give an account of these experiments and the methods. For a long time his experiments were futile, because it was impossible to make a machine of iron or steel strong enough to withstand the pressure which must be applied to the prepared pulp to reduce it to coal. By the action of super-heated steam, peat is converted into a perfectly homogeneous pulp. By passage of this through any of the ordinary compressing machines used for making bricks, etc., blocks or cylinders are obtained of a substance which, so far as its economic uses are concerned, is not inferior to most qualities of bituminous coal, for gas or fuel. Every effort was made to render the bore perfectly smooth and polished in the cylinder from which the peat was finally pressed out, and for this purpose even glass and porcelain were employed. However the peat was found to be so impalpable that it was forced into the microscopic pores of the metal, and even of porcelain and glass. The peat thus inserted itself in the finest possible particles which acted like wedges, chipping off small pieces from the interior of the cylinder. No matter how fine and smooth the bore of the cylinder was made, after very beautiful working for a few days, gradually this material would insert itself in the microscopical interstices of the metal, until gradually the working of the machine was stopped or an explosion ensued. A great many trials were made and much money spent, and finally the enterprise was given up.

MR. A. A. JULIEN remarked upon the voluminous literature connected with the study of peat, and the widely varying results, notwithstanding the enormous amount of labor that has been expended. The study of this material has been approached by investigators from two economic points of view; its relations to agriculture, and its employment as fuel. In investigations of the former class the larger number of analyses have been ultimate—*i. e.*, to determine the carbon, oxygen, hydrogen, nitrogen, etc., which make up peat and its allied products. This gives very conflicting results; the slightest possible change in the amount of water, the oxidation or dissociation of the material, even while during analysis, yielding very different results even in the hands of a single investigator. The other method is approximate, simply intended for the estimate of the value of coal or peat as applied to the purposes of fuel, and is that represented in the analysis of Mr. Britton. Such analysis, however, can throw but little light on the origin of the substance; organic acid seems to be further indicated by the red ash derived from the coal-like substance (Analysis No. 3), the white ash of the enclosing peat showing the residue of silica and alumina insoluble in the humus acids.

Further, the physical characteristics of the substance described by Prof. Fairchild, its brittle jelly-like character while moist, and extreme shrinkage on drying to bright coal-like brittle flakes, are identical with those of apocrenic, humic and other organic acids. These considerations render it highly probable that this substance has been produced within the peat at Scranton merely by the leaching out of the upper portions of the bog and the concentration of soluble salts of organic acids, in part crenates, along certain planes and in small cavities within the denser part of the peat toward the bottom of the bog. There is as yet no evidence, however, that these facts have any important connection with the formation of bituminous coal, much less with that of anthracite, represented by these specimens. A third method of the examination of peat is founded upon the determination of its proximate constituents or compounds, both those of amorphous character and various organic acids. From insufficient knowledge of the exact constitution and nature of these acids, especially in their various hydrated forms, the method is very difficult and has thus far had but limited application. Only such a mode of examination can throw light upon the character of the bright jelly-like substance in the Scranton peat.

Some statements by Prof. Fairchild, however, give a clue to its identity. He has mentioned a rapid change of color in specimens of the peat taken from a depth of thirteen feet, the yellowish brown color of the surface becoming blackish brown in a few moments while being handled. This seems to indicate not the trifling change produced by drying, but the characteristic reaction of crenic acid, well known to chemists by its immediate oxidation and partial conversion into apocrenic acid. This affects not only the acid but its ordinary salts, *e. g.*, those of iron, and has been observed both in its artificial product in the laboratory, and in nature, in the deposit of iron crenate beneath peat bogs and from the waters of many springs.

Prof. D. S. MARTIN called attention to the resemblance of the lighter colored and solid variety of this peat to the darker variety of the "turba" of Brazil. In the latter he had also observed thin seams of a black bituminous substance which was much like that which occurs in this peat.

The subject was further discussed by Prof. Hubbard and Mr. Parsons.

MICROSCOPICAL SOCIETY OF ILLINOIS.

