instant and where also the pressure driving the gas particles past the piston rings will be the greatest.

This in no way militates against the work done by A. G. Williams[3] on cylinder wear; he came to the conclusion that corrosion was the principal factor in cylinder wear. Corrosion goes on all along the surface of the cylinder exposed to the exploded gases, but the chemical effects produced by the CO_2 when it goes into solution with the water of combustion corrodes the surface of the cylinder and make the material of the surface of the cylinder just that much easier to pick off by the rapidly moving gas particles as they speed past the piston rings at the upper end of the stroke.

Shadow photographs of the rush of gases from the muzzle of a revolver show the gases escaping ahead of the projectile. This means that around the bullet, *i.e.,* between it and the inner wall of the barrel, gas is being forced at high speed in a fashion like that of the exploding gas around the piston and rings of the internal combustion engine. Here again the principle of Bernoulli operates to tear out the particles composing the inner wall of the barrel of the gun.

The "Big Bertha" started with an inner diameter of 8.2 inches to its detachable steel lining. After 66 shots had been fired, the inner diameter was 9.2 inches. If the principle of Bernoulli was effective the inner diameter of the lining should have been eroded more at the breech than at the muzzle. No data are available on this point, but Mr. P. A. Shepherd, an official of the J. Stevens Arms Company of Chicopee Falls, Mass., tells me that any rifle manufacturer knows that the erosion at the chamber end of a rifle barrel (throat erosion) is greater than at the muzzle. This substantiates the idea that the principle of Bernoulli is an important factor in this wear of a rifle barrel as well as that of an engine cylinder.

As a physicist I can see possibilities in this point of view, but there may be other phases to the problem which have not been considered and which might rule the Bernoulli concept completely out of court by the automotive engineers.

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ANOTHER VALUE OF A NATIONAL POLICY OF RESEARCH

MR. FRANK[1] has set down several excellent values that would accrue from having a national policy of research. However, he does not mention the greatest value of all, that of providing a rigorous concept of what is meant by the term research. As concepts of this sort need defining in terms of operational procedure, Mr. Frank's committee might well attempt to submit to the scientists of this country an outline of the basic steps and logical implications that underlie all modern research. This is no small undertaking, but is surely one that is basic to a national policy of research. The term research, if we are to continue to use it, should have a greater meaning than simply critical thinking or systematic examination.

Furthermore, if we are to urge research upon the members of society as a panacea for their ills we should be able to explain, very definitely and precisely, what constitutes research. If research is to be accepted as a fourth pillar of the state, at least the scientists, let alone the layman, should clearly understand how research is both related to and distinct from common-sense investigation. Modern usage of the term "research" is beginning to smack of faith-healing—a miraculous but mysterious process.

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SCIENTIFIC BOOKS

ELECTRONICS

An Introduction to Electronics. By RALPH G. HUDSON. x + 97 pp. New York: The Macmillan Company. 1945. $3.00.

IT seems to the present reviewer that this little book should serve a very useful purpose. It is written in extremely elementary language, but the author has succeeded in describing in relatively few words the essentials underlying the operational principles of a number of important electronic devices. The book will be useful to one who knows practically no physics because it will enable him to get a bird's-eye view of the operation of the essential devices. It will also be useful to the very advanced physicist because frequently he has not had time to acquaint himself with the devices which exist. A few words of elementary description is all that he needs to call the devices to his attention, and his own knowledge of physics will supply him with the remainder of the possibilities of understanding to a degree of detail, of course, much greater than is given in the book itself.

The book contains a well-balanced distribution between diagrammatical and pictorial material. Naturally it does not contain any appreciable amount of fundamental theoretical matter, but is essentially descriptive.

One does not demand very high logical accuracy in

[3] A. G. Williams, *Jour. Inst. Auto. Engrs.,* London, June, 1933, Vol. I.

[1] L. K. Frank, SCIENCE, 101: 433, 1945.

matters of detail in a book of this kind, but it is a little disturbing to see a picture of the cyclotron with a sub-title: "Dr. E. O. Lawrence and associates at the University of California," when neither of the individuals shown happens to be Professor Lawrence.

