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Note on the difference of Temperature between the Surface of the Earth, and the Air in contact with it. By M. ROZET.

It is known that the surface of the earth is more heated under the influence of the rays of the sun, than the air in contact with it. In 1830 I found that in the neighborhood of Algiers, the temperature of the sand on the sea shore sometimes exceeded that of the air by 30° (Cent.)

In 1850 I began a series of observations at Orange, at 46 metres above the level of the sea, with two thermometers, one suspended in the shade at 1 metre above the earth, the other at a depth of 0.01 m. (0.4 inch,) below the surface, and covered with earth.

In 1851 I continued these observations at Gap, at 750 metres above the sea, during the months of May, June, and July, and I have just renewed them at Tours, at 90 metres above the ocean, during the fine weather of the first half of March. The following are the results obtained: all soils do not heat in the same way, but the law of the variation of the differences of temperature from the air is constant, and the same for all. On a fine day, the sky without clouds, at sunrise, no difference exists; the excess of temperature of the soil over that of the air increases very regularly until about 2 hs. 30 m. of the afternoon; it then gradually diminishes in the same way, until an hour after sunset, when the difference disappears, and thus it remains until sunrise again. Only four times during all the course of my experiments have I found the temperature of the soil at sunrise lower by 1° or 2° than that of the air. At sunset the difference is already only 1.5° , or even 0.5° , so that, generally, the loss of temperature by the surface of the soil to a depth of 0.01 m., does not exceed these quantities. The maximum differences were in March, 9° , in May, 11.5° , in June, 14° , and in July, 14° .

Laying off on a horizontal line from left to right, equal spaces to represent times from sunrise, and raising at every point an ordinate proportioned to the difference of temperature at that time, we get, on clear days, a regular curve, whose horizontal tangent corresponds to 2 hs. 30 m., while the curve bends much more rapidly on the right hand than on the left of that point. After one hour after sunset the curve generally coincides with the axis of abscissas; very rarely does it pass below it; it is true, however, that I have made no observations in winter.

On days when the sky is covered the form of the curve remains the same; but it rises much less above the axis of abscissas. On such days the maximum differences varied in May, from 2° to 4° , in June, from 4° to 6.5° , and in July, from 4° to 7° .

In clear weather, if a cloud covers the sun for 30 minutes only, the difference of the two temperatures evidently decreases, then augments again so soon as the sun re-appears; so that for every such alteration, the curve has a point of contrary flexure.

Several times, when the sun showed himself after a rain, I have found the temperature of the moist ground lower than that of the air, or the difference negative; but if the sun continued to shine, it soon became positive, and the point of flexure was then below the axis of abscissas.

I made some observations during my geodetic stations on the summits of the Alps, and I have ascertained that in the month of June, at 2200 metres of altitude, the difference between the temperature of the soil and that of the air, in fine weather, reached 10° .

My employment not permitting me to follow these observations strictly, I communicate to the Academy the results of those which I have made, to induce meteorologists to resume them, and continue them with more care and regularity than I have done."—*Comptes Rendus de l'Académie des Sciences*, (Paris,) 3d April, 1854.

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Application of Branch Currents to the Electrical Telegraph. By M.
PETRINA, of Prague.

M. Petrina has been employed for eighteen months in constructing break-circuit apparatus for the current, like those which are used in electrical induction-machines. One of these apparatus by its rapid vibrations produced very distinct tones, and gave him the idea of making an electrical harmonica, with a collection of interrupters. He thought at first, that to play on his harmonica he would be obliged to use as many small batteries as he had tones, as he was convinced that otherwise the current by division would become too enfeebled, and that each apparatus would in consequence not give the tone which was expected from it. The experiment, however, showed him that he was mistaken: with a single element for the eight interrupters of his harmonica, he observed neither weakening of the current nor change of tone; and he could, without any difficulty whatever, sound his eight vibrating springs, either together or combined in any way whatever. It could not be otherwise, for the fact demonstrated by the experiment is a necessary consequence of Ohm's theory and of the laws of branch currents. In fact, according to the theory of Ohm, the current of a galvanic apparatus increases in proportion to the diminution of the sum of the resistances to the current; and the law of branch currents requires that each one of the currents shall have the same intensity which it would have if the circuit was closed by that conductor only, admitting, however, that the resistance of the electro-motor is very small or sensibly null, not only in regard to the sum of the resistances of all the circuits, but also in regard to the resistance of each closed conducting circuit.

M. Petrina is astonished that the important theory of branch currents has been, at least to his knowledge, nowhere applied to the electric telegraph. In the central office at Vienna, there are as many principal batteries as there are telegraphic lines leaving that office, and as many local batteries as there are Morse's recording apparatus. Whilst according to what we have said, a single principal, and a single local battery would suffice, even while messages were being sent along all the lines at once. The only condition to be complied with would be, that the single battery should be strong enough to transmit the signals to the most distant stations; one of its poles would be united with the wires of all the lines, the other pole would, as usual, go to the ground.