The regular meeting of the State Microscopical Society of Illinois, was held at the Academy of Sciences, No. 263 Wabash avenue, on Friday evening, December 9, 1881, President Dr. Lester Curtis in the chair. After the reading of minutes and other routine business, the secretary announced the following donations:

From Dr. Schmidt, of New Orleans, one dozen slides, consisting of nerve-fibers and other Histological preparations.

"Botanical Notes" from Prof. E. J. Hill, of Englewood, Ill.

Bulletin of Microscopical Society of Belgium, and the report of the Microscopical Society, of Liverpool.

Dr. Angier, of St. Madison, Iowa, spoke in reference to some Acari which he had found under the skin of a chicken.

Prof. Burrill, of Champaign University, was introduced and spoke in reference to the poison of the poison ivy. He took some of the exudation and found it teeming with bacteria, and he questioned whether the poisoning and the bacteria come from the plant or otherwise. The speaker stated that upon examination of the workings of the leaves, he found the same forms; the milky fluid which exuded from stem contained numbers of them and the effect of placing some of this upon h. arm had been attended with quite serious results.

The speaker went on to say that he had found the foregoing facts true with other plants among which he mentioned the chicory, buckwheat and dandelion.

Dr. Curtis described a new half-inch objective made by Gundlach and owned by Dr. J. Hollist. The glass was claimed by the maker to have an angle of 100°. Its angle had not been measured since leaving his hands.

It has the society screw and can be used on any ordinary stand. The back lens of the objective is large and extends beyond the border of the opening in the screw. This opening, therefore, acts as a diaphragm. In order to secure the benefit of the full aperture the portion of the objective can be removed and an adapter furnished with the Butterfield broad range screw can be substituted. It has also another screw of about the same diameter as the Butterfield screw, but provided with a finer thread, the name and description of this screw was not known. The front of the objective is ground down to a conical shape. For ordinary use this front is covered with a brass cap, having an aperture in the centre to allow the conical end of the objective to pass through. The cap can be removed when it is desired to use the objective for the examination of opaque objects. On removal of the cap the conical sides of the lens are seen to be covered with some sort of black varnish to prevent the passage of

outside light. A lieberkuhn is furnished with the glass which can be screwed on in place of the cap while examining opaque objects. The speaker had not had the glass in his hands long enough to become perfectly acquainted with all its qualities, it certainly is a good one, however. It resolves angulatum very satisfactory, and bears eyepiecing extremely well, working admirably on anatomical structures.

The lieberkuhn seems to be a valuable addition for some sorts of study as it brings out surface workings with unusual clearness, even in transparent objects. Mr. E. B. Stuart exhibited a Hitchcock lamp which he stated commended itself to the use of microscopists. No chimney is required, it being a blast lamp, the flames of which is fanned by a passage of air from the bottom, the top of the lamp driven by a noiseless clockwork. The oil well is entirely separate from the outside part of the lamp, and is kept cool by the cold blast of air constantly surrounding it. It gives a light of about a six-foot gas burner and the flame is steady and more free from flicker than gas or the ordinary carbon burner. He also showed under the microscope specimens of the gelatine-bromide plates for photographic work, that had been submitted by a photographer as imperfect. An inspection under the microscope showed three kinds of spots. One caused by dust particles which had settled on the gelatine while still soft, and as the emulsion hardened, became firmly fixed on the plate. The second kind of spots were caused by, apparently, the solvent action of some substance on the film, as it could be seen to be less dense at those points, while the third were thicker and evidently caused by carelessly spattering the emulsion on partially dried plates.

The meeting was then declared informal.

WM. HOSKINS, *Secretary*.

THE AMERICAN CHEMICAL SOCIETY.

The papers appointed to be read on the evening of the December meeting were, owing to the election of officers, omitted and therefore at the *Conversazione* held on Dec. 16 they were again brought up for consideration.

The first and second papers were "On the Separation and Estimation of Manganese" and "On a Modification of Mohr's Burette; adopting it to use in delivering corrosive solution" by Nelson H. Barton. Both of these papers consisted of descriptions of details of manipulation which the author had been lead to use in his own laboratory resulting from his experience and which under favorable considerations might be desirable to employ.

The third paper was by Mr. Casamajor and titled "Analysis of Soghum Juice" an enumeration of the results obtained by him in his laboratory with comments on them.

