machine shop, and as beneficial to the community as it is to a smelting works.

In furtherance of this principle we must remember that language in relation to ideas is a solvent, the purity and clearness of which affect that which it bears in solution. Whewell, in 'The Philosophy of the Inductive Sciences,' has expressed this view of the matter with noble eloquence. 'Language,' he said, 'is often called an instrument of thought, but it is also the nutriment of thought; or rather, it is the atmosphere in which thought lives; a medium essential to the activity of our speculative powers, although invisible and imperceptible in its operation, and an element modifying, by its qualities and changes, the growth and complexion of the faculties which it feeds.'

In considering the subject from this standpoint, there is borne in upon the mind a suggestion which carries our thought far beyond the confines of the matter under discussion. Such power of speech as man possesses is a faculty which appears to divide him from all other living things, while at the same time the imperfection of it weighs him down continually with the sense of an essential frailty. To be able to express oneself perfectly would be divine, to be unable to make oneself understood *is* human. In 'Man's Place in Nature,' Huxley points out that the endowment of intelligible speech separates man from the brutes which are most like him, namely, the anthropoid apes, whom he otherwise resembles closely in substance and in structure. This endowment enables him to transmit the experience which in other animals is lost with each individual life; it has enabled him to organize his knowledge and to hand it down to his descendants, first by word of mouth and then by written words. If the experience thus recorded were properly utilized, instead of being largely disregarded, then man's advancement in knowledge and conduct would enable him to emphasize, much more than it is permitted him at present, his superiority over the dumb brutes. Considered from this standpoint language is a factor in the evolution of the race and an instrument which works for ethical progress. It is a gift most truly divine which should be cherished as the ladder which has permitted of an ascent from the most humble beginnings and leads to the heights of a loftier destiny, when man, ceasing to stammer forth in accents which are but the halting expression of swift thought, shall photograph his mind in the fulness of speech, and, neither withholding what he wants to say nor saying what he wants to withhold, shall be linked to his fellow by the completeness of a perfect communion of ideas.

T. A. RICKARD.

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SCIENTIFIC BOOKS.

Geschichte der Metalle. Vom Verein zur Beförderung des Gewerbfleisses mit dem ersten Tornow-Preise gekrönte Preisschrift. Von ADELBERT RÖSSING. Berlin, Verlag von Leonhard Simon. 1901. 8vo. Pp. vi + 274.

This 'History of Metals' forms a great contrast to the 'History of the Precious Metals' by Alex. Del Mar, reviewed in SCIENCE for December 6, 1901. The latter, as we have shown, is a philosophic study of the sources and history of the *two* metals, silver and gold, the work under review deals with the occurrence (in nature), the history of discovery the chemical, metallurgical and electrical preparation, the statistics of production and the cost price of *all* the known metals, fifty-five in number. Dr. Rössing's treatise forms, consequently, a most timely and valuable complement to that by Del Mar.

The arrangement of matter is very convenient for reference; after an introduction occupying twenty-one pages, the metals are discussed in alphabetic order, the treatment

being as indicated above, but limited by circumstances in many instances. The metals that have been in use from earliest times, either in native state or in ores, naturally occupy more space than those of comparatively recent origin; especially since in the former class is included the development of metallurgical operations used at different periods to make the metals available.

The occurrence in nature of many of the metals is very fully shown by lists of localities and of ores, or minerals, the latter accompanied in many cases by formulæ giving their chemical composition. References to authorities cited occupy footnotes on nearly every page, and as an example of their thoroughness may be mentioned a note calling attention to a 'peculiarly American and wonderful' company for extracting gold from sea-water, formed in Connecticut. The history and exposure of this fraud is well known to the readers of Science.

In sketching the history of processes for extracting metals from their ores, the modern extensive application of electricity has not been neglected, especially with reference to aluminium, antimony, gold, copper, silver and zinc. In this connection German, British and American patents are occasionally cited.

Unusual forms or conditions of some metals are named, and their chemical preparation described—colloidal mercury discovered by Lottermoser, and Leo's colloidal silver, but the researches of Carey-Lea seem to be unknown to the author.

Among the most valuable features of this work should be mentioned the statistics of production and the prices; when possible the figures are given for the entire nineteenth century in five-year averages; and a study of them brings out some striking features. The contrasts in production and price of aluminium are especially notable; from 1858 (three years after the labors of St. Clair Deville had made it an article of commerce) to 1884 a kilogram of aluminium was quoted at 100 marks, during the year 1890 the price per kilo fell from 27.6 to 15.2 mks., and in the following year it fell to 5 mks.; the price in 1897 was 2.5 mks., and the output amounted to three and four tenths millions of kilos, of which nearly two millions were produced in the United States. Sodium was quoted at 32.5 mks. per kilo in 1866, and at 5 mks. in 1897. Manganese has suffered an extraordinary fall in price, showing that as soon as an article is positively demanded by commerce, means for securing it cheaply are devised; in 1886 manganese was quoted at 550 mks. per kilo, and four years later at 40 mks.; it fell in 1896 to 16 mks. per kilo.

The price of metallic sodium in 1879 was 20. mks. per kilo, and it had fallen to 5 mks. in 1897. Some metals of minor importance maintain a relatively uniform price, as antimony and palladium; while that of platinum has risen from 500 mks. per kilo in 1870 to 1297 mks. in 1895, and largely owing to the demand made for it by electrical apparatus.

In pleasing contrast to these rapid fluctuations in price is the steady behavior of the king of metals—gold; the figures (in part) are as follows:

1801–05,	2736.8	mks.	per	kilo.
1846–50,	2736.3	"	"	"
1876–80,	2730.7	"	"	"
1891,	2736.3	"	"	"
1892,	2743.2	"	"	"

The important bearing of this is obvious to students of monetary science.

The author is to be commended for the pains he has taken to prepare a valuable work of reference; the reviewer regrets that he feels obliged to point out a blemish in the manufacture of the volume, for which the publisher is primarily responsible. The running-head lines, particularly important in a dictionary or a book on the alphabetic plan, have been omitted and their place is inadequately filled by the page numbers; this makes it difficult to find a given metal readily, although in alphabetic order, except by scanning the text closely on a given page, or by examining the table of contents. This economy by publishers is to be deprecated. Henry Carrington Bolton.

Practical Marine Engineering, for Marine Engineers and Students, and with Aids for the Applicants for Marine Engineers' Licenses. By Wm. F. Durand, Professor of Marine Engineering, Cornell University. New York, Marine Engineering Co. 8vo.