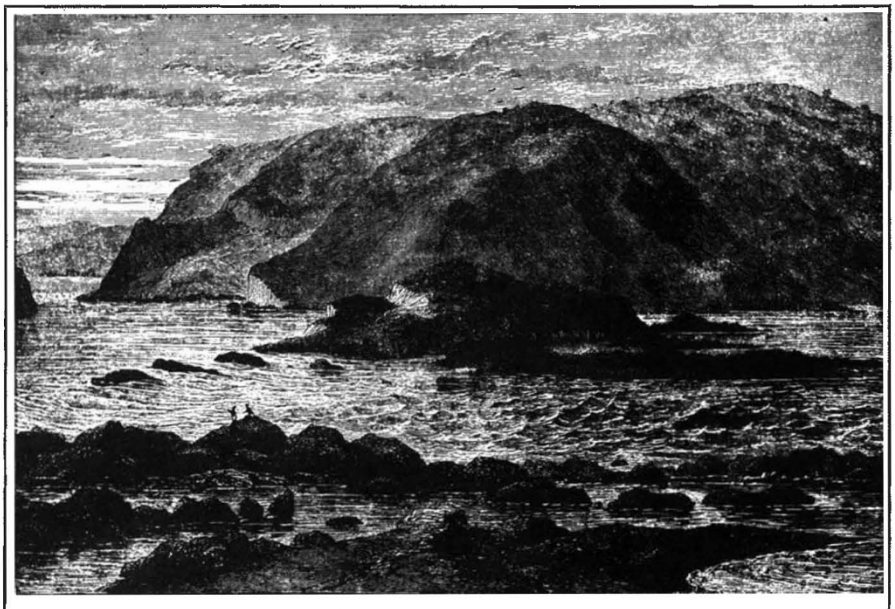
Nature Vol. 258 December 11 1975

self; but his work inevitably brings to mind two previous articles which went largely unnoticed at the time of their publication. Some years ago, Humboldt (*J. Phys. Chim. et Hist. Nat.*, **2**, 314; 1794) reported that when he brought his compass near a large mass of very pure serpentine atop a granite hill in the Fichtel Mountains of Upper Franconia, the needle completely reversed its direction. His conclusion was that the magnetic axes in the serpentine are parallel to the Earth's field but 'reversed' in polarity. Unfortunately, measurements carried out on the same rock by others in 1816 indicated that the polarity reversal was less complete over the whole mass of serpentine than Humboldt had thought, raising some doubt as to the true picture. Seen in the light of the more detailed study of reversed magnetism by Broun, however, Humboldt's discovery must be taken more seriously than hitherto.

An even older example of a compass needle reversing its direction was presented by Castro (*Logbooks of João de Castro*, Portugal, 1538–1539). During an expedition to the coast of India, Castro landed on the Island of Chaul and, placing his compass on a boulder in order to measure the bearings of the island, found that the north end of the needle pointed south. Although he made sure that the rock was not lodestone, Castro failed to record whether or not the boulder was in its original position of formation. The direction of the magnetism in it therefore remains unknown. But magnetised the boulder certainly was; and so Castro must be credited at least with the discovery that rocks other than lodestone can be magnetic.

In summary, then, Castro discovered magnetic rocks, Humboldt discovered reversely magnetised rocks and Broun has demonstrated scientifically that reversed magnetism is genuine. Taken together these are exciting results which pose some fascinating problems for the future. In particular, is a reversal of the Earth's field polarity really conceivable? If, as some still believe, the Earth is less than 6,000 years old, such a reversal might pose several problems of timing, for it is hardly to be imagined that so radical a change in so fundamental a phenomenon as the Earth's magnetism would be rapid. On the other hand, if, as Phillips (*Life on Earth: Its Origin and Succession*, Macmillan, London, 1860) suggested earlier this year, the Earth is 96 million years old, this difficulty would recede. □



The Yellala (rapids) of the Congo River.

Two Trips to Gorilla Land and the Cataracts of the Congo. By Richard F. Burton. Two vols. (London: Sampson Low and Co., 1876.)

The chief interest of the second volume is connected with the Congo river, up which Burton journeyed as far as the Yellala, or rapids, which he calculates to be between 116 and 117 miles from the mouth, the total fall in that distance being 390 feet, of which 195 feet occurs between the Yellala and Boma, 64 miles. From the Great Rapids to the Vivi or lowest rapids, a distance of five miles, the fall is 100 feet. Some important facts are given as to the character of the Congo mouth and the changes which are constantly taking place, which must even yet be of value to chart constructors.

The author gives a minute and graphic description of the river and its many reaches between Boma and the rapids; the scenery on the banks is often quite Rhine-like in its character. The river itself Capt. Burton regards as one of the noblest in the world. With a valley area of 800,000 square miles, it has a yearly mean volume of 2,500,000 cubic feet per second, nearly four times that of the Mississippi, which has a very much larger drainage area.—(*Nature*, **13**, 123; October 16, 1875).

Second messengers in synaptic transmission

from a Correspondent

A satellite symposium to the Fifth International Meeting of the International Society of Neurochemistry entitled New First and Second Messengers in Nervous Tissues, was held at Brescia, Italy, on August 28–30, under the auspices of the Department of Pharmacology of the Brescia Medical School. It was organised by the Chairman, Dr Marco Trabucchi.

Cyclic nucleotides that function as second messengers in synaptic transmission not only mediate the first messenger-elicited changes in ionic membrane mechanisms but also participate in the regulation of the expression of the metabolic code. They can either enhance template activity or increase RNA polymerase II activity. This important progress in our understanding of how metabolic responses are regulated trans-synaptically in postsynaptic cells was reported during the symposium.

D. M. Chuang *et al.* (National Institute for Mental Health, Saint Elizabeth's Hospital, Washington, DC) reported that in rat adrenal medulla during a trans-synaptic sustained stimulation of postsynaptic nicotinic receptors or by the injection of specific receptor agonists, the 3′,5′-cyclic adenosine monophosphate (cyclic AMP) content increases by about 10-fold. The onset of this increase is coupled with stimulus application, but its duration is regulated independently. They have shown that a complex self-regulatory mechanism involving protein kinase, an activator of cyclic nucleotide phosphodiesterase and a high K_m cyclic nucleotide phosphodiesterase regulates the extent and duration of the cyclic AMP accumulation elicited in chromaffin cells by sustained trans-synaptic stimulation of adenylate cyclase. A low molecular weight protein, stored in the membrane of chromaffin cells, can be released *in vitro* from membrane preparations of adrenal medulla following phosphorylation of membrane proteins by a cyclic AMP-dependent protein kinase. As described by Cheung (*J. biol. Chem.*, **246**, 2859; 1971), this low molecular weight protein activates cyclic nucleotide phosphodiesterase by lowering the K_m of the high K_m enzyme which possesses a high catalytic capacity. Hence, in chromaffin cells, by lowering the