The various chapters (by T. S. Stevens, J. D. Loudon, E. Hoggarth, and N. Campbell) are uniformly written and maintain the high standard set by the previous volumes. Owners of volumes I to III will need no further recommendation.

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Proceedings of the Rehovoth Conference on Nucular Structure. Held at the Weizmann Institute of Science, Rehovoth, 8–14 Sept. 1957, under the auspices of the International Union of Pure and Applied Physics. H. J. Lipkin, Ed. North-Holland, Amsterdam; Interscience, New York, 1958. xvi + 614 pp. Illus. + plates. $12.50.

The rapid growth of the volume of publications makes it almost impossible even for the specialist to keep abreast of current scientific work. Large conferences, devoted to a reasonably narrow field, increasingly become the means of communication among physicists. The proceedings of such conferences are almost the only up-to-date record of the available results and of the current thinking in a field. The present volume, appearing only five months after the conference took place, is bound to become useful, both by refreshing the memory of the participants of the conference and also by serving as an orientation, and perhaps even as an introduction to the subject, for those who were not present. It shares with other similar volumes the characteristic of great readability which records of verbal proceedings have, and also a certain sketchiness, which is, unfortunately, quite unavoidable.

The volume contains about 125 contributions. Most of these are, naturally, short communications. However, there are more or less comprehensive summaries on all the principal subjects of discussion: the shell-model (Eden on the theoretical foundation and Kurath on some of the detailed results); the unified model (Mottelson and Peierls); group-theoretical methods (Racah and Flowers); electromagnetic transitions (Wilkinson); finite size of the nucleus (Rose); beta decay and parity (Konopinski on theory and Langer on measurements); extranuclear effects (Abragam on theory and Frauenfelder on measurements); instruments (Gerholm); and measurement of short life-times (Devons and S. G. Cohen). About two-thirds of all the contributions were theoretical in nature, about one-third experimental. The average length of the summary papers is perhaps a shade shorter than most readers would prefer: few of them extend to more than ten pages. Some of the short communications do not cover a page.

The Rehovoth Conference had its full share of announcements of new and important results; these give added zest to such gatherings and a significance beyond that of disseminating information. Apart from a discussion of the parity problem (by Lee and by Wu), there was a discussion of the calculation of binding energies based on the shell-model, by Talmi; Elliott's views of the unified model—which promise to grow much beyond their present importance—were reviewed by Flowers; Peierls spoke on his and Yoccoz' views on the same subject; and Bromley reviewed evidence for collective properties of light nuclei. Very probably other important ideas have been proposed, the significance of which I have failed to appreciate. There are also three interesting and detailed articles on specific subjects: one by Bergstrom on the nuclei in the Pb^{208} region, one by Zweifel on the K-capture phenomenon, and one by Steffen on the measurement of β-γ angular correlations.

It must have been an interesting and spirited conference, and the record of it does great credit to the editor. There was also some good-natured fun, recorded at the end of the volume. It should be noted that Pauli appears twice in the group picture of the participants but only once as contributor.

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Puzzle-Math. George Gamow and Marvin Stern. Viking, New York, 1958. 119 pp. Illus. $2.50.

This is a very enjoyable collection of 32 amusingly told little stories. Each story consists of two parts. The first part, printed in ordinary type, leads up to a neatly formulated puzzle; the second part, printed in italics, presents the solution of the puzzle. The ambitious reader should lay down the book when he has finished the ordinary type; he should try to find the solution by himself and, having found it, compare it with the italics. In doing so, he will learn more and have more fun than the lazy reader who reads the italics right away. Yet even the lazy reader may derive a lot of pleasure and profit from these little stories, because they are not pointless. There are whimsical details, some of which are emphasized by amusing drawings. Yet behind such details there is an essential mathematical principle in some stories, or an instructive method of solution or a side glance on physics in other stories. Still, the great majority of the puzzles are in all details accessible to the intelligent layman. Less than half a dozen solutions use a little high-school algebra, and in some of these cases the reader can skip the algebra and still understand the main point.

