itself. I believe that this analysis is the justification of the course itself. It shows the advantage of confronting in a series of lectures the old classic data with the modern tendencies, all of which have to be brought into agreement. The crisis of transformism which Le Dantec announced some eight years ago is very much more acute and more in evidence now than it was then. In making this analysis, I have been able to furnish you in advance with an outline to the following lectures which together will form four successive parts; first, a rapid examination of data contributed to the support of the transformist conception by morphology in its different aspects (comparative anatomy, embryology, paleontology); second, the examination of the principal dynamic explanations of transformism, above all Darwinism and Lamarckism; third, a study of the main principles of genetics, and fourth, a few final lectures in which we shall review all the data.

A course on evolution might seem *a priori* a hypertrophy to a program of studies, and in fact it is nothing but an extremely restricted scheme for examining important questions and the many investigations which this line of study has brought forth. All I can do, then, is to confine myself to a general view of the question, limiting myself to facts and essential data.

M. CAULLERY

SIR CLEMENTS R. MARKHAM

SIR C. R. MARKHAM, the famous geographer and explorer, who died in his London home, January 30, from burns caused by the overthrow of a candle, was in many respects a very remarkable man and his services to his fellows deserve to be widely known. He thought so little of himself that he did not trouble even to have a correct notice in "Who's Who in Science," nor did he talk or write of his own doings, so that, having survived most of his contemporaries, few were aware how much the modern world is indebted to him. Due to his sagacity and enterprise was the introduction of the quinine-producing shrub in India and the East; through his energetic work for twenty-five years as secretary to the Royal Geographical Society, and later as president, there was a vast increase in geographical knowledge and scientific exploration, whilst his published books on many diverse subjects were almost all on original ground. They would form an excellent course of study for any young man desirous to train mind and judgment on a good foundation. Each is a mine of careful research and accurate information, with utmost simplicity in presentation. There is no writing for effect and no self-exploitation; the narrative flows along easily and the reader can enjoy it as evidently the writer did.

Born in 1830, the son of the Vicar of Stillingfleet, Yorkshire, he entered the navy in 1844 and began his adventures hunting Riff pirates in the Mediterranean. In 1850, when the expedition in search of Sir John Franklin's party was preparing, he applied to join, and being refused on account of his youth, it is said that he sat down on the steps of the Admiralty and declined to move until the decision was reconsidered. Leaving in May, 1850, they returned in the autumn of 1851, having explored 300 miles of coast to about meridian 115 degrees on Melville Island, and in "Franklin's Footsteps" (published 1853), young Markham gave a spirited account of all they had seen. After wintering on Griffith Island, parties were sent in different directions over the ice, dragging by hand sledges with their limited provisions; McClintock's party covered 770 miles in 81 days, going 300 miles in a direct line from their ship. Markham was with a small party who went 140 miles in 19 days with one sledge. No wonder he spoke with genial scorn at a recent British Association meeting, of the modern polar explorer with every contrivance for comfort.

This expedition did not succeed in discovering the fate of Sir John Franklin and his crews, but it was one of twenty or more undertakings which between 1847 and 1857 went into the unknown north and turned the map of the Arctic circle from a blank into a well-charted region of desolate land and ice.

In 1852 Markham retired from the navy in order to travel and went to Peru, chiefly to study traces of the Incas. Reaching Lima from Panama, he rode on horseback along the coast south as far as Nasca, noting the wonderful Inca system of irrigation (the main trenches four feet high with roof and sides of stones) and then turned inland up to Ayacucho, and by Ollantaytambo to Cuzco. From there he went on by Paucartambo down the eastern side of the Andes and followed the course of the river Tono as far as its junction with the Purus. The Purus at that time was unexplored and there are other great blanks in the map made by Markham in 1859 for his Hakluyt edition of the early Spanish expeditions to the valley of the Amazons. In the course of this trip he learned Quichua, being at places where every one spoke that language, and he copied and studied the ancient native drama of Ollanta. Everywhere he got on well with the people, receiving hospitality in private houses, traveling with no luggage except saddlebags and making light of difficulties in the fashion of those days. He returned by sea from Islay to Lima. The pleasantly written "Cuzco and Lima" (1856) contains much general information and a chapter on Quichua grammar, a subject of study for the rest of his life. In the Introductory to the grammar and vocabulary published in 1864 he wrote:

> Ever since I was a midshipman on the Pacific station the land of the Incas has had for me an indescribable charm. I greedily devoured the pages of Prescott while anchored under the shadow of the mighty Cordilleras; and the story of the conquest and of the gentle children of the Sun, made an impression on me then, which time will never efface.

