the computed results of Kimball and observed by these authors, respectively:

Wave-length λ	Computed n_1	Observed n	$n - n_1$
13.96	1.436526	1.4373	+ 0.000774
22.3	1.339977	1.340	+ 0.000323 [sic]
			corr. + 0.000023

In *Annalen der Physik,* 6, 1901, pp. 624, 625, F. F. Martens states in footnotes that for the wave-length 13.96 the German authors had made a correction,[2] giving $n = 1.4627$. He also points out that Kimball's constants should give for this wave-length the value 1.4635, and says: "Dieser Fehler ist . . . höchst befremdend." He then goes on to quote our values of n, cutting off from them the fifth and sixth places of decimals which had been published in Volume I.

In 1901, immediately after seeing Martens' article, I checked Kimball's work. I found that all his logarithms were correct, but that in setting down the number corresponding to the final logarithm he had erroneously transposed the figures 3 and 6, so that his value as published in the *Annals* should have read $n = 1.463526$. The corrected $n - n_1 = -0.000826$.

Later, Dr. F. Paschen made a beautiful determination of the dispersion of rock salt,[3] carrying on to much longer wave-lengths than we had done. He disagrees sharply with Martens, who thought the fifth and sixth places of decimals in n in our work should be thrown away, saying that he finds it up to 2.3 microns "von bewundernswerter Präzision." Up to and including the wave-length 4.12 his values and our values of n differ only a few units in the sixth decimal place, as shown by Table 394, p. 360, Smithsonian Physical Tables, 8th Revised Edition. I wrote to Dr. Paschen expressing my gratification and telling him the nature of Kimball's error as related above. I received a very kind reply.

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RECENT HIGH MORTALITY AMONG GEOLOGISTS

IN the issue of SCIENCE for December 29 Dr. Sidney D. Townley offers a criticism of my note in the issue of May 26 under the caption "Unusual Mortality among Geologists." I there drew attention to the very high mortality, sixteen fellows of the Geological Society, for the period between November 15, 1943, and April 18, 1944, slightly more than five months.

To quote Dr. Townley, "Only two of these deaths occurred in 1943, so if we stick to annual totals it is quite probable that 1943 will show nothing unusual. . . ." The figures were available to Dr. Townley, and he could have known that the death losses for the year 1943 (15) were the highest in the society's half-century of existence up to that time, with exception of the years 1934 and 1935, when they were 19.

We entered the war a few weeks only before 1942 and the society's losses by death for the three-year war period 1942 to 1944 have been 51, the greatest for any three-year period in the 56 years of its history. This figure was approached only once; in the period 1933 to 1935, when the losses were 47 (a fraction of one per cent. higher if membership increase is taken into account). The next highest loss for a three-year period was 31.

I hold no brief for my suggestion that the latest high mortality may in part be due to the war. It was offered as a suggestion only, and I have no suggestion even to offer for the high death losses of the period 1933 to 1935. Dr. Townley tries to explain the sixteen deceased fellows of November 15, 1943, to April 18, 1944, by the large number of geologists who were drawn into the profession by LeConte, Branner and Chamberlin at the time when the sixteen must have been undergoing their training. Unfortunately for this hypothesis no one of the sixteen came under the training of any one of the three, as reference to "Who's Who" would have shown.

WILLIAM H. HOBBS

SCIENTIFIC BOOKS

PHYSICS FOR THE GENERAL READER

Physics Tells Why. By OVERTON LUHR. Illustrated by Ruth C. Schmidt. ix + 318 pp. Lancaster, Pa.: The Jaques Cattell Press. 1943. $3.50.

THE modest subtitle of this book is "An Explanation of Some Common Physical Phenomena." Actually the book does more than this implies since, in addition to explaining many phenomena, it also gives a systematic development of the elementary principles of physics, grouped in nearly the usual manner under mechanics, electricity, light, heat and sound, with a concluding chapter on radiation and atomic physics. Thus the basic framework is not far from that of the traditional text-book of general physics.

