which, Loch Goil, was only half a degree warmer than in April. The range of surface temperature in June was from 45° to 53°, and of bottom temperature from 42° to 47°·3, according to locality. Constant temperature to the bottom commenced at a much lower depth than in April. In the upper basin of Loch Long, which was discussed with more fulness, the surface-temperature was 48°·4, at 10 fathoms it was 44°·2, and from 55 fathoms to the bottom at 70 fathoms it was 44°. But between 10 fathoms and 55 fathoms the water was colder than at either of these points, reaching its lowest temperature of 42°·8 at 20 fathoms. It thus appeared that a lenticular mass of water floated between the warmer strata, the opinion as to the cause of which was meantime reserved until further light can be thrown on the phenomenon. In the Clyde district, Dr. Mill said, physical configuration is the determining cause of differences of temperature, and it appears that as the season advances, warmth descends from the surface everywhere by conduction, and travels inward from the sea by conduction and convection. The study of water climate, he said, was likely to lead to important results, but it must be carried on by a large number of observers, who would note the temperature of rivers and of falling rain, before any degree of completeness could be obtained. The paper was illustrated by a series of admirable charts.

SCIENTIFIC SERIALS

THE *Journal of the Franklin Institute*, August.—Capt. O. E. Michaelis, the applications of electricity to the development of marksmanship. This is the conclusion of an interesting paper on chronoscopic and chronographic methods, illustrated by cuts of recent instruments.—W. Lewis, experiments on transmission of power by gearing (conclusion of the discussion).—F. Lynnwood Garrison, the microscopic structure of car-wheel iron.—G. Richmond, the refrigeration-machine as a heater.—C. Hoele, a method of designing screw propellers.—F. E. Ives, correct colour-tone photography with ordinary gelatine bromide plates. A proposal to reduce the sensitiveness of the bromide films to the blue and green rays, by introducing into a plate-glass tank mixtures of aniline colour solutions, chiefly yellow and red, in certain proportions, thereby equalising the sensitiveness throughout the range of the visible spectrum.—Joshua Pusey, suggestions towards a simplified system of weather signals, termed the index weather-signal system.—P. E. Chase, Herschel and Jevon on density of the ether.

Annalen der Physik und Chemie, vol. xxviii. No. 8, August 1886.—Prof. G. Quincke, electrical researches, No. xii., on the properties of dielectric fluids under strong electric forces. The dielectric constant of a number of liquids is examined by two methods, by attraction between two plane parallel plates immersed in the liquid, and by discharge of their charges through a galvanometer. High potentials were obtained by a Holtz machine, and measured by a long-range electrometer up to 30,000 volts. The results show that with high electric forces the dielectric constant is less than with lower electric forces; in other words, there exists an apparent tendency to saturation in inductive capacity. Measurements of the dielectric constant are always from 10 to 50 per cent. higher when made by the balance-method than those made by the condenser discharge method. In different dielectric fluids the spark-distance for the same difference of potentials is different, and always much shorter than in air. The potential requisite to produce a spark within a dielectric liquid increases with the spark-length, but at a slower rate. The strength of a steady electric current in a dielectric fluid increases more rapidly than the electromotive force which produces it; an exception, apparently, to Ohm's law.—L. Sohncke, electrification of ice by water-friction. Experimental proof that water becomes negatively electrified and ice positively electrified by mutual friction. The author thinks thereby to explain the origin of thunderstorms by friction of cumulus and cirrus clouds.—E. Edlund, researches on the electromotive force of the electric spark. He finds the counter-electromotive force of the electric spark to be divisible into two parts, one at each pole, that at the positive pole decreasing, and that at the negative pole steadily increasing, as the air-pressure is diminished. He regards this as explaining the anomalies of unequal heating of the electrodes.—W. Donle, contributions to knowledge of the thermo-electric properties of electrolytes. According to these experiments the thermo-electromotive force between two electrolytes, such as solution of sulphate of copper and sulphuric acid is approximately proportional to the differences of temperature of the points of contact; the proportionality varying in some way with the concentration of the solutions. The electromotive force is usually less with more concentrated solutions. Through the heated junction of a chloride and a sulphate the current flows from chloride to sulphate.—F. Auerbach, on the electric conductivity of metal powders. Precipitated silver was used. The author finds an enormous reduction when the density is increased by mechanical force.—R. Krüger, on a new method of determining the vertical intensity of a magnetic field. This method consists in sending an electric current radially through a horizontal copper disk suspended by a thin wire, and observing the rotation of the disk.—R. Maurer, on the ratio of the sectional contraction to the longitudinal elongation produced in rods of glue-jelly. The rods were made of gelatine and water, and of gelatine and glycerine. One of the methods was an electrical one, consisting in observing the change of electrical resistance on stretching. These jelly rods exhibit the phenomena of residual strains very markedly.—M. Hamburger, researches on the duration of the impact of cylinders and spheres.—Dr. K. Noack, on the fluidity of absolute and diluted acetic acids. Curious minima of fluidity are observed by the author, varying with concentration and with temperature.—W. Müller-Erzbach, the law of decrease of absorbing power with increasing distance.

