single-sheet bulletins. It is proposed to continue the issue of these from time to time whenever there is information of special interest. Attention is called to the fishery resources of the Yukon River, which so far have been utilized only by the Indians for their immediate needs, but which it is believed may afford a food supply to the miners and traders who have been attracted to that region, and ultimately to the country at large. Full statistics are given of the sections covered by the report, and it may be noted that at Gloucester and Boston there has been a falling-off in the aggregate receipts of fish since 1896, while the South Atlantic States as a whole show an increase in the product, the amount of capital invested and the number of persons employed in the fisheries.

What strikes one very forcibly in glancing over this report is the many discouragements the fish culturist is called upon to face and the large number of serious losses due to unavoidable, often seemingly trivial and sometimes inexplicable, accidents. A few degrees of temperature, more or less, a heavy shower, the lingering of ice or an unfavorable wind may cause heavy damage and almost bring to naught the labor of weeks. Another thought is to what extent should the general government undertake the propagation and distribution of the more strictly game fishes, such, for example, as black bass and trout? The investigation of the best methods for the accomplishment of such work should undeniably lie with the United States, but these once discovered, its continuance should rest with States and individuals. What may be done by individual effort is shown by the fact that a large number of the many ponds of Plymouth county, Mass., have been stocked with black bass by the simple process of carrying a few fish in pails from one pond to another. It may be said that the establishment of many of the trout hatcheries has been due to the efforts of members of Congress and not to any desire of the Commissioner of Fisheries. The propagation of such widely-spread and all-important species as cod, shad, the Pacific salmon and the lobster is quite another matter and should properly be carried on by the United States.

The statistical as well as the strictly scientific work of the Fish Commission is again of national importance, and the special omission of fishery statistics from the coming census bears testimony to the value of the work done by this division.

It is gratifying to learn that the appropriation for scientific work has this year been materially increased, for, from past experience, we know that what to-day appears to be a purely scientific problem to-morrow becomes an all-important practical matter. In this connection Dr. Smith urges the appointment of an expert in fish pathology, calling attention to the large mortality which often prevails among fish, both under natural and artificial conditions, and for which there is at present no known cause or remedy. The annnal losses at the hatcheries of the Commission, while not excessive, are still great enough to demonstrate the need of skilled investigation, and the present expenditure of a few thousand dollars may yield subsequent returns of millions.

Last, but not least, it may be again noted that under the present Commissioner it has been arranged to keep the laboratory at Wood's Hole under the scientific direction of Professor Bumpus open throughout the year.

ENGINEERING AND THE PROFESSIONS IN EDUCATION.

THE receipt of the annual volume of Proceedings of the 'Society for the Promotion of Engineering Education'* is a reminder of

* Proceedings of the Sixth Annual Meeting of the Society for the Promotion of Engineering Education, Vol. VI. Published by the Society. 1898. 8vo. Pp. xxvii + 324.

the extent to which all departments of education are becoming systematized and organized in the United States. Hitherto, in all countries, there had been observable a very serious lack in this respect, even in Germany, where the central government, and the authorities of every kingdom alike, control and direct the education of all classes from central organized bureaux.

With us primary and secondary education have had consistent and authoritative direction, not always wise or expert, but always earnest and well-intended; for the common school has been recognized, from the first, as the strongest bulwark of our institutions, political and social. Professional education and training, however, have, like all higher learning, been sustained mainly by private, sporadic and unsystematic, unauthoritative, support and aid. Education, in a true sense and on the lower levels, has been fairly well-cared for; professional training, that education which is rather a noble form of apprenticeship to a noble vocation, finds even yet almost no public and little private recognition. Of late the schools of engineering are securing some attention from investors in this form of higher security and from the State Legislatures and expert educators and professionals. In the West, particularly, the schools of the vocations are attracting more and more attention as their relation to and bearing upon the social condition of the people is coming to be generally appreciated.

The volume before us contains the proceedings of a single meeting of a representative association of this class, and presents a very excellent picture of the purposes and methods of such an institution. The Society, about five years old, numbers 244, and includes practically all of the leaders in the development of this branch of technical educational work in the country, and representatives from nearly all recognized professional schools in this field. Twenty-nine papers are published, together with lists of officers and members, the constitution of the Society, its rules and its proceedings at the Boston meeting of 1898.