There is, however, a marked difference from the usual text, aside from the omission of numerical problems and all but a few of the most elementary equations. This difference, which incidentally justifies the subtitle, is that the reader is led to basic principles, not by laboratory experiments designed to illustrate them, but by ordinary experiences of household, street and field. A certain degree of precision

[2] *Ann. der Phys. u. Chemie,* Bd. 61, 1897, p. 224.
[3] *Ann. der Phys.* Bd. 26, 1908. See pp. 120, 121, 132.

is sacrificed by this method, but a book intended for readers without special training must in any case be mainly descriptive. The loss is more than offset by the advantage of letting the reader draw on his familiar experience rather than labor to understand the reasons for details of experimental procedure.

The method of Dr. Luhr's book is one which has been tried in others, especially in some of the more recent high-school texts, not always with much success. It requires of the author the clearest perception of his subject and a very thoughtful discrimination. The natural temptation is to be timely and so draw illustrations from the recent developments of technology, about which the reader's curiosity is awake because he has not yet learned to take them for granted. These developments, just because they are the latest products of a complex technology, generally involve so many principles in combination that they often make the least suitable illustrations for the beginning reader.

In avoiding this temptation, Dr. Luhr has not only explained the elements of physics with an admirable simplicity and clarity, but he has done something even more worth while in arousing the reader's wonder about things that are in front of his eyes every day. For this reason especially, the book should be recommended to boys and girls of high-school age.

The illustrations by Ruth C. Schmidt have an agreeably offhand character, as if the manuscript had fallen into her hands by accident and she had made marginal sketches by way of commentary as she read it. The appearance is doubtless deceptive; they probably required work enough. Those which show human figures (if the word "human" can be so far extended) are sympathetic if also somewhat ironic caricatures of man, alternately baffled, determined and delighted in his quest to understand the world around him.

In reading this lively book, it is hard to realize that it was written by a man in a losing struggle with an illness which took his life before the work was printed. The manuscript was prepared for publication by Ralph Johnson. This work of friendship must have been done conscientiously, as the book is very free of such small errors as an author generally finds to correct in a last reading of his manuscript, if he does not miss them even then. One which escaped in the present work may perhaps be worth mentioning. The statement that "Aristotle, as well as most of the other learned men of Ancient Greece and Rome, believed that the earth was flat" slights the work of the early astronomers, who had not only shown that the earth is spherical but had also found how to measure its radius. But this is of negligible importance in a book which is not intended as a history and which succeeds admirably in the purpose for which it was written.

Atoms in Action. By GEORGE RUSSELL HARRISON. xii + 401 pp. Garden City Publishing Co. 1944. $1.49.

THIS is an inexpensive, though enlarged, edition of the work which appeared under the same title in 1937. Its subject is physics, especially applied physics, and it offers, in a lively style and intelligible form, a remarkable amount of information in this diverse and rapidly changing field. It sustains a high degree of clarity over the whole range of applied physics, including among other subjects spectroscopic analysis, radio communication and the physics of agriculture and medicine.

Since the field is contemporary and the author's intention was to be up-to-date, he had to face the difficulty, referred to in the preceding review, of explaining physics by its more complex rather than its simpler phenomena. This has been skilfully done. A certain familiarity with technical and scientific terms is assumed, but not much more than is taken for granted by writers on science in the daily papers. The reader who has had a good introductory course in physics should find no difficulty with the book. The reader with only the kind of knowledge which any one is likely to have acquired by a reasonable awareness in a technological culture will probably understand most of it, though he might do well to read, for example, "Physics Tells Why" as an introduction. A person with much more knowledge of physics will still be almost certain to learn a great deal that he did not know before.

The section which has been added in the present edition deals with physics in the war and afterward. Because the rest of the book was widely reviewed in the first edition, the part which is new naturally invites the especial attention of the present reviewer. It has besides a particular interest in that it contains an exposition of the author's view of the social consequences of science, a view which could only be inferred from occasional discursive remarks in the earlier edition. Since the jacket carries the announcement that "Atoms in Action" has the unqualified endorsement of the American Institute of Physics, many readers may assume that the social outlook of its author has some official recognition as that of American physicists generally.

This outlook may be briefly described as a materialistic optimism. In calling it materialistic, I do not mean to imply that the author is apathetic to intellectual and spiritual values, but he believes that these follow automatically fom the material gains of applied science. Scientific research is thus the key to every sort of progress, and, now that mankind has found this key, improvement—material, intellectual, and spiritual—has a mechanical inevitability. Thus he says:

Nature provides an automatic compensating mechanism, such that if material progress is too rapid, suffering results which accelerates spiritual progress.

