

At the third meeting of the Institut de la Vie, devoted to theoretical physics and biology (Versailles, June 1971), Szent-Györgyi made the following chairman's remarks (preprint): "... We all studied one or another part of living systems. The smaller the unit, the more pure physics and chemistry, but also the less 'alive' it is. . . ."

It is fascinating to compare this text with the following one by Bergson (*L'Evolution Créatrice*, page 31, oeuvres page 521): "... Ainsi la 'vitalité' est tangente en n'importe quel point aux forces physiques et chimiques; mais ces points ne sont, en somme, que les vues d'un esprit qui imagine des arrêts à tels ou tels moments du mouvement générateur de la courbe. En réalité, la vie n'est pas plus faite d'éléments physico-chimiques qu'une courbe n'est composée de lignes droites."

It seems to me a weakness of this otherwise very valuable book that these important aspects have been neglected.

I. PRIGOGINE

- ¹ Monod, J., *Le Hasard et la Nécessité* (ed. Le Seuil, Paris, 1970).
- ² Bergson, H., *La Pensée et le Mouvant*, 30; (Oeuvres, ed. du Centenaire, Presses Universitaires de France, Paris, 1963).
- ³ Balescu, R., and Brenig, L., *Physica*, **54**, 504 (1971).
- ⁴ Bergson, H., *L'Evolution Créatrice*, 11 (Oeuvres, 503).
- ⁵ Glansdorff, P., and Prigogine, I., *Structure, Stability and Fluctuations* (Wiley Interscience, New York, 1971); (French edition by Masson, Paris, 1971).
- ⁶ Eigen, M., "Self-organization of Matter and the Evolution of Biological Macromolecules, Ch. VIII, sect. 5, *Naturwissenschaften* (in the press).

Russian Crystals

Symmetry of Crystals. By E. S. Fedorov. Translated from the Russian by David and Katherine Harker. Pp. x+315. (American Crystallographic Association: New York, 1971.) \$25.00.

ONE of the great scientific activities of the nineteenth century was classification. In many fields the systems then developed have long since fallen into disuse, but the most modern work in X-ray diffraction still makes use of the idea of the crystallographic space groups which were discovered, apparently independently, by Fedorov somewhere between 1885 and 1890, by Schoenflies in 1891, and by Barlow in 1894. Unfortunately, because Fedorov's work was published in Russian, it did not become widely recognized in the West until after the other two publications. The three authors approach the subject from quite different points of view and Fedorov's is based on a geometrical system of his own development which involves consideration of the ways in which space may be filled by polyhedra of different shapes.

In 1949 the USSR Academy of

Sciences commissioned the publication of a collection of Fedorov's contributions divided into five monographs. The first three set up the basic analytical geometry required and consider the necessary ideas of symmetry. Monograph four is Fedorov's own comparison with the results of Schoenflies, and in monograph five Fedorov develops the ideas of space-filling polyhedra.

The present work is a translation of the 1949 Russian text and is obviously a labour of love. The project was undertaken by the National Science Foundation and the American Crystallographic Association, and it goes without saying that a work of this magnitude and complexity could not possibly have been translated adequately except by someone as familiar with the scientific material as with the Russian language. Dr and Mrs Harker clearly satisfy these conditions and their magnificent version is a real contribution to the historical documentation of crystallography.

It is, however, very much more than a mere historical document. The ideas and developments followed by Fedorov are most stimulating though the somewhat ponderous prose—which undoubtedly is an accurate reflexion of the nineteenth century atmosphere—may be a little daunting to some readers.

It should certainly find a place in the libraries of all crystallographic laboratories, and all concerned in its production are to be congratulated on making such a fascinating document readily available to modern crystallographers.

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Narcotic Pharmacology

Narcotic Drugs: Biochemical Pharmacology. By Doris H. Clouet. Pp. xxii+506. (Plenum: New York and London, 1971.) \$31.36.

ALTHOUGH the opium alkaloids have been used for medicinal purposes in one form or other for more than two thousand years, we still do not understand how these drugs and their modern synthetic and semi-synthetic congeners exert their analgesic action and why they produce such severe physical dependence even after a relatively short period of use. In recent years, the interest in these drugs has risen steeply, chiefly because of their widespread non-medicinal use by persons who have become dependent on them. A great deal of effort has been spent by research workers in universities, research institutes and pharmaceutical firms to produce new compounds which retain their analgesic power but are not liable to be abused as drugs of addiction.

The volume edited by Dr Clouet brings together some of the work published in recent years. The subtitle of

Biochemical Pharmacology is rather a misnomer because the twenty-six chapters range over a much wider area of the pharmacology of the narcotic analgesic drugs than could be defined as biochemical. The contents cover the chemistry of narcotic analgesic drugs, their metabolic disposal, their effects on the metabolism of energy, phospholipids, proteins and nucleic acids, their effects on biogenic amines, acetylcholine, corticosteroids and other hormones. The sites and modes of action of the narcotic analgesic drugs are examined in single cells, the central and peripheral nervous system and the kidneys. There is a discussion of the possible causes of tolerance and, finally, a consideration of two important therapeutic programmes, namely the use of antagonists as a protective measure and the methadone maintenance programme.

It is unfortunate that most of the research work reported in this volume was published before naloxone, the first pure antagonist of morphine, had become available. In many of the papers quoted, the partial agonists, nalorphine and levallorphan, served as "antagonists"; because of their dual action as agonist and antagonist, the interpretation of the experiments in which they were used was often equivocal. Until the advent of naloxone, it was not easy to distinguish between specific and non-specific effects of morphine-like drugs. This dilemma was particularly difficult to overcome in experiments on certain isolated tissues in which only very high concentrations of these drugs had an effect. We know now that many of these effects are non-specific; apart from not being antagonized by naloxone they also do not show such stereospecificity as is found for their analgesic effects. It is for these reasons that some of the observations and conclusions presented in the volume cannot be accepted as valid.

The editing of books written by a number of authors is a difficult task of which Dr Clouet has absolved herself well. Nevertheless, a few unfortunate phrases have not been expunged, as for example "illicit narcotic seizures also have been analysed by microcrystal tests".

My criticisms should, however, not detract from the importance of this book which will be of great value to the active research worker who feels with L. Shuster that "theoretical castles are easy to build in the realm of narcotic addiction" and with H. L. Borison that "so long as we lack more effective means of studying the communication mechanisms of the brain, we shall have to face the dilemma as to how the neurochemical approach to addiction can yield meaningful answers if they do not rest upon sound neurophysiological footing".

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