

larvæ are affected by changes of salinity, but there appear to be no detailed observations on this point.

All these observations, however, have been made on a single species, *Teredo navalis*. There are many other kinds of shipworms and, although we know little of their habits, we do know that they differ greatly in the degree to which they can adapt themselves to water of reduced salinity. *Teredo navalis*, which can flourish in water only half as salt as that of the oceans, probably owes its evil reputation to the fact that its tolerance for brackish water enables it to invade estuaries and harbours where the water is commonly less salt than that of the sea outside. It is the common species in the North Sea and comes up the Thames as far as Greenwich. At Plymouth, another species, *Teredo norvegica*, appears to be the commonest, and it will probably be found to prefer salter water. On the other hand, various tropical species ascend rivers, such as the Ganges and the Zambezi, to places where the water is quite fresh. There is even a report that a shipworm occurs in Lake Tanganyika, although no specimens have yet been seen by naturalists.

It should be clear, then, that an accurate determination of the existing species of shipworms and of their conditions of life is of great importance from a strictly practical point of view. How far we are from having this knowledge is perhaps only realised by those who have tried to determine collections of shipworms from

different parts of the world. But that is no reason why such knowledge as we have should be neglected. In some recent investigations on the efficiency of certain poisons when used to protect wood against attack by shipworms, the authors do not even trouble to tell us what species of shipworm was used in their experiments.

A study of the shipworm suggests some considerations bearing on current biological theories. For example, like all highly specialised organisms living under peculiar conditions, the shipworms raise in the most striking way the problem of adaptation. The form of the body, the shape of the shell-valves with their file-like rows of teeth and the pivots on which they rock, the disposition of the muscles, the sucker-like foot, the alimentary canal—all these and many other details of structure co-operate to form a mechanism which is unintelligible except as a device for boring into and feeding on wood. The mutation theory of evolution teaches that organisms have evolved by sudden changes of structure which had no relation to the needs of the organism and only an accidental fitness for its mode of life. It is scarcely exaggeration to say that according to this school the shipworm bores into wood and feeds on it because it happens to find itself provided with suitable implements for doing so. If that were all the help to be got from the theory of evolution, it would be better to go back to the doctrine of special creation.

Obituary.

DR. H. B. GUPPY, F.R.S.

HENRY BROUGHAM GUPPY, who died at Martinique on April 23 on the voyage home from Tahiti, began work at a time when a medical training was the usual method of approach to a scientific career. Like other eminent naturalists, he started that career as a surgeon in Her Majesty's Navy. But the inspiration of the islands of the great oceans remained throughout his life as the directing force of his painstaking investigations of the problems relating especially to geographical distribution which they suggested.

In 1878 Dr. Guppy visited the China Seas; but his great opportunity came in 1881, when he was appointed surgeon to H.M.S. *Lark*, which was commissioned for survey work in the western Pacific. Two volumes on the Solomon Islands, published in 1887, contain the results of three years' study on the ethnology, natural history, and geology of this somewhat difficult group, where it was necessary to 'dare a little' in order to learn. The problem of coral-reef formation especially attracted him, and in 1888 he was able to continue his study of the problem on the Keeling-Cocos Islands, a classic locality, as the subsidence-theory held by Darwin was the result of a brief visit to the Islands during the voyage of the *Beagle*. Guppy, who examined all the islands and islets, more than twenty in number, concluded that these small atolls and horse-shoe islands only assume their characteristic form after the island has been thrown up by the waves (see NATURE, 39, 236, 1889). Later, in his physical and geological monograph of Vanua Levu, Fiji (1903), he describes

as "one long story of emergence" the building up of the island by reef-formation on a submarine basaltic plateau.

The problem of the stocking of coral islands had interested Dr. Guppy from the first, and between 1890 and 1896 he made a careful study of British plants from the point of view of dispersal by water—a paper on "The River Thames as an Agent in Plant Dispersal" was read at the Linnean Society in 1892. This prepared him for three years' intensive work in Fiji and Hawaii (1896–99), and later on the west coast of South America (1903–4). The fruit of these observations was "Plant Dispersal" ("Observations of a Naturalist in the Pacific," vol. 2, 1906), an eminently suggestive work and a mine of information on the floras, especially littoral, of the islands and eastern shores of the Pacific, and the means of dispersal which have been effective in their formation. General problems are also discussed; and the hypothesis of a great Pacific land-area is dismissed: "We have much to learn before it would be safe to look to hypothetical changes of sea and land to explain difficulties in distribution." The problem of fruit and seed became the *motif* of his work, and his "Studies in Seeds and Fruits; an Investigation with the Balance" (1912) is a study of mechanical and physiological problems bearing on means of dispersal. These were preparatory to his second book on this subject, "Plants, Seeds, and Currents in the West Indies and the Azores" (1917), a record of his personal observations during visits to the Islands, and a valuable contribution to the study of Island floras. The award of the Linnean Medal of the Linnean Society in the same year, and his

election shortly after to a fellowship of the Royal Society, were a well-earned recognition of long years of quiet, steady, fruitful work carried out with remarkable singleness of purpose.

