Book Reviews

The Demand and Supply of Scientific Personnel. David M. Blank and George J. Stigler. National Bureau of Economic Research, New York, 1957. xix + 200 pp. $4.

In the preface of this book the authors explain what they have attempted to do: "The present monograph is primarily a study of the methods by which one can explain movements in the supply and demand for scientific personnel. Rather than discuss the problem in abstract terms, however, we have deemed it more fruitful to apply the methods under examination to the recent situation in the technological professions in the United States, that is, up to 1955." The result of this effort is a book with five chapters—"A General View of the Technological Professions," "Demand and Supply: Method of Analysis," "Factors Influencing the Demand for Engineers and Chemists," "The Supply of Engineers," and "Supply and Demand for Mathematicians and Physicists"—and eight appendixes, the most important of them being "(*A*) Engineering Earnings," "(*D*) Projection of the Number of Engineering Degrees to 1970," and "(*H*) The Engineers Joint Council Surveys."

After finishing the book, one may wonder if scientific personnel has been considered in its entirety and if the methods used really can explain movement in its supply and demand.

First, it seems that such a strict delimitation of the scientific personnel studies as was in fact used raises some inplications having a direct effect on the validity of the study. For instance, it does not seem possible to study the problem of scientific personnel in itself. That is to say, one cannot consider only the case of a particular category of scientific personnel (engineers, for example) apart from the other categories (technicians, foremen, and others) or consider solely the scientific personnel, apart from the administrative and commercial personnel, since there exist possibilities of moving from one category to the other.

Also, one would like to know more about "what is an engineer" and to know exactly what categories of people are under examination. The authors are talking about the census definition of an engineer (page 10 and pages 174–178), but one has to look at Appendix *B* (page 154) and Appendix *E* (page 174) in order to know what this definition is, and to page 11 for the standard requirements for membership in the professional engineering societies. These requirements are narrower than the census definition. With respect to the choice of the census definition, "less exacting than that of the professional engineering societies" (page 10) and including both graduate and nongraduate engineers, one may ask (i) if all people examined and grouped under the heading of "engineer" are performing approximately the same functions; (ii) if this is not too broad a definition; and (iii) if it would not have been better to examine only the graduate engineers. Two facts bear on these doubts about the validity of the methods used in this study. First, it is not possible to know the number of nongraduate engineers in each industry [the figures given for 1940 (page 11) and for 1950 (Appendix *F*) are not by sectors of industry but by number of years of professional training]; on page 69 the authors assume "that new entrants consist solely of engineering graduates with bachelor's degrees" and exclude in their forecast the losses of and the demand for nongraduate engineers. Moreover, the place of nongraduate engineers is studied in the "Supply of Engineers" (pages 86–92). It is evident that the authors saw all those difficulties, since they wrote, "it is surprising that so little is known about the ways in which they [the nongraduate engineers] enter the profession and the kinds of function they perform" (page 87), but in studying the nongraduate engineers they do not give us any supplementary information about them, and one is therefore forced to conclude that this study of the supply of and demand for engineers is only a partial one, not representing the entire situation.

Second, the method used does not appear to give a complete explanation of the phenomenon and raises the question of its suitability. For example, although the authors are "deeply interested in the economic questions implicit in an allegation of shortage" (page 23), they reject two meanings of the word *shortage* as it is applied to members of a particular profession—situations in which the actual number of available workers is less than the number dictated by some social criterion or goal or those in which the quantity of the labor services in question that is demanded is greater than the quantity supplied at the prevailing wage—and they adopt a third one: a shortage exists when the number of workers available (the supply) increases less rapidly than the number demanded at the salaries paid in the recent past (pages 23–24). And they add: "In any event, this is a well defined and significant meaning of the word 'shortage' and we propose to investigate now whether such a shortage has existed for engineers in recent decades" (page 24).

It seems clear that, in the minds of the authors, money was, is, and will be the only explanation for the demand and supply of engineers—and, therefore, for their shortage or surplus. And all engineers were, are, and will be pure calculating *"homines economici"* since "the differentials of engineers' earnings above those of the academically untrained labor force are still in excess of the costs of obtaining an engineering degree . . ." (page 31) and, "in principle, one would expect occupational choice to be largely determined by the discounted values of expected life earnings in alternative occupations, compared with the discounted costs of entering these occupations" (page 79). This psychology of the *"homo economicus"* has been attacked by economists for a long time—Veblen played an important part in this attack at the turn of the century—and cannot pretend to explain the behavior of a human being. It is more than doubtful that wages can explain the movements of supply and demand for the past eighty years. What is rather surprising is that the authors seem not to be completely persuaded of the validity of their only means of explanation, since they write: "For lack of data, we cannot discuss in detail the degree of future attractiveness (financial *or* otherwise) [italics supplied] of engineering as compared with other occupations that college graduates engage in" (page 75), and, "it would be desirable, we repeat, to examine the determinants of occupational choice among college students, but we shall not enter upon this large subject here. But it should be emphasized that the roles of income, stability of employment, subsequent breadth of choice of industry or type of work, and similar factors have not yet been examined quantitatively" (page 77). Therefore, earnings are not the only explanation of movements of supply and demand, and the conclusion about the

shortage of engineers has to be revised.

Again, even if this study is concerned with the situation and forecast of the number of engineers in the United States, the methods of predicting demand used by the U.S. Bureau of Labor Statistics and the Engineers Joint Council are not the only ones in use, and it seems unfortunate that no mention is made of the English and German methods of forecasting. Sometimes, some help can come from the other side of the Atlantic.

The explanation of the movements of the supply of, and demand for, scientific personnel in the past and forecast of these movements for the future remain to be made.