The leading paper is the address of President Johnson, a discussion of the topic: 'A Higher Industrial and Commercial Education as an Essential Condition of our Future Material Prosperity.' This is a most interesting and impressive statement of the needs of the United States in this direction, and of the dangers that threaten a nation neglecting to systematize its industrial system and the education of the 'Industrial Classes' for their life and work in presence of a competition which is coming to be more constant and more dangerous as the means of communication and of transportation become more extended and more perfect. The foreign 'Mono-technic Schools' are held up to our view as models of a type of school which is almost unknown in this country, and as having proved the salvation of the Germanic peoples. The establishment of high-grade mono-technic and commercial schools is urged as the most promising and desirable of all visible modern improvements in education and training for the industrial classes.

A full evening was given to a paper 'On the Organization of Engineering Courses and on Entrance Requirements for Professional Schools,' in which the writer, following a somewhat similar line of thought, developed the theory of professional education, exhibited the logical differences between the real 'education' of the academic colleges and the primarily vocational training, the 'higher apprenticeship' of the professional schools; showing that while the one should offer a 'ladder from the gutter to the university,' as Huxley said, the other lets down a ladder from the profession to the people, the two thus demanding radically different methods of construction of

their curricula, as well as different methods of prescription of entrance requirements. The one supplements the schools, and must build smoothly up from below; the other builds down from the profession, and must, at all hazards, make its junction at the upper end effective, while its entrance requirements must be such as will least embarrass the aspirant while satisfying the proper demands of the profession. Each curriculum, however, must be constructed by experts in its own field, and the professional must be relied upon to perfect the courses and prescribe the requirements of the technical school, as must the expert in academic education be expected to be given a free hand in the upbuilding of general education.

Shorter papers on laboratory work, on details of educational apparatus, 'thesis work,' courses of instruction in various departments and reports of committees, fill the volume with a mass of material hitherto unparalleled in this line, and which must deeply interest, not only workers in this field, but all educators, and particularly all who are interested in the promotion and improvement of our still defective and inadequate educational provision for the best interests of the industrial classes, and in the advancement to still higher planes of our professional schools. The careful study, not of this volume only, but of the series, beginning with the organization of the Association at the Educational Congress at Chicago, in 1893, in connection with the Columbian Exhibition, cannot but well reward every one interested in the modern and current movements in this politically, as well as socially, important department of the scheme of national education, the perfection of which is so vital an element in determining what shall be the political and the moral and intellectual status of our country in coming generations.

R. H. THURSTON.

SCIENTIFIC BOOKS.

Die chemische Energie der lebenden Zellen. DR. OSCAR LOEW. Munich, Dr. E. Wolff, publisher. 1899. Pp. 170.

This publication gives the results of a series of observations on the chemical characteristics of living matter. It is proved that the proteids of living matter are of very labile nature and different from those of the dead matter, into which they are transformed by atomic migrations in the molecules. It is also demonstrated that in many plants a labile reserve-protein occurs which is not yet organized, but is changed by the same conditions as kill the cells. The book contains the following chapters:

1. Views on the causes of the vital activity.
2. General characteristics of living matter.
3. Chemico-physiological characteristics of living matter.
4. The essential concomitants of protoplasm.
5. The character of the biochemical work.
6. On the formation of protein in the lower fungi.
7. On the formation of protein in the green plants.
8. Theory of protein formation.
9. A labile protein as reserve material in plants.
10. Chemical characteristics of the labile protoprotein.
11. Lability and activity in the protoplasm.
12. Theory of respiration. Chapters 9 and 10 give the results obtained in conjunction with Th. Bokorny.

The most modern progress of theoretical chemistry has been brought to bear in this work. The theories advanced in the work and the suggestions which they contain will make the book invaluable to students of bio-chemistry and physiology. Doctor Loew has concluded his work with the following brief summary:

"It may be briefly recapitulated in a few words how much the theses put forth correspond or coincide with the observations made. In the first place, it should be remembered that the living substance shows a great resemblance to a chemically labile body and that the dying process of the protoplasm is suggestive of the transition of a labile into a stable modification of organic compounds. According to the theory developed in the eighth chapter concerning the formation of albumin, the lability of the plasma-protein is due to the simultaneous presence of aldehyde and amido groups. The