objections. Bunsen (*Wied.*, 1885, xxiv. 335) has shown that CO_2 will not condense on glass unless a film of water be previously formed. Warburg and Ihmori (*Wied.*, 1886, xxvii. 481, and *Wied.*, 1887, xxxi. 1006) adduce reasons for believing that the water film is largely due to uncombined or loosely combined alkalies on the surface. On clean unvarnished metals, washed glass and quartz, the thickness of the water film which can be removed by dry air without heating does not exceed 12 $\mu\mu$. A striking exception is agate, on which films 1640 $\mu\mu$ thick are stated to have been formed. As this substance, however, is composed of alternate layers of quartz and a porous impure opal, the basis for an accurate calculation does not exist. On the whole, it seems that no definite conclusions as to the magnitude of the radius of molecular action (ρ) can at present be drawn from these experiments. Quincke (*Pogg. Ann.*, 1869, cxxxvii. 402), as is well known, by measuring the capillary elevation of liquids between glass plates coated with thin wedge-shaped films, found $\rho = 50\ \mu\mu$. Plateau ("Statique des Liquides," 1873, i. 210) showed that the surface-tension of a soap-bubble, which thinned until its thickness was 118 $\mu\mu$, was unaltered. He concluded that $\rho < 59\ \mu\mu$. Maxwell ("Ency. Brit.," 9th ed., Art. "Capillary Action"), however, though by a confessedly imperfect theory, shows that the surface-tension may not change until the thickness of the film $= \rho$. Hence Plateau's result may mean only that $\rho < 118\ \mu\mu$. Reinold and Rücker (Phil. Trans., clxxvii. Part ii. 1886, 627) have proved that the surface-tension does not alter by 0·5 per cent, when the film is so thin as to show the black of the first order of Newton's colours. This appears at first sight at variance with Quincke's result, but their observations are really in remarkable accord with his. The black and coloured parts of a film are separated by a sharp line, which proves a discontinuity in the thickness (Proc. Roy. Soc., 1887, No. 182, 340). The colours, which correspond to certain thicknesses, which may be called the unstable range of thickness, are always missing. The black part of the film has been proved by Reinold and Rücker (Phil. Trans., Part ii. 1883, 645) to be of a uniform thickness, which differs but little from 12 $\mu\mu$. Sir William Thomson (Proc. Royal Institution) and these observers independently arrived at the conclusion that these curious phenomena are due to the fact that the surface-tension diminishes to a minimum, and then increases again when the thickness is somewhat $>12\ \mu\mu$. The colours of the film prove that the upper limit of the range of unstable thickness is between 96 and 45 $\mu\mu$. Quincke's result indicates that it lies between 100 $\mu\mu$ and 50 $\mu\mu$, according as we adopt Plateau's or Maxwell's views. These calculations are therefore in complete accord. Quincke's result is not an isolated fact, but is supported by observations on soap films. The statement that 50 $\mu\mu$ and the radius of molecular action are of the same order of magnitude may now perhaps rank as an ascertained fact. Another method of investigating the radius of molecular action is based on the phenomena of electrolytic polarization, by observing the change in the difference of potential between a metal and a liquid in which it is immersed, when a gas or metal is deposited on it by electrolysis. In the former case we do not know the density of the gas, in the latter Oberbeck (*Wied.*, 1887, xxxi. 337) concludes that a plate of platinum is completely polarized by a film of another metal of from 3 to 1 $\mu\mu$ in thickness. The method of experiment is, however, open to objections, which are indicated by Oberbeck himself. Measurements of the thickness of the double electric layer of Helmholtz, which is closely related to the distance between two consecutive layers of molecules, have been made by Lippmann (*Compt. rend.*, 1882, xcv. 687), and by Oberbeck and Falck (*Wied.*, 1884, xxi. 157). The values they give vary between 1 and 0·02 $\mu\mu$. Wiener (*Wied.*, 1887, xxxi. 624) has studied the alteration in the phase of light reflected from very thin silver plates deposited on mica. He finds that the effect begins to alter when the thickness is reduced to 12 $\mu\mu$, and that it was possible to detect a silver film the thickness of which did not exceed 0·2 $\mu\mu$. The diameter of a molecule is a conventional term for the mean distance of the centres of two molecules during an encounter. It may therefore be different in the liquid and gaseous states. Sir William Thomson ("Natural Philosophy," Thomson and Tait, Part ii. 295, 1883), as the result of his celebrated discussion of this point, concludes that the mean distances between the centres of molecules in liquids (supposed arranged uniformly) is between 0·07 and 0·02 $\mu\mu$, and that the latter quantity is an inferior limit to the diameter of a gaseous molecule. The diameters of molecules (d) may be calculated if we know the mean free path (L), and the so-called condensation coefficient (v), which is the volume of the molecules contained in a unit volume of the gas. Loschmidt (*Sitzungsber. Wien. Akad. Math. Classe*, lii. abt. 2) and O. Meyer ("Die Kinetische Theorie der Gase," 225, 1887) have calculated d on the assumption that the molecules in a liquid practically fill the whole space it occupies. Exner (*Rep. der Physik*, xxi. 226, 1885), using a formula given by Clausius, $v = (K - 1)/(K + 2)$, where K is the specific inductive capacity, and can be replaced by $v = (n^2 - 1)(n^2 + 2)$, where n is the refractive index, finds values of d about five times smaller. Three independent methods of calculating the diameter of a gaseous hydrogen molecule lead to results between 0·14 and 0·11 $\mu\mu$. The most reliable conclusions which have been reached as to molecular magnitudes may be summed up in the following table, which is reproduced from a diagram exhibited during the lecture.

