are secreted but not reabsorbed. From these masses of material we could separate very significant amounts of dihydrocholesterol, but koprosterol was not found.

As a result of these observations we had proved that the dihydrocholesterol after its formation in the tissues actually is secreted through the intestinal wall. This clarifies the metabolism of dihydrocholesterol but not of koprosterol. Since koprosterol was not found in the tissues but always in larger amounts in the feces, we must still assume that it is a product of the bacterial action in the intestines even though we have not been able to reproduce the same *in vitro*. We must consider that up to the present it has not been possible to cultivate all of the intestinal bacteria and it is very probable that any one of the difficultly cultivatable anaerobes may be able to bring about this change. It is hoped that the near future may throw light on this question.

To us the most important question now appeared to be, what is the significance of this intermediary hydrogenation which leads to the formation of dihydrocholesterol in the animal? The question may also be formulated to read: What is the source of the hydrogen which leads to the hydrogenation of the double bond in cholesterol? In view of this process existing in both animals and plants we must conclude that we have under consideration a general biological process in which the cholesterol functions as hydrogen acceptor. According to the Wieland dehydrogenation theory, it was necessary to assume that this hydrogen originated from other organic substances which yield hydrogen and thus became unsaturated. This hydrogen yielding substance was expected to be found among the other lipoids associated with which cholesterol occurs in nature.

Since the amount of dihydrocholesterol formed daily is very small, a working hypothesis was advanced that the formation of dihydrocholesterol is associated with the formation of fat soluble, highly unsaturated, but biologically very active substance. Such a substance, for example, would be ergosterol which possesses a structure very similar to cholesterol, but which has three double bonds instead of one as in cholesterol. I stated that ergosterol is very difficultly, if at all, absorbable and since it is present in all animal tissues it led to the view that animals as well as plants possess the power of forming the ergosterol. If this is the case, then it is also possible that we might have formed simultaneously from cholesterol both dihydrocholesterol and an ergosterol-like body.

Recently Koch, Koch and Kraus-Ragins,[18] carried out a very illuminating experiment. When cholesterol, freed from the last traces of ergosterol, was heated at a high temperature without access to oxygen, a new substance was obtained which, after irradiation by ultra-violet light, possesses antirachitic activity.

We have modified these experiments for our purposes and have worked with cholesterol preparations which were not only free from the last traces of ergosterol but also of dihydrocholesterol.[19] When these preparations were heated to high temperatures in a high vacuum with a complete exclusion of oxygen there was obtained a small amount of a saturated sterol which very likely is dihydrocholesterol. At the present time we have only a very small amount of this difficultly obtainable substance, so that we have not been able to identify it accurately. The formation of this saturated sterol and of the antirachitic body can, however, not be explained in any other way than to suppose that a small part of the cholesterol has been converted by dehydrogenation into an ergosterol-like body with the probable introduction of two new double bonds and that at the same time there is formed in another part of the cholesterol a completely saturated sterol due to the liberated hydrogen.

We have not always succeeded in carrying out this reaction because it appears that a catalytic agent may be involved. This reaction makes it appear very probable that the animal body may also be able to carry out a similar process and that the dihydrocholesterol found by us is in fact associated with the formation of the ergosterol. This interpretation must, however, be confirmed by further experimentation.

In this lecture I have referred only to the most obvious results of our work. On account of lack of time I have unfortunately not been able to discuss the methods which are so very important in all experimental work and serve as a basis for a critical evaluation.

NATIONAL PARKS IN AFRICA

THE EXTENSION OF WILD-LIFE CONSERVATION

By MARY L. JOBE AKELEY, A.M., Litt.D.

SECRETARY OF THE AMERICAN COMMITTEE FOR THE PARC NATIONAL ALBERT

THE first national park created in the great continent of Africa is the Parc National Albert, established by royal decree of Albert, king of the Belgians, in 1925. Here, in the Kivu District of the Belgian Congo, are found the rare mountain gorilla (*gorilla gorilla berengei*), to-day of increasing scientific importance. Living side by side with the gorilla on the

[18] Koch, Koch and Kraus-Ragins, *Jl. Biol. Chem.*, 85, 102, 1929.

