noticeable when they are compared with the delicate figures of Bütschli. Scarcely more than one tenth of the figures are original, and although the author has endeavored to avoid the commonplace in his selections from other writers, there is still a goodly array of the old and tiresome figures which seem to be as immortal as the Protozoa they represent, if one may judge from their perpetual metempsychoses in our zoological charts and text-books. The volume closes with an extensive, but by no means complete, bibliography and a good double index.

There can be no doubt that the volume should and will find a place in all our laboratories as a handy compendium of a marvelous group of organisms of basic importance in all our work in zoology, physiology and comparative psychology.

W. M. Wheeler.

Annual Report of the Chief of the Bureau of Steam Engineering. 1901. Washington, Government Print. 1901. 8vo. Pp. 70.

Admiral Melville reports in this document upon the condition and progress of the engineering branch of the United States navy, its personnel and material. The report is concise, clear, frank and illuminating. This Bureau has charge of all the machinery, of the navy, designs the engines, the boilers and machinery of the naval fleet, writes the specifications and contracts for such as may be built by private constructors, supervises the construction, makes the tests of completed machinery and has charge of the maintenance and repair of all such machinery. It expends $3,000,000 to $4,000,000 each year, mainly in repairs and preservation of the engines and boilers of the fleet. Of this work the report gives a detailed account, which is, however, not of special interest to the layman.

The new Naval Academy buildings, now under construction, are expected to cost about $7,000,000. Admiral Melville asks that, of this total, about $250,000 be applied to the construction of a laboratory for research in the physical sciences having direct application in engineering and marine construction. The building is to be two stories in height and 150 by 110 feet in plan, conforming in style of architecture to the buildings, planned for the Academy, now in progress. It is proposed to appropriate $150,000 for its equipment. This enterprise, if perfected, is another step in the direction of conforming the plan and workings of the Naval Academy to those of the great technical colleges of the world, and especially in the incorporation into its curriculum of experimental work in research as well as professional instruction.

With the resources of the general government available, the comparatively small expenditures needed to make the military and naval academies professional schools of the highest class, not only, as previously, in their organization and administration, but also in their equipment and in a complete and thoroughly modern curriculum, should be readily obtained, and these schools should take their rightful places as ideal, representative and model professional schools, in the extra-professional departments as well as in those which are purely vocational. In the applied sciences, particularly, they should be made perfect exemplars of the type which every civil as well as naval and military institution of learning should approximate as closely as means and the character of its faculty may permit.

Admiral Melville is pioneering here as effectively as when within the arctic circle and more usefully than ever did any explorer. He demands that the scientific departments of the Naval Academy, and especially the professional engineering division, be 'placed upon an equality with several universities whose colleges of mechanic arts and science in equipment far surpass the engineering outfit of the academy plant.'

The staff for this laboratory is to be organized from cadets and their teachers with, perhaps, one of the officers of the old engineer corps as its director. It is not only to be used in the investigation of the technical problems of the engineer department and of the naval service, but in the furtherance of the schemes of inventors where promising to be useful to the government or the public, also in testing all the appliances related to naval work; the materials and apparatus purchased by the Navy Department; and in the investigation of

especially important questions, such as relate to the economy of liquid fuel, the value of the steam-turbine, the form and proportions of propellers, the use of electricity and the value of electric apparatus and transmissions, the causes and preventions of corrosion of boilers, condensers and machinery, the best forms of boiler, the balancing of engines, the development of a storage battery suitable for naval use and the use of compressed air and of gas and oil engines.

The splendid work of the laboratories of the colleges and technical and professional engineering schools of our own country and, particularly, of Germany is referred to as illustrating the promise of this enterprise.

The Chief of Bureau devotes some space to the subject of the personnel and the organization of the naval establishment, stating that the 'Personnel bill' has thus far failed of complete and satisfactory result and asserting that it can only be expected that its purpose will be effected when the officers of the navy of every class cordially unite to carry its provisions into effect completely and efficiently. He quotes Mr. Roosevelt, who, in the original report upon this plan, asserted 'every officer on a modern war vessel has to be a fighting engineer.'

The union of the engineer corps with the line of the navy, however, has not been a complete success, so far as intended to provide the service with a body of officers equally at home above and below decks and capable of efficiently handling the great 'war-engine' in its every department and detail. The young officers should be given large and responsible charge of work in the engineering departments and trained as experts; otherwise that failure which was anticipated by many friends of the navy during the discussion of the bill, as a possibility if not a probability, must be looked for as certain.

It is stated that for every three officers taken from the engine-room for duty on deck, only one has been transferred from deck to engine-room, and the vitally essential care of motive power is coming thus to be impossible; unless, indeed, a radical change of method be adopted. The 'engineer's war-engine,' according to Roosevelt, must be in the care, each in his province, of a crew of officers and men competent, individually as well as collectively, to handle its complicated and costly machinery with efficiency and economy. Thus far the new provision of law has not insured even the maintenance of the former efficiency of the great machine. The condition is critical and the Chief of Bureau shows courage as well as discretion in his discussion of the subject.

R. H. THURSTON.

Roscoe-Schorlemmer's Lehrbuch der organischen Chemie. Von JUL. WILH. BRÜHL, Professor an der Universität Heidelberg. Sechster Theil, bearbeitet in Gemeinschaft mit Eduard Hjelt und Ossian Aschan. Braunschweig, Friedrich Vieweg und Sohn. 1901. Pp. xxxix + 1045. Price (bound), M. 24.

This is the eighth volume of the German edition of Roscoe and Schorlemmer's 'Treatise on Chemistry,' and is the sixth part of the portion dealing with organic chemistry. It includes a consideration of the vegetable alkaloids, glucosides and bitter principles, natural coloring matters, chlorophyll, lichen substances and such indifferent bodies of vegetable origin as have not been considered in previous volumes.

Somewhat more than one half of the volume is given to the alkaloids. The primary classification of these is based on the group characteristic of their structure. This gives the pyrrolidine, pyridine, quinoline and isoquinoline groups and a group containing alkaloids of unknown structure. Within each group they are further classified in accordance with the plant or family of plants from which they are derived, this latter classification depending on the well-known fact that alkaloids found in the same plant, and often those found in different plants of the same family, usually have closely related structures.

About one fourth of the book is given to the glucosides and about eighty pages are given to chlorophyll and the same number to lichen substances. The discussion of chlorophyll is especially full and satisfactory and includes a good bibliography of the subject. In this portion, especially, the needs of the biologist as well as of the chemist have been considered.