STANLEY'S DISCOVERIES.

THE accompanying map of the Aruvimi River has been compiled from two sketches, — one published in the *Mouvement Géographique;* the other, in *Nature*, — both being extracts from a map accompanying Stanley's letter. The original will presumably be published in the "Proceedings of the Royal Geographical Society." The names of places appear still somewhat doubtful, being differently given on the two sketches.

Stanley's discoveries form a most important addition to our knowledge of Central Africa. It appears that Mr. Wauters's hypothesis of the connection of the Nepoko and Aruvimi was well founded, as the former is an important tributary of the Aruvimi. It remains an open question whether there is any connection between the Aruvimi and the Mootan Nzige, the southern of the two large lakes. Mr. Wauters presumes that the Lunda (or Lenda), the southern tributary of the Aruvimi, may be the outlet of that lake, but we have to await more detailed reports before we will be able to form an opinion on this point. The tributaries which Mr. Stanley describes in his map have probably been drawn according to reports received from natives.

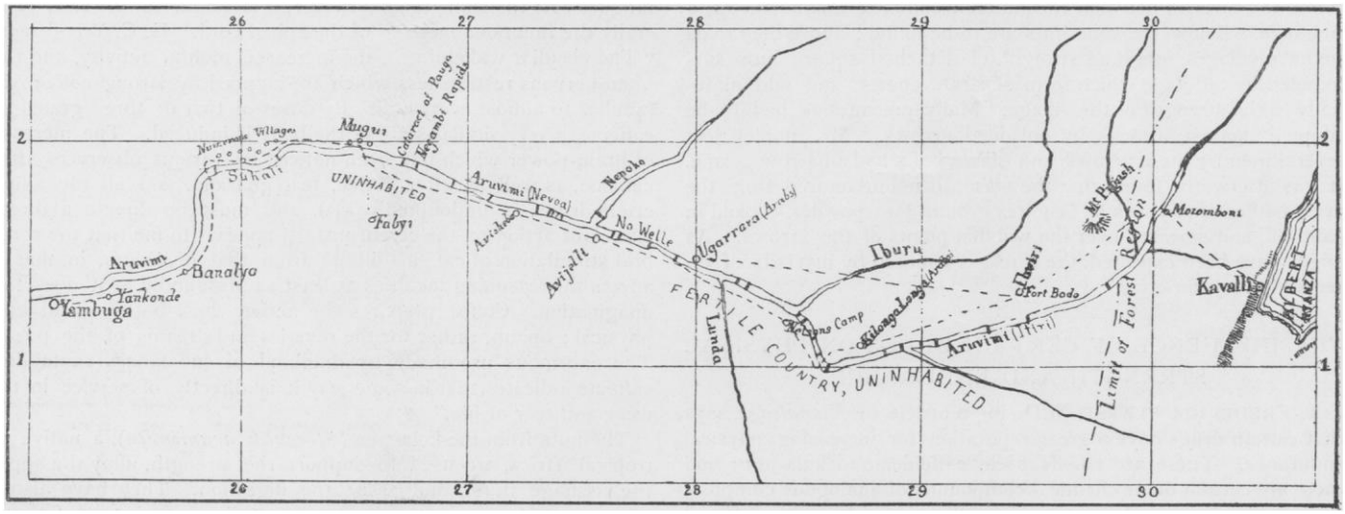
As to the river itself, the Aruvimi is, with its windings, about 800 miles long from its mouth in the Kongo to its source almost on the edge of Albert Nyanza, though the course in a direct line is probably not more than 400 miles. The banks of the river, covered with forest from the Kongo to the Nepoko, are uniformly low, here and there rising to about 40 feet. Above the Nepoko, hills begin to crop up more frequently, palms are more numerous, and the woods show the tall white-stemmed trees so characteristic of the slopes of the lower Kongo. While there are rapids at several places above Yambuga, above the Nepoko navigation becomes much more difficult, and rapids more frequent, while two considerable falls are met with. The land rises steadily, until, about 400 miles above Yambuga, the river is contracted into a rushing stream about 100 yards wide, banked by the steep walls of cañon, the slopes and summits of which are clothed with wood. Whatever changes the face of the land may show, the forest covers peak, hill, ridge, valley, plain: everywhere it is continuous, never broken, except at such clearings as man has made. Mr. Stanley very graphically compares the country traversed by his expedition to the long glacis of a fort rising from the Kongo to a height of from 5,000 to 6,000 feet. Down the slope flows the Aruvimi, one of whose feeders runs almost within sight of Albert Nyanza, to which there is a sudden drop of 2,900 feet.

The main Ituri, at the distance of 680 miles from its mouth, is 125 yards wide, 9 feet deep, and has a current of 3 knots. It appears to run parallel with the Nyanza. Near that group of cones and hills, affectionately named Mount Schweinfurth, Mount Junker, and Mount Speke, Stanley would place its highest source.