[19] Schoenheimer, *Naturwissenschaften*, 18, 881, 1930.

cool wooded slopes of the extinct volcanoes, Mikeno, Karisimbi and Bishoke, are leopard, elephant and buffalo. Pygmies, still primitive and unspoiled by the white man, dwell in the lower reaches of the gorilla forest. Along the shores of Lake Edward and on the nearby sandy plains (areas added in 1929), are herds of antelope such as are found in British East Africa. Great herds of hippo frequent not only Lake Edward but also the slow-flowing Rutshuru River. Now that this first national park has become a reality, Belgian conservationists are planning to increase their sanctuaries for conservation and research in the Belgian Congo. Parc National Albert will be followed by two new Congo park projects, Parc Leopold and Parc Ruwenzori.

Immediately after his 1921–22 expedition for the American Museum of Natural History, the naturalist and conservationist, Carl Akeley, called the attention of scientists as well as of nature lovers to this remote and beautiful part of the world. While securing there a group of gorillas for a natural history exhibit for African Hall, he was unwilling to take any life needlessly. He collected only five—one half the number of specimens permitted him by the Belgian Government—because he believed this number sufficient to serve his scientific purpose. While observing the gorillas at close range, he became impressed by the non-combative nature of these animals when undisturbed by man. He also was greatly surprised by the small number of gorillas inhabiting the forests of the extinct volcanoes, Mikeno, Karisimbi and Bishoke, in which they had been reputed to be plentiful. He knew that many "mighty hunters" of big game were at that time eager to hunt and kill gorillas in order to have a new sport and new trophies. Since he believed it would be an easy matter to exterminate the whole colony because of the nature of the gorilla and because of the scarcity of the animal, he began to advocate a gorilla sanctuary for the protection of the great ape as well as of all other wild life, both plant and animal. Of the greatest importance to his project were Mr. James Gustavus Whiteley, Belgian consul general at Baltimore, and Dr. John C. Merriam, president of the Carnegie Institution of Washington, who recommended this gorilla sanctuary plan to Baron Emile de Cartier de Marchienne, then Belgian ambassador to the United States. The ambassador took it directly to King Albert, who was so impressed by the desirability of the measures advocated that he created the Parc National Albert in 1925.

Shortly after the Parc was established, my husband requested Belgian permission, through Baron de Cartier, to return to the Congo. To secure studies for a painted background and accessories for the Gorilla Group and to carry on initial investigations of the gorilla in his native haunt were the objects of our 1926 expedition to the Kivu—the Akeley-Eastman-Pomeroy African Expedition for the American Museum of Natural History. On our way to Africa in February, 1926, my husband and I went to Brussels, where we were entrusted with the royal mission to the Kivu, which empowered us to execute a general survey of the new national park. Later we invited Dr. J. M. Derscheid, zoologist and cartographer of Brussels, to join us in Africa to assist with this survey. After my husband was called to the Great Beyond, three days after we reached his 1921 camp in the gorilla forest, Dr. Derscheid rendered invaluable service to our expedition so that we fulfilled the Belgian royal mission. On my return to Europe, I was requested by King Albert to give him personally a preliminary account of the results of our expedition. In Brussels in 1928, Dr. Derscheid and I prepared our report and our recommendations for the Belgian Government concerning the future of the Parc National Albert. According to the original decree, the park was limited to a triangular area comprising the three extinct volcanoes, Mikeno, Karisimbi and Bishoke. We now proposed that this area be extended so as to include Nyamlagira and Nyiragongo, active volcanoes of importance to geologists and seismologists; that it should include the southern shore of Lake Edward and the Rutshuru River, where animal life is abundant; that certain native villages and arable lands be excluded in order to avoid any future conflict between native rights and the economic development of the country on the one hand and the interests of science on the other; and, for the promotion of scientific research, that there should be established a central station for research and administration, including laboratories, library and study museum, and also that ranger stations should be built throughout the park. In conclusion, we recommended that the management of the park be placed in the hands of a scientific institution so favorably situated as to obtain financial and scientific help both in Belgium and in foreign countries.

King Albert received us at the Royal Palace on October 8, 1928. There, our report was submitted and throughout a long and interesting evening the future of the park was discussed. Subsequently, the royal decree of May 6, 1929, increased the park domain to 500,000 acres, according to our proposals, and provided therein for the preservation of all fauna and flora for strictly scientific purposes. The decree also stipulated that the park is to be administered by the *Commission du Parc National Albert* and by a committee of direction. His Highness Prince Eugene de Ligne was named president. In the park, it is forbidden, under penalty of penal servitude, or fine, or both, to pursue, capture, kill or molest in any way any kind of wild animal, including animals which are

reputed harmful; to take or destroy the eggs of wild birds; to cut down, destroy or remove any uncultivated plant; or to make any excavation, embankment, boring or any operation of a nature to change the aspect of the ground or of the vegetation. Unless provided with a special permit, no one (except officials and others properly qualified) may enter the park, or circulate, camp or sojourn therein, or introduce dogs, traps or firearms, or possess or transport or export skins or other parts of wild animals, or uncultivated vegetable products. Lands now occupied by natives or private persons are to be expropriated. Even on these tracts under private or native occupation, the destruction, capture or pursuit of the gorilla as well as all forms of hunting this animal are absolutely forbidden.

