diminish the rapidity by vibrating themselves more slowly, and thus render the rays visible. Ultra violet rays could consequently be transformed into violet, blue or green; blue rays into yellow or red. What generally happens, however, is that they change red rays to purely calorific ones and thus make them invisible.

We must here make several important observations. First of all, violet rays do not only produce the greatest fluorescence, but also the greatest phosphorescence. Red rays produce neither the one nor the other. Luminous or dichroic substances give a light differing from that which they receive. It has been demonstrated, finally, that the closest relationship exists between the two phenomena—That fluorescence can be considered as an intense phosphorescence which can be seen in broad daylight, but which dies with the light which gave it birth, while phosphorescence is only a feeble but persistent fluorescence.

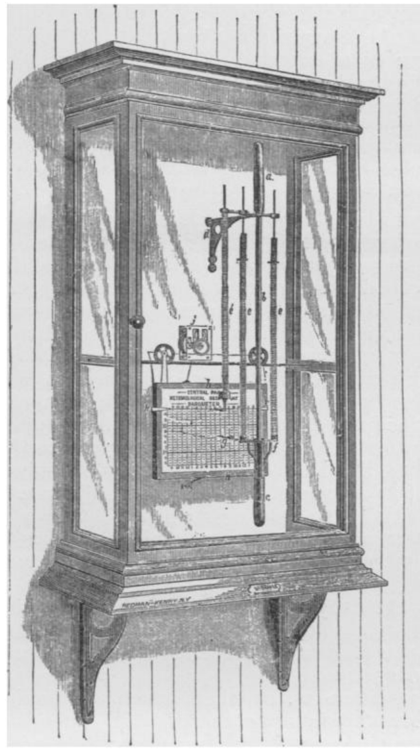
"Solar phosphorus" generally reproduces luminous vibrations even when it has ceased to receive the latter, and it can transform calorific rays into luminous ones. A diamond acts in this way, also fluor-spath, and nearly all artificial phosphorus. One of the last named gives forth a light of various colors, if it is heated to different degrees after being exposed to the light. Sulphate of strontium produces a deep purple light at 20°, a violet light at 15°, blue at 40°, bluish-green at 70°, greenish-yellow at 100°, and reddish-yellow at 200°,

Moreover, phosphorescence, like fluorescence, can be produced by means of an electric light rich in chemical rays. If you expose to such a light a flower, a butterfly or any other object covered with phosphorescent powder, it will assume a magnificent appearance. The English chemist, Crookes, prepared diamonds and rubies in this way, by enclosing them in an air-tight glass ball placed in the immediate vicinity of the negative pole, from which a luminous current issued. The effect was superb, recalling all sorts of fairy stories. Some African diamonds shone with a brilliant blue light, and a large greenish one produced such an intense radiance that it almost looked like a lighted candle. In fact the light was quite sufficient to read by, and the history of that famous stone in the Temple of Hieropolis seemed really probable. A collection of small diamonds from various countries, placed in any receptacle that is air-tight, will produce parti-colored fiery lights, blue, pink, red, orange, yellow, green and pale green, all mingling together.

In a third recipient, Crookes placed a quantity of uncut rubies, which, when the electric light fell upon them shone with such a gorgeous red flame that they appeared to be incandescent. Artificial rubies prepared by Feil in Paris gave as brilliant a light as the real ones, and white crystals became rose-colored or deep red. Such wonderful carbuncles would have astonished even the authors of the old legends.

A CURIOUS thing occurred lately in the works of M. Fleury, at Cette (Hérault). The feed-water of the boiler giving much incrustation, M. Fleury was advised to put into the boiler some fragments of zinc as a de-incrustant, and did so. In a few days, spite of oiling, the steam-engine began to work very badly, the piston catching a great deal, and it soon became necessary to stop and make examination. The piston was found to be covered with a thick adherent layer of copper. It was put on the lathe, and at certain ovalised points, the metallic layers were so thick that the tool worked in copper alone. The explanation given by M. Fleury is this: The boiler was connected with the engine by copper pipes. Particles of zinc carried off by the steam would form with the copper numberless small galvanic couples; hence the transport of copper to the piston, which would principally attract them by reason of its motion, and of the heating produced. It is remarked in *Les Mondes*, that the eminently electric properties of expanding steam may have helped in development of the phenomenon.