A. B. R.

REV. W. A. B. COOLIDGE.

By the passing away, in his seventy-sixth year, of the Rev. William Augustus Brevoort Coolidge, at the Swiss home which he had built for himself, Châlet Montana, Grindelwald, another famous mountaineer, who carried on the great traditions of the pioneers of the Alps, is removed from our midst. Not merely was he a climber of the very front rank, but the most erudite of the band, possessing a wonderfully complete personal knowledge of the Central European Alps—of their topography and physical geography, their history, and that of the countries in which they are situated. Familiarly and equally conversant with English, French, and German, he was a prolific writer in all three languages, conveying his exceptional knowledge with conciseness yet with fascinating interest. He wrote, for example, the articles on Switzerland in all the three later editions of the "Encyclopædia Britannica," those portions on the geography and history of the country being not only of great value and meticulous accuracy but also of eminent literary merit. Besides his well-known guide-books (to the Dauphiny Alps, Lepontine Alps, Adula Alps, Mountains of Cogne, and the Bernese Oberland), and his editions of Ball's "Alpine Guide" and Murray's "Handbook of Switzerland," he wrote a most charming book, "The Alps in Nature and History," in which his wide knowledge of the history, antiquities, folk-lore, religious and political development of the playground of Europe is used for our instruction in a truly delightful manner.

Coolidge was a singular combination. An American citizen throughout his life, born near New York and at school in the United States, he became an undergraduate of Exeter College, Oxford, where he took a first in modern history and won the Taylorian scholarship for French. He was afterwards elected to, and retained to the last, a fellowship at Magdalen. Moreover, from 1883 until 1895 he acted as curate at South Hinksey, having taken holy orders. In 1909, however, he removed permanently to Grindelwald, where he had built the Châlet Montana as a home for himself and his priceless library of Alpine literature.

For thirty-five years Coolidge spent the long vacations and some winter ones in climbing and exploration, in his best days accompanied by that wonderful guide, Christian Almer; during this time he climbed practically every peak in the whole of the Swiss, French, and Italian Alps. Elected a member of the Alpine Club in 1870, and an honorary member in 1904, he edited the journal of the Club for the ten years 1880-1889. His greatest claim to fame, however, is in the realm of topographical and physical geography, the whole of his writings on these subjects being characterised by a degree of accuracy which renders them pre-eminently trustworthy and of high permanent value.

A. E. H. TUTTON.

MR. F. S. SPIERS.

By the death of Mr. Frederick S. Spiers, science loses one who was well known for his ability as an organiser, particularly of affairs related to physical chemistry. Mr. Spiers was born on October 21, 1875. His father was a Dayan or Judge of the Jewish Court. He was educated at the Central Foundation School, Finsbury Technical College, and at the Central Technical College, South Kensington, and obtained the degree of Bachelor of Science (London). He was an associate-member of the Institute of Electrical Engineers and a fellow of the Institute of Physics.

Mr. Spiers was best known for his work as secretary of the Faraday Society, which he assisted to found in 1902. He was an indefatigable organiser. With his help the Society has become one of the most important organisers of scientific discussions in the country. These are noted for the way in which they have brought American, Continental, and British workers together. His ardour was so keen that sometimes it had to be checked owing to the exiguous character of society finances. In 1920 he added to his work that of secretary to the newly founded Institute of Physics, and in this post has shown a like activity and alertness in bringing to the attention of the Board every possible way of amplifying its work. For both of these societies he has proved himself a man whom it will be difficult to replace.

During the War, Mr. Spiers stimulated the formation of a nitrogen products committee of the Faraday Society. As a result of the reports of this committee, in part drafted by him, important researches were carried out by the Munitions Inventions Department. He also organised for the British Science Guild the successful exhibitions of British Scientific Products held in 1917 and 1918. For his work in connexion with the War he received the Order of the British Empire.

Mr. Spiers was well-read in all branches of physical chemistry, but his daily work gave him no opportunity for research. Two papers only appear in his name; one on the electromotive force of Clark cells (*Phil. Mag.*, 1896), and one on contact electricity (*Phil. Mag.*, 1899). His outlook was, however, much wider than his scientific work. He was a Hebrew and Talmudical scholar, and his love for music amounted to a passion. He was keenly interested in all forms of applied art, and at one time was engaged in the production of decorative metal work by electrodeposition. The gold medal and diploma of the Franco-British Exhibition (1908) was awarded for some of this work. The attendance at his funeral was a testimony to the large amount of work that he had done for Jewish education. He was a member of the Jewish Board of Deputies.

His slight body was unable to stand the physical strain of all his activities. On several occasions he had been obliged to rest. For a couple of days before his death he took holiday, but returned on the Friday feeling rather worse than better. In the afternoon (May 21) he was found by one of his office staff leaning back in his chair. He had passed peacefully away.