GY.

AUNAS, A STUDY OF EVOLUTION. Sollas read a paper at a late y, which is reported in *Nature* been made apparently to work ment Dr. C. A. White's essays of fresh-water faunas as contributed to a supposed inadapta- ms to existence in fresh-water. e is shown by the existence of Limnocodium, and still more dant, who succeeded in accus- llusca to a fresh-water habitat, the severity of a fresh-water ence of most marine forms in thoroughgoing explanation is a study of the means by which s is secured. In the case of mbryos are distributed over n never pass from the sea into ays directed seawards. Nor, ce introduced into a river per- its propagation took place ex- rvæ, for these would gradually water animals should not, as a e of existence, nor, as a matter ater sponges, and Polyzoa, the y cyst in the complete state. stage provides for distribution y. The young of fresh-water xistence until they are similar viparous. The suppression of nly occurs in fresh-water, but is is connected with the fact of disadvantage as compared advantage to the organism if in a state of seclusion. From w; development in seclusion od, hence the appearance of nt furnished by the parent to secluded larva being spared existence, and supplied with st tax on its digestive powers, is available for metamorphic na of accelerated and abbre- shortening of the larval life the adult life, and shifts the

chances of variation and selection forward into the adult stage. Thus animals which hatch out in a complete state will most probably suffer modifications of that state, and not of previous ones, except very indirectly. Here we discover a direct tendency towards a mode of development which explains the "arborescent" character of our zoölogical classifications, *i. e.*, the tendency of the tree of life is now to produce leaves rather than new branches. In the case of fresh-water fauna very direct reasons have existed for the suppression of the free larval stage. In this connection may be noticed the richness in species and the poverty in genera of the fresh-water mollusca. In discussing the origin of fresh-water faunæ, there are three hypotheses from which we have to select: (1) That marine forms have immigrated into rivers; (2) that they have migrated into marshes and thence into rivers; and (3) that marine areas have been converted into fresh-water ones. The last course has been the most usual, especially in the case of non-locomotive forms. Hence the origin of fresh-water invertebrates is connected with the great movements which have affected the earth's crust. The earliest well known lacustrine areas are those of the old red sandstone, in one of which we meet with the earliest known fresh-water mollusk, *Anodonta jukesii* (Forbes). The lakes of the Permo-Triassic period contributed additions to the fresh water fauna of the globe. The Neritidæ and Melaniidæ are so closely connected with them they may be regarded as their collateral or direct descendants, and thus may have originated in Triassic lakes, but not earlier. Other genera probably arose at the same time; the occurrence in Cretaceous deposits of Unio, Physa, Valvata and Limnea in the Nearctic, Palæarctic, and Oriental regions, suggests a high antiquity for these genera; and they may have existed in Palæozoic times. The lakes of the Tertiary period furnished probably further contributions to our fresh-water fauna, such as Lithoglyphus and Dreissena. Thus, existing fresh-water genera are probably descended from marine forms which became metamorphosed in the waters of the Devonian, Triassic, and Tertiary lakes. In the lakes of Central Africa the Tertiary fresh-water fauna still survives, nearly all of the genera from Lake Tanganyika being referable to genera already in existence in Mesozoic and Tertiary times. The lakes of the northern hemisphere received on subsiding beneath the glacial sea such Arctic forms as *Mysis relicta* and *Pontoporeia affinis*, but most of their existing inhabitants have re-entered them since their emergence from the sea.

SHELLS OF ANTICOSTI.—When leaving Ottawa in the summer of 1883 to study the flora of Anticosti, Professor Macoun promised me that he would endeavor to make as complete a collection as possible of the land and fresh-water shells of that little known island. The result of his labors is most gratifying, and shows that they were energetically and intelligently directed. His col-

lection was some time since placed in my hands for determination, and I have now much pleasure in submitting a list of the shells to the many students of science who take an interest in the distribution of the Mollusca.

Land Shells: *Helix hortensis* Müll.; *Macrocyclis concava* Say; *Hyalina nitida* Müll.; *Patula striatella* Anthony; *Conulus fulvus* Drap.; *Vallonia pulchella* Müll.; *Helicodiscus lineatus* Say; *Vitrina limpida* Gould; *Cionella subcylindrica* L.; *Pupa muscorum* L.; *P. pentodon* Say; *P. hoppii* Möller; *Vertigo gouldii* Binney; *Succinea obliqua* Say; *S. ovalis* Gould; *S. avara* Say; *S. verrilli* Bland.

Fluviatile Shells: *Limnæa stagnalis* L.; *L. palustris* Müll.; *L. emarginata* Say; *Physa heterostropha* Say; *Bulinus hypnorum* L.; *Planorbis bicarinatus* Say; *P. campanulatus* Say; *P. deflectus* Say; *P. parvus* Say; *Valvata sincera* Say; *Pisidium abditum* Hald.; *Anodonta fragilis* Lamarck.

Professor Macoun was informed that a large kidney-shaped mussel occurred in Fox river—a locality which he was unable to visit. This shell no doubt is *Margaritana margaritifera*—already recorded from Anticosti by Professor Alpheus Hyatt. *Acanthinula harpa* Say, was not observed, although from being found on the mainland opposite, in Gaspé, and inward along the St. Lawrence to Montreal, its presence might be expected. Both the plain and banded forms of *H. hortensis* were collected, but none of var. *nemoralis*. *Vallonia pulchella* is the strongly ribbed variety (*costata* Müll.), which has not, I believe, been found elsewhere in Canada, where the typical form is very common, but which is known to occur at various points in the United States. *Succinea verrilli* does not seem distinguishable from *S. avara*, otherwise than by its want of the protective covering so characteristic of the latter shell. The Limnæa referred to *emarginata* is somewhat doubtful, but is probably that species. The Anodonta is quite distinct from the pale, thin forms of *fluviatilis* which it is the custom to call *fragilis*, and probably more nearly approaches Lamarck's species—originally described from Newfoundland—than any shell found in the interior region. It will be observed that the list includes nearly all the shells which are common to America and Europe. Of these *Conulus fulvus* has the most extended distribution north and south, while others of them—*Cionella subcylindrica*, *Patula striatella*, *Bulinus hypnorum*, *Limnæa stagnalis* and *L. palustris*—range with it across Canada to Vancouver island. —*Frank R. Latchford, Ottawa, Ont.*

Gill on the Habits of Fishes.—Professor Gill gives the following notes in a late number of *Forest and Stream*: "We have an interesting instance of the female of one type of catfish found in South America, the Aspredinidæ, in which there occur periodical swellings of the skin of the abdomen in which the eggs are received, and therein they are nourished for some time. Agas