UNIVERSITY AND EDUCATIONAL NOTES

THE following promotions have been made at Yale University: Dr. Harold S. Burr, associate professor of anatomy; Dr. Chester R. Longwell, associate professor of geology; Hubert M. Turner, associate professor of electrical engineering; Dr. Erwin B. Kelsey, assistant professor of chemistry, and Dr. Winthrop M. Phelps, assistant professor of orthopedics.

RECENT appointments to the faculties of the University of Chicago include those of Dr. A. Baird Hastings as professor of physiological chemistry and Dr. Louis Leiter as assistant professor in the department of medicine. Professor Harvey A. Carr has been made chairman of the department of psychology.

R. E. SOMERS has been made head of the department of geology at the University of Pittsburgh. Roswell H. Johnson continues as head of the department of oil and gas production.

DR. SELIG HECHT, research fellow, International Education Board, has been appointed associate professor of biophysics at Columbia University.

DR. H. V. ATKINSON, professor of pharmacology in the University of Texas Medical College, has been appointed associate professor of pharmacology in the Iowa State University Medical College.

DR. R. L. EDWARDS, professor of physics at Park College, has been appointed professor of physics at Miami University, succeeding Dr. J. A. Culler, who retires at the end of this year.

DR. ROBERT L. WEBSTER has been appointed head of the department of zoology at Washington State College and entomologist to the experiment station.

AT Brown University, Dr. Rudolph Ernest Langer, of Dartmouth College, has been appointed assistant professor of mathematics and Dr. Harry Edward Farnsworth, of the University of Maine, assistant professor of physics.

DR. FREDERICK LEET REICHERT, of the Johns Hopkins University, has been appointed associate professor of surgery in the Stanford Medical School beginning with the year 1926–27.

DR. C. L. WITHYCOMBE, lecturer in zoology and entomology at the Imperial College of Tropical Agriculture, Trinidad, is leaving the college at the end of the present session, having been appointed lecturer in entomology at Cambridge University.

THE Egyptian Council of Ministers has appointed Sir E. Cooper Perry director of the Faculty of Medicine for three months from the beginning of October next, with the view of organizing that faculty in the newly established University of Cairo.

DISCUSSION AND CORRESPONDENCE

THE HABITS OF THE GRUNION

A MUCH appreciated form of necromancy practiced in California consists of dipping up a teacup full of sand on the shore about Long Beach, in May, at the time of highest tides. The sand is then spread out in a pan and a teacupful of salt water is poured over it. Shortly after, a large part of the sand springs to life and swims about in the form of very active minute creatures, with transparent bodies and big black eyes. If placed in an aquarium these objects remain alive and vigorous for a week, more or less.

The explanation of this magic lies in the habits of the Grunion (*Leuresthes tenuis*), a slender, silvery fish, four to six inches long, of the family of Silversides (*Atherinidae*) much resembling the common Atlantic species, but differing in the absence of teeth.

In the high tides of spring and early summer the grunion comes ashore in hundreds, ascends to the highest wash of the waves, where the female squeezes herself, tail-first, into the sand, depositing her eggs which are fertilized at once by the male. These eggs lie quiet until the next spring tide, unaffected by sunshine or rain, but ready to leap into life at the next touch of salt water, by a process at once marvelous and instantaneous. Two or three broods are produced in one summer, and each year until the fish is four years old.

The life history of the grunion has been most carefully worked out by Miss Frances N. Clark, of the California State Fisheries Laboratory, at Terminal, California, between San Pedro and Long Beach. The record, an illustrated pamphlet of fifty-five pages (offered as a thesis for the degree of doctor of philosophy at the University of Michigan), is published by the California Fish and Game Commission. It is entitled "The Life History of *Leuresthes tenuis*, an Atherine Fish, with Tide-controlled Spawning Habits." The origin of the name "grunion" I have not been able to trace.

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ADSORPTION MECHANISMS

COLLOID chemists have for some time considered adsorption as being of two kinds—"polar" and "apolar,"[1] or adsorption at "watery points" and at "oily points."[2] The writers believe that a more definite classification of adsorption forces in terms of atomic and molecular structure is both possible and

[1] Freundlich, "The Elements of Colloid Chemistry," translated by Barger (Dutton, New York, 1924); p. 64.

[2] Loeb, "Proteins and the Theory of Colloid Behavior" (McGraw-Hill, New York, 1922); p. 283.

desirable. Such a classification will be attempted in this note.