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A Treatise on Limnology. vol. I. *Geography, Physics and Chemistry.* George Evelyn Hutchinson. Wiley, New York; Chapman & Hall, London, 1957. xiv + 1015 pp. Illus. $19.50.

Sixteen years ago teachers of hydrobiology refreshed their dog-eared limnology lecture notes when Hutchinson's mimeographed "Lecture Notes on Limnology" were made available in limited supply. Hopefully we have awaited the completion of the then envisioned *Treatise.* We were unanimously confident of the excellence and scholarly depth it would represent, and, now that the first of the two volumes is published, we are not disillusioned. Moreover, the biologists among us await eagerly the appearance of volume II on biology. Volume I is a masterly presentation and truly unique; a "monumental work," as it was so appropriately designated by a prepublication critic.

One might expect a *Handbuch* of these dimensions to be padded. This is not the case; it is packed with important and thoughtfully selected data. It is replete with examples drawn from all corners of the earth and with data assembled from some obscure *"Berichte," "Undersökningar," "Trudy (URSS),"* or *"Tôhoku."*

In this book scientists of many disciplines should find much that is required reading. I find a great deal of evidence to support the author's statement in the preface: "The book is addressed to all who are professionally concerned with limnology, but also to biologists who may wish to know something of the physiochemical environment, mode of life, and evolutionary significance of such freshwater organisms as they may study from quite different points of view; to geologists who are desirous of learning something of modern lakes in order that they may better interpret the record of inland waters in past times; and to oceanographers who wish to compare the results of their own science with what has been learned of the small but very individual bodies of water which make up the nonmarine part of the hydrosphere." To the latter clause I might add that the oceanographer, after reading this book, most certainly will be convinced of the usefulness of lakes as possible sites for experimental, small-scale oceanographic research. This is an opportunity they have not exploited.

As a thoughtful synthesizer of knowledge, Hutchinson is unsurpassed. Numerous instances bear this out, in which published and even unpublished data, from widely different sources, have been reworked to describe a new principle or to make an old one more clear. Readers of "Marginalia" in the *Sigma Xi Quarterly* must certainly have admired the great breadth of Hutchinson's reading and his literary skill. Occasionally one was "snowed under" by complex concepts expressed in elliptical style. In volume I of *A Treatise in Limnology* he has made every effort to explain clearly. In his "Lecture Notes on Limnology," the term *thermocline* was defined as "the horizontal plane defined by the inflection point of a temperature curve." In the *Treatise,* the definition now reads simply "the plane in which the temperature falls most rapidly." This should not be construed to mean that volume I is free from complex concepts, for to include such concepts is inescapable and to omit them would be undesirable. Many principles of physical limnology are involved and will be understood principally by those oceanographers and hydrobiologists whose training in mathematics, physics, and chemistry is adequate. One marvels at Hutchinson's versatility and at his ability to grapple competently with so many phases of science.

The following are some helpful features of the *Treatise*: (i) In the section on geological origin of lakes there is a concise summary of 76 lake types. (ii) A list of mathematical symbols is given, and an effort has been made to avoid duplications. (iii) An index of the lakes mentioned in the text gives the precise longitude and latitude of the location of each lake. (iv) A list of the genera and species that are discussed is given, together with a helpful listing of the taxonomic position of individuals in the plant and animal kingdoms. (v) There are 1489 references. Asterisks identify the titles of works of unusual limnological interest and those with extensive lists of references. (vi) Tables on the inorganic ions in rain, lakes, and rivers present data nowhere else available in one place. (vii) A concise summary concludes each chapter.

For publisher should be praised for his interest in publishing a professional volume of this kind. There is justification here for some type of subsidy, because the many students and field-station staff-members who could best profit from this book will be unable to afford it.

The book is embellished here and there by a witty comment, a fitting quotation from the classics, or even by a light verse. For example:

"Big swirls have little swirls
That prey on their velocity,
And little swirls have lesser swirls
And so on . . . to viscosity."

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Géologie Sédimentaire. Les séries marines. Augustin Lombard. Masson, Paris; Vaillant-Carmanne, Liége, 1956. 722 pp. Illus. F. 11,000.

The field of sedimentary geology can, if the definition is broad enough, include almost all facets of geology except petrology of the igneous rocks. To include all aspects of this generalized subject in one volume is an almost impossible task. Lombard has amassed an amazing amount of information in a well-organized volume which includes 13 plates, 180 illustrations, and 34 pages of bibliography. Inevitably in such a broad subject some of the sections are little more than brief outlines, and in some cases these brief outlines are not as comprehensive as they should be. In part I the general subject of recent marine sediments, topography, and structure of the ocean basins is treated in too brief a manner, and several important references are omitted; for example, Emery, Tracey and Ladd on coral reefs and flat-topped seamounts [*U.S. Geol. Survey Profess. Paper No. 260-A* (1954)]; Phleger, Parker, and Peirson on present-day planktonic Foraminifera [*Reports of the Swedish Deep-Sea Expedition No. 7* (1953)]; Revelle on pelagic sediments [*Carnegie Inst. Wash. Publ. No. 556* (1944), pt. 1]. In part II the analysis of sediments does not include the Wentworth reference so commonly used for clastic size classification in the United States [*J. Geol.* **30**, 382 (1922)]. In part 3 the writer gets into his special field of stratigraphy and produces an excellent and well-documented discussion of such difficult subjects as facies and rhythmic deposits.

All in all, Lombard has produced a valuable addition to the knowledge of sedimentation and stratigraphy, especially of the European section. American geologists will find the bibliography especially helpful because of the numerous references to European journals.

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