Around the park proper is a zone of protection. In it cutting down trees, hunting and fishing are prohibited. The few natives who live therein will not lose their hereditary rights, but they may employ only their primitive weapons. The Belgian Government will pay the strictly administrative expenses of the park, maintaining a corps of conservators and native police.

In October, 1929, King Albert formally installed the *Commission du Parc National Albert,* a body of eighteen scientists chosen from England, Sweden, the United States, France, the Netherlands and Belgium. In his address at the *Palais des Académies,* Brussels, His Majesty described the park as unique because of its widely diversified scientific opportunities. He emphasized the varied aspects of the region, "which are of interest not only to geologists and mineralogists, but which are remarkable from the point of view of ethnography as well, since Bantu and Hamitic tribes as well as pygmies (Batwa) are simultaneously present."

In 1930, the American Committee for the Parc National Albert was formed to cooperate with the International Committee in the matter of scientific research. His Highness, Prince Albert de Ligne, at that time Belgian ambassador at Washington, who from the beginning has been most active in forwarding the plans for the park, was named by His Majesty chairman of the American Committee; Mary L. Jobe Akeley was appointed secretary. In addition to the two American members of the International Commission, Professor Henry Fairfield Osborn and Dr. John C. Merriam, the Prince de Ligne subsequently appointed as members of the committee Mr. Stanley Field, president of the Field Museum of Natural History, Chicago; Dr. Vernon L. Kellogg, of the National Research Council, Washington; Dr. Robert M. Yerkes, of Yale University; Dr. George W. Crile, of Cleveland; Dr. Lewis H. Weed, of Johns Hopkins University, Baltimore, and the Hon. James Gustavus Whiteley, Belgian consul general at Baltimore.

At a meeting of this committee, in December, 1930, at the American Museum of Natural History, New York, the Prince de Ligne, who was leaving America shortly thereafter to take up his duties as Belgian ambassador at Rome, resigned his office. Dr. Merriam was elected president to succeed him. At this time, it was decided to enlarge the American committee in order to afford a national representation. Subsequently Senator Frederic C. Walcott and Mr. George D. Pratt were elected as new members, and more recently, Dr. William K. Gregory, of Columbia University. The committee's purpose now is to bring the Parc National Albert and other similar undertakings in Belgian Africa in closer contact with American scientific and conservation organizations, as well as to secure support for these projects.

Dr. J. M. Derscheid, now *administrateur-général* of the park, present at this meeting, reported the progress of the Kivu park as well as detailed plans for the further extension of the park system in Belgian Africa. The newly projected Parc Leopold, near the northern border of the Congo, will comprise an area of 1,000,000 acres. Lying north and east of the Parc National Albert will be another new park, Parc Ruwenzori, adjoining the Belgian Congo-British Uganda boundary. The Congo park areas will thus total 2,000,000 acres.

Pending the official establishment of these new parks, activity has been concentrated in the Parc National Albert. Patrols of native scouts are on guard to prevent the killing of any wild animal and the destruction of plant life. Meanwhile the Belgian Government has appropriated funds for the maintenance of the park service, and has advanced a loan of two million francs, to begin immediate construction of a central station for scientific research. This station will be erected on a grant of twenty acres in the heart of the government post at Rutshuru. Here will be the central library, containing a collection of all the scientific treatises relating to the fauna, flora and geology of Central Africa; a study museum, for which will be collected all the animals indigenous to the immediate vicinity; laboratories, equipped for the use of zoologists, botanists, seismologists and geologists. Provision is being made for a chemical laboratory and a photographic wing. Nearby will be an assembly hall, administrative offices and living quarters. All these buildings are designed for the use of white men unaccustomed to the tropics. Although only one degree from the equator, Rutshuru is white man's country because its 5,000 foot elevation lifts it out of the torrid zone.

