## PHYSICAL NOTES.

COPPER-PLATING ON ZINC.—The use of Cyanide baths for plating on zinc has the double disadvantage of being poisonous and expensive. Hess, it is stated, has overcome the objections by rendering the cyanide bath unnecessary. This he accomplishes by the use of an organic salt of copper, for instance, a tartrate. Dissolve 126 grammes sulphate of copper (blue vitriol) in 2 liters of water; also 227 grammes tartrate of potash and 286 grammes crystallized carbonate of soda in two liters of water. On mixing the two solutions a light bluish-green precipitate of tartrate of copper is formed. It is thrown on a linen filter, and afterwards dissolved in half a liter of caustic soda solution of 16° B., when it is ready for use. The coating obtained from this solution is very pliable, smooth, and coherent, with a fine surface, and acquires any desired thickness if left long enough in the bath. Other metals can also be employed for plating in the form of tartrates. Instead of tartrates, phosphates, oxalates, citrates, acetates and borates of metals can be used, so that it seems possible to entirely dispense with the use of cyanide baths.

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MM. LETHUILLER and Pinel, of Rouen, have devised an electrical indicator, by means of which the water-level in steam boilers may be ascertained at any distance. The arrangement employed for this purpose consists of an indicating tablet, which may be placed in any part of the establishment, however remote from the boiler-house, in the office of the engineer or the superintendent, or within reach of the boiler inspector. This tablet is connected with the electric indicator, which is fixed at the top of a vertical tube above the boiler, by two electric conducting wires. At the lower part of the scale of the indicator are placed two pieces of copper, upon each of which is fastened a small plate. These platinum wires are superposed at a distance of 0.08 in. When the index, which is attached to a vertical rod connected with the float in the boiler, descends, it rest on the upper plate of platinum, depresses it, and puts it in contact with the lower plate. An electric current is thereby established from a battery connected with the apparatus, causing a bell on the indicator to ring, while at the same time the sign "low water" appears on the tablet. Similar pieces of copper and platinum are fixed at the upper part of the scale, and when the index reaches this limit, in consequence of the rising of the float, the bell rings as before, and the indication "high water" is shown on the tablet. In order to remove the warning word from the tablet, a button is pressed, which returns the indicating parts to their normal position.

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IT is but a short time ago we were pleased to see an original article, written by a Japanese, on the combustion of carbon, at low temperatures, and again we are reminded of the "new departure" in an article on the determination of the acceleration due to the force of gravity, at Tokio, Japan (*Amer. Jour. of Sci.* for Aug.), in which the writer, Mr. T. C. Mendenhall, acknowledges the assistance of Messrs. Tenaka and Tenakadate, of the Department of Physics, of the Imperial University of Japan. The method employed was the usual one, which involves the use of a good chronograph and a break-circuit clock, together with an arrangement by means of which the experimental pendulum can be made to record its own beats upon the chronograph at any time. As the resistance offered to the pendulum, although small, is perceptible, it will interfere with its motion if the pendulum is obliged to operate the break circuit at each beat. Mr. Mendenhall obviates the difficulty by making the pendulum break the circuit but twice, once at the beginning of the period and once at the end. By this process the experiment need not be protracted, and yet a great degree of accuracy may be obtained. As the average duration of the experiment is only twenty minutes, differences of temperature may be neglected, and all the conditions may be maintained constant during the whole time of the swing.

PROF. JOSEPH LE CONTE, in an article read before the National Academy of Science, takes issue with Helmholz on some important points in the latter's conception of the Law of Listing. This law has important bearing on the phenomena of binocular vision. Its application, however, from the conclusive experiments of Prof. Le Conte, must be limited to other motions of the eye than those taking place in strong convergence. In thus differing from the high authority of the great German, Prof. Le Conte in a philosophical spirit worthy of more general imitation, deprecates the too common method of trying to verify the results of others, rather than to determine the law for one's self.

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AS a considerable difference exists between the results obtained by the formulæ of Le Verrier and Stockwell in calculating the longitude of the perihelion and the eccentricity of the earth's orbit, Mr. R. W. McFarland in August *Journal of Science*, gives a comparative table, in periods of 10,000, extending over 4,500,000 years. It is accompanied by a chart (with ordinates at intervals of 50,000) dividing the time into two periods, viz., for 3,250,000 years before, and 1,260,000 years after A. D., 1850. An inspection of the table shows that the motion of the perihelion is exceedingly irregular and occasionally retrograde.

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JAS. CROLL, F. R. S., makes mention of an article written by himself in *Phil. Mag.* xxxiii., 1867, pp. 213-216, which may not have been before presented to the American public, in which he accounts for the remarkable fact, first observed we believe, by Mr. Glaisher, that the difference of reading between a black-bulb thermometer exposed to the direct rays of the sun, and one shaded, *diminishes* as we ascend into the atmosphere. Mr. Croll deduces from this, that radiation into stellar space is the medium for the preservation of snow in elevated places, and the protective action of aqueous vapor the cause of its melting in places where there is a greater snow-fall, a remark in perfect harmony with Prof. Tyndall's important discovery regarding the influence of aqueous vapor on radiant heat.

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PROFESSOR HENRY DRAPER read a paper of great interest before the Royal Astronomical Society in May, which now appear for the first time in this country.—(*American Journal of Science.*) He gives facts which seem to point to the conclusion that it is not improbable that Jupiter is still hot enough to give out light, though perhaps only in a periodic or eruptive manner. He applied spectroscopy to the problem and submitted to the Astronomical Society the photograph upon which he based his ingenious speculations. We are glad to see that Prof. Draper has been assisted by his wife in these observations. Humboldt long ago suggested as an advantage to science that the finer senses of women be used in astronomical research.

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A NEW and abundant locality for the mineral Danburite has been discovered by Mr. C. D. Nims, the mineral collector, in St. Lawrence County, N. Y., which is said by Messrs. Brush and Dana (*August American Journal of Science*), to be of considerable extent and importance. The mineral occurs massive, micro-crystalline and also in druses of magnificent appearance, where, in one instance, a crystal was found 4 inches long and 2½ inches macro-diagonal width. The crystals were originally embedded in a younger calcite which has been much eroded. The paragenesis (in a matrix of granitic rock) seems to be, from their description, quarz, danburite, pyroxene and tourmaline and last a pink calcite. It is also accompanied by pyrite. Messrs. Brush and Dana elaborate their description and enrich it with many angular measurements. The homœomorphism of topaz and danburite are conclusively demonstrated, and an opportunity has been seized to supplement and revise the observation made at the time Smith and Brush worked on the original mineral from Danbury.

O. A. M.