DRAPER'S SELF-RECORDING, MERCURIAL BAROMETER.



We are indebted to Dr. Daniel Draper for preparing an abstract of his weekly Meteorological report for this journal, the third of which appears this day in another column.

Dr. D. Draper is director of the Meteorological Observatory of the Department of Public Works, Central Park, where all observations are made by self-recording instruments, especially designed and arranged for this purpose.

The great object Dr. Draper had in view when designing these instruments, was to combine simplicity of construction with perfect efficiency. His great success is well known to all familiar with Meteorological Science, and we propose in the course of a few articles to fully describe these instruments, and illustrate the subject with excellent wood cuts.

We commence the series with a description of the apparatus for recording Barometric observations.

"I was led to construct this form of barometer from the fact that with the photographic one it cannot be told what the atmospheric fluctuations are until the next morning, when the photographic plate is developed. Even then, if there has been much variation in temperature, it alters the sensitiveness of the collodion film, so that it is very difficult to read the tracing. The construction of the pencil instrument is as follows:

In the pencil barometer the glass tube is 36 inches in length, the upper portion being of larger diameter than the lower; it is held firmly in a fixed position, and filled in the usual manner with quicksilver; its lower or open end dips into a tube or reservoir containing the same metal. This reservoir is suspended on two spiral steel springs, and has freedom of motion up and down. When the pressure of the atmosphere diminishes, a portion of the mercury flows out of the tube into the reservoir; this becoming heavier, stretches the steel springs, causing the ink pencil fastened to them to mark downwards. If the pressure increases the reverse movement takes place. The ink pencil makes its mark on a ruled paper register, carried at the rate of half an inch per hour from right to left by a clock.

There is a third steel spring of the same length and strength as those on the reservoir, stretched by a weight to a distance equivalent to 30 inches on the barometer scale. The object of this spring is to give the correction of temperature for those sustaining the reservoir. The register paper should always be set to the same line on which the pencil of this spring marks.

The movements of the mercury on the register can be magnified to any required extent by increasing the length of the spiral springs. In this instrument it is multiplying twice.

DESCRIPTION OF INSTRUMENT.

The tube marked *a b* is of glass; the upper part is of a larger diameter than the stem, *a* being ¾ of an inch internal diameter and 10 inches long, while the stem, *b*, is ⅛ of an inch bore and 26 inches long. The total length of the tube is therefore 36 inches. The reservoir, *c*, is suspended from a brass frame, *d*, fastened to the back of the case. This frame also holds the upper ends of the steel springs, *e, e, é*. The glass reservoir, *c*, is of the same diameter and length as the upper part of the tube, *a*; on its open end is turned a flange to hold it in a brass frame, *f*, to which are fastened the lower ends of the steel springs, *e e*; it also carries an ink pencil, *g*, that touches the ruled paper on the board *h h*, which is drawn aside by the clock, *i*. The spring, *é*, is for the correction of temperature on the other springs. Heat has a slight effect on them, causing them to lengthen about $\frac{1}{16}$ of an inch from 90 degrees Fahr.; to allow for this, the third spring, *é*, is weighted with a lead weight and pencil, it marks its fluctuations on the upper line of the register sheet. In this manner this instrument gives the correction for temperature (or reduction to 32°) from the fact that it weighs the mercury instead of measuring its length, which is affected by heat.

Ink pencils of the barometer and other instruments are made by drawing narrow glass tubing to a fine point, which lightly touches the paper register, leaving a mark of red ink that has been diluted with about one quarter of its volume of glycerine. The glycerine prevents the ink from drying too rapidly. The advantage of this form of pencil over lead ones is that it requires little or no pressure to produce a mark.