It is a most remarkable fact that the source of the Aruvimi is in so close proximity to the Albert Nyanza. Another fact of great interest Mr. Stanley refers to, — the existence of a snowy mountain which may rival Kilima Ndjaro (19,000 feet), in the neighborhood of Mount Gambaragara, or Gordon Bennett, between Albert Nyanza and Muta Nzige. This may be Mount Gordon Bennett itself; but Mr. Stanley does not think so, and he is supported by the few data which he furnishes. It would be quite in accordance with what we find in other parts of the world that a group of high peaks should be found together.

One other point of geographical interest is Mr. Stanley's observation that the Albert Nyanza is rapidly decreasing in size. A century or perhaps more ago, the lake must have been twelve or fifteen miles longer, and considerably broader opposite Mbakovia, than it is now. With the wearing-away of the reefs obstructing the Nile below Wadelai, the lake has rapidly receded, and is still doing so, to the astonishment of Emin Pacha, who first saw Lake Albert seven or eight years ago. It is to be hoped that Mr. Stanley will find time further to investigate this subject, as well as to explore the country between the Albert Nyanza and Muta Nzige, settle the position and outline of the latter, and ascertain precisely to what river system it belongs.

The abruptness with which the forest comes to an end and the



MAP SHOWING STANLEY'S GEOGRAPHICAL DISCOVERIES IN CENTRAL AFRICA.

rich grass-lands begin, about eighty miles from Albert Nyanza, is another point deserving special attention, and can only be explained when we have accurate observations of the rainfall and other conditions that go to form climate.

The character of the forest is entirely different from the open woods, with scanty underwood, of the more southerly parts of Africa. According to Stanley's description, they resemble in character the South American forests. Stanley says: "Take a thick, Scottish copse, dripping with rain; imagine this copse to be a mere undergrowth, nourished under the impenetrable shade of ancient trees ranging from 100 to 180 feet high; briers and thorns abundant; lazy creeks meandering through the depths of the jungle, and sometimes a deep affluent of a great river. Imagine this forest and jungle in all stages of decay and growth, — old trees falling, leaning perilously over, fallen prostrate; ants and insects of all kinds, sizes, and colors murmuring around, monkeys and chimpanzees above, queer noises of birds and animals, crashes in the jungle as troops of elephants rush away; dwarfs with poisoned arrows securely hidden behind some buttress or in some dark recess; strong brown-bodied aborigines with terribly sharp spears, standing poised, still as dead stumps; rain pattering down on you every other day in the year; an impure atmosphere, with its dread consequences, fever and dysentery; gloom throughout the day, and darkness almost palpable throughout the night: and then, if you will imagine such a forest extending the entire distance from Plymouth to Peterhead, you will have a fair idea of some of the inconveniences en-

dured by us from June 28 to Dec. 5, 1887, and from June 1, 1888, to the present date, to continue again from the present date till about Dec. 10, 1888, when I hope then to say a last farewell to the Kongo forest."

Mr. Stanley's description of the daily course of things in the forest region is worth quoting: "The mornings generally were stern and sombre, the sky covered with lowering and heavy clouds; at other times thick mist buried every thing, clearing off about 9 A.M., sometimes not till 11 A.M. Nothing stirs then: insect-life is still asleep; the forest is still as death; the dark river, darkened by lofty walls of thick forest and vegetation, is silent as a grave; our heart-throbs seem almost clamorous, and our inmost thoughts loud. If no rain follows this darkness, the sun appears from behind the cloudy masses, the mist disappears, life wakens up before its brilliancy. Butterflies scurry through the air, a solitary ibis croaks an alarm, a diver flies across the stream, the forest is full of a strange murmur, and somewhere up river booms the alarum drum. The quick-sighted natives have seen us, voices vociferate challenges, there is a flash of spears, and hostile passions are aroused."

Stanley does not give very detailed information regarding the tribes met with, except the statement that five different languages are spoken. He says that Negambi Rapids, about two hundred and fifty miles above the junction of the Aruvimi and the Kongo marks the division between two different kinds of architecture and language. Below, the cone-huts are to be found; above the rapids we have villages, long and straight, of detached square huts surrounded by tall logs, which form separate courts, and add materially to the strength of the village. Many precautions had to be adopted against attacks by poisoned arrows. Mr. Stanley lost several men by these arrows, and Lieut. Stairs had a narrow escape. It was afterwards found that the poison is manufactured from the dried bodies of red ants or pismires ground into powder, cooked in palm-oil, and smeared over the wooden points of the arrows. As might have been expected, the forest is haunted by myriads of insects of every variety.

THE INFLUENCE OF CERTAIN DRUGS ON PHYSICAL STRENGTH AND ENDURANCE.