$\mu\mu$.		
118	Superior limit to ρ	Plateau (Maxwell)
96–45	Range of unstable thickness begins	Reinold and Rücker
59	Superior limit to ρ	Plateau
50	Magnitude of ρ	Quincke
12	Range of unstable thickness ends	Reinold and Rücker
12	Action of silver plate on phase of reflected light alters ...	Wiener
10·5	Thickness of permanent water film on glass at 23° C. ...	Bunsen
4·3	Mean distance between centres of molecules in gases at 760 mm. and 0° C.	O. Meyer
3–1	Thickness of metal films which polarize platinum	Oberbeck
1–0·02	Thickness of electric double layer	Lippmann and Oberbeck
0·2	Smallest appreciable thickness of silver film	Wiener
0·14–0·11	Diameter of gaseous hydrogen molecule	Exner O. Meyer Van der Waals
0·07–0·02	Mean distance between centres of liquid molecules	W. Thomson
0·02	Inferior limit to diameter of gaseous molecule	W. Thomson

—The following papers were read:—A new method of obtaining monohydrazides of α-diketones, by Prof. F. R. Japp, F.R.S., and Dr. F. Klingemann. The authors have prepared von Pechmann's monohydrazide of diacetyl by the action of diazobenzene chloride on sodium methacetate.—The formation of dihydrazides of α-diketones, by the same.—The action of phenylhydrazine on anhydracetophenonebenzil, by Prof. F. R. Japp, F.R.S., and Mr. G. N. Huntly.—The supposed identity of rutin and quercitrin, by Dr. E. Schunck, F.R.S. A comparative examination of rutin obtained from the leaves of *Polygonum fagopyrum* and of quercitrin shows that, though they are extremely similar, yet they differ in composition and in some of their properties. Rutin has the composition $C_{42}H_{50}O_{25}$, and yields, on hydrolysis, one molecule quercetin and three molecules isodulcite, whilst quercitrin $C_{36}H_{38}O_{20}$, as is known, yields, under like conditions, one molecule quercetin and two molecules isodulcite.—The composition of bird-lime, by Dr. E. Divers, F.R.S., and M. Kawakita. Japanese bird-lime prepared from *Ilex integra* contains, in addition to 6 per cent. of caoutchouc and minute quantities of oxalates, the ethereal salts of palmitic acid, and, in small quantity, of a semi-solid undetermined fatty acid. On hydrolysis these yield *ilicylic alcohol*, $C_{22}H_{38}O$, differing only slightly from Personne's ilicic alcohol, and *mochylic alcohol* $C_{26}H_{46}O$. A resinoid body, $C_{26}H_{44}O$, was also separated. When heated with palmitic acid, the two alcohols are converted into compounds just like purified bird-lime. The authors consider bird-lime to be closely allied to the *waxes* in chemical constitution.

ERRATA.—P. 335, line 15 (from top), *for* $3SOH_2SO_4$ *read* $3H_2SO_4$; line 19 (from top), *for* SO *read* SO_2.