jumbling the translator's manuscript. There are careless errors in the rendition of proper names—for example, the famous site at Uolba Lake is variously rendered as Wolba and Yolba. And, lastly, there are an unnecessary number of typographical errors, despite the fact that, as the introduction takes pains to assure us, the typist is a Harvard graduate. I was disappointed to find on the first three pages of the text seven typographical errors, three errors of transcription, three instances of poor or unintelligible translation, and one obvious error in the Russian original faithfully reproduced (the Irtysh River is not by any stretch of the imagination in north*western* Kazakhstan).

All these shortcomings can surely be attributed to overhasty editing of the translation. May we therefore plead for just a little more care and effort in preparing the forthcoming publications on the Caucasus and Central Asia; such care and effort would immeasurably increase the value of this decidedly worth-while project.

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The Social History of Lighting. William T. O'Dea. Macmillan, New York, 1958. xiii + 254 pp. Illus. $8.50.

Not since Henri d'Allemagne wrote *Histoire du Luminaire* in 1891 has the subject of artificial lighting been treated historically with so much care and authority as William O'Dea treats it here. Written with style and wit, having an almost anthropological perspective, and packed with well-documented information, this book will serve equally the historian of science and culture, the antiquarian, or the mere browser who enjoys pleasant reading in unusual byways.

O'Dea avoids the developmental or evolutionary approach to the history of lighting and also steers clear of the purely chronological approach. Instead, he divides his chapters under functional heading, according to the principal ways in which light has played a part in social history: "Light for the home," "Light for travel," "Light for work," "Light in worship and superstition," for example. The last two chapters deal with "The materials of light" and "Getting a light."

In the beginning chapter, entitled "Bad light," we learn of the nocturnal difficulties that were endured by every one before 1800. When Boswell inadvertently snuffed out his candle while writing late at night, he had to wait for the night watchman and then call out the window for a light, lest in groping about for a tinder box he should disturb his landlord and be shot as a burglar. When tallow candles were the only means of stage lighting, "it was nothing for a snuff boy to come before the audience in the middle of the most emotional scene in order to tend a smoking candle."

The text is enlivened and documented not only by bright literary allusions but also by a splendidly chosen series of plates reproducing paintings, prints, and drawings that depict lighting devices in use. There are also many line drawings interspersed through the text.

One is constantly surprised by the encyclopedic coverage of the subject matter and by the broad frame of reference which surrounds it. The revolutionary importance of Ami Argand's combined invention of the tubular air-draft burner and the glass chimney in 1783 is reiterated here. But for the first time in a general history of lighting, it is shown how the balloon ascension of Argand's friends, the Montgolfier brothers, so completely overshadowed the new lamp that Argand was unable to attract enough attention to the lamp to cause its development. Only the unscrupulous Quinquet seems to have been aware of its significance and to have used the knowledge for his own ends. The point is gracefully stressed by quoting Dr. Johnson's remark to Mrs. Thrale: "You will observe, Madam, that the balloon engages all mankind."

We learn that Menier, the French chocolate manufacturer, lit his factories with arc lights in 1875, that Pullman cars were first lighted by kerosene lamps in 1874, and that the Duke of Brunswick illuminated a garden fete in 1741 with 5000, or more, float-wick oil lamps. We are told that Hooke in the 17th century used a spherical water condenser with sunshine as the source of light for his microscope, and that a scheme to illuminate the roof of the Capital in Washington, D. C., with arc lights in 1884 was vetoed after a trial period. An entire chapter is devoted to the history of lighthouses; this chapter begins with the Pharos of Alexandria, touches on the coal-burning beacons of 17th- and 18th-century England, and ends with the electrification of these houses, which was started as early as 1858.

It is, perhaps, a commentary on the inadequacy of published studies on American lighting that O'Dea devotes little space to it. Little is said of the important role that whale oil played in early 19th-century lighting in America, and one wishes that the oft-repeated story which attributes to Franklin the invention of the two-tube whale-oil burner had been either avoided or substantiated.

The single, mechanical improvement in the organization of the book that I can suggest is to include plate numbers on the plates, since they are referred to by number in the text. For a work so thorough and so well-documented, however, these are merely quibbles. It is an excellent book, much the best that has yet been done on this subject.

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Advances in Chemical Physics. vol. 2. I. Prigogine, Ed. Interscience, New York, 1959. ix + 412 pp. Illus. $11.50.

This second volume of the series maintains the high standards established by volume 1 [*Science* **129**, 833 (1959)]. Although many topics are treated, emphasis is placed on new developments in the theoretical evaluation of molecular electronic energies and on properties determined by electron dynamics. The extensive review of the many-electron problem in quantum mechanics is not only useful but also timely, in view of the great effort currently being applied to this problem.

The articles are rather uniformly of a review character, with some mention of important unsolved problems and some speculation on the nature of possible future developments.

The contents convey a reasonably accurate impression of what this volume has to offer. "Clathrate solutions" (57 pages), J. H. van der Waals and J. C. Platteeuw; "Inter- and intramolecular forces and molecular polarizability" (25 pages), Kenneth S. Pitzer; "The solubility of solids in compressed gases" (34 pages), J. S. Rowlinson and M. J. Richardson; "Thermodynamics of metallic solutions" (28 pages), R. A. Oriani; "Recent advances in polymer

chemistry" (40 pages), M. Szwarc; "Nuclear quadrupole resonance in irradiated crystals" (20 pages), Jules Duchesne; "Correlation problem in many-electron quantum mechanics. I. Review of different approaches and discussion of some current ideas" (116 pages), Per-Olov Löwdin; "Correlation problem in many-electron quantum mechanics. II. Bibliographical survey of the historical developments with comments" (43 pages), Hiroyuku Yoshizumi; "The problem of barriers to internal rotation in molecules" (27 pages), E. Bright Wilson, Jr.

