would produce complete decolorisation. If, on the other hand, the same solution be added in the same quantities to wine which has been artificially coloured red, the deception will soon become apparent by the speedy decolorisation of the liquid, or by the communication of some different colour to the liquid and to the precipitate. The following table exhibits the various colours assumed by the liquid and precipitate produced under these circumstances in wine coloured by different substances—

Substances added.	*Colour of Liquid.*	*Colour of Precipitate.*
Pernambuco wood	Light orange red	Reddish yellow
Campeachy wood	Golden yellow	Orange yellow
Archil	Very light red	Reddish yellow
Laccamuffa	Very light green	Greenish-grey
Prepared Cochineal	Nearly colourless	Grey
Fitolacca	Nearly colourless	Yellowish
Myrtle	Nearly colourless	Dingy-greenish
Violets	Very light rose	Yellowish
Colouring matter of normal wine	Persistent wine-red.	Blood-red

Dye-woods resist decolorisation more strongly than vegetable juices; and Brazil wood, when treated with the above-mentioned reagent, aided by heat, acquires a crimson-red colour, due to the formation of brazilin.—[Ann. di Chim. app. alla Med., September, 1869, p. 142.]

PHYSICS

Professor Magnus on Heat Spectra.

PROFESSOR MAGNUS has recently contributed to the Berlin Academy a memoir on the radiation and absorption of heat at low temperatures. The results, which are of the highest importance, are essentially as follows:—

1. Different bodies, heated to 150° C., radiate different kinds of heat.

2. Some substances emit only one kind, some many kinds, of heat.

3. Of the first class, perfectly pure rock-salt is an instance. Just as its incandescent vapour, or that of one of its constituents (sodium), is solitary in tint, so the substance itself, even at 150°, emits heat of but a single ray. It is monothermic, just as its vapour is monochromatic.

4. Rock-salt absorbs heat radiated from rock-salt in larger quantity, and more powerfully, than that derived from sylvine and other kinds. It does not, therefore, as maintained by Melloni and Knoblauch, transmit heat from all sources with uniform facility.

5. The amount of absorption effected by rock-salt increases with the thickness of the absorbing plate.

6. The high diathermancy of rock-salt, does not depend on its small absorptive power for the different kinds of heat, but on the fact that it only radiates (and, consequently, only absorbs) heat of one kind; while almost all other bodies at the temperature of 150° emit heat which contains only a small fraction or none of those rays which are given out by rock-salt.

7. Sylvine (potassium chloride) behaves like rock-salt, but is not monothermic to an equal extent. This circumstance is also obviously in analogy with the incandescent vapour of the salt, or of potassium, which is known to furnish an almost continuous spectrum.

8. Heat purely derived from rock-salt is almost completely absorbed by fluor-spar. It might thence have been expected that heat radiated from fluor-spar would also be energetically absorbed by rock-salt; yet 70 per cent. of it traverse a plate of rock-salt 20 mm. in thickness. If we remember that the total heat emitted by fluor-spar is more than thrice as large as that of rock-salt, this phenomenon is readily explicable; nevertheless, it is probably dependent upon some other property of fluor-spar.

9. If a spectrum could be projected of the heat radiated at 150°, and rock-salt were the radiating substance, such a spectrum would contain only *one* band. If sylvine were employed, the spectrum would be more expanded, but still would only include a small portion of the spectrum which would be given by the heat radiated from lamp-black.

In a subsequent communication, Herr Magnus treats of the reflection of heat radiated at the surfaces of fluor-spar and other bodies.

Having succeeded in obtaining the heat from different substances at 150° free from the rays of flames and other thermogenic bodies, and afforded proof that there are some substances which emit waves of one or but few lengths, while others present them in more frequent variety, it next appeared interesting to solve the problem how bodies behave with reference to reflective power; whether, in bodies which act similarly upon light, differences parallel to those which are observed in respect of the absorption and transmission of heat do not also occur in its reflection.

Differences in reflective power are unmistakably apparent only when rays are reflected which have a uniform, or but slightly varying, length. Such rays have already been derived either from a section of the spectrum furnished by a rock-salt prism, or by transmitting the rays from a source of heat of many wave-lengths through substances which absorb a number of them. There are, however, but very few bodies that transmit rays of only one or a few wave-lengths; moreover, such rays, obtained by either method, have a very low intensity.

In spite of this difficulty, MM. de la Provostaye and Desains showed, as early as 1849, that different quantities of the heat from a Locatelli's lamp were reflected from speculum metal, silver and platinum, according as it had been conducted through glass or rock-salt; and, for reflecting surfaces of all kinds, less in the case of glass than in that of rock-salt.

Soon afterwards, by an extended series of experiments, and employing the prismatically dispersed heat of a lamp, it was proved by the same physicists that heat from the different portions of the spectrum is differently reflected. But, doubtless in consequence of the low intensity of the incident heat, their researches had reference solely to reflection by means of metallic surfaces. Now, if in rock-salt we possess a substance that emits waves of only one or but few lengths, and are acquainted with other bodies which, at 150°, also radiate but a few kinds, researches can be instituted on reflection at non-metallic surfaces. It has thus appeared that the different kinds of heat or wave-lengths are reflected from such surfaces in very different proportions. One of the most striking examples may here be adduced: it refers to the reflective power of fluor-spar.

Of the heat radiated by a great variety of substances, unequal (though but slightly differing) amounts were reflected at an angle of 45°; being in the case of—

Silver	between	83	and	90	per cent.
Glass	,,	6	,,	14	,,
Rock-salt	,,	5	,,	12	,,
Fluor-spar	,,	6	,,	10	,,

But of the heat from rock-salt, fluor-spar reflected 28 to 30 per cent., whereas silver, glass, and rock-salt returned no more of this heat than in the preceding cases.

Here, too, it was evident, as in the experiments on thermic transmission, that sylvine emits, besides a large quantity of the rock-salt kind, species of heat of another nature. Fluor-spar reflects 15 to 17 per cent. of the heat from sylvine; less, consequently, than that from rock-salt, and more than that from the other radiating bodies.

Granted an eye that could distinguish different wave-lengths of heat in the same manner as wave-lengths of light, and when the waves from rock-salt are incident upon different bodies, fluor-spar will appear to it brighter than any. If the rays are derived from sylvine, fluor-spar would seem still brighter than all the above bodies, but not so bright as when submitted to the rock-salt rays.

Melloni has shown that different substances transmit heat in very unequal proportions, and that the source of heat has a marked influence on the facility of transmission. Still, the sources of heat were only distinguished by degree; it was merely recognised that an increased temperature corresponds to increased variability of wave length. It now appears that at one and the same temperature, and *that*—viz., 150°—far below incandescence, different substances emit very different kinds of heat, and that, within such a range, an extraordinarily large number of different heat-rays or wave-lengths continually intermingle. This manifold intermixture is particularly furthered by the selective reflection taking place at the different surfaces.

It follows from what has been said that an eye capable of discerning the different wave-lengths of heat, as it can now discriminate the colours of light, would perceive, with very little warmth to itself, every possible variety of tint in surrounding objects.

PHYSIOLOGY

Pettenkofer on Cholera

NEARLY the whole of the second part of the Zeitschrift für Biologie, bd. v. (300 pages), is taken up by a long memoir by Prof. Von Pettenkofer on "Soil and Sock-water in their