ican mathematicians were among his students and later helped to develop in our country a deep and abiding interest in mathematical research. The lectures which constitute the present volume were given at his home to a small number of students during a period of about five years, and he had expected to revise them and then publish them as his last mathematical contribution. On account of illness he could not do this and therefore the present volume was prepared for the press by those who were entrusted with his unpublished papers. Fortunately the editors decided to make no important changes so that we have here the words of a mathematical statesman which should interest not only mathematicians but also others who are interested in the great cultural forces of our age.

The headings of the eight chapters into which the present volume is divided are as follows: Gauss; France and the École Polytechnique in the first decades of the nineteenth century; the establishment of Crelle's Journal and the blooming of pure mathematics in Germany; the development of algebraic geometry beyond Moebius, Plücker and Steiner; mechanics and mathematical physics in Germany and England until about 1880; the general theory of functions of complex variables by Riemann and Weierstrass; deeper insight into the essence of algebraic forms; group theory and function theory, especially automorphic functions.

These headings represent fundamental centers in the remarkable development of mathematics during the nineteenth century. They also point to the fact that Klein naturally emphasized the history of those developments in which he either took part or which are closely related to the subjects which he helped to advance. In particular, the theory of numbers, algebra and the theory of aggregates received relatively too little attention. This lack of completeness is, however, compensated by the confidence inspired by one who speaks about the history of a subject on which he himself is an authority. While some attention is paid to biographical sketches and other matters which are not strictly mathematical we find here also some of the most profound and far-reaching mathematical observations. The commanding but attractive personality of the author is exhibited in many places, and his unusually wide personal acquaintance with leading mathematicians and with their most important contributions adds greatly to the value of the work. As an instance of the type of some personal remarks we may note that in speaking about H. Poincaré it is noted on page 375 that he did not enter the field of applied mathematics in the proper sense of this term and hence his contributions may be regarded as somewhat below those of Archimedes, Newton and Gauss, who also experimented and measured.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

SYNTHETIC RESIN AS A MOUNTING MEDIUM

IN the issue of SCIENCE for January 14, 1927, announcement was made of a new synthetic resin possessing physical and optical properties which made it particularly useful in microscopy. Having had experience with other compounds which at first seemed promising, yet later spoiled for one reason or another, the only doubt I had or expressed at the time the above-mentioned article was prepared concerned the stability of the product. It was first made on October 6, 1926, and a part of the original sample, as well as slides mounted therefrom, is in perfect condition on April 1, 1927. Evidently, the resin can be depended upon to keep unchanged for a period of many months; we have no reason to suspect that it will ever change.

In fluid form, this material has a refractive index of close to 1.70 for yellow light, and when hardened on the slide, it approaches 1.80, the exact figure not yet having been determined because it is far above the scale of any available refractometer.

A great deal of interest in this material has been shown by microscopists in many parts of the world as a result of the preliminary announcement in SCIENCE, and if the inquiries I have received can be used as a basis for forming an opinion, it certainly appears that there is a real desire in many branches for a better material than Canada balsam for a mounting medium.

For the benefit of all interested workers, I want to explain that I have developed the technique of handling the resin, only in the mounting of diatoms. It is so superior to other known resins for this purpose that one is tempted to call it ideal.

Whether methods of using it in other branches of microscopy can be developed or not remains to be determined by experiment. Thus far the best solvent we have found is aniline, but this does not necessarily mean that the last stage before mounting a preparation should consist of clearing in the solvent. Aniline is not very volatile; consequently a more protracted or higher temperature is needed to bring the resin to brittle hardness under the cover than would be the case could xylol or benzol be used as solvent. The hardened slides do not show a tendency to lose their covers by chipping. Improvement in methods of manufacture are expected to produce a material with a greatly reduced yellow color, but it is not likely to ever be water-white. The experienced microscopist will readily detect the ease with which transmission of the green ray for which most objectives are corrected is effected.

