

acid cycle and the discovery of carbon dioxide fixation in pyruvate metabolism, seem to have provided new and attractive alternative interpretations of some of the basic experiments of Szent-Györgyi, although Krebs himself has upheld the importance of this system. Secondly, hydrogen transport to the cytochrome system is now considered possible directly via flavoprotein from several intermediate metabolites, so that the same insistence on the essential transport by the succinate system does not seem to be regarded as necessary. A highly critical attitude towards the 4-carbon acid system is often noticeable, particularly by Hogness (p. 143) and Ball (p. 35); the latter rejects entirely as "a blind alley" the inclusion of the malate-oxaloacetate system into Szent-Györgyi's scheme. Whether the Krebs cycle really includes citric acid, or rather *isocitric* acid or some other intermediate is also debated. The application to bacterial metabolism of these cycles, and the importance in bacteria of carbon dioxide fixation, are discussed in valuable contributions from H. G. Wood and C. H. Werkman.

How, and to what extent, is this energy harnessed for use by the living cell? The positive evidence in this most difficult question seems to be limited to the part played by coupled phosphorylations, as exemplified by the obligatory coupling between the oxidation of triose and the phosphorylation of adenosine diphosphate. H. M. Kalkar and C. F. Cori individually discuss these and related problems. The latter shows how the phosphorylation of glucose depends on the aerobic formation of energy-rich phosphate bonds during the simultaneous oxidation of substances such as pyruvic, fumaric and succinic acids. The glucose so phosphorylated is now capable of breakdown to triosephosphate and pyruvate, and thus the cycle of glucose oxidation continues. In reviewing these important mechanisms, Cori directs attention to the fact that in the intact cell regulatory arrangements must exist integrating these activities; such regulators may well include many hormones, substances which do not themselves appear to be essential constituents of any enzyme system, but which may perhaps soon be fitted into this fascinating story. Another example of aerobic phosphorylation is provided by F. Lipmann, who shows that in the bacterial oxidation of pyruvate the highly unstable acetylphosphate may be isolated as the silver compound. Otto Meyerhof, now of the University of Pennsylvania, contributes a stimulating introductory article on intermediary metabolism, which includes numerous valuable suggestions for present-day attack.

Space does not permit more than a passing reference to the discussion on tumour metabolism: the reviewer is here on delicate ground, for the phrase "most authors agree . . ." which occurs several times in this chapter is perhaps an over-statement. But this section is worthy of serious study, and the pessimism of K. A. C. Elliott is well offset by the exuberance of Dean Burk. The latter boldly challenges all and sundry that he will diagnose tumour growth from its metabolism correctly in well over 95 per cent of cases, but perhaps this estimate of the accuracy may be lowered if many more normal tissues with "cancer-like metabolism" are discovered, and several are already known. No one seems to have given much attention in this section to the possible connexion between aerobic glycolysis and insufficient oxygenation *in vivo*, although Lipmann in his discussion on the Pasteur reaction has done so, and this may in the reviewer's opinion be as important

a factor in tumours as it is believed to be in other tissues with aerobic glycolysis, such as cartilage, medulla of kidney, and intestinal mucous membrane.

Although there is much about carbohydrate oxidation and something about amino-acid oxidation in this book, the oxidation mechanisms which deal with fats, aceto-acetic acid and fatty acids are scarcely referred to at all.

The text is enlivened by numerous "candid" photographs of the participants. The general production is excellent.

F. DICKENS.

A RUSSIAN-ENGLISH DICTIONARY

New Complete Russian-English Dictionary (New Orthography)

Edited by Dr. Louis Segal. Pp. xii+965. (London: Perey Lund, Humphries and Co., Ltd., 1942.) 42s.

THE making of dictionaries is an evolutionary process; each new dictionary has or claims to have certain advantages over its predecessors that justify its appearance in the competitive struggle for existence, while the greater part of the reading matter must necessarily remain unchanged. The most obvious merit of Dr. Segal's dictionary, in comparison with earlier Russian dictionaries, is the clearness of the type; this is a most pleasing improvement. The use of the new orthography is an inevitable development which will be welcomed by the ever-increasing number of those who are unacquainted with the old, and the accenting of the Russian words will also be a help to the average English user.

A characteristic of many of the older Russian-English dictionaries is the frequent use of obsolete English words, as though the compiler (usually a Russian) of the dictionary was himself unacquainted with the evolution of the English language in the last two centuries and had slavishly copied earlier lexicographers whenever a difficulty or doubt as to the meaning of a word had arisen. It must be admitted that this most recent dictionary displays the same characteristic of archaism, the origin of which can easily be traced to earlier dictionaries, particularly Alexandrov's, to which the author acknowledges his indebtedness, and in which identical archaisms occur. Words like "eliquation" and "prase" defeated both the reviewer and the "Concise Oxford Dictionary"; one finds words such as "tetraphyllous" where "four-leaved" would obviously have been better, and so far at least as agriculture is concerned some of the translations betray a certain limitation on the compiler's knowledge of English agricultural terminology. Taking the dictionary as a whole, these are quite minor defects; the point is that they all occurred in the old, pre-Revolution dictionaries and have been incorporated unamended into the new. On the other hand, the translated idioms have been considerably increased in number (in comparison with the older dictionaries) and have been brought up to date.

It would have been advantageous to the majority of English students of Russian to have had some simple guide to the conjugation of verbs included in the brief section on grammar at the beginning. This is a part which might profitably be extended in a subsequent edition.