"A new Laboratory Filter and Aspirator" was the next paper, also by Mr. Casamajor. The apparatus referred to has recently been patented, and in the above paper it was thoroughly described and a model exhibited. The fifth paper was by Dr. A. R. Leeds, entitled "A Chemical Inquiry into the Self-purifying Power of a Flowing Stream." In this paper the complete results of the work done by Dr. Leeds for the New Jersey Board of Health were presented. It will be recollected that in a previous number a synopsis of this paper was given to the readers of SCIENCE. On the present occasion charts were exhibited showing the exact relations existing between the various estimations which were made. These were peculiarly interesting to chemists although unfortunately the entire subject of water analysis is in such a state of confusion that it is difficult to make much headway in the accumulating and conflicting mass of literature which is current on this subject. The entire paper of Prof. Leeds will be published in the N. J. Board of Health Reports. The final paper of the evening was "A New Method for the Analysis of Mustard" by the same gentleman with the assistance of Mr. Everhart. The ordinary methods given by Hassall, Blyth and others were so unsatisfactory in their results that an effort was made to produce something more definite. After some little study it was found best to separate the various constituents by different extractions with various reagents, so that an addition to the conventional determinations of moisture, oil and ash (for the mineral adulterants) extractions of alcohol and ether are made for the remaining ingredients.

M. B.

SUICIDE, an Essay on Comparative Moral Statistics. By HENRY MORSELLI, M. D., Professor of Psychological Medicine, Royal University, Turin. Being abridged from the original, as Volume XXXVI of the International Scientific Series. New York. D. Appleton & Co.

The present moment seems peculiarly favorable to the presentation of a work on the subject of suicide. Whether it be the great accumulation of financial and political crises, or the increase of mental derangements, or a fundamental change in the *morale* of the civilized races, it would seem as if a great suicidal wave was sweeping over our social horizon. The labors of Buckle, Wallace and Bagshot have taught the necessity of studying such complicated problems synthetically. The statistics of no one community, the analysis of no one cause, will suffice to explain their phenomena. Professor Morselli, fully recognizing this fact, has undertaken a study of the question of suicide from a statistical point of view, and one involving in its analysis the results of Social Scientific, Anthropological, and Medico-Psychological inquiries.

The first fact demonstrated by a careful study of statistics is the regularity and the increase of suicide in civilized countries, which finds its expression in the painful conclusion, that "in the aggregate of the civilized States of Europe and America, the frequency of suicide shows a growing and uniform increase, so that generally, voluntary death since the beginning of the century has increased and goes on increasing more rapidly than the geometrical augmentation of the population and of the general mortality."

Among individual elements serving to explain this increase of suicide, climate deserves the least prominence as a direct factor. The only ascertained fact in this direction is that in the centre of Europe on an area of about 942, 000 square kilometers comprised between 47-57° of latitude and 20-40° of longitude, are found the people who manifest the greatest inclination to suicide. The least amount of suicide is found on the isothermal line of + 17.° 5 C, running through Portugal, Spain, Italy, Corsica and probably Greece. That the mere feature of temperature is not a very important one, is shown by the fact that on the isothermal line of + 10° C, there is the greatest variation. In the United States for example the suicidal rate is 35 per million; in Ireland 16, in England 67, in Belgium 55, the Netherlands 35, Hanover 140, Prussian Saxony 228, Galicia 98. A more direct and constant relation is found with other cosmical influences, thus the regions of the great rivers are most afflicted by suicide *coeteris paribus*, while on the contrary marshy or excessively low lands, like the Landes in France, the low countries about the Zuyder Zee and Jutland, show a lesser proportion. That suicide is most frequent in the warm seasons, is confirmed by Morselli, this observation is a familiar one to New Yorkers. In our city a perfect suicide *furore* occurs in certain summers, and the direct influence of the heat has no doubt much to do with this as with the summer increase in violent crimes similarly the results of insanity or passion, a fact to which, however, no reference is made by the author before us. It is certainly a noteworthy fact, in which he confirms Guerry, that the maximum of suicide falls under the summer solstice, the minimum under the winter solstice.