He goes on to say that, unable himself to continue the study of Quichua in the Andes, he hopes that his work may help others to make a start where he was obliged to leave off. In 1871 he published "Ollanta," from a good copy possessed by P. Justiniani (a descendant of the Incas), with an English translation. A revised translation forms the appendix to "Incas of Peru" (1910). He was assured by the natives in 1853 that the drama was undoubtedly composed before the Spaniards came:

> No European language can describe an action with anything like the precision and accuracy combined with brevity, of which Quichua is capable and the wonderfully abundant vocabulary produces great variety in composition.

This trip to Peru led to a second, for he had seen the shrub of the Peruvian bark and its use for malarial fever, and urged its introduction into India.[1] The Secretary of State for India consequently charged him with this important mission and in "Travels in Peru and India" (1862), he described his successful efforts. The Ecuador forest region he entrusted to R. Spruce,[2] who searched the western slopes of Chimborazo, took 1,000 cuttings and made a large number grow. He also collected seeds after carefully watching them ripen. Pritchett was told to collect in Huanuco and Markham himself reached Islay in March, 1860, and went first to Puno in the hope of interesting the Bolivian government but found opposition to any plan that might interfere with the local monopoly. He therefore went down to the Montaña over Peruvian ground by the Tambopata valley to Sandia in Caravaya, with Weir, a collector. There he found three desirable species, *C. micrantha* growing nearest the river, *C. Calisaya* in a zone above and *C. ovala* in a third zone, six to eight hundred feet above the river. He brought away 529 plants of six species, chiefly *C. Calisaya* and *C. morada,* returned safely by Lima and Panama to England and thence conveyed his precious cargo to India and the

[1] It was then excessively costly, as the collectors cut down the trees to get the bark.

[2] See Spruce's "Diary," edited by Alfred Wallace, 1908.

Neilgherry Hills. Successful production of quinine in India and distribution of seedlings all over Burmah and Ceylon reduced the cost so that it could be used by all. Of late years an artificial imitation has been used in the western world and can not be so beneficial. A similar tree with medicinal bark grows in Yucatan and at Cordoba in Mexico.

In the interesting preface to "Conquest of New Granada" (1912), Markham says that he found valuable drawings of the cinchona plants of Colombia by Mutis, in the toolhouse of the Botanic Garden at Madrid and obtained leave for their publication, edited by J. Triana.[3] He afterwards employed Cross to explore the region of *C. Pitayensis* in Colombia, east of Popayan and Timaná, and in 1867 published a translation of the works of Mutis and Karstan on the cinchona genus; also a handbook in Spanish for the use of cultivators.

Having joined the Royal Geographical Society in 1854, he became honorary secretary to the Hakluyt Society in 1858 and thenceforth some of his time was occupied in research for suitable manuscripts that he edited and in most cases translated from old Spanish, no small task. He was private secretary to the Under Secretary of State for India, 1862–64, and in 1865 was sent to Ceylon to report on the pearl fisheries. A military expedition to Abyssinia becoming necessary to rescue the British consul and other captives, Markham was sent as geographer, accompanying the troops to Magdala. In the "History of the Abyssinian Expedition" (1869), he gives admirable descriptions of the people, the geology and natural history of the land, with maps.

From 1863 to 1888, as secretary of the Royal Geographical Society, he had special opportunities to keep polar enterprises before the public. Through his indomitable energy the Nares expedition was fitted out in 1874 and he accompanied it as far as Greenland. He originated and promoted another expedition in 1875–76, when Commander D. Markham succeeded in reaching latitude 83 degrees, 20 minutes and 22 seconds, the highest northern position achieved up to that time. He also worked hard to obtain funds for Captain Scott's first expedition; the tragic end of Scott's party materially shortened his life. African exploration owed much to his encouragement of the pioneers who during the sixties endeavored to reach the sources of the Nile and discovered the great lakes, and at the British Association of 1864 he brought together Livingstone, Speke, Burton, Grant, Kirk and Sir Samuel Baker. Through him the Royal Geographical Society has been of untold benefit to scientific explorers by providing them with skilled instruction in nautical astronomy and surveying, etc. His address on the fiftieth anniversary of the society and the Review of Geography in his "Life of Major Rennell" (founder of modern geography), show the advance of the science until it has seemed to have no more worlds to conquer; for many years he was its inspiration and it took new force and meaning under his guidance.