In such matters, it is difficult to be original. Three or four problems were new to me. I knew the rest, except certain details of presentation; of course, details of presentation are important here. I saw certain old acquaintances, with which friends used to tease me when I was an undergraduate, printed here the first time. And so the authors deserve praise also as collectors of mathematical folklore.

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Problema Protivorakovikh Antibiotikov. (Problem of Anticancerous Antibiotics.) N. G. Klueva and G. I. Roskin. Gosudarstvenoi Kontrolnoi Institut Sivorotok i Vaksin imeni L. A. Tarasevicha, Moscow, U.S.S.R., 1957. 247 pp. 10 rubles.

Shortly after World War II, considerable interest was aroused by the work of Nina Klueva and Gregory Roskin of Moscow, who reported that lysates of *Trypanosoma cruzi* (called "KR" from the initials of the authors) inhibited the growth of tumors in mice and had beneficial effects in some patients with cancer. Hauschka [*Cancer Research* **7**, 717 (1947)] and Belkin [*ibid,* **9**, 560 (1949)] could not duplicate the effects in mice, although their work included trypanosomes from the same source as those used is Moscow. Malisoff [*Science* **106**, 591 (1947)] claimed to have reproduced the findings, but his work was shown to be faulty.

Discussion of the KR preparation then became enmeshed in political complications and disappeared from the Soviet medical literature until 1956. This book summarizes the investigations and includes the findings in the use of the lysate in over 100 patients; of these cases 30 are reported in some detail. Unfortunately, the data raise more questions than they answer.

Daily intramuscular injections were administered for several months to 24 patients with carcinoma of the lip. The authors state that some effect was observed in 19 patients, and reports are presented on nine. Review of these suggests that these include three acceptable

cases of 5-year, and two acceptable cases of 3-year, survival without clinical evidence of cancer. The investigations included 73 patients with breast cancer, with some effect claimed in 40 cases; reports are detailed on ten, and of these at least four can be discarded as being questionable. These cases are particularly difficult to interpret, since most of these were early neoplasms, diagnosed by clinical examination, followed only by palpation after biopsy. Study of a few patients with easily measurable metastatic lesions would have been more informative.

Personal communications with other cancer investigators in the Soviet Union indicate that the Klueva-Roskin research has been a disappointment. It is noteworthy that their latest book lacks the imprimatur of the Academy of Medical Sciences U.S.S.R., or, indeed, of the official publishing house "Medgiz." Nevertheless, I am left with an uneasy feeling that the final chapters on the lysates of *Trypanosoma cruzi* remain to be written.

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The Future Supply of Oil and Gas. A study of the availability of crude oil, natural gas, and natural gas liquids in the United States in the period through 1975. Bruce C. Netschert. Published for Resources for the Future by Johns Hopkins University Press, Baltimore, Md., 1958. xi + 134 pp. $3.

Since the United States is vitally dependent upon a continuing supply of petroleum and natural gas, it has been heartening, during the last decade, to see our traditional complacency regarding the adequacy of these resources giving way to national concern over how soon the rates of production will begin their inevitable declines. The latest study concerned with this problem is the book *The Future Supply of Oil and Gas,* by Bruce C. Netschert of the staff of the nonprofit organization Resources for the Future, Inc.

This study, which presents no new data, consists first of a presentation and a review of most of the estimates and opinions published since 1950, all of which have been attributed to "experts" or to "recognized authorities." Then follow the estimates given by the author himself: (i) The total crude oil awaiting future recovery in the United States is of the order of 500 billion barrels, and the total future supply of natural gas is of the order of 1200 trillion cubic feet. (ii) The production "availability" of oil will be 6 billion barrels per year for the year 1975, that for gas will be 20 trillion cubic feet per year for the year 1980. (iii) The peaks of production "availability" for both oil and gas will occur later than the year 1975. (The meaning of the term *availability,* as used by the author, is obscure, but he seems to imply that we could produce the specified amounts if we wished to do so.)

