person's calling—the calling which determines his responsibilities" (page 36).

What has gone wrong here? By transposing epistemological questions concerning the validity of theoretical claims into psychological questions concerning "claims" and the acceptance of claims," Polanyi has, I suggest, deprived himself of any means whatsoever for defining the *meaning* of a claim to truth. The same thing occurs in his briefly sketched theory of values; when he has finished we are in no position even to define what an authentic value might be; we are left in the hazards of an admiring submission to a greatness which might also be a corruption. Now this, indeed, may be an essential part of our existential situation. But even this cannot be the whole story, since if it were, all talk about real greatness and real corruption would be senseless in principle. If the very *criterion* by which we are to estimate ourselves is one or more historical heroes, what *sense* indeed does it make to talk then of "corruption"? Corruption in *terms* of what? And what sense does it make to talk of validity in knowledge if that notion is dissolved into "acceptances," "claims," and "commitments"? Has not Polanyi so radically psychologized the whole affair that he has deprived himself of the very means by which he might give meaning to the validity he aims at, accepts, and claims? The value of Polanyi's analyses is great; but I find that in its ultimate formulations all dialectical tension between the subjective and objective is lost, an almost inevitable result of confusing the phenomenology of validity with psychology.

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**Chemical Engineering Practice.** vol. 6, *Fluid Systems, II.* Herbert W. Cremer and Trefor Davies, Eds. Academic Press, New York; Butterworths, London, 1958. xxvii + 600 pp. $19.50.

This latest volume in a series of reference books on chemical engineering practice presents the conventional unit operations of gas absorption, evaporation, fluidization, adsorption, leaching, crystallization, filtration, and centrifugation. In addition, liquefaction and fractionation of gases, as well as refrigeration practice, sublimation, and vacuum freeze-drying are covered. The general topic of colloids is also included.

As in the previous volumes of this work, the author of each chapter has attempted to present highlights and emphasize the practical aspects of a particular field. However, for certain operations two chapters have been included, one on theory and one on practice. This procedure, for example, has been followed in the case of gas absorption and crystallization. Although thorough coverage of each topic included would require a volume the size of the total compilation, the authors have, in most cases, presented useful details, which may be amplified by reference to the extensive bibliography. This is a valuable addition to the chemical engineer's bookshelf, particularly because of its emphasis on technological details.

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**Oceanography and Marine Biology.** A book of techniques. H. Barnes. Macmillan, New York, 1959. 218 pp. Illus. $7.

Oceanographers have developed a large number of special techniques and devices with which they attempt to investigate the depths of the sea from their research vessels. A review of these methods and instruments, such as this book purports to present, could serve a useful purpose for the general public as well as for the student and professional oceanographer.

The author has deliberately omitted the many kinds of fishing gear, and he does not consider the Aqualung or such devices as the bathysphere and bathyscaphe. Even within these limits, the range of techniques is very great, and it would be too much to expect comprehensive coverage in so small a book. Biologists, to whom the book seems to be primarily addressed, will doubtless find the section dealing with methods of sampling living organisms too cursory and uneven. A number of instruments are very briefly described and illustrated, and a very few are given detailed, at times minute, description. Only in the case of the Hardy plankton recorder is there sufficient discussion of the limitations and advantages of an ininstrument. Biologists may find more satisfactory for their purposes the chapter on measuring such properties of water as currents, temperature, and salinity. Some common, and a few uncommon and outmoded, instruments used by physical oceanographers are briefly described and illustrated. There is, however, no mention of methods for measuring transparency and radiation in the sea, factors that may be of paramount importance to biologists.

The most useful portions of the book are the chapter that deals with the use of sound waves in the sea, in which the use of the echo sounder and underwater sound in marine biology is discussed, and the chapter that deals with photography and underwater television. In the latter chapter is reviewed the recent work in underwater television, in which Barnes himself has been one of the most active participants. These two chapters present some material that it is difficult to find elsewhere in text form.

The text is marred by some digressions, and some of the verbal descriptions of the mechanisms are difficult to follow. A good portion of the figures seem to serve little purpose in such an abbreviated text. There is a bibliography of about 140 titles, none of which is cited in the text.

This book may be adequate as an introduction for the layman to some of the methods of oceanography, but it is too incomplete and too hurriedly written to serve as a handbook of techniques in marine biology and oceanography for the professional oceanographer, and the student is given too little insight into the applications and limitations of the techniques described to be able to use the techniques intelligently.

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**Comprehensive Analytical Chemistry.** vol. 1*A*, *Classical Analysis.* Cecil L. Wilson and David W. Wilson, Eds. Elsevier, Amsterdam, 1959 (order from Van Nostrand, Princeton, N.J.). xix + 557 pp. $17.50.

This book is the first part of the first volume of a treatise which will eventually comprise five volumes and about 6000 pages. In the general introduction the editors say, "The aim has been to provide a work which will act as a standard reference, self-sufficient in as many cases as possible, and where this cannot be achieved, a work which will be a natural starting point for any analytical investigation."

A chapter entitled "Analytical processes" occupies nearly half the book. It discusses materials, sampling, sta-

tistics, the measurement of weight and volume, solvent extraction, and organic reagents in inorganic analysis. The section on statistics, by E. C. Wood, is exceptionally well written. That on solvent extraction, by G. H. Morrison and H. Freiser, is systematic and concise, yet it contains a vast amount of practical detail.

A 100-page chapter on gas analysis, by A. E. Heron and H. N. Wilson, treats in detail the Hempel and Orsat techniques, as well as newer microanalytical methods, but discussion of gas chromatography has been postponed to a later volume.

