teacher who has no time for research rapidly becomes an ineffective and uninspiring teacher, and that overteaching defeats its own ends," the instruction should be in the nature of a guiding, the giving not of a string of recipes, but of sound principles enabling the student to work out his own salvation.

Since, wherever he may go, the student must adapt himself to his environment, it is the plan to catch what we can and study what we catch rather than to follow fixed courses. The facilities for catching, however, are very favorable. We have the lake in front of us, the woods behind, the creek on one side, and a meadow on the other. Here the entire day of the student is given to collecting and exploring expeditions, lectures and laboratory work.

During the past summer courses of instruction have been given in zoology, botany, cytology, bacteriology, embryology, and survey methods. As soon as the necessary buildings can be secured, courses in neurology and comparative psychology and physiology will be added.

The department of instruction is self-sustaining, but facilities for research are still limited and here is an opportunity for some public spirited citizen.

" Research in all directions, in fact, meets with such reward that it should be sustained by all persons who desire to encourage the progress of knowledge. But the rich men of our country do not discriminate between this function and that of teaching. They found universities with princely liberality, but research has to struggle with poverty of means and deficiency of time. Great libraries are founded, but the work in the laboratory from which issue the books which create libraries receives comparatively little substantial encouragement. * * * Initiative and discovery are the conditions of progress, and no better service could be rendered to humanity than the creation of opportunities for their activity."

C. H. EIGENMANN.

SCIENTIFIC BOOKS.

Alaska and the Klondike. By ANGELO HEILPRIN. New York, D. Appleton & Co. 1899. 8°, pp. X, 315, illustrations and maps.

Professor Heilprin has given us a book which is a combination of personal travel and adventure, with statistics, a synopsis of mining laws, and other data interesting to the traveller or miner. With these, which do not especially concern the readers of SCIENCE, are some observations on the physical geography and geology which are deserving of consideration.

The author started from Skaguay by the White Pass route, July 30, 1898, arriving at Dawson, August 6th, and leaving on the 20th of September, for the outside world by the same route. The general geology of this region had previously been studied by McConnell, Dawson, Spurr, Russell and others, whose observations may be found recorded in the publications of the Dominion and United States geological surveys.

Professor Heilprin found the summer climate not unpleasant, and, *mirabile dictu*, encountered no mosquitos in the mining region. So his survey of the geological conditions was not interfered with by annoyances which disturbed the philosophic calm of most of his predecessors in the same field.

He notes conditions which confirm the opinions held by previous explorers as to the probable existence of large bodies of fresh water over much of the present placer region. The well-known bed of volcanic ash which extends for hundreds of miles along the Upper Yukon a little below the present surface of the ground, is believed by him to have been deposited in water. In the alluvium above and below it he noticed fresh water shells in a fossil state, a feature which has been observed in many places lower down the river. Though these deposits are entirely compatible with the hypothesis of the existence of an extensive lake in the region, they cannot be adduced in proof of it, since the small summer pools which are

very common on the tundra often swarm with *Limnæa*, *Physa*, *Pisidium* and *Valvata*. The marl which results is in some localities so abundant, that at Old Fort Yukon it was collected, ground up and mixed into whitewash which was used on the buildings of the original trading post, nearly forty years ago.

In the vicinity of the Klondike the author notes the hummocky appearance of the hills 'very much like magnified morainic knolls in a glaciated country,' though having a considerable elevation. Water worn pebbles and remnants of terraces up to nearly twelve hundred feet were observed by him personally.

Notwithstanding the evidences of antiquity afforded by some features of the landscape, Professor Heilprin considers that many of the more pronounced features of the region are comparatively recent. While the placer gravels of the streams and benches seem to indicate more than one denudational phase, and the principal stream-valleys are wide and open, many of their lateral tributaries are narrow and V-shaped, and the former appear to have been modified by late stream displacements. The present stream-beds, even of the Yukon, are not the most conspicuous orographic depressions but have been carved out much more recently, and it is even suggested that the emergence of the land from lacustrine conditions may have happened 'a few hundred years' ago.

The author estimates that denudation in the immediate valleys of the main streams is taking place at the rate of a millimeter a day, which, according to his computation, would equal 'a valley trough of about a foot and a third' in a single year. Allowing one hundred and twenty days for the period when erosion is not wholly prevented by congelation, the reviewer computes that the total denudation for the year would amount to less than five inches at the author's rate. Now the summer rainfall for the Upper Yukon is very small, less than an inch a month, and the surface of the ground is covered with a dense spongy mat of vegetation. There seems to be no particular reason why there should be any appreciable denudation, except in the actual beds of the streams themselves. The water of all these small non-glacial streams is notably clear, and they carry practically no sediment at the points where they enter the main river. Consequently it seems probable that the estimate of Professor Heilprin requires revision, even his second one, in which he proposes a rate of 175 feet in five hundred years. For a short period, and in certain limited portions of its bed the Yukon is able to move a considerable weight of débris, but the gravels and sands in great part antedate the existence of the present river, which has actually cut through them at but a few points in its 2000 mile course.

Professor Heilprin, in view of his limited opportunity for research, very properly disclaims any attempt to decide upon the geological structure of the region. However he devotes a good deal of space to an argument in favor of the deposit of gold in the placers, not from preëxisting stringer leads or veins in the country rock, but as a deposit, *ab initio*, from gold held in solution in water, upon or among the already deposited gravels. This is a contention which may properly be left to metallurgical experts to discuss, to the reviewer it seems unsupported by any direct evidence in this region. The author agrees with previous observers in affirming the non-glaciated character of the Klondike, and the presence of comparatively recent indications of volcanic activity. Pleistocene mammals are represented by fossil bones in the gold gravels as elsewhere in Alaska, and there is little doubt that the placer deposits as a whole are post-glacial and their material largely due to denudation by ice action during glacial times.

W. H. Dall.

The Design and Construction of Dams, including Masonry, Earth, Rock-Fill, and Timber Structures; also the principal types of Movable Dams. By Edward Wegmann, C.E. Fourth Edition, revised and enlarged. New York, John Wiley & Sons. 1899. Quarto, cloth, xii + 250 pages, 97 plates. Price, $5.00.

Many mathematicians have occupied themselves with the deduction of the shape which a high masonry dam should have in order to possess both stability and economy. Such economic profiles are of interest and value to the designer, but practically each engineer de-