nutritive material was bought at 44 cents per pound. The cost of the nutritive material in one sample of halibut was 57 cents, and in the other $1.45 per pound, though both were purchased in the same place at the same price—15 cents per pound, gross weight. In closing, Professor Atwater referred to the widespread but unfounded notion that fish is particularly valuable for brain food on account of its large content of phosphorus. Suffice it to say that there is no evidence as yet to prove that the flesh of fish is specially richer in phosphorus than other meats are, and that, even if it were so, there is no proof that it would be on that account more valuable for brain food. The question of the nourishment of the brain and the sources of intellectual energy are too abstruse for speedy solution in the present condition of our knowledge.

ANATOMY OF THE TONGUE IN SNAKES AND OTHER REPTILES, AND IN BIRDS.*

By Dr. C. S. Minot.

The tongue arises as a protuberance on the floor of the mouth, which in the course of development acquires a muscular system; the latter appears first in the reptiles. The principal muscles are the longitudinal arising from the hyoid bones, morphologically a part of the branchial muscles. In the crocodiles these are the only muscles found. In the snakes, however, proper lingual muscles play an important part, there being a distinct vertical muscle between the *Ceratoglossi*, three distinct transverse muscles, one superior and two inferior, and finally a longitudinal muscle immediately under the upper surface of the free portion of the tongue. Each muscle is distinct and separate throughout its whole course; they can all be traced with facility. The disposition of the nerves and other parts of the tongue was also described. The examination of the tongue of an *Ameiva*, the common long-tail lizard, revealed a structure in all its features identical with that of the snake's tongue. This offers a confirmation of the view that lizards and snakes are closely related, for in no other class of reptiles has a snake-like tongue been observed. On the other hand, the tongue of the Chamæleon is peculiar. It has been previously studied by several authors, all of whom have committed important errors. The whole tongue is exceedingly complicated and difficult to understand. The arrangement of the muscles is the most remarkable yet observed among animals, and they cannot be homologized with the muscles of the tongue of any other animal, until our knowledge of the subject shall be greatly enlarged. Dr. Minot stated, while he had made new observations on the tongue of the chamæleon, that he had been led to recognize more clearly, than previous writers, the difficulty of explaining the mechanism of the organ. The tongue of birds presents a uniform type, distinct from that of any reptile. The tongue has its simplest and lowest form in the crocodiles, is much advanced in the snake and fissilingual lizards, remarkably transformed in the chamæleon, and presents a special type in birds. These points are brought out by numerous microscopical observations on the nerves, blood vessels and other parts.

SOME FACTS AND THEORIES BEARING A RELATION TO THE DISTRIBUTION OF ORGANIC FORMS ON THE GLOBE.†

By W. H. Davis.

The author commenced by pointing out the fact that the inorganic conditions which surround us are in a state of change, ceaseless, and ever varying; and illustrated this portion of the subject by references to denudation and redeposition of existing land surfaces. It was then shown that these inorganic changes could not take place without at the same time producing an effect on the organic world commensurate in some degree with the intensity of the inorganic change; this led up to the question of the same area of the earth's surface at successive periods possessing a varying fauna and flora, and the light thrown by palæontological investigation upon the changes of land surface that had taken place, and this knowledge of past conditions in its turn throwing an instructive light upon the former range of the various orders and genera of organic beings. Thus it was, that as there was a perpetual ebb and flow and ceaseless interchange of inorganic structure, so the forms and types of life affected by these influences are also in a continual and corresponding state of unrest, from the necessity of the two conditions being in harmony with each other, the organic and the inorganic.

The first problem, therefore, was, seeing that a change of the organism was necessitated by a variation in the conditions of existence, whether these changed conditions as they arise were of themselves capable of inducing structural differences in organized forms subjected to their influences. Starting with the negative view, it was pointed out that there were but two courses open to the organism affected—migration or extinction; but the former cause of itself involved a minor change of conditions, and as in the life history of the earth, a second, third, or greater number of migrations were necessitated, at last the probabilities were of the environment of the organism being so varied from its primary condition that extinction in this case must also ensue. Thus a form persisting through several or many periods of geological time would be impossible; but as this was contrary to many observed facts, the converse view was discussed, and actual structural modifications due to changed conditions referred to, as in the case of animals and plants introduced into West Africa, South America, and other regions. Mimicry was also instanced as evidence of the influence of inorganic form on living organisms. In man the Europeo-American nation of the United States was quoted as an instance of a race being formed under our very eyes.