On page 12 there is an implication, of course unintentional, that the droplets in a cloud chamber are produced by condensation on the charged ray which is under investigation rather than by condensation on the charged droplets resulting from ionization. However, such defects are of minor importance. The elementary reader will not be harmed, because the details of his picture must be incomplete anyhow, and the advanced reader will not be harmed, because he will make his own corrections. All in all, the author may be congratulated on producing a very clearly written volume useful for the purpose for which it is obviously intended.

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BIOLOGICAL NAMES AND TERMS

A Source Book of Biological Names and Terms. By EDMUND C. JAEGER. xxvi + 256 pp. 96 figs. Springfield, Ill.: Charles C Thomas. 1944. $3.50.

THAT which we call a rose might still retain its sweetness by another name, but it would lose much of its charm for us nevertheless. Names may be fraught with meaning or they may be nonsense, as the author suggests in his dedication.

We are told that this rather slim volume contains some 12,000 elements from which biological names and terms are made. These, in alphabetical order, are explained, and examples are cited. According to the preface, this book surpasses in scope "many times the most complete collections in unabridged dictionaries and scientific glossaries and gives a key which unlocks the treasury of meaning of more than a million technical names and terms."

This volume is not a dictionary of technical terms, but, as the title says, a source book. All the more commonly known genera, many specific names and technical terms are included, from the standpoint of the elements of which they are composed. Geographical names and those based on modern personal names are not listed; nor are "ill-coined terms" of some "careless insect-anatomists and ecologists who have proved themselves to be word-butchers of the meanest sort." There is a discussion of a little over a page on "How Words Are Built." Some nine pages on word-formation of generic names are quoted from T. S. Palmer's "Index Generum Mammalium."

In the 256 pages which constitute the bulk of the book word elements are carefully considered, from "a-" which, as you probably know, has various meanings, including "a negative or absence of something," "from," "without," "away"; to "zyzz," which, as you probably don't know, means "zigzag." The origin of such elements, usually from the Greek or Latin, is indicated, often with notes of interest.

Ninety-six of the plants and animals are illustrated. Some of the drawings are original; many of those of plants are adapted from the author's book on "Desert Wild Flowers"; and some at least of the animals glint with expression—from wistful to smug.

Obviously this book contains a wealth of information on the derivation, meanings and uses of biological words and word elements. From it the student, to whom it seems to be more especially addressed, may learn the underlying significance of the names and terms of his science. The specialist may also profit by the opportunity for reflection on the original meanings of the vocabulary with which he graces or encumbers his field. Both may search in vain for more particular meanings of certain technical terms—but then, this is a source book rather than a dictionary.

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MAMMALS OF THE OLD WORLD

Extinct and Vanishing Mammals of the Old World. By FRANCIS HARPER. Special Publication No. 12, American Committee for International Wild Life Protection. xv + 850 pp., 1 pl., 67 figs. Baltimore, Md.: The Lord Baltimore Press. 1945.

IN 1942 appeared a companion volume devoted to mammals of the Western Hemisphere, prepared mainly by the late Glover M. Allen but with aid by Harper; in the present work, the proportions of contributions of the two authors are reversed. This volume is the larger by 230 pages and is more thoroughly illustrated. Together they constitute a record that mankind, being chiefly responsible for the extirpations, should view only with contrition, but which it is well both for laymen and scientists to have in permanent form. May it prove more than a pious hope that these books will stimulate action before it is too late for the preservation of some of the earth's most interesting creatures.

Already the hour has passed for more than a hundred kinds of mammals, 31 per cent. of which were exterminated during the preceding, and 67 per cent. in the present, century. The deadly work has thus attained a doubly accelerated pace. The volume here reviewed, though relating to only one hemisphere (the eastern), contains more summarizing statements than its predecessor. One of these itemizes the exterminations by countries and leading, to our sorrow,