Two chapters, each a textbook in miniature, deal with inorganic and organic qualitative analysis, respectively. A plan for the systematic detection of 47 elements without the use of hydrogen sulfide is described here for the first time, by P. W. West and A. O. Parks. Spot tests are discussed, and H. Weisz describes his novel and simple "ring oven" technique for identifying many different elements in a single drop of solution. The relevance of these qualitative techniques to modern analytical chemistry is defended.

A long chapter on inorganic gravimetric analysis follows, written largely by F. E. Beamish and W. A. E. McBryde. The discussion of laboratory techniques is detailed and valuable; the section headed "Reagents" is sketchy, yet it contains an excellent discussion of the solubility of metal-organic precipitates and the kinds of contamination which such precipitates can have. The chapter closes with an account of precipitation from homogeneous solution, by L. Gordon. I wish that a more complete discussion of thioacetamide had been included here.

The emphasis throughout is on practical applications; the book is written for the chemist at the laboratory bench. Theoretical principles are not neglected, however, and there are ample literature citations. There is some overlapping of the topics treated in different chapters, but this is welcome, since the 17 authors write from different backgrounds—from Great Britain, the United States, Canada, and Austria.

I warn every practising analytical chemist and every chemical librarian that he had better become resigned to purchasing each volume of this work as it appears.

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**Antonio Meucci, Inventor of the Telephone.** Giovanni E. Schiavo. Vigo Press, New York, 1958. 288 pp. $10.

Even though technology is so ancient that its presence or absence serves to distinguish the human primate from the nonhuman primate, the history of technology is still one of the youngest scholarly disciplines. With few exceptions, it is still in the formative stage in which all change and advance is ascribed to a few unique inventors. Efforts have been made to break the hold of this cult of personality, but official biographies, popular histories, and public relations departments tend to perpetuate this oversimplification of how inventions are made and introduced into use.

Consequently, it is refreshing to see an attack on the great-man theory, even if it is only a flank attack that substitutes one man for another. Giovanni Schiavo's book, *Antonio Meucci: Inventor of the Telephone*, seeks to replace the single inventor of the telephone, A. G. Bell, with Antonio Meucci, the man from whom the Bell Telephone Company and Western Union supposedly stole the invention. Meucci was born in Italy in 1808 and remained there until 1835. He then went to Cuba, where he accumulated a considerable fortune through his inventions in electroplating. He moved to New York City in 1850 and supported himself (and, for a brief time, his exiled revolutionary compatriot, Garibaldi) by setting up a candle (and salami!) factory, but his unscrupulous business partners eventually left him in poverty.

Sometime during the 1850's or 1860's, he conceived the idea of the *telettrofono*, or electric telephone, that he sought to patent in 1871, but since he lacked funds he could obtain only a caveat in which he claimed he was working on such an invention. Two facts form the basis of the charges made by some individuals in the mid-1880's that his invention had been stolen: His wife sold his models in 1871 while he was sick; and the papers and experimental model he left with the Western Union in 1872 disappeared.

This book is a black-and-white narrative of these events, obviously directed to a particular audience. Quotations from the legal depositions lend some plausibility to the author's argument, but the evidence is insufficient to make a convincing case. However, the book serves to remind us that invention is a complex social act that is not due to the efforts of any one person, for what one glimpses here is only a portion of a very intricate story that extends from the workshops of many inventors to the Supreme Court of the United States.

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## New Books

*The Arterial Wall.* Albert I. Lansing. Williams & Wilkins, Baltimore, Md., 1959. 268 pp. $7.50. This volume represents an attempt to review the data that are currently available on the structure, function, and chemistry of the major components of the arterial wall. The volume is sponsored by the Gerontological Society.

*A Biological Survey of Katmai National Monument.* Misc. Collections, vol. 138, No. 5. Victor H. Cahalane. Smithsonian Institution, Washington, D.C., 1959. 246 pp.

*Blakeslee: the Genus* Datura. Amos G. Avery, Sophie Satina, Jacob Rietsema. Ronald Press, New York, 1959. 330 pp. $8.75.

*Curious Naturalists.* Niko Tinbergen. Basic Books, New York, 1959. 280 pp. $5.

*Diseases of Medical Progress.* A survey of diseases and syndromes unintentionally induced as the results of properly indicated, widely accepted therapeutic procedures. Robert H. Moser. Thomas, Springfield, Ill., 1959. 147 pp. $4.75.

*Education in the Age of Science.* Brand Blanshard. Basic Books, New York, 1959. 320 pp. $4.50.

*Experimental Surgery.* Including surgical physiology. J. Markowitz, J. Archibald, H. G. Downie. Williams & Wilkins, Baltimore, ed. 4, 1959. 943 pp. $12.50.

*Exploring Biology.* The science of living things. Ella Thea Smith. Harcourt, Brace, New York, 1959. 731 pp. $5.20.

*A Field Guide to the Birds.* Giving field marks of all species found east of the Rockies. Roger Tory Peterson. Houghton Mifflin, Boston, Mass., ed. 2, 1959. 314 pp. $3.95.

*The Flight of the Small World.* Arnold Eiloart and Peter Elstob. Norton, New York, 1959. 255 pp. $4.50. This is the story of the journey across the Atlantic of four Britishers—half way by free balloon and halfway by sea when they were forced down by a violent storm.

*Food.* The yearbook of agriculture, 1959. U.S. Department of Agriculture, Washington 25, D.C. (order from Supt. of Documents, GPO, Washington 25). 748 pp. $2.25.

*Gas Chromatography.* A. I. M. Keulemans. C. G. Berver, Ed. Reinhold, New York; Chapman & Hall, London, ed. 2, 1959. 255 pp. $7.50.

*Jan Evangelista Purkyne.* Czech scientist and patriot, 1787–1869. Henry J. John. American Philosophical Soc., Philadelphia, Pa., 1959. 105 pp. $3.