It may, of course, be urged that the differences here pointed out are only of a character such as might be anticipated to have arisen, and that, pendulum-like, they vibrate through a very small arc, and in no way give rise to fresh species, still less to fresh genera. The next point, therefore, that comes in for consideration is whether these structural differences are ever commutative. We have seen that the change which can be produced in a single species is not an alteration in respect of one character only, but an alteration of many characters affecting different parts and portions of the same organism. Now these modifications, small as they are (in comparison with the question of a complete change of species), certainly did not leap into being in an instant, but have exhibited themselves gradually. Here, then, is a starting-point for the cumulative evidence. The changes themselves, even so far as they have gone at present, are but expressed cumulative results, and having become once established, it is only in accordance with what we have already seen to be the case, that with a further change of surroundings, a corresponding modification must ensue, or extinction alone must follow. But in this argument we are not altogether left to the evidence as visible to the eyes of mankind during the historic period, but a mass of the facts of palæontological history, some embryological investigations, and many zoological observations are absolutely inexplicable save on these grounds. If we trace the connections of the reptilian and avian forms, the progressive stages in time of the Equidæ, or the changes in structure of the more lowly Ammonitidæ, the same answers must be given, that the extremes observed in the respective groups have been the result of a cumulative modification due to the types of life being in a condition of instability, and ever seeking to bring themselves into harmony with their inorganic surroundings.

In further illustration of this portion of the subject, sympathetic modification or correlative adaptation may be noted, as when the change of one structure in an animal induces changes in other structures remote and apparently unconnected with it, as in the pigeon, the beak and toe lengthening and shortening in unison.

Degeneration was strongly insisted upon as a factor in producing fresh types, equally with progressive modification.

Passing, then, to the various views entertained as to the causes of the present geographical distribution of life, the doctrine of specific centres was explained, the author maintaining that this idea was, in effect, but the old teleological argument that every organism was created for a definite

* Read before the A. A. A. S., Boston, 1880.

† Read before the Metropolitan Scientific Association, London, England, Oct. 12, 1880.

and fixed purpose; that it was specially adapted to its original design; and, finally, fixed where its adaptation had fullest scope. This view was strongly opposed by arguments based upon parasitism, showing that there had been a gradual variation in design as different circumstances arose, and fresh materials came to hand.

NEW SPECIES OF MOLLUSCA AND ECHINODERMS.

Professor A. E. Verrill describes in detail, in the last number of the *American Journal of Science*, many new species of Marine Fauna, discovered on the southern coast of New England, during the present season by the large party, under the auspices of the U. S. Fish Commission, of which Professor Spencer F. Baird is a Commissioner.

The following is a list of the new species, described by Professor A. E. Verrill and Mr. Sanderson Smith, with the exception of *Luidia elegans*, described by Perrier.

MOLLUSCA.

Heteroteuthis tenera, sp. nov.—*Calliteuthis*, gen. nov. *Calliteuthis reversa*, sp. nov.—*Alloposus*, gen. nov. *Alloposus mollis*, sp. nov.—*Cymbulia calceola*, sp. nov.—*Pleurotoma Agassizii*, sp. nov.—*Pleurotoma Carpenteri*, sp. nov. *Scalaria Pourtalesii*, sp. nov.—*Scalaria Dalliana*, sp. nov.—*Lamellaria pellucida*, sp. nov. *Lepetella*, gen. nov. *Lepetella tubicola*, sp. nov.—*Lovenella Whiteavesii*, sp. nov.—*Calliostoma Bairdii*, sp. nov. *Margarita regalis*, sp. nov. *Margarita lamellosa*, sp. nov. *Turbonilla Rathbuni*, sp. nov. *Turbonilla formosa*, sp. nov.—*Pleurobranchæa tarda*, sp. nov. *Philine amabilis*, sp. nov. *Diaphana* (*Utriculus*) *gemma*, sp. nov. *Doris complanata*, sp. nov. *Cadulus Pandionis*, sp. nov. *Loripes lens*, sp. nov. *Modiola polita*, sp. nov. *Pecten fenestratus* (?)

ECHINODERMS.

Asterias Tanneri, sp. nov. *Odontaster*, gen. nov. *Odontaster hispidus*, sp. nov. *Archaster Americanus*, sp. nov. *Archaster Agassizii*, sp. nov. *Luidia elegans*.

A POISONOUS PRODUCT OF FERMENTED INDIAN CORN.

