ever, and many of the fossil forms, show that no clear line of separation can be drawn, though the names are still retained for simple convenience.

The usual primary subdivisions of the Echinoidea into two subclasses, the Palæechinoidea and Euechinoidea, have been abandoned and the older divisions, Regularia and Irregularia, adopted. The primitive ancestral Echinoid is unknown, though it is evident that the first forms were small sac-like bodies, with the mouth and anus at opposite poles and the muscular body supported by a series of angular plates, of which five pairs were perforated by pores. The thickening of the plates and the consequent loss of flexibility is believed to explain the reduction in the number of vertical rows taking place in the passage from paleozoic to neozoic genera.

C. E. BEECHER.

Studien über die Narcose, Zugleich ein Beitrag zur allgemeinen Pharmakologie. By E. OVERTON. Jena, Gustav Fisher. 1901. Pp. 195.

The chief object of these studies is the presentation of a new theory of narcosis which was put forward simultaneously but independently by Overton and H. Meyer. The essential point of the theory is that narcotics are such substances which are more or less soluble in the lipoids of the nerve cells, chiefly cholesterin and lecithin. However, as all substances reach the nerve cells only after being taken up by the blood and the lymph, they have in the first place to be soluble in the chief medium of these fluids—*i. e.*, water. The question, therefore, whether and in what degree a substance is a narcotic—*i. e.*, whether and in what degree it is able to enter into the nerve cell—depends upon whether and how much this substance is more soluble in fats than in water; in other words, the narcotic capacity of a substance depends upon the coefficient of its solubility in organic solvents divided by its solubility in water.

The book consists of two parts. The first part deals in an interesting and instructive way with the general aspect of the subject of narcosis. At the start the author shows that the distinction made by Claude Bernard, Dastre and other French writers, between anæsthetics and narcotics cannot be maintained. Neither does the practical separation of the inhalation anæsthetics from the other narcotics have a scientific basis. There is, however, according to the author, a distinct difference between indifferent narcotics and narcotics of a basic character. The latter vary in their effects upon animals as well as plants from species to species; while the indifferent narcotics affect all vertebrates and some invertebrates in the same degree, provided the concentration of the narcotic within the blood of the animal is taken as a basis for the unit, and not the quantity of the narcotic used up in the production of the narcosis of the animal. The writer discusses the various steps which a narcotic has to pass through from its administration to the animal to its arrival in the body cells, and the different modes of penetration of the several layers of the cell, according to the compound employed as a narcotic. He then describes in detail the methods employed by Paul Bert, as well as those employed by himself, to obtain a constant concentration within the plasma of the blood of the volatile as well as of the non-volatile narcotics.

The author reviews the different theories of anæsthesia: hyperæmia, anæmia, Claude Bernard's semi-coagulation of the protoplasm, Dubois's theory of partial dehydration of the protoplasm. He quotes further Richet's rule that a compound is the stronger an anæsthetic the less soluble it is in water; and after reviewing our present knowledge of the presence of cholesterin and lecithin in the nerve tissues, he mentions that already as early as 1847 Bibra and Harless have suggested that there might be a connection between anæsthesia and the capacity of the anæsthetics to dissolve fats; and that L. Hermann has further suggested that cholesterin and lecithin of the ganglion cells might present the point of attack of the anæsthetics.

Turning to his own above-mentioned theory Overton states that he studied the solubility of the narcotics in olive oil, on account of the difficulty of obtaining sufficient quantities of lecithin, and describes in detail the physical and physiological methods employed by him for determining the division-coefficient (Thei-

lungs coefficient) $\frac{\text{oil}}{\text{water}}$ of the many indifferent and basic anæsthetics. His studies led him to the conclusion that the narcotic power of a compound depends in the first place upon its division-coefficient between the aqueous medium and the cholesterin-lecithin solvents of the organism, provided the absolute solubility of the compound in the cholesterin-lecithin solvent is not below a certain minimum.

In the second part detailed descriptions and tables are given of the numerous experiments made on a great many compounds, establishing in each one its division-coefficient and its narcotic power. The compounds comprise indifferent and basic narcotics, also antiseptics and antipyretics which possess more or less anæsthetic powers as secondary effects. The author draws from his numerous experiments the conclusion that the longer and the less branched the carbon chains of a compound are, the stronger is its narcotic power, and that the substitution of a hydrogen atom by a hydroxyl group diminishes, and the substitution by an alkyl group increases, the narcotic power of a compound. Overton thinks that the indifferent narcotics interfere probably in a physical way with the cholesterin and lecithin of the cells, while the basic narcotics interfere also with the protoplasm of the cell, hence the greater clinging of the latter group of narcotics to the cells and their deleterious effects.

Overton's book is a very valuable contribution to biology and pharmacology; it opens new fields and new methods of research and will prove to be a fruitful stimulus to student and investigator.

S. J. Meltzer.

New York.

Les matières colorantes naturelles. By V. Thomas (Chef des travaux de chimie appliquée à la Faculté des Sciences de Paris). Une publication de l'Encyclopédie Scientifique des Aide-Mémoire. Publiée par Gauthier-Villars, Paris, sous la direction de M. Léauté (Membre de l'Institut). Pp. 180.

It is probable that no department of chemistry, during the past thirty years, has experienced a more marvelous development and elaboration than that relating to the artificial dyestuffs. At the present time these synthetic dyes are numbered by the thousand, and millions of dollars are invested in their commercial production. Two of the largest chemical factories of the world are devoted to this industry, one employing over 200 trained chemists, the other over 160, practically all of them Ph.D. men from the universities. The relation between the structure of these dyestuffs and their tinctorial value has been definitely established for most classes of artificial colors, and the literature of the subject is vast in extent.

The result of this tremendous activity in the field of artificial colors has been that the natural colors have been correspondingly neglected, and it is only within quite recent years that attention has again been directed to these substances, many of which have been familiar since ancient times. These scattered researches upon the tinctorial constituents of plants used in dyeing have been collected, digested, and the results presented in a condensed form by the author. The work is ably and carefully done, the chapter upon the Flavone Colors being especially praiseworthy.

In this volume the author treats only those natural coloring matters which are commonly regarded as derivatives of benzophenone, xanthone or flavone, thus including the majority of the natural yellow dyes.

Each chapter opens with general statements concerning that particular group of colors, its history, development, etc. This is followed by a detailed description of the individual colors, giving history, preparation, properties, tinctorial value, etc., the reactions and syntheses by which the constitutional formula has been elucidated being clearly and concisely explained. References to original articles are numerous, and in some cases (*e. g.*, syntheses in the flavone group) quite extensive.

The separate chapters deal with the following colors:

I. Derivatives of benzophenone.—Maclurin and derivatives, catechin and derivatives, kinoin.

II. Derivatives of xanthone.—Indian yellow, euxanthone, gentisin and gentisein, datiscetin, paradatiscetin.