ceived that when the absorbent sodium-vapour was very dense and the dark line very broad a peculiar bend outwards appeared in the spectrum at the ends, and on opposite sides, of the line. The cone of sodium vapour in the Bunsen flame acts as a prism with upward horizontal refracting edges. If glowing sodium vapour give dispersion, this cone should give, with horizontal rays passing through it, a vertical (though necessarily impure) spectrum; and if the rays have also passed through a glass prism with horizontal refracting angle, a spectrum of the form above described should be got. From the position, the refractive index of the vapour is greatest for those rays which are most deflected downwards. In agreement with the author's researches on solid bodies and liquids, the refractive index increases greatly as you approach the band from the red side, is less on the green side than on the other, and then quickly increases again. If an actual prism of glowing sodium vapour could be produced, one might observe, even with little thickness of vapour, indications of anomalous dispersion in the narrow absorption lines. Herr Kundt's attempts, however, to change the cone-shaped flame, by means of lateral plates of glass or mica, to a prismatic one, led to nothing.

In a recent paper on the theory of inconstant galvanic elements (*Wied. Ann.*, No. 6) Herr Exner contends that the so-called galvanic polarisation in elements has no existence. The distinction between a Daniell and a Smee element is merely quantitative, not qualitative. What does he mean?

GEOGRAPHICAL NOTES

WE understand that a letter was received in London last Saturday from a member of one of the Belgian Expeditions in Central Africa, stating that he had met Mr. Thomson, with the African Exploration Fund's Expedition, on May 18, at a place some ten days' march from Simba's, so that the party had evidently found it necessary to return to the coast by the caravan route to Bagamoyo or Saadani instead of following the original plan of coming out at Kiliwa. It is probable that the change of route was necessitated by civil wars among the native tribes. Mr. Thomson has thus had an opportunity, not contemplated at the outset, of passing through a considerable tract of unknown country between the south-east of Lake Tanganyika and Unyan-yembe, and it is satisfactory to know that in so doing he has been able to visit Lake Hikwa and settle its proper position, which has been a puzzle to geographers for some time. In a map accompanying the account of Mr. H. B. Cotterill's journey with the late Capt. Elton northwards from the head of Lake Nyassa, this lake is placed with dotted lines in a position which is probably a good deal too much to the south and east of its true locality. The letter above referred to added that Mr. Thomson was in excellent health, and that he claimed to have traversed 2,000 miles of unknown country in the twelve months he had then been on the march. A telegram from H.M.'s Consul-General at Zanzibar, dated July 17, announces the safe return of Mr. Thomson and his party.

MR. ALFRED RABAUD, president of the Marseilles Geographical Society, has just published (Marseilles: Barlatier-Prissat) a brochure entitled "L'Abbé Debaise et sa Mission géographique et scientifique dans l'Afrique centrale," which is accompanied by a photograph of the deceased traveller.

PROF. R. J. VETH, president of the Dutch Geographical Society, has just issued in Italian (Turin: Guido Cora), "Notizia de Selajar et Isole Adiacenti," which is illustrated by an original map of Selajar and other islands of the Celebes group, together with a note by Signor Cora.

THE *Travailleur*, with the French Government Expedition for the exploration of the Bay of Biscay, left Bayonne on July 17, having on board MM. Milne-Edwards, father and son, Vaillant, of the Natural History Museum; Fischer, assistant naturalist; Marion of Marseilles, Fohn, Perin, and the English naturalists, Dr. Gwyn Jeffreys and the Rev. Mr. Norman. The results of the expedition may be described at the Swansea meeting of the British Association.

NEW SCHEME FOR DIRECTING BALLOONS

M. GABRIEL YON, one of the directors of the great Giffard captive balloon, and Mr. E. A. Pearse of Bristol, have each published a pamphlet on the direction of aërostats.

The balloon of each inventor is to be elongated according to the principles of the experiments tried by Giffard in 1852 and by Dupuy de Lôme in 1871. The propeller is to be moved by a gas-engine in the Pearse balloon, and by a steam-engine in the Yon balloon. M. Yon proposes to use the gas of the balloon as fuel, but only in proportion to loss of weight produced either by uncondensed steam or by consumption of petroleum.

Nothing can be said to be really impracticable in the Pearse scheme, although Mr. Pearse lacks the aeronautical training which distinguishes M. Yon, an aeronaut who ascended with M. Giffard in 1854, and has witnessed all his experiments. The only essential difference between M. Giffard's scheme and the new system is the place given to the fan, which M. Giffard attaches to the car. Practice will only decide whether the alteration projected is an improvement or otherwise. The reason alleged for the change is the bringing of the fan nearer to the centre of resistance. But it obliges the aeronaut to give to his fans a very small diameter, which requires an immense number of rotations in a second, and consequently represents a loss of power.

The calculations appear to have been made with care by M. Yon and Mr. Pearse. A trial would be greatly desirable, although it is impossible to suppose that the aerial carriage of Mr. Pearse or the directing balloon of M. Yon can possibly bring aeronauts to the North Pole for their inaugural trip, they may be instrumental in eliciting useful facts. We may add to the peculiarities of M. Yon's scheme that he uses a small globe inclosed in the lower part of the aërostat called a compensation sphere, and connected by a pipe with a ventilator, for keeping intact the form of his aerial machine. Mr. Pearse does not appear to be convinced of the urgent necessity of abstaining in any aerial construction from every complication which can be avoided at any cost, and he suggests the adoption of some accessory organs which, although designed to help aeronauts, would tax too much the lifting power or the attention of the aerial sailor. Mr. Pearse supposes that he will be able to navigate the air with an excess of weight, and does not pay attention to the intensity of motive power required to counteract gravitation even in a partial manner. He should certainly take advantage of the pamphlet written by his French competitor, who deals mostly with facts belonging to the public, and on which nobody can, in the present state of science, raise any claim as being his own property.

Both these pamphlets are greatly in advance of similar productions, and are creditable to their writers. Mr. Pearse's pamphlet has been only published for private publication. M. Yon's is printed with a number of plates representing many details; but a directing balloon is so complex a matter that this part of the publication can hardly be said to be complete.

Having been the builder of M. Dupuy de Lôme's balloon and one of his crew, M. Yon may be said to have witnessed all the great aeronautical constructions of the age. Next to M. Henry Giffard, of whom he claims to be the pupil, he is the most completely qualified aeronaut to work out the solution of the great problem to which a recent success in photography has given unexpectedly in some respects a practical result.

W. DE FONVIELLE

EXPERIMENTS WITH THE WIRE TELEPHONE, CHIEFLY ON STRONGLY MAGNETIC METALS

BY a wire telephone is meant an instrument like that described in *NATURE*, vol. xxii. p. 168. In most of the experiments mentioned below, the mercury cups there figured were dispensed with, as they are unnecessary when stout wires are used. A small ear-piece with a ferrotype plate was also used instead of the drum-head, whose special purpose was to reproduce music so as to be audible at a distance. For hearing close at hand the ferrotype plate is much superior; indeed with the drum many of the sounds alluded to below could not be heard.

So far as I can see yet, the most probable cause of the sound in the wire telephone, when fine wires of ordinary weakly magnetic metals are used, seems to be variation of the longitudinal tension arising from the variation of the heating effect of the current. It is of course quite possible that there may be a lengthening of the wire due to the passage of the current over and above that arising from the heat developed, although such an effect can scarcely be said to be certainly established by experiment as yet.