This central station, moreover, is now connected

with the outside world by a motor road to the Upper White Nile by way of Beni and Irumu—and thence by water and rail to the Mediterranean. Another road will soon connect with Kisumu, Uganda, and thence by train to Mombasa, the port of entry to Kenya Colony on the Indian Ocean. However, avenues of easy approach to this region will by no means result in letting down the barriers into the park so far as the outside world is concerned. One of the most important points in the scientific creed of the park is that therein the primitive shall be preserved! In addition to the general policy of absolute protection, certain designated areas will be kept wholly free from human intrusion, except as an emergency may demand.

Of especial significance in connection with international effort for immediate conservation are two recent addresses delivered in London—one by Major R. W. G. Hingston before the Royal Geographical Society on March 9, 1931, the other by Sir Peter Chalmers Mitchell on September 24, 1931.

Major Hingston recently returned from an African expedition which was approved by the Secretary of State for the Colonies and the Joint East African Board and at the request of the Society for the Preservation of the Fauna of the Empire. After visiting Northern Rhodesia, Nyasaland, Tanganyika, Kenya and Uganda, he has prepared a scheme for ten British national parks for Africa. He says:

> Of all the assemblages of wild animal life that of Africa is by far the most important. In the abundance and variety of its constituents, in the immense size, the unique character, and what we must call the prehistoric appearance of its examples there is nothing to compare with it in any other continent. The elephant, rhinoceros, hippopotamus, giraffe, okapi, gorilla are perhaps the most impressive manifestations of the creative force that to-day exist on the earth. Fortunately it is an expression of general feeling that the final extinction of these extraordinary creatures would be a gigantic calamity. Nevertheless it is equally true that these and many other types of the African fauna can not under existing conditions hope to survive far into the future. It is as certain as night follows day that unless vigorous and adequate precautions be taken several of the largest mammals of Africa will within the next two or three decades become totally extinct. Should that occur then assuredly we shall have abused a trust and future generations will judge us accordingly.
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> Every large animal of whose extinction we have any record has been eradicated by human agency. Confining ourselves to the African fauna, the great blaubok, which inhabitated Cape Colony, was annihilated by the farmers in the year 1800; the quagga, which covered the plains of South Africa, was exterminated by the Boers in 1858; the typical form of Burchell's zebra, which existed in British Bechuanaland, became extinct about the year 1910. Certain other species have been so reduced that they may be said to border on extinction. Take for instance the white rhinoceros. Within the lifetime of many of us still living the white rhinoceros abounded in the African continent from the Vaal to the Zambezi. To-day it is reduced to twenty individuals in Zululand and one hundred and thirty individuals along the upper reaches of the Nile. It has been exterminated over half a continent within a space of fifty years. The gorilla, nyala, Grevy's zebra are species which have shrunk to minute numbers and are on the verge of disappearance. The whole African fauna is steadily failing before the forces of destruction brought to bear against it. Great and small, everything is retreating. And the saddest aspect of the melancholy picture is that it is the largest and most extraordinary examples which are yielding most rapidly in the conflict. I doubt if any of the great pachyderms, the elephant, rhinoceros, and hippopotamus, will, if present conditions continue, survive beyond the next fifty years.

He enumerates the four forces causing the annihilation of wild life: (1) The spread of cultivation; (2) the demands of trade; (3) the activities of sportsmen; (4) the menace of disease.

Stating that the weak point of the game reserve is its insecurity and want of permanence, he continues:

> The national park, in contradistinction to the Reserve, is placed by legislation on a more stable basis. It possesses a title. It is made by Act of Parliament the property of the public forever to be utilized for the sole purpose of preserving the natural subjects within it. It can not be abolished or altered in any way except by subsequent Act of Parliament. This is the most secure and rigid status that can be given to a wild-life sanctuary. It alone offers any reasonable hope that the sanctuary may last into the distant future.
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> There are only two institutions in Africa which at present possess that likelihood of permanency implied in the status of a national park. One is the Kruger National Park of the Transvaal, established in the year 1926. The other is the Parc National Albert of the Belgian Congo, established in the year 1925. Both of these have some reasonable prospect of surviving the economic importunities of civilization. It is the belief of all who desire the perpetuation of the fauna that national parks on this rigid basis should replace the fluent reserves.