SOCIETIES AND ACADEMIES

EDINBURGH

Royal Society, July 19.—Mr. Robert Gray, Vice-President, in the chair.—The Right Hon. Lord Rayleigh communicated a paper on the colours of thin plates. He has laid down on Maxwell's triangle of colours a curve representing the variation of the colours of thin plates as the thickness of the plates increases.—Prof. Dr. Fr. Meyer communicated a paper on algebraic knots.—Prof. Tait described Amagat's "manomètre à pistons libres."—Prof. C. G. Knott communicated a paper on the electrical properties of hydrogenised palladium. This paper contains the results of experiments on the resistance and thermo-electric properties of hydrogenium or hydrogenised palladium. Up to a temperature of about 200° C. no special peculiarity is noticeable; but at that temperature, or a little higher, hydrogen begins to escape from the wire, and this causes the particular specimen of hydrogenium to recover partially, if not wholly, its pure palladium characteristics. It is known that the resistance of a palladium wire charged with hydrogen at ordinary atmospheric temperatures increases at a rate almost strictly proportional to the amount of charge. The same law seems to hold at all temperatures up to 150° C., and in such a way that the *total* increase of resistance of a given palladium wire for a given rise of temperature is nearly the same at all charges; or the temperature-coefficient for any particular specimen of hydrogenised wire is practically inversely proportional to the resistance as compared with the resistance of the wire in its pure uncharged state. Just before the hydrogen begins to escape, the resistance begins to increase somewhat more rapidly than at lower temperatures; and this peculiarity is more marked in the specimens of higher charge. When once the hydrogen begins to escape, the resistance begins to fall off rapidly as the temperature rises to 300° C. At this temperature the wire cannot be distinguished from pure palladium. In the thermo-electric experiments, peculiar irregularities appear at the higher temperatures, which seem to be due to the fact that the hydrogenium wire is unequally heated, and that the hydrogen, which is almost completely driven out of the heated portion of the wire, returns partially as the wire is cooled down again. In all cases at temperatures below 150° C., the current is from pure palladium to hydrogenium through the hot junction, is probably proportional to the difference of temperature in each case, and is greater for the greater charge. Thermo-electrically, fully saturated hydrogenium lies between iron and copper at ordinary atmospheric temperatures. On the thermo-electric diagram the hydrogeniums of different charge are represented (up to a temperature of 150° C.) by a series of straight lines parallel to palladium, whose thermo-electric powers at 0° C. range roughly from − 600 (pure palladium) to + 1400 (saturated hydrogenium) expressed in C.G.S. units. (Compare Everett's "Units and Physical Constants," p. 151.)