cially upon the transmission of light through ordinary media. The chief difference between his treatment of the subject and the classical one of Maxwell lies in the fact that Goldhammer considers what are usually called the *constants* of the medium, the specific resistance or the dielectric constant, for instance, not to be *constants*, but to be *functions of the wave frequency, developable in power series.* It may be remarked that this view receives a certain amount of support from the researches of Blondlot and J. J. Thomson, which show that the dielectric constants of certain materials do depend upon the frequency.

Developing mathematically the preceding hypothesis, Goldhammer arrives at very general equations for the velocity and absorption of light in a given medium. It is worthy of remark that the formulas given by Helmholtz, Sellmeier and Lommel can all be considered as special cases of that of Goldhammer and can be derived from it.

In *Wied. Ann.*, No. 3, Band 67, Goldhammer applies the theory which has just been sketched to the Zeeman effect, and thus obtains a new theoretical explanation of the phenomenon. Considering the absorption spectra first, he shows that any alteration in the specific constants of the medium will cause a change in the position of the absorption lines. He then assumes that the magnetic field does cause such an alteration in these quantities; in support of this assumption, he calls attention to a paper by Bolzmann (*Wied. Ann.*, 31, p. 789), in which it is shown that a magnetic field increases the resistance of a gas placed in it.

Kirchoff's laws allow one to pass from the absorption spectrum to that of emission. Then in a bright-line spectrum the effect of a magnetic field is to cause displacements in the lines and might give rise to doublets and triplets.

In order to account for the polarization phenomena, Goldhammer makes a further assumption that the magnetic field causes the medium to become æleotropic and double-refracting. The circular polarization of the doublets, when viewed along the lines of force, is very closely connected with the well-known magnetic rotation of the plane of polarization.

It will be noticed that this theory of Goldhammer's differs materially from those proposed by Lorentz and Larmor. Goldhammer makes the whole of the phenomena depend upon changes in the medium, while Lorentz and Larmor attribute them to the electrodynamic forces developed by the motion of electrified ions in a magnetic field.

At present it seems that the ionic is the more promising of the two theories, since it gives an explanation, incomplete it is true, of the complexity of structure of the lines and of their polarization. The numerical value of the ratio between the mass of a vibrating ion and the charge carried by it as derived from the Zeeman effect is in good agreement with that obtained by J. J. Thomson from the phenomena of cathode rays.

DAYLIGHT-PHOSPHORESCENCE.

Mourelo (*Comptes Rendus*, t. CXXVIII., p. 557) has made the curious discovery that sulphides of strontium, calcium, barium and zinc, prepared in a particular way, show much more brilliant phosphorescence after exposure to diffused daylight than they do after exposure to direct sunlight, and, further, that periodic exposure to diffused daylight increases very remarkably the power of phosphorescing. After being brought to this sensitive state one phosphorescing portion is able to excite phosphorescence in another non-luminous portion either when the two portions are in contact or when they are contained in separate glass tubes.

A. St.C. D.

NOTES ON INORGANIC CHEMISTRY.

An analysis of the water of the Great, or Illecilliwaet Glacier, British Columbia, has been published in the *Chemical News* by F. T. Shutt and A. T. Charron. The waters were taken a few feet from the face of the glacier, and were of characteristic turbid or milky appearance. Analysis showed water of great organic purity, the free ammonia being 0.018 parts per million; albumenoid ammonia 0.027 to 0.037; nitrogen as nitrates and nitrites 0.0246 to 0.0442; chlorin 0.1; solids 12 to 30.8. On sedimentation the waters became perfectly clear, and microscopic examination of the deposit showed

it to be very fine rock matter, chiefly fragments of quartzite.

AN analysis of an artesian water from Derbyshire is given by John White in the *Analyst*, which is peculiar as containing barium, it being the first recorded occurrence of this metal in waters in this section. The well is 1,300 feet deep and 160 feet above the sea level. According to the analysis given, the water first obtained at depth of 837 feet, contained of barium carbonate 1.77 parts per 100,000; the deep water contained at first of barium chlorid 38.55 parts, and six months later 40.7; water eighty feet below the surface contained 3.03 parts. The sodium chlorid in the deep water was over two thousand parts. The author discusses the origin of the barium salt. Clowes has found minute crystals of barium sulfate in the red sandstone near Nottingham, and Dieulafait has shown barium to be a constant constituent of primitive rocks, but this does not explain the conversion of the sulfate into carbonate or chlorid. The only possible explanation, according to the author, is that the barium sulfate has been at high temperature reduced to the sulfid by coal, and this converted into the chlorid by concentrated salt solution. The carbonate is derived from the chlorid. In confirmation of this it is pointed out that barium sulfate has been found in connection with coal deposits and barium chlorid in water in the vicinity of coal mines. It is, however, not impossible that under certain conditions, such as Melikoff has shown take place between sodium sulfate or sodium chlorid and calcium carbonate in the presence of aluminum or ferric hydroxid, a reaction may take place between the barium sulfate and sodium chlorid in a concentrated solution of the latter.

PROFESSOR VÈZES, of Bordeaux, has continued his work upon the oxalates and nitrites of the platinum metals, and his last contribution to the *Bulletin Société Chimique* is on the complex salts of palladium. A concentrated solution of potassium chloropalladite is converted by potassium oxalate into the pallado-oxalate, and the same salt is formed by the action of oxalic acid upon the pallado-nitrite. On the other hand, the pallado-oxalate is readily converted into the chloropalladite by hydrochloric acid, and into the pallado-nitrate by potassium nitrate. These reactions correspond very closely to those of the platinum salts as investigated by Vèzes, except that only one modification of the pallado-oxalate has been found. The pallado-oxalic acid was also obtained and found to be tolerably stable.

The same journal contains analyses of a series of potassium, ammonium and silver salts of the so-called osmiamic acid, by Brizard, in which the formula proposed by Joly for this acid is fully confirmed. According to this, osmiamic acid is a nitroso compound, having the formula OsO(NO)OH, and corresponds to nitroso hydroxid of ruthenium.

J. L. H.

CURRENT NOTES ON METEOROLOGY.

BLUE HILL OBSERVATORY BULLETINS.

BULLETIN No. 2 (1899) of Blue Hill Observatory, prepared by A. E. Sweetland, contains accounts of two remarkable snow storms which occurred during the past winter. The first storm, that of November 26–27, 1898, caused the wreck of 141 vessels on the New England coast, and the loss of 280 lives. It was during this storm that the steamer *Portland*, with about 175 persons on board, was lost off Cape Cod. The suddenness and violence of this storm were due to the rapid increase in energy which took place when a cyclone from the Gulf of Mexico and one from the Great Lakes met on the coast. The fall of snow was very heavy. On February 8–14, 1899, a severe cold wave and another heavy snowfall occurred. On February 13th, at 8 a. m., the zero isotherm extended as far south as latitude 31°. At Blue Hill the average temperature of the five days February 8–13 was 3.1° lower than the average of any successive five days since the Observatory was established. This cold wave was followed by a heavy snow storm, with high winds, along the North Atlantic coast. It is interesting to note that the preceding cold wave, although it caused much suffering by its severity at the time, had one very fortunate effect. The extreme cold which had almost closed some of the harbors with ice, and the difficulty of navigation when the waves, driven by the strong westerly gale, quickly