Education and special training is establishing in the department of chemical engineering at Columbia University in the City of New York an Ordnance Department School of Explosives Manufacture. The object of this school is to give men with proper preliminary qualifications the training necessary to fit them for use by the Ordnance Department as commissioned officers in the supervision of factory operation and inspection of the finished products in plants manufacturing explosives and raw materials for explosives. The school will be only for enlisted men in the military service who are detailed for instruction in the school by the Ordnance Department.

UNIVERSITY AND EDUCATIONAL NEWS

THE will of the late Dr. John C. McClenathan, Connellsville, the value of whose estate is approximately $160,000, leaves the bulk, after the death of his widow, to Washington and Jefferson Colleges to erect a building to be known as the McClenathan Hall of Science.

THE Loyola University School of Medicine has recently been reorganized. The buildings and equipment of the Chicago College of Medicine and Surgery were purchased in September, 1917, making an important addition to the resources of the school. In the department of anatomy Dr. R. M. Strong, professor of anatomy at Vanderbilt University Medical School has been appointed professor and head. Dr. Thesle T. Job has been made assistant professor of anatomy.

AT Cornell University Mrs. Dorothy Russell Naylor, '13, has been appointed instructor in mathematics in place of Percy A. Fraleigh, '17, who has received leave of absence for National service. Frances G. Wick, '05, has been appointed acting assistant professor of physics for the current year.

DR. S. D. ZELDIN, of the College of Hawaii, has been appointed professor of mathematics in Olivet College.

DR. HORACE LEONARD HOWES has been appointed professor of physics at the New Hampshire College to succeed Professor V. A. Suydam, resigned. He is a graduate of Syracuse University in the class of 1905 and took his doctor's degree at Cornell in 1915. While at Cornell he was instructor in physics and research assistant to Professors E. L. Nichols and Ernest Merritt.

DISCUSSION AND CORRESPONDENCE

FOOD OF AQUATIC HEMIPTERA

THE reading of an interesting article in this JOURNAL by Hungerford,[1] that discussed the food supply of certain aquatic bugs, caused me to look up some of my own notes on the food of water-striders and other aquatic Hemiptera. These notes were recorded mainly from observations made near Urbana, Ill., during the years 1911–13 inclusive.

Hungerford[2] states: "In the literature dealing with aquatic Hemiptera, we are informed that without exception they are predatory: those which dwell upon the surface capturing such flies and other terrestrial insects as may chance to fall into the water, and those that pass their lives beneath the surface preying upon aquatic insects and similar organisms." My own conclusions, regarding the food of water bugs, formed from reading the literature on aquatic Hemiptera, if expressed briefly, would be very similar to those just quoted, with some exceptions.

At the present, I recall three writers who mention that aquatic bugs use other food besides insects. Miall[3] makes the following statement: "To this suborder [Heteroptera] belong a number of very common aquatic insects. They are all predatory, feeding upon small insects or crustaceans." This writer[4] points out that, "Nepa feeds mostly on small insects, Ranatra, upon the water-flea (Daphnia) and other aquatic animals." The following is another quotation from Miall: [5] The in-

[1] "Notes Concerning the Food Supply of Some Water Bugs," SCIENCE, N. S., Vol. XLV., pp. 336–337, 1917.

[2] *Ibid.*, p. 336.

[3] "The Natural History of Aquatic Insects," London, 1903, p. 346.

[4] *Ibid.*, p. 354.

sects in question are *Halobates* and *Halobatodes*. . . . They feed upon the floating bodies of dead marine animals, and may be seen to run out from such objects when alarmed by the approach of a boat. These insects belong to the Rhynchota (Hemiptera) and in some respects come pretty near to such forms as Hydrometra or Velia." Walker[6] has found once or twice several specimens of marine Hemiptera belonging to the group *Halobates,* gathered round floating pieces of seaweed, as if obtaining nutriment. However, it must be acknowledged, that practically nothing is known about the food of these creatures. McCook[7] has demonstrated that individuals of *Gerris remigis* feed readily on the juice "of finely ground boiled beef." They take such food, with avidity, even in their own habitat.

If a more critical study should be made of the food of aquatic bugs in general, in their various habitats, I believe that still further evidence would be accumulated, showing that considerable food, of the other kinds, besides insects, was used by these interesting forms. In fact Hungerford[8] himself has pointed out a number of exceptions, some of which I can substantiate from my own observations, and to which I can add others also from my own observations.

The following statements agree with those of Hungerford[9] to the extent that the aquatic bugs now to be mentioned, are not entirely predatory, nor is their food entirely that of insects: I have found by microscopic examination of the alimentary system that water-boatmen of the genus *Arctocorisa* feed on vegetable matter; diatoms and Oscillatoria have been identified. They probably obtain most of this from the ooze on the surface of the mud, at the bottom of the pond or stream. In order to obtain additional evidence, I placed some of the water-boatmen in shallow, glass dishes of water, with some of the ooze containing algal débris, as suggested by Hungerford,[10] but my observations were discontinued before I was satisfied definitely that these bugs scooped up this substance with their front legs, and used it as food. I also placed back-swimmers of the genus *Notonecta* in shallow, glass dishes of water and fed them with small crustaceans, such as copepods and ostrocods. The back-swimmers appeared to thrive on this food. By means of a similar experiment, I was able to demonstrate that the marsh-treader, *Hydrometra martini,* will feed on copepods tangled in the surface-film. This was more likely to occur when the water became somewhat stale.