For the address of Sir Peter Chalmers Mitchell, I quote from an extract published by the London *Times* of September 25, 1931. The great naturalist reviewed the dangers threatening wild life in every part of the world, and which were increasing with the improvement of transport. "In most countries," he said, "the conscience of the people and of governments is being awakened to the danger, and much is being done, by game laws, the institution of closed times and the making of reserves. Unfortunately these measures are insufficient, and, as he had urged in an address to the British Association in 1912, it is of vital importance that large areas should be set apart for all time, secured against the sportsman and settler and pros-

pector, preferably under international sanction, for the perpetual preservation of the plants and animals and natural beauties they contained. Since 1912 there has been a number of additions, of which the most important are the Kruger National Park, made by the Union Government of South Africa, and the Parc National Albert in the highlands of the Belgian Congo."

"The latter, both from its natural beauty and the animals it contained, he characterized as one of the most interesting in the world. Among other animals it contains some of the few surviving gorillas in the natural surroundings which they have occupied for hundreds of thousands, possibly for millions of years. Across the frontier in Uganda, in territory under British control, there is an area of a few square miles of exactly the same physical features, and occupied either permanently or occasionally by gorillas of the same variety. For several years the Zoological Society of London, the Society for the Preservation of the Fauna of the Empire and other bodies and individuals have urged the Colonial Office to place this area on exactly the same terms of permanent security as the Parc National Albert. The governor of Uganda has declared himself in favor of the proposal, and the Government of Belgium, through the ambassador in London, has begged that this should be done. But the Colonial Office has remained apathetic or obdurate, putting off the decision on one ground or another. It is much to be hoped that this blot may be removed from the reputation of Great Britain."

Obviously the future is full of difficulty and fraught with the gravest danger to wild life, but active effort among scientific men in both Europe and America will undoubtedly advance the movement for permanent conservation under fundamental law. Moreover, the preservation in certain areas of the primitive, wholly unaffected by the aggressive march of civilization, offers a rare scientific opportunity. To accomplish this is now the spirit motivating many who now carry on the fight to save vanishing Africa. Theirs is not a sentimental interest. It is a true understanding and a realization of the urgent need for action. In Africa, at least, Carl Akeley's dream, now become a reality, has halted the juggernaut of mass destruction. Belgium's whole-hearted action is epoch-making in the international possibilities of conservation and of scientific inquiry. Such liberal and broad-minded policy will go far toward influencing other nations and cementing national friendships.

Because the Parc National Albert offers an unparalleled opportunity for scientific investigation it is confidently hoped that interested laymen in America as well as elsewhere may forward the effort for the great central scientific station in the Belgian Congo Park. Practical and sympathetic support will become not only a force contributing to the advancement of science, but it will be of material assistance in the fight for the conservation of wild life under conditions of unusual significance.

SCIENTIFIC EVENTS

DANIEL GABRIEL FAHRENHEIT

DANIEL GABRIEL FAHRENHEIT, inventor of the mercury thermometer, was a native of Danzig. There is some ground for suspecting that the family may have come originally from Königsberg, in East Prussia. At any rate, numerous persons bearing this and similar names have been located there. The letter printed below is translated from the German original, which is to be found in the town archives of Danzig. It was called to the writer's attention by Dr. Recke, the chief archivist of Danzig, who kindly consented to its publication in English. Dr. Recke planned to publish it in its original form in the course of the present year (1931) in the *Zeitschrift des Westpreussischen Geschichtsvereins*. The scheme of Fahrenheit's guardians to have their energetic young ward—then about twenty-one years of age—sent to the most remote of Dutch colonies did not materialize. Except for occasional travels abroad, Fahrenheit remained in Amsterdam and The Hague until his death in 1736, and won his claim to fame in his adopted country. He appears to have begun the use of mercury for thermometers in 1720, and he reported his invention to the Philosophical Society of London in 1724. It may be of interest to note that whereas his own explanation was that he determined his zero point by the behavior of a combination of salt, ice and sal ammoniac, some German authorities insist that Fahrenheit's zero represents nothing else than the coldest day in Danzig in 1709! All accounts agree that the winter of that year was exceptionally cold. If the latter view is valid, this troublesome son of the Free City provides a curious link between Danzig—at its coldest—and that Anglo-Saxon world that has so persistently gauged its temperature by his device.

Mr. Burgomaster and honorable gentlemen [of the Danzig Town Council]:

We, who have been named as the guardians of the minor children of the late Daniel Fahrenheit, have sent his son, Daniel Gabriel, a minor, to Amsterdam by his own consent, to serve in an office, in the hope that he would learn there to conduct himself properly. But things have gone very badly with this minor; he has spent the money given him; and he has behaved himself regrettably in other ways. So, in order to protect the interests of his brothers and sisters, we have been obliged