These studies are continued in the second number of the *Journal*, where Drs. Rimington and Steyn produce an interesting study of the poisoning of Angora goats, suspected to be due to *Psilocaulon absimile*. This plant contains malic, tartaric and oxalic acids, the last-mentioned being present to the extent of 8·6 per cent, which may therefore well be the toxic constituent concerned. On this point, however, the authors say they have evidence of the presence of a second toxic substance on which a further communication will be presented in due course. Six papers entitled "Studies on Photosensitisation" by Dr. Quin have arisen from an attempt to ascertain the cause of 'geeldikkop', a disease of small-stock, characterised by photosensitisation and by a generalised icterus. The disease has been generally associated with ingestion of *Tribulus* spp., but it is pointed out that there are well-authenticated cases in which *Tribulus* cannot be the cause. In view of the occurrence of photosensitisation in 'geeldikkop', a number of fluorescent substances such as eosin, erythrosin, acriflavin and quinine were administered to sheep, but though these all caused photosensitisation, in no instance was icterus produced.

The association of *Tribulus* with this disease has naturally led to a chemical examination of plants of this genus. Already in 1928 Dr. Quin had found that administration of the expressed juice of *Tribulus* to sheep caused death, the chief symptoms being discoloration of the conjunctivæ, the blood-vessels having a chocolate-brown colour. Examination of the blood indicated the presence of an abnormal pigment suspected to be methæmoglobin. These observations have been confirmed, and Drs. Rimington and Quin now show that the lethal factor is potassium nitrite, which is only present in traces in the plant, but is produced when the ground plant is placed in water by the action of an oxidation-reduction enzyme system, similar to that present in the potato, on nitrates which may occur in considerable quantity in the plant. These interesting observations, however, leave the association of *Tribulus* with 'geeldikkop' unexplained since, as Dr. Quin points out in a subsequent paper, no fresh or dried *Tribulus* material dispatched to the Onderstepoort laboratory, or cultivated there, has produced a case of true 'geeldikkop' on administration to sheep, although several species of *Tribulus* can definitely be held responsible for outbreaks of the disease in the Karroo areas of Cape Province (see also NATURE, 132, 178, July 29, 1933).

Two species of *Hypericum*, a genus associated with the production of photosensitisation in animals in Europe, have also been examined and found to produce this effect, but unaccompanied by icterus. *Lopholæna coriifolia*, a plant suspected as a possible cause of one outbreak of 'geeldikkop', was found to contain an active substance producing marked fatty changes in the liver, but in no way characteristic of the conditions found in 'geeldikkop'. Two species of *Lippia*, however, did produce both icterus and photosensitisation, but the symptoms were much less severe than those seen in true 'geeldikkop'. Although a final explanation of the cause of this mysterious disease is still to be sought, it is clear that progress is being made, and incidentally a number of interesting observations on plant chemistry and on the effects of minor plant constituents on animals are being accumulated.

Obituary

PROF. W. M. DAVIS

EVERY active worker in geology, in geography and in oceanography will feel that the death on February 5 of William Morris Davis, at the age of eighty-four years, is the passing away of a historical figure in science. His life when written will be the story of the development of geomorphology and of the creation of an American school of international prestige. His whole career, more than sixty years of active scientific work, exhibits the regular series of interests of many great investigators, detailed studies in a relatively limited scientific field, next broader applications supported by intense, varied and enthusiastic studies to test and support the same—and finally the close of life devoted to a single line of investigation, often the ploughing of a lonely furrow.

Davis's first field was the southern part of New England, including New Jersey, and his publications extend to every type of its topography. About 1880 he concentrated on the Hudson and Connecticut valleys. These lie in a region of tilted blocks produced by faulting, the initial fault scarps subjected to extensive erosion. As Davis showed, the cliffing may be completely altered and these cliffs were termed *fault-line scarps*. He was fascinated by these studies of erosion, and he summarised his many publications in "The Rivers and Valleys of Pennsylvania" and "The Rivers of Northern New Jersey". He pictured the work of unchecked erosion on the land, by weathering and by water, in all its stages, finally culminating in a reduction of sea-level, the *base-level* "towards which the land surface constantly approaches . . . but which it can never reach". Here he encountered the established views in respect to marine abrasion, and he characteristically set to work on investigations in Europe, Asia and South Africa to establish the validity of his views. He also studied glacial (recent and Permian) erosion, faulting and shorelines, with a certain disregard of local researches. His work on shoreline topography, the continental slopes and marine shelves, bristles with original ideas, but the soundings on which he was depending were occasionally woefully inaccurate, though I cannot recall that these were such as to invalidate his conclusions as to embayed shorelines. It will be

interesting to mention that in a letter I received more than twenty-five years ago he discussed the down-faulting of a former extension of the Deccan in the area now occupied by the Indian Ocean, the area of the investigations of the "John Murray Expedition".