Let us consider first the sources of affinity (*i.e.*, of attraction for other atoms or groups) in an atom or group of atoms. The most common of these are the following:

(a) An unpaired electron in the valence shell of an atom.

(b) A positive atomic kernel (H, Na, Cu, etc.) not surrounded by electronpairs.

(c) An electro-negative atom, or more specifically a lone electronpair (a pair of electrons not acting as a bond between atoms) in the valence shell of a negative atom.

(d) Double and triple bonds and similar structures (such as three- or four-membered rings) in which one (or more) of the bonding electronpairs is not near the line joining the centers of the two atoms it holds together.

The actual magnitude of the attraction between two structures will of course depend not only on the kind or kinds of affinity regions possessed by each but also on what we might call the "degree of affinity" or the "degree of unsaturation," which will vary widely for different substances. Thus we should expect an "acid" hydrogen atom (class b) to have a greater affinity than a hydrogen atom in a paraffine hydrocarbon for an oxygen atom in another molecule (class c).

Structures of type (a), because of their strong affinity for similar structures, rarely exist at ordinary temperatures.[3] Amorphous carbon and the fresh surfaces of some metals, however, probably constitute exceptions to this generalization. Adsorption by these substances we may assume to be largely of the (ab) (ad) and perhaps (ac) types, according to the nature of the substances adsorbed.

From crystal structure and other evidence,[4] we know that (b) and (c) type structures mutually attract each other, often quite strongly. From organic chemistry there is considerable evidence[5] that two (d) structures attract each other, an addition product (often existing only momentarily) being formed. Attractions of these types—(bc) and (dd) —we might assume to be important in adsorption processes. We might also expect (bd) and perhaps also (cd) adsorption.

Adsorption is very likely often a mixture of the above types. By properly choosing the substances studied, however, it may be possible to study separately the characteristics of the different kinds.

[3] *Cf.*, Lewis, "Valence and the Structure of Atoms and Molecules" (Chemical Catalog Co., New York, 1923); Chapter VI. Huggins, *Phys. Rev.*, March, 1926.

[4] *Cf.*, Huggins, *J. Phys. Chem.*, *26*, 601 (1922).

[5] Huggins, *J. Am. Chem. Soc.*, *44*, 1607 (1922).

The relation between the foregoing method of classification and the division into "polar" and "apolar" adsorption is only partly obvious. (bd) adsorption is certainly "polar," while (dd) adsorption is probably to be identified with "apolar" adsorption. The other types are more difficult to classify. Perhaps it will be better not to try, but rather to frankly admit that adsorption is of more than two kinds.

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WHO DISCOVERED VITAMINES?

WHILE it might be irrelevant for humanity who is the discoverer of vitamines, so long as they became known, nevertheless it is a question of general interest for the public and of personal interest to numerous workers in this field.

While the most important work on this subject was done in the years 1911–1912, it suddenly became known in 1919[1] that Sir Frederick G. Hopkins, of Cambridge University, was credited as its discoverer. The same opinion is shared by certain English, American, French and German investigators, to quote only a recent article by Drummond, Channon and Coward.[2] Attribution of the discovery to Hopkins was particularly surprising to me, as I have worked in the years from 1910 to 1915 in London, chiefly at the Lister Institute, on the same subject and never heard Sir Frederick quoted or regarded as the discoverer of vitamines. It is only since I left England in 1915 that these rumors began slowly to penetrate to me. Unless the English investigators possess in their hands some additional experimental evidence, beyond a lecture by Hopkins (which remained unknown to every worker up to 1919) in 1906 and two experimental papers in 1912, in justice to other pioneer workers in the vitamine field he should not be regarded as their discoverer. In fact, his experimental paper was presented so late (1912) that it exerted a relatively small influence on the development of the whole subject. His paper came many years after the researches of Bunge and his school, Forster and others and even later than the work of Eijkman, Grijns, Stepp, Schaumann and myself, and therefore remained unknown to all these workers.

What are the facts? In 1906 Sir Frederick undertook a series of famous experiments on the importance of certain aminoacids in foods, particularly tryptophane, then recently discovered by him. He apparently noticed then that even on adding tryptophane to tryptophane-deficient diet, the animals im-

[1] Report Medical Research Committee, No. 38, 1919.

[2] *Biochemical Journal*, 19, 1047, 1925.