To receive the atmospheric fluctuations a suitable ruled paper is fastened by means of small brass clamps, *k k*, to the board, *h h*, which is hung by rollers to the thick steel rod fastened to the sides of the case, on which the paper is carried from right to left by the clock, *i*, at the rate of ½ an inch per hour, by means of the pulley on the hour arbor of the clock. The wire that connects the register board to the clock is soft steel, number 28 wire gauge; having only one turn round the pulley it readily slips so that the board can be pushed sideways for the adjustment of time, or for the renewal of the sheet of paper."

ON AN OCCURRENCE OF GOLD IN MAINE.*

By M. E. Wadsworth.

The gold under consideration here is found on Seward's Island, a small island in the town of Sullivan, Hancock County. The gold is found in quartz veins cutting an eruptive mass of diabase. This diabase forms a dike of about forty feet in thickness, lying approximately parallel to the bedding of an indurated fine-grained argillaceous mica schist; all dipping nearly S. 30° W., 24° to 42°. The dip averages about 35°, and the strike is far from being uniform. Crossing the diabase at various angles, but generally from north to south, are segregated quartz veins. In some places the rock is a confused reticulated mass of these veins, with patches of diabase lying between them. The veins vary in width from a mere seam to even a foot in breadth. Starting where only one or a few of them are visible, they gradually increase in number, until they become quite numerous, while they will doubtless be found to fade away as they began. The diabase and schists are cut by several dikes of diabase running approximately at right angles to the strike of the schist, or parallel to the veins. The vein stone is quartz, together with some calcite, tremolite and chlorite, and carries tetradymite and gold.

So far as examination has been made, the veins in the diabase carry gold, and the decomposed diabase immediately adjacent to the quartz veins also contains that metal to a greater or less extent. The gold occurs principally in small grains in the vein in conection with the tetradymite, bits of decomposed diabase, and in the cavernous portions, but not in the compact quartz of the vein itself. The tetradymite is in irregular grains and masses, showing a brilliant metallic lustre, and a well-marked basal cleavage. The locality is worked for it gold, and was visited by the writer in December last

Cambridge, Mass.

*From the *Bulletin of the Museum of Comparative Zoology*.—Harvard College.

ELEMENTS AND EPHEMERIS OF COMET (*c*), 1881.—SCHÆBERLE.

The elements and ephemeris of the comet, given below, are those computed at the observatory of Lord Crawford, at Dun Echt, Scotland, and cabled to the *Science Observer* by means of the code adapted by S. C. Chandler, Jr., and John Ritchie, Jr.

ELEMENTS.

Perihelion Passage, 1881, Aug. 21^d .50. Greenwich Mean Time.

		°	′	
Long. Perihelion	=	218	45	Eq. 1881. o.
Dist. Perihelion from Node	=	121	9	
Long. Node	=	97	36	
Inclination	=	140	37	

log. Perihelion Distance, 9.8069.

EPHEMERIS.

Greenwich midnight 1881.	R.A. h.	m.	s.	Decl. °	′
Aug. 3	6	43	4	+ 47	46
7	7	11	24	50	11
11	7	54	56	52	20
15	8	59	24	52	57

Computed by Drs. Copeland and Lohse, at Dun Echt Observatory, from observations at Vienna and Dun Echt.

The following elements have kindly been furnished by Prof. Ormond Stone, of Cincinnati:—

T = August 19.202.

	°	′	″
ω =	122	30	21
☊ =	98	42	41
i =	141	35	2

log. q = 9.79590.

Science Observer Special Circular No. 16

The following simple electrical experiment is described in *L'Electricien*. A small box of pasteboard is closed with a lid of fine glass, on the upper surface of which collodion is applied several times (but not so much as to render the lid opaque). In the box are placed insect forms, made of sponge or cotton. On rubbing the collodion surface with dry fingers, in dry weather, the insects move about in a curious manner.