

THE *Revue Scientifique* announces the death of the naturalist M. Pictet.

THE *Cologne Gazette* states that Herr Henglin, the African traveller, has declined the offer of the Khedive to take the command of the troops sent to Abyssinia, in place of the late Munzinger Pasha, but is organising an Abyssinian exploration for scientific purposes.

DR. VON RICHTHOFEN, the well-known traveller and geographer, has been appointed Professor of Geography at the University of Bonn. He is still occupied at Berlin with the editing of his great work on China.

THE additions to the Zoological Society's Gardens during the past week include a Le Vaillant's Cynictis (*Cynictis penicillata*) from South Africa, presented by the Viscount Maudeville; a Hooper Swan (*Cygnus ferus*), European, presented by Mr. Montague Kingsford; a Weeper Capuchin (*Cebus capucinus*) from Brazil, presented by Mr. August Kettner; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. T. J. Dunn; two Darwin's Pucras (*Pucrasia Darwini*) from China, purchased.

SCIENTIFIC SERIALS

Zeitschrift der Oesterröichischen Gesellschaft für Meteorologie, Nov. 15, 1875.—Dr. Billwiller, of Zürich, contributes an article on a local occurrence of the northerly "Föhn." It was formerly believed that the Föhn came from the Sahara Desert, whence it derived its warmth and dryness, but Hann showed a few years ago that, according to known physical laws, descending air becomes warmer and drier, that winds of the Föhn kind are not confined to the Alps but occur in other mountainous regions, and that the southern slopes of the Alps have a north wind, which is the exact counterpart of that called the Föhn. A mass of observations made in Switzerland have since proved the correctness of his theory. Herr Billwiller, from the data he has as yet examined, finds that isolated Föhn winds prevail only when a broad current flows over the whole Alps in the same direction, ascending on one side and descending on the other. But there are cases in which no perceptible upward movement can be traced on one side, and yet on the other the Föhn descends into the valleys from above. A difference of density, often great, is the cause of this. The lower strata being obstructed the outflow of air necessary to restore equilibrium comes from above. The merely local Föhn blows strongly down a valley, but on reaching the colder air of the plain mixes with it and quickly comes to rest. Tables are given showing meteorological conditions in particular cases.—The next article, written by Dr. Wild, and quoted here from the Annual Report of the Imperial Observatory at St. Petersburg, is a review of the work of the Meteorological Congresses of 1873 and 1874. Perhaps the most important result of these congresses will be the general use of more trustworthy instruments by official and private observers. The following advantages have already been gained: an international system of ciphers for telegraphic despatches throughout nearly the whole of Europe; an international form of publication in the following countries: Norway, Sweden, Denmark, Russia, Austria, Switzerland, Italy, and part of Germany; and lastly, the establishment in many States of central institutions. We shall thus obtain better, more uniform, and more accessible data as a consequence of the late congresses.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Jan. 6.—On the refraction of sound by the atmosphere, by Prof. Osborne Reynolds, Owens College, Manchester. Communicated by Prof. Stokes, Sec. R.S.

This paper may be said to consist of two divisions. The first contains an account of some experiments and observations undertaken with a view to ascertain how far the refraction of sound caused by the upward variation of temperature may be the cause of the difference in the distances to which sounds of the same intensity may be heard at different times.

Some rockets, capable of rising 1,000 feet, and then exploding a cartridge containing 12 oz. of powder, having been procured,

an effort was made to compare the distance at which the rockets could be heard with that at which a gun, firing $\frac{1}{4}$ lb. of powder and making a louder report than the rockets, could be heard under the same conditions of the atmosphere. In the first instance the rockets and the gun were fired from a spot in Suffolk, around which the country is tolerably flat, observers being stationed at different distances. Owing, however, to the effect of the wind and the time required for the observers to proceed to the distant stations, these experiments were not successful in establishing the comparative merits of the gun and the rockets. They were, however, important as showing that on hot calm days in July the reports of the rockets never failed to be distinctly audible at distances of four and five miles, although the sun at the time was shining with full force on the ground, and rendering the air near the surface so heterogeneous that distant objects seen through it appeared to wave about and twinkle.

The next attempt was made during a cruise on the east coast. After three weeks cold and windy weather, the 19th of August was a fine day, and some experiments were made in Lynn Deeps, which revealed a very extraordinary state of the atmosphere as regards the transmission of sound. A party rowed away from the yacht in one of her boats, it having been arranged beforehand that either a rocket or a large pistol was to be fired from the yacht when signalled for; also that when those on the yacht heard those in the boat call they should answer. The boat proceeded to a distance of five miles, until those on the yacht had completely lost sight of it; but all the time the calls from the boat were distinctly heard by those on the yacht, although after they had lost sight of the boat they ceased to answer the calls. On the boat also not only were the reports of the pistol and rockets distinctly heard, but every answer from the yacht was heard plainly. The last came after an interval of thirty-five seconds, which gave the distance $3\frac{1}{2}$ miles. Nor was this all; but guns, and on one occasion the barking of a dog, on the shore eight miles distant, were distinctly heard, as were also the paddles of a steamer fifteen miles distant.

The day was perfectly calm, there was no wind, the sky was quite clear, and the sun shining with great power—conditions which have been described as most favourable to the stoppage of the sound by the heterogeneity of the atmosphere, and which may also be described as most favourable for great upward refraction. On this day, however, it was observed that all the time distant objects loomed considerably, i.e., appeared lifted. This showed that the air was colder near the surface of the sea than it was above. It is to this circumstance that the extraordinary distances to which sounds were heard on this day is supposed to be due. The diminution in the temperature of the air being downwards, the sound, instead of being lifted as it usually is, was brought down, and thus intensified at the surface of the water, which, being perfectly smooth, was thus converted into a sort of whispering-gallery.

The report of the pistol and the sounds of the voice were attended with echoes, but not so the reports of the rockets; and it is suggested that these so-called echoes may be found only to attend sounds having a greater intensity in one direction than in another.

The second part of the paper refers to a phenomenon noticed by Arago in his report of the celebrated experiments on the velocity of sound made on the nights of the 21st and 22nd of June, 1822.

It was then found that, although the guns fired at Montlhéry could be distinctly heard at Villejuif (eleven miles distant), those fired at Villejuif could not be heard at Montlhéry without great attention, and at times (particularly on the second night) they were not heard at all; although on both nights the wind was blowing from Villejuif to Montlhéry, the speed of the wind, which was very light, being about 1 foot per second. No explanation of this phenomenon was offered by the observers, although it was much commented on. And on the second night the gun at Villejuif, which on the previous night had been pointed upward, was brought down in the hope that this might improve its audibility (this step was, however, found to render matters worse than before).

From this lowering of the gun at Villejuif it seemed as though there was probably some difference in the conditions under which the guns at the two stations were placed, as if that at Villejuif was fired from a level, while that at Montlhéry might be fired over a parapet. An inspection of the district confirmed this view; for Villejuif is on a low, flat hill, while Montlhéry is on the top of a steep cone; and not only is it 80 feet above Villejuif, but it is surmounted by the mound of an old castle, which