If the grains of Maize, or Indian Corn, be subjected to fermentation, they become dark in color without changing form, and are found to contain, in considerable amount, a body which may be extracted by alcohol. After the removal of the alcohol by distillation, there is obtained a residue, from which, after long standing, an oil separates. This oil is brown in color, has a sharp, bitter taste, and a sp. gr. of 0.925. It forms soaps with alkalies, is soluble in alcohol and ether, and becomes resinous when exposed to the air. It acts as a poison on the animal system, and in certain other properties is very similar to strychnia.—Coeytaux, *Chemiker-Zeitung*.

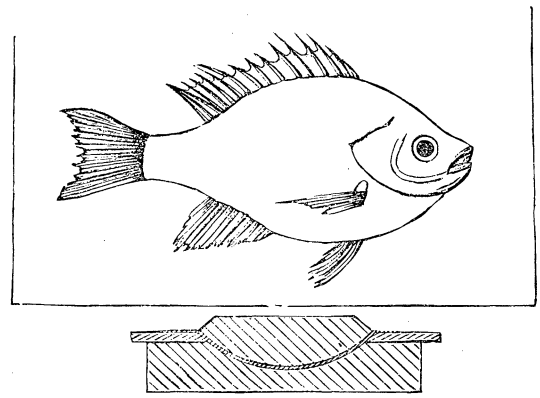
A PHYLLOXERA CONGRESS was held last month in Spain, at Saragossa, for the consideration of all topics connected with the grape Phylloxera. *The American Entomologist*, basing its opinion on the recovery of vines in Solano County, Cal., asserts its belief that the ravages of Phylloxera will have its day, and that from causes, not far to seek, the vine will again grow on the very lands which have been lately ravaged. For fear of the Phylloxera the Turkish Government have forbidden the introduction of any plants whatever into the territories of the Sultan.

IT is said that the Cochineal insect, which is a native of Mexico and Central America, thrives well in Florida.

CRYSTALS OF HÆMINE.—F. Högyes has examined crystals from the blood of men, oxen, swine, sheep, dogs, cats, rabbits, guinea-pigs, mice, pole cats, poultry, pigeons, geese, ducks, *Rana esculenta* and *temporaria*. All have one crystalline form only. They belong either to the monoclinar or triclinar system, probably the former.

TAXIDERMY.

Mr. Herman E. Davidson suggests an improvement in the art or method of mounting skins of fishes, which consists in forming a rigid mold of plastic material on the surface of the skin to be mounted before it is detached from the body of the fish, and thereafter removing the soft portion from the skin and stuffing or filling before it is removed from the mold, whereby the natural form and convexity of the fish are preserved.



This improvement may be understood by the annexed drawing. It will be seen that Mr. Davidson takes a moldboard having a portion removed corresponding with the outline of the body of the fish, exclusive of median fins, and inserts the body of the fish in the opening, the median fins resting against the face of the board, and forming a mold of plastic material upon the body of the fish projecting beyond the other face previous to removing the soft parts and stuffing the skin. The soft parts are then removed from the skin resting in the mold, and plastic material, adapted to solidify, is then poured in.

BOOKS RECEIVED.

THE JOURNAL OF NERVOUS AND MENTAL DISEASES, for October, 1880. Office No. 70 Monroe street, Chicago, and G. P. Putnam's Sons, New York.

The opening article is by Dr. S. V. Clavenger, consisting of his paper read before the American Association for the Advancement of Science, entitled "Plan of the Cerebro-spinal Nervous System." An abstract of this paper was furnished to "SCIENCE," by Dr. Clevenger, and appeared in this jonrnal of the 11th of September last. Specialists should not fail to read the paper now presented in detail, as it forms an important addition to the literature of this subject. Dr. Edward C. Spitzka contributes two papers, the first a continuation of his "Contributions to Nervous and Mental Pathology," and "Contributions to Encephalic Anatomy." In the latter article Dr. Spitzka takes up the subject and methods of a study of the Ichthyopsidean brain. As we shall probably reproduce this article for the benefit of the readers of "SCIENCE," further reference to it at present is unnecessary. We cannot, however, refrain from expressing our satisfaction at finding that Dr. Spitzka continues to devote his attention to original research in this direction; our knowledge of human anatomy has been greatly extended by the investigation, of naturalists, into the lower forms of life, and if higher results are attained, it will be by such indefatigable and intelligent work as is manifested in this paper of Dr. Spitzka. The other articles in this number are, "Contributions to Psychiatry by James G. Kiernan, M. D. A case of Diffuse Myelitis, by Dr. J. C. Shaw, and Dr. John S. Woodside. A case of Acute Myelitis, by S. G. Webber, M. D., and a case of Meningo-encephalitis, by H. M. Bannister, M. D.