According to my calculations, the author's "availability" figures for the years specified imply a minimum ultimate cumulative production of about 450 billion barrels for crude oil and about 1500 trillion cubic feet for natural gas. Since these figures are about three times, for crude oil, and almost twice, for natural gas, those cited only two years ago by Wallace E. Pratt [*Peaceful Uses of Atomic Energy* (U.S. Government Printing Office, Washington, D.C., 1956), vol. II, pp. 89–105] on the basis of replies to a questionnaire from 22 leaders of the petroleum industry, the critical reader will wish to know how so wide a discrepancy has arisen. To me it seems to have been the result of several complementary procedures.

In the first place, the author's weighting of "expert" opinions has been extraordinarily uncritical. The most flagrant example of this has been his inclusion in Tables 1, 2, and 4 of a completely "wild" figure of a reserve of 1000 to 2000 billion barrels of oil, given by a man having no firsthand knowledge or experience whatever in either the exploration for or the production of oil and gas, while excluding the estimate of 170 billion barrels of liquid hydrocarbons (which would include about 145 billion barrels of crude oil) obtained by Wallace E. Pratt as representing the ultimate reserves (both past and future production), figured on the basis of a recovery factor of 40 percent of the oil in place. The Pratt estimate implies the initial existence underground of a total of only about 360 billion barrels of crude oil.

The second procedure, which has been followed systematically, has consisted in choosing for each factor having a range of uncertainty that value which will tend to maximize the final results. Thus, an allusion has been made to the possibility of oil occurring to a depth of 65,000 feet, whereas the greatest depth drilled to date is about 22,500 feet. Reference has also been made to the possible occurrence of oil in the Precambrian. Similarly, to maximize the estimate of the amount of oil underground, Pratt's figure of 40 percent for the present average recovery factor has been rejected in favor of the lower figure of 33⅓ percent; whereas, according to George H. Fancher, the average recovery factor for Texas, which accounts for about 40 percent of the total United States production, is now about 46 percent.

By such procedures the author has arrived at estimates of reserves, and of future productive capabilities, for both oil and gas which, in the light of present information, crowd the upper limits of plausibility. These conclusions, accordingly, imply the existence for the next several decades of a state of national self-sufficiency with respect to petroleum and natural gas which may be more illusory than real. Consequently, should they be accepted at face value and made the basis for national policy, the results could prove to be detrimental to the national welfare.

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Structure Reports, 1951. vol. 15. A. J. C. Wilson, General Ed. International Union of Crystallography; Oosthoek's, Utrecht, Netherlands, 1957. viii + 588 pp. $29.

This volume maintains the high standard of clear and critical description which has made the *Structure Reports* series an indispensable reference source for chemists, crystallographers, metallurgists, mineralogists, solid-state physicists, and all who are concerned with the atomic structure of matter. Once again we should thank the editors and their reporters for their painstaking contribution to the problem of encompassing the accomplished work in this productive field of research.

Volume 15 is the first of those covering the second decade, since volumes 8 to 13 covered the period 1940–50, taking over from *Structurbericht,* which was discontinued after 1939, and volume 14 is the cumulative index, currently in preparation.

The work of *Structure Reports* was started in 1948, and volumes have appeared at the rate of one a year since 1951. As in nearly all branches of science, the amount of work to be reported has increased steadily. The editors are therefore faced with the dual problem of maintaining a steady output and bringing the series closer to date. To this end it is proposed to increase the number of section editors so that groups of abstractors can be working simultaneously on successive volumes. This is indeed welcome news, for the only limitation to the usefulness of the *Reports* has been the large gap between them and current research. A word of congratulation to the International Union of Crystallography is also in order for bringing about this most successful venture in international cooperation. Under