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Exotic Zoology. Willy Ley. Viking, New York, 1959. xii + 468 pp. Illus. $4.95.

The art of writing a book with two primary objectives in mind has been attained by Willy Ley in his new book on natural history. Instead of making new editions of *The Lungfish, the Dodo, and the Unicorn* (1941, revised 1948), *Dragons in Amber* (1951), and *Salamanders and Other Wonders* (1955), Ley has selected the most pertinent and interesting portions of each of these books, rewritten some of the sections, and brought them all up-to-date. This material makes up about one-half of the new book, *Exotic Zoology;* the remainder consists of new material not previously published in book form. Thus, a blending of the old and the new has produced one of the most enchanting books on natural history to appear in recent years.

This is the age of the specialist, and such a person should be able to take any chapter of *Exotic Zoology* and write it to death. Instead of this, Ley investigates a number of subjects from two points of view—their historical development in the knowledge of man, and their place, if any, in the evolutionary pattern of life as a whole. This use of both historical and zoological data gives the reader the impression that this is a well-rounded and authoritative book without giving him the feeling that he is reading a textbook. However, no textbook that I have read has the range of factual material that this book has.

Exotic Zoology is divided into five parts. The first part is appropriately titled "Myth?" It discusses the unicorn in legend and fact, the legends of the survival of large reptiles (dinosaurs?), the Abominable Snowman, and the various legends of the little people—not fairies, but real little people. Pygmies exist, true, but do the descendants of the australopithecines still live in the deep forests of Africa?

The second part, "Records in stone," develops the dragon myths in fact and fiction and includes a very good discussion of the woolly mammoth. A side diversion on the flying dragons—the early bird-reptiles (or is it reptile-birds)—completes this section.

In part three, "Oceanic mysteries," we rove among the strange stories of the Kraken and the scientific basis for belief in huge cuttlefish types in the sea. The sea serpent is treated in a manner that is sympathetic, scholarly, and scientific. The almost unbelievable, large coco-de-mer nut and its strange struggle for existence is one of the botanical puzzles of the world, and it is told here. The spawning habits of the eel complete this section on natural history puzzles.

We find in part four, "Some fabulous islands," the stirring accounts of the extinct moas, and to me, the always intriguing stories (both factual and legendary) of the poison Upas tree. However, the man-eating tree is traced back to a well spun yarn. On the other hand, the Dodo did exist. It played a part in the history of exploration, similar to the role played by the large number of huge tortoises on the islands off the coast of South America.

To conclude this fascinating book, the author (in part five), delves into "Witnesses of the past." Such a hidden treasure house is Australia and its various fauna. Even today, mysteries unfold—such as the discovery of the 200-million-year-old coelacanth—and assure us that adventure is not dead.

To end this journey through space and time, Willy Ley takes us to the continent of mystery, Africa, and the strange and unsuspected animals that turn up there. Such a large animal as the okapi was unknown before 1900. Other primitive types have been found, and the concluding sentence, "And the Congo peacock raised again the old but still open question: what else may be hiding in the Rainy Forest . . . ?" expresses my sentiments completely.

The personal anecdotes, the almost homey treatment, and above all, the careful erudition of Willy Ley will attract the natural and the physical scientist, as well as the layman.

The appendixes contain tables that aid in reading the book, namely, "Sequence and duration of geological periods," and "Animals and climate in northern Europe during the Pleistocene period." Olga Ley's well-done and wisely chosen illustrations add a great deal to the pleasure of reading this book. If you are interested in the world about you, you will like Willy Ley's *Exotic Zoology*.

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Navaho Art and Culture. George Mills. Taylor Museum, Colorado Springs Fine Arts Center, Colorado Springs, Colo., 1959. 221 pp. Illus. + plates.

To what extent does the art of a people reflect the values and the character of the society that produces it? George Mills, dissatisfied with the intuitive nature of previous studies of this problem, has sought a more objective method of attacking it. Choosing as his people for study the Navaho Indians of the American Southwest, he first seeks to analyze each of four of their artistic media—the traditional arts of weaving, silverwork, ceremonial dry-painting (commonly referred to as sand-painting), and a series of freehand, crayon drawings made for him in 1951–52 under conditions he imposed. He finds some 20 artistic traits which are common to all four media and designates them significant from the viewpoint of cultural values.

Mills then summarizes the major premises of the Navaho way of life as he has determined them from analysis of the literature on the tribe, written by cultural anthropologists. He then seeks to find psychological interpretations for the 20 Navaho artistic traits in the literature on the psychology of art in which the meanings of similar traits in the art of non-Navaho peoples are considered. And finally, he compares these interpretations with the major premises of Navaho life as revealed in the writings of students of the whole culture.

These correlations, for the most part, are very striking. They suggest that Navaho art is, indeed, an integral part of Navaho culture, which reflects the psychological characteristics and cultural values of these people. Furthermore, Mills finds that interpretations