It is well known that many members of the family Gerridæ, which consists of an assemblage of aquatic Hemiptera living on the water-film, feed mainly on terrestrial insects which fall into the water and float on its surface. Water-striders are considered to be entirely predatory in their manner of feeding, and so far as I know there is no statement to the contrary in the literature on aquatic Hemiptera. However, it may be of interest to state that I have definite proof that *Gerris remigis* and *Gerris marginatus* both feed, at times, on vegetable matter. The following statement is a modified extract, taken from my field notes: After having studied water-striders in their natural habitats for several months, especially with reference to their food relations, I decided that both *Gerris remigis* and *Gerris marginatus* were entirely flesh-eating. However, on October 14, 1911, this opinion was changed. At the time, I was making observations of the water-striders on the surface-film of a brook near Whiteheath, which is approximately eighteen miles southwest of Urbana. Small red fruits were observed, drifting downstream, and these attracted the attention of the water-striders at once. Both species seized them readily, *Gerris remigis* with the greater avidity, and pushed their beak-like mouth-parts through the outer skin, down into the inner fruit. Some of the fruits, with their attendant water-striders, drifted near the bank of the

[5] *Ibid.*, pp. 380–381.

[6] "On the Genus *Halobates* Esch., and Other Marine Hemiptera," *Entomologist's Monthly Magazine,* Second Series, Vol. IV., p. 231, 1893.

[7] "Nature's Craftsmen," New York, 1907, pp. 363–365.

[8] *Loc. cit.*, pp. 336–337.

[9] *Ibid.*

[10] *Loc. cit.*, p. 337.

stream, and with the aid of a large reading-glass attached to a pole, it was possible to see the feeding movements of the mouth-parts. Several observations were recorded later than this of specimens of *Gerris remigis* sucking the juices of these berries. Only on one other occasion was *Gerris marginatus* seen to use this fruit as food. The plant from which these fruits came is commonly known as the coral-berry or Indian currant, *Symphoricarpos vulgaris*. It is very common along the banks of the brook near Whiteheath.

I have found that, during my observations of the food habits of water-striders in captivity, while confined in aquaria, both species mentioned suck the juices of freshly killed *Physa* and *Planorbis*. They also feed on fresh beef, on the soft parts of banana fruit, and on the inner, softer parts of the skin.

These observations seem to add additional evidence to Hungerford's[11] contention that aquatic Hemiptera are neither entirely predacious, nor do they feed entirely upon insects. It is very likely that other observers could report further observations of the character that have been recorded here.

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SCIENTIFIC BOOKS

Wild Animals of North America: Intimate Studies of Big and Little Creatures of the Mammal Kingdom. By EDWARD W. NELSON. Natural-Color Portraits from Paintings by LOUIS AGASSIZ FUERTES. Track Sketches by ERNEST THOMPSON SETON. Published by the National Geographic Society, Washington, D. C., U. S. A.; 8vo, pp. + 385–612, folded frontispiece, 108 colored illustrations on text paper (not plates), 85 halftone illustrations. [This is essentially a reprint of two articles which appeared in the *National Geographic Magazine*, for November, 1916, and May, 1918. The changes comprise repaging beyond page 472, the readjustment of the matter on pages 473–475, the replacement of a half-tone on page 475, the rectification of page references to illustrations to accord with the new paging where needed, and readjustment of the matter from page 571 on, so as to admit 32 new illustrations of footprints and the captions to these.]

This is a work which meets to a gratifying degree the need for an essentially non-technical treatise upon the natural history of the mammals of North America. No living person is better equipped to carry to a successful conclusion such an undertaking than is its author. Nelson has contributed in the field of vertebrate zoology now for over forty years, to be explicit, beginning in July, 1876 (*Bulletin Nuttall Ornithological Club*, Vol. 1, p. 39). With a background of long experience in the field, and with further years of official connection with the United States Biological Survey and its unique resources in mammalogy, he has made available a brochure of pleasing amplitude and satisfying authoritativeness.

Between the colored pictures and the written sketches the public can gain from this contribution a better idea of our principal mammals than from any other available publication. It should awaken a generally greater interest in our native mammals, and this will help build up a desire for the conservation of the harmless and useful species such as has resulted from the public education in relation to our bird life. On the other hand it is important to be able to distinguish those mammals, chiefly of the order Rodentia, which are thoroughly inimical to human interests. People at large must know how to cope with these enemies. It would seem that a full knowledge of the natural history of such animals is essential to determining the most successful means of controlling them and to applying these means properly to the varying conditions throughout the country. Nelson's accounts of our injurious mammals are full of stimulative suggestions along these lines, and while the work as a whole can not be considered as an "economic" publication, its influence will go far to secure adequate popular consideration of these matters.

[11] *Loc. cit.*, pp. 336–337.