It is impossible to refer in any detail to the gigantic output of Davis in these thirty years. In his own continent he found every type of country, from completely desiccated to extreme moistness, almost tropical heat to perpetual cold, and he studied the phenomena in respect to each, thus gradually building up that study of the visible earth forms on which modern geography is so largely based. He claimed none of his conceptions as new, but he looked at every phenomenon through new glasses, and he codified all phenomena to form almost a new science. During all these years Davis was teaching not only in his own University, Harvard, but also lecturing almost everywhere he was asked. His exposition was clear and he used every possible device, particularly solid and composite sections, to make his views clear to his auditors and subsequent readers, dismissing all possible opposition, and sometimes ignoring the evidence on which it was based. His scientific opponents could not approve where, as in science, views are nicely weighed in the balance, but undoubtedly he gained an immense following in America and stimulated both teachers and the public to observe. By many he was regarded as an inspired teacher, but his methods were of more use in popularising science rather than in stimulating research. His popular works on geography deservedly secured an immense circulation, for the visible world was therein a connected system, made clear by pictorial methods largely original. Davis came at the right time.

Davis's third period commenced about 1912 when he began to feel a mighty interest in the coral reef problem, upon which he published more than forty papers, actively pursuing the subject until his death. He thoroughly enjoyed the subject, for it became necessary for him to travel extensively, and he saw many new faces and met many new types of mind. He visited the West Indies several times, with longer expeditions to Fiji and New Caledonia, with calls upon the Great Barrier Reef, Tahiti, and many other places. While he criticised Agassiz for the shortness of his visits, and his lack of detailed examination, his methods were much the same, and every locality had to fall into his line. He paid little attention to animals and plants and their dependence on the favourable conditions of their environment. He seemed to love to indite fierce letters in which he was entirely unsparing of his opponents' feelings, but, when, very occasionally, he wrote a letter in his own hand about himself, he revealed a personality happy in spite of great griefs, a man to be loved. Shaler he held in great affection and it gave him joy to write "The Coral Reef Problem", 1928, in the Shaler Memorial Series, a book of value for all time, with its full discussion of embayed shores and unconformable contacts. He felt himself inspired. Did not he, Dana and Darwin all share the same natal day in different years—and must they not be right? What was the use of further expeditions when all seemed to Davis so clear? Why in his necessary travels did the present writer sit down for months on five occasions to look at separate reefs? "A waste of time!" Davis was very human; he deemed it his duty to fight here to gain a great peace hereafter.

J. S. G.

PROF. R. CHODAT

GENEVA, which has always had a great name as a school of botany, has suffered a great loss by the death on April 29 of Prof. Robert Chodat at the age of sixty-nine years. A worthy follower of de Saussure and de Candolle, Chodat upheld the traditions of his predecessors by the wide outlook of his botanical studies, and the thoroughness of his investigations.

Appointed to the professorship in Geneva in 1891 after studying in Basle and Geneva, Chodat has been responsible during the past forty-three years for the development of a first-rate laboratory, herbarium and botanical library. The lack of university botanical gardens, which he frequently deplored, necessitated his researches being centred in the laboratory, and here he elaborated those methods of pure cultures of Algæ which led to such important results. His book on the polymorphism of the Algæ put him at once in the front rank of algologists and stimulated many workers to embark on this line of research. More recently he had taken up mycological investigations, and his sound knowledge of physiological chemistry enabled him to advance considerably our knowledge of fermentative processes.

Chodat did not, however, confine himself to investigations in the laboratory. A visit to Paraguay in 1914 enabled him to study the structure and habits of its plants and resulted in the publication of an important flora of that country. Repeated visits to Spain and Portugal and the Balearic Islands with his students gave him a comprehensive knowledge of the Mediterranean flora, of which he published some interesting accounts.

Chodat rescued from neglect the Alpine Garden at Bourg St. Pierre by attaching it to the University of Geneva, and the vacation courses he gave there every summer attracted many students from England and elsewhere; numerous investigations carried out there were published by the Botanical Society of Geneva. Chodat, like other Swiss botanists, was greatly impressed by the numerous Mediterranean plants found in the upper Rhone valley of Switzerland, and his careful observations led him to the conclusion that many, if not most, of them had been distributed from the south across the mountain passes and had not, as was formerly supposed, immigrated by way of the Lake of Geneva.