The Hakluyt Society too has done excellently under him, bringing out many good editions of valuable old works of travel. In his address on the fiftieth anniversary in 1896, Sir Clements said:

> Our editors work gratuitously and for mere love of their authors. Every volume has an introduction and is annotated so as to give the reader all the help he can require in the study of the text.

Continuing with a graceful reference to the United States "whence we receive so much and such generous support," he added:

> The well-being of the Hakluyt Society is a symptom and not an insignificant one, of healthy tendencies of thought and healthy aspirations among the peoples who speak the English language.

The Founder's Medal of the Royal Geographical Society was bestowed on him in 1888; he was president from 1893 to 1906, remaining as vice-president to 1912; was also president of the International Geographical Congress, 1895–99; admitted as F.R.S., in

[3] "Nouvelles études sur les quinquina," Paris, 1870.

1873, and as F.S.A. about the same time and was president of the Hakluyt Society from 1889. In 1896 he was given the K.C.B., and other honors included a grand prix at the Paris Exposition of 1867 for the introduction of the cinchona cultivation into India; the order of the Rose from the emperor of Brazil, and of Christ from the king of Portugal. He married in 1857 a lady of the ancient family of Chichester. It is remarkable that the two branches of the family, both living in Devon, have never intermarried since the reign of Edward the Second, about 1310.

With Lady Markham he attended the meetings of the International Congress of Americanists at Stuttgart (1904) and Vienna (1908), and as president of the eighteenth congress (London, 1912), his support was most generous and energetic. He had hoped to take part in the nineteenth congress, held in Washington, December 27–31, 1915, for his heart was always drawn towards South American research, and he desired to aid it as far as possible. In a written message to members of the congress, he said:

I regret extremely to be unable to attend, for I am deeply impressed with the great value and importance of these meetings. They are intended, as one main object, to supply to the minds of young explorers and students the best methods of obtaining accurate information and of using it when obtained. I think it should be impressed upon the rising generation of Americanists that study alone is insufficient for securing really satisfactory results; and that exploration and the collection of antiquities is not enough. The two branches must be combined. The study and use of authorities is by far the most difficult. In using them the character of the authority to be used must be carefully considered as well as his opportunities and his date. One great stumbling block for young students, whether in the study or in the field, is the adoption of a theory, leading to the search for its support. . . . A true worker should have no theory.

I wish to submit my view to the congress that there is a splendid field for almost a life work in a study of the ancient civilization in the Peruvian coast valleys from Tumbez south. As yet it has not been touched by any one who is alike a diligent student with a profound knowledge of all that has been written in the past, together with the surveying, architectural and mechanical acquirements needed for a thorough examination of all that is to be found on the spot, and in museums. . . . I look upon a complete and thorough investigation of the history of the Chimu kingdom as one of the chief Americanists' desiderata.

Sir Clements Markham's life was full of achievements, such as would have been possible only to one fitted with extraordinary power and versatility. To have established in India and throughout the East, as he did, the cultivation of a prophylactic for the desolating malarial disease was a great service to humanity. Of boundless enthusiasm and tenacity of purpose, his ambitions were of the highest type, and his appreciation of the efforts of others to reach the points at which he aimed, was generous to the extreme. He was indeed a man in whom his countrymen could discern the best and most sterling qualities of their race.

A. C. B.

PRINCIPAL CAUSES OF DEATH IN THE UNITED STATES

ACCORDING to a preliminary announcement with reference to mortality in 1914, issued by Director Sam. L. Rogers, of the Bureau of the Census, Department of Commerce, and compiled by Mr. Richard C. Lappin, chief statistician for vital statistics, more than 30 per cent. of the 898,059 deaths reported for that year in the "registration area," which contained about two thirds of the population of the entire United States, were due to three causes—heart diseases, tuberculosis and pneumonia—and more than 60 per cent. to eleven causes—the three just named, together with Bright's disease and nephritis, cancer, diarrhea and enteritis, apoplexy, arterial diseases, diphtheria, diabetes and typhoid fever.

The deaths from heart diseases (organic diseases of the heart and endocarditis) in the registration area in 1914 numbered 99,534, or 150.8 per 100,000 population. The death or mortality rate from this cause shows a marked increase as compared with 1900, when it was only 123.1 per 100,000.

Tuberculosis in its various forms claimed 96,903 victims in 1914, of which number 84,366