"; "Elliptic geometry"; and "Epilog."

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Pharmacology: Biologically Active Compounds

Molecular Pharmacology: The Mode of Action of Biologically Active Compounds. vol. 2. E. J. Ariens, Ed. Academic Press, New York, 1964. xii + 280 pp. Illus. $10.

Volume 2 of *Molecular Pharmacology* complements the general material presented in volume 1 [reviewed in *Science* **145**, 695 (1964)] by considering in detail what is known of the interaction of drugs and chemicals with biological objects (entities) at the cellular level in three areas. These selections illustrate the unique and inherent difficulty faced by those who attempt to explain observable pharmacological effects by studying interactions at the molecular level.

The presence of a chapter on olfactory mechanisms seems at first to be inappropriate in a book on pharmacology. The sense of the selection becomes especially clear when the chapter is set in juxtaposition to the two chapters on cancer chemotherapy and receptor theory enzymology. Molecular pharmacology is the study of the interactions of biologically active substances at the receptor level. Olfaction involves such an interaction. Although the structure of the organ in its anatomical and histological aspects has been studied in detail, virtually nothing is known about the physicochemical nature of the "olfactory receptors."

This ignorance of the composition and structure of receptors is not an uncommon situation in pharmacology where as soon as the presumed receptor is removed from its intimate environment, in an attempt to characterize it, the receptor response can no longer be measured. Even with the receptor *in situ*, as in olfaction, it is almost impossible to obtain objective measurements of the response. One need only recall the difficulty encountered in obtaining quantitative data on pain to see the value of considering olfaction as a pharmacological model.

Investigations into the molecular basis of cancer chemotherapy begin with the selection of a specific receptor of known composition and structure as a target for attack. For example, the function of nucleic acids in cellular proliferation (a response) makes the inhibition of their synthesis or function the logical point at which to undermine the cancer cell. Specific drugs against the various types of cancer, molded on the enzymatic parameters of the particular tumor types, have to be designed. The exploitable metabolic differential between normal and cancer cells may be small. Extreme specificity of drug-receptor interaction becomes the overriding consideration in design and interpretation. Such specificity in the reaction of drug with the receptor is necessary not only for practical success in chemotherapy, but for the interpretation of experimental results, at the biochemical level, which attempt to relate the interaction to the cellular response. The author considers in detail the complicated nature of how cytotoxicity is produced by chemical agents, the chemotherapeutic targets at which they are aimed, as well as the many roadblocks that may divert the ever so cleverly designed drug from its goal. The drug's failure to penetrate, its possible activation or premature deactivation, natural and acquired resistance of the target cell, and the one-two punch of combination drug therapy are considered.

The third chapter deals with classical enzymology, using the active site of an enzyme as an example of a receptor. Although the author gives the well-known formulations concerning enzyme action, their presence in this volume underlines the disadvantage under which general pharmacology labors in being unable to isolate and work with systems as well defined as those of the enzymologist. It is not surprising that the pharmacologist knows considerably less than the enzymologist about the reactive sites. This humbling fact represents the challenge in modern pharmacology.

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