And in another place:

Civilization contains innate self-stabilizing influences. Society has certain problems to solve and definite lessons to learn. The function of science is to speed up this learning process. If modern wars seem more terrible, it is because we are learning our lessons faster and overcoming more rapidly those obstacles to human progress which must be met in any case.

Certainly no one will doubt that scientific research provides means which may be used for human progress, but that there is any automatic mechanism to insure that these means will be so used is a debatable thesis, doubted by many thoughtful and well-informed people. It was a good while ago but already within the age of modern technology that John Stuart Mill wrote: "Hitherto it is questionable if all the mechanical inventions yet made have lightened the day's toil of any human being." Most of us would doubtless count this an exaggeration. But I think we should find it harder to dismiss the opinion of Henry George, that "the new forces [of material progress], elevating in their nature though they be, do not act upon the social fabric from underneath, as was for a long time hoped and believed, but strike it at a point intermediate between top and bottom. It is as though an immense wedge were being forced, not underneath society, but through society. Those who are above the point of separation are elevated, but those who are below are crushed down." And indeed one can not help wondering whether what the world has now would pass for civilization with Socrates, let us say, or Pascal or, for that matter, with any barefoot and illiterate South Sea Islander caught between the bombs and shellfire of the technically advanced nations.

But, in any case, it is to be hoped that "Atoms in Action" will have many new readers. They will find that nature is not niggardly of either her secrets or her riches, and the world can be made incomparably better by knowledge, employed with good-will. And if, like this reviewer, they can not share Professor Harrison's optimistic belief that this will happen automatically, they may be moved themselves to try to make it come true.

R. T. Cox

THE JOHNS HOPKINS UNIVERSITY

ORGANIC SYNTHESES

Organic Syntheses. Vol. 24. An annual publication of satisfactory methods for the preparation of organic chemicals. NATHAN L. DRAKE, editor-in-chief, with an editorial board and an advisory board. Pp. 119. New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd. 1944. $2.00.

THE syntheses described in this new volume of this important series are the following: Acenaphthenequinone, Aminoacetal, 4-Amino-2,6-dimethylpyrimidine, *dl-alpha*-Amino-*alpha*-phenylpropionic acid, 4-Amino-1,2,4-triazole, Benzoyl cyanide, Benzoylformic acid, *tert.*-Butyl acetate, *o*-Chlorobromobenzene, ω-Chloroisonitrosoacetophenone, 2-Chlorolepidine, 1-Chloromethylnaphthalene, Coumarilic acid, Cyclopropanecarboxylic acid, *nor*-Desoxycholic acid, 3,12-Diacetoxy-*bisnor*-cholanyldiphenylethylene, γ-Di-*n*-butylaminopropylamine, 2,6-Dichloroaniline and 2,6-dibromoaniline, Diphenyldiazomethane, Ethyl diazoacetate, Ethyl hydrazinecarboxylate and diaminobiuret, Ethyl-N-tricarboxylate, Glyoxal bisulfite, 4(5)-Hydroxymethylimidazole hydrochloride, 4-Methylcarbostyril, 4-Methylcoumarin, Methyl pyruvate, *o*-Nitrobenzaldehyde, *p*-Nitrobenzyl acetate, *p*-Nitrobenzyl alcohol, Phenylmethylglycidic ester, 1-Phenylnaphthalene, *alpha*-Phenylpropionaldehyde, Selenophenol, Sorbic acid, Undecyl isocyanate, Vinylacetic acid.

The concluding subject index covers volumes 20–24.

In other respects the volume is exactly like its predecessors, Vol. 23 having been reviewed somewhat more fully in SCIENCE of August 27, 1943, page 200.

MARSTON TAYLOR BOGERT

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REPORTS

THE NEW YORK ZOOLOGICAL SOCIETY

IT is extraordinarily encouraging how the affairs of the Zoological Society progress even during the stress of this war. Public interest, together with the moral and financial support coming in from many quarters, is evidence of the importance and permanence of the things that this institution stands for and of its potentialities in the future.

[1] Address of Fairfield Osborn before the New York Zoological Society, January 9, 1945.

Usually at these meetings it is the president's duty to report to the members as to the past year's happenings. With your permission I shall only do this most briefly and then go on to consider some plans and ideas for the future.

THE YEAR 1944

The year 1944 again gave us confidence to believe that our services provided real contributions to public