T. FREDERICK PEARSE, M.D., in an article in *Knowledge*, says that certain drugs have a great reputation for increasing physical endurance. These are chiefly coca, caffeine, and kola-nut; and there are certain other chemical compounds of analogous composition which are derived from muscular tissue, and have been found experimentally to have a similar effect. These are chiefly creatine and hypoxanthine. The chemical relation of all these substances is very interesting. Strange to say, some are themselves the products of muscular waste. It will be noticed, also, that creatine and hypoxanthine occur in beef-tea, which is so well known as a general restorative and as a nervous stimulant, and there is ample experimental proof that it assists muscular power. The chemical relationship of the alkaloids found in tea, coffee, kola, and coca to the products of muscle-tissue metamorphosis suggests that these products are either replaced in the muscular tissue by these drugs, or that the products act on the nervous system either as a food or as a stimulant, and are merely supplemented in their action by the drugs. It is a very interesting question whether these alkaloids act locally on the muscle substance or upon the central nervous system.

As we know that tea, coffee, cocoa, and beef-tea sustain and strengthen the nervous energies when they have been exhausted by other than prolonged muscular action, the inference is that these substances, as well as the analogous products of muscular tissue, act also directly as food or stimulant to the nervous centres. Dr. Pearse has tested and found by experiment the powers of caffeine in increasing the respirations, and in strengthening as well as increasing the rapidity of the heart's action.

The following statements have been made by different writers as to the value of these substances. Of coca, *Markham's Peruvian Bark* says it enables a greater amount of fatigue to be borne with less nourishment, and it lessens the difficulty of respiration in ascending mountain-sides. The *Practitioner* says, "The leaves are chewed to appease hunger and support strength in the absence of food, and used generally for the stimulant and narcotic effects of tobacco and alcohol;" the *Lancet*, "It is of use to steady nerves of excitable persons (to a sportsman in shooting, for example), to give endurance; it is used by travellers in Bolivia and Peru to counteract the effect of rarefied air on mountains." Lauder Brunton writes, "In small doses it is said to lessen fatigue and enable the Indians in Peru to make long marches, and a similar result has been obtained in trials upon soldiers in Germany." Experimentally, coca appears to act in small doses as a stimulant to the nervous system, affecting first of all the cerebral hemispheres, next the medulla, and lastly the spinal cord. It lessens the feeling of fatigue, but the only mental effect seems to be an exhilaration of spirits. Like caffeine, it increases the rapidity of the heart-beat, and raises the blood-pressure.

Experimentally, caffeine has been found, in small doses, to quicken the respiration and also the pulse. It seems to affect the accelerating centre directly, as its action is equally well defined after the nerves have been divided. Besides increasing the rapidity of the heart's action, it seems also to strengthen it, and it raises the blood-pressure. Caffeine also seems to lessen tissue change and waste. In addition, caffeine appears to have some power in paralyzing the conducting power of the sensory parts of the spinal cord, and it may be in this way that it relieves the sense of fatigue. At the same time, however, it is found to increase generally the functional activity of the spinal cord. H. C. Wood says, "The peculiar wakefulness, the increased mental activity, and the often nervous restlessness which are induced by strong coffee are familiar to almost every one. By doses of two or three grains of caffeine, a very similar state of the body is induced. The increase of brain-power which has been noticed by various observers after caffeine, as well as after coffee, tea, guarana, and all the allied crude drugs, is undoubtedly real, and must be due to a direct stimulant action on the cerebrum. It appears to me that the cerebral stimulation of caffeine differs from that of opium, in that it affects the reasoning faculties at least as profoundly as it does the imagination. Coffee prepares for active work both mental and physical; opium, rather for the reveries and dreams of the poets. The enormous use made by mankind of substances containing caffeine indicates that in some way it is directly of service in the wear and tear of life."

The nuts from the kola-tree (*Sterculia acuminata*), a native of tropical Africa, are used to support the strength, allay the appetite, assuage thirst, and assist the digestion. They have also a reputation for increasing the capacity to bear prolonged fatigue. The kola-nuts contain a large percentage of the same chemical principle, theine, as is contained in tea and coffee. They also contain an aromatic volatile oil, to which some of their properties must be attributed. The seeds have been employed as a remedy for drunkenness, and they are said to abate the drink-crave. By virtue of the alkaloids, caffeine and theobromine, contained in kola, it must act as a cardiac tonic, improving both the force and rhythm of the heart. The kola-nut is slightly bitter and astringent, and its reputed value in digestive disturbances and diarrhœa may be based on these properties.

Of all inorganic compounds, the phosphates seem perhaps of the greatest importance in animal tissues. They are found in considerable quantity in the human body wherever active cell-growth is going on. They must be ranked among the most valuable and necessary foods. Their acknowledged value in disorders of the nutritive system of children, and also in convalescence from acute as well as wasting diseases, in all of which rapid growth and tissue development is taking place, is good ground for the practical inference that they are intimately concerned in nutrition generally, and especially in the recuperation of parts worn out by disease. The recovery from prolonged and severe exertion also may very probably be assisted by them. The compounds of the meta-, pyro-, and hypo-phosphates, in which the element phosphorus is loosely combined, seem much more efficacious than the ordinary salt. According to Ashburton Thompson, repeated doses of phosphates improve the appetite, increase the rate of the circulation, sharpen the mental faculties, increase the muscular power, and give a sensation of well-being.