Upon heating, the material becomes so fluid it readily passes through filter papers and this property makes it very superior in diatom-work because of the freedom of the slides of bubbles. Its high index of refraction is its most valuable property, of course, and it should make chitinous structures, such as insects, crustaceans, etc., readily visible without staining.

Experiments are still in progress by the chemists, L. A. Penn and Paul Ruedrich, of Berkeley, California, in order to determine the best method of preparation of the resin and the chemical reactions involved.

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A NEW USE FOR THE NEPHELOMETER AND REFRACTOMETER

DURING the course of certain experiments with a large number of samples of sweet corn, it became essential to determine with a minimum of time and effort the relation between vigor and the condition of the distilled water in which it had been soaked. Some years ago, when the question of the toxicity of distilled water was under discussion, evidence was presented that the injurious effect produced on seedlings grown in distilled water was at least partially due to the extraction of electrolytes from the roots. These determinations were made in several instances by means of conductivity measurements. Apparently none of the investigators attempted to measure the effect of distilled water on dormant seeds. A number of experiments were undertaken along this line, but the Abbé refractometer was used instead of the hydrogen-ion concentration as the means of determining the relative quantities of solids leached from the seeds. The method is extremely simple, consisting merely of soaking 5 or 10 gm of seed in 50 cc of distilled water in well-stoppered bottles for forty-eight to seventy-two hours at a temperature of 30° C. Two or three drops of the liquid are all that is required for the reading. In order to check the test thousands of readings were taken of distilled water in which sweet corn seed had been immersed. In nearly all cases duplicate samples from the same ear were planted on the greenhouse bench and the growth of the seedlings compared with the instrument readings. A representative portion of one of the experiments is given in the accompanying table. This will give an idea of the responsiveness of the test. The refractive index tends to increase in inverse proportion to the vigor of the seedlings. When the refractive indices (x) are correlated with the seedling characters (y) of the entire series of 116 ears in this particular experiment, $r_{xy} = .592 \pm .041$ when y = per cent. germination; $r_{xy} = .360 \pm .055$, when y = height of seedling; and $r_{xy} = .343 \pm .055$ when y = green weight. Higher correlations have been obtained in other series.

No.	Refractive index (21° C.)	Colloidal index (mm) (Std. 30 mm)	Greenhouse test: Pct. germination	Increases over check: height (mm)	greenweight (gm)
28	1.33595	1.05	0	− 93.0	−0.26
29	1.33470	3.05	0	− 93.0	−0.26
30	1.33440	6.90	15	− 82.5	−0.23
31	1.33455	3.55	0	− 93.0	−0.26
32	1.33445	7.05	45	− 23.5	−0.06
33	1.33420	7.25	65	− 18.0	−0.07
34	1.33540	4.00	0	−134.4	−0.30
35	1.33510	1.95	0	−134.4	−0.30
36	1.33440	3.85	30	− 44.5	−0.10
82	1.33410	20.25	95	5.6	−0.08
83	1.33400	25.20	100	116.6	0.38
84	1.33410	30.95	100	112.0	0.42
85	1.33405	26.15	100	73.2	0.21
86	1.33415	17.45	90	50.4	0.16

Early in the experiments it became apparent that high refractive indices were accompanied by the presence of dense suspensions of colloids. Upon reading these with a Leitz nephelometer it was at once apparent that in many respects the colloidal index of the leachings is superior to the refractive index as a measure of the potential vigor in sweet corn. The colloidal indices in the above table are typical. The standard used in these experiments consisted of 0.5 per cent. c.p. soluble starch dissolved in 0.5 per cent. sodium toluene para sulphochloramid.

It should be noted that the coefficients of correlation for the entire series are even higher than for the refractive indices. The values are $r_{xy} = .634 \pm .037$ when y = per cent. germination; $r_{xy} = .680 \pm .034$ when y = height of seedlings; and $r_{xy} = .693 \pm .033$ when y = green weight. The correlation between the refractive and colloidal indices is $r_{xy} = .713 \pm .015$.

A considerable tendency exists for the coefficients of correlation to increase inversely as the percentage of germination in the case of the colloidal index. This is illustrated by the following: