and at the end of five years he will be competent to bring useful material to the state society and later to the sections of the American Medical Association.

In the practise of medicine the student days are never over. There is so much to be learned that a long and industrious life leaves one with the feeling that he is but a beginner. The most important habit a young man can form is the 'daily study habit.' Let him put in even one hour a day with the reading of journals and books of reference and much can be accomplished. He should keep an account of the time and if something interferes for a day he should charge himself up with it. A two weeks' vacation means fourteen hours to be made up. Most men can do more and no man has a right to do less, no matter how busy he may be. The leaders in our profession make a daily average of three or four times this amount of study the year round in addition to the demands of an active practice.

The practitioner must make frequent trips away for the purpose of observation. In no other way can he avoid the rut of self-satisfied content which checks advancement and limits usefulness. No amount of diligence as a student can take the place of personal contact with men in this same line of work.

What are the rewards of so laborious a life? They can not be measured because there is no standard of comparison. To realize that one has devoted himself to the most holy of all callings—that without thought of reward he has alleviated the sufferings of the sick and added to the length and usefulness of human life, is a source of satisfaction money can not buy. I know many a man grown gray in the profession with little of a tangible nature to show as a result of his work, but who is not only contented with his lot but proud to have served in the ranks, and who looks back upon a life of privation and hardship for the benefit of humanity as a privilege which he is thankful has been vouchsafed him.

Let us continue to strive as individuals for the honor and dignity of our profession. In this we but follow out the aims and ideals of those who have gone before and prepared the way. But the great movements of the future can not be brought about by individual action. They must be initiated and controlled by united effort, and in no other way can the epoch-marking truths of preventive medicine be made to bear fruit. Unity is the spirit of the times; it marks the difference between the old and the new.

The vital need of the medical profession is a harmonious organization—an organization that will encourage right thinking and good usage among ourselves, help to secure needed medical reforms, compel redress of grievances and promote and encourage the highest interests of its individual members: and in this lies the future usefulness of the profession as a whole.

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THE KEEPING OF TOBACCO.[1]

The smoking quality of cigars and tobaccos depends in a large measure on their physical condition, the moisture condition being an important factor. A green, unseasoned cigar does not develop that peculiar aroma which is the delight of all fastidious smokers, and a cigar which has been allowed to become too dry burns too rapidly, most of the aroma being lost in the rapid combustion. Every manufacturer or dealer aims to bring his stock into exactly the right moisture condition and then to maintain it in that condition.

The public taste for cigars varies in different localities and countries and in all

[1] Published by permission of the Secretary of Agriculture.

the large factories cigars are conditioned to suit the demands of the country to which they are to be sent. In Europe, more especially in the British Isles, the consumer of cigars requires that they should be dry, in fact, almost brittle. It is a common incident in that country to see a smoker take his cigar and place it to his ear to see if it will give forth a cracking sound; and if it does not crackle the cigar is considered too moist. Pipe smoking tobaccos, however, are required very moist. In the United States the proper condition for cigars and pipe smoking tobaccos is just the reverse. The American smoker requires his cigars in such a condition that the wrapper, binder and filler will yield to the pressure of the fingers without cracking or breaking the wrapper; while on the other hand the smoking tobaccos, especially the granulated tobaccos, must be moderately dry.

Various methods are employed for keeping cigars and tobaccos in the proper condition, but up to the present time no method has been devised that will act automatically. Both manufactured tobacco and cigars are susceptible to climatic conditions, and it requires the constant attention of the manufacturer and dealer to regulate the moisture in his stock cupboard or show case. In retail stores great trouble is experienced in keeping the air in the show cases in the proper condition, especially when these are constantly being opened. In warm, wet weather more moisture is admitted than is needed, while during the cold winter months the cigars are apt to become too dry, especially in the upper part of the show cases.

Until recent years the common practise was to have a tray fitted with felt pads moistened with water placed in the top of the cupboard. This proved rather unsatisfactory, as evaporation took place too rapidly and the pads required constant moistening, especially during the winter months. These felt pads have given way to a large extent to asbestos wool which, when saturated with water, conserves the moisture for a much longer period. The constant opening and closing of show cases causes a constant replacement of the air in the case by the outside air. When the outside air is moist, as during wet weather, the pads have to be removed from the cases, for otherwise the air would become too moist. When the outside air is dry, the pads are used in the cases to compensate for the moisture lost at every opening of the case.

Several mechanical devices for regulating the proper amount of moisture in a cigar vault or stock room have been placed on the market, the principle of most of these being to drive a current of air over a vessel of water or damp pad either of felt or asbestos, thereby circulating a current of moist air in the room. Another device has been to spray water into the surrounding air. Both these devices are subject to the same objection as the use of damp pads, namely, that they do not automatically control under all climatic conditions the moisture content of the atmosphere with which the cigars or tobaccos are in contact.

As the present methods for the keeping of cigars and tobaccos in the proper condition of moisture are at best haphazard and as the aroma of a cigar depends to a very great extent upon the degree of dampness, a more precise method was sought, which should automatically maintain the proper degree of humidity of the air with which the cigars or tobaccos are in contact. It was with the object of determining what percentage of moisture in the air would be the best for the required purpose that these experiments were undertaken, or, using more technical language, the vapor pressure was sought at which the cigars or tobaccos maintained their proper physical properties.

It is a principle of physical chemistry that everything, even the most infusible of metals, has a vapor pressure, although this is so small as to be negligible in some cases. In other words, every object tends to keep the air space around it saturated with the vapor of that object. Thus, a body of water will continually evaporate into the air if the air be unsaturated with water vapor at that temperature, and conversely when the air becomes saturated with water vapor and then is cooled for any reason, precipitation ensues as cold saturated air contains less water vapor than warm saturated air. This vapor pressure of water is a perfectly definite quantity at any temperature, the pressure of the water vapor, or percentage of water vapor in the air, being greater at high temperatures than at lower temperatures. A solution of a solid in water has also a perfectly definite pressure, the more concentrated the solution the lower being the pressure. If for any reason the quantity of water vapor is greater than that with which the solution can exist in equilibrium, the solution gains in weight due to the condensation of the excess of water vapor from the air, and thereby becomes more dilute, and will continue to become more dilute until equilibrium is established between the solution and the vapor. Thus, if a beaker containing a dilute solution of sugar, and a beaker containing a more concentrated solution of sugar be placed under a bell-jar, the dilute solution tends to maintain a greater moisture content in the air space than does the more concentrated solution. Consequently there is a slow continual evaporation from the dilute solution to the more concentrated one, and this process will continue until the vapor pressure of the two solutions becomes identical, that is, until the percentage composition of the solutions is the same. In like manner, if the beakers contain solutions of salt and sugar, respectively, of unequal vapor pressures, there will be a distillation from the solution of higher vapor pressure to that of lower vapor pressure, the distillation continuing until the two solutions have acquired equal vapor pressures. In like manner, salts containing water of crystallization have definite vapor pressures depending on the temperature. If the vapor content of the gaseous phase falls below this vapor pressure, the hydrated salt gives up vapor sufficient to restore that vapor pressure, some of the anhydrous salt, or of a salt of a lower degree of hydration, being formed. If the content of the gaseous phase increases for any reason above the vapor pressure of the hydrated salt, there is no change until the vapor pressure of the saturated solution of the salt is reached, at which point the salt deliquesces, or becomes damp, due to the formation of a film of the saturated solution on the surface of the crystals. The saturated solution of magnesium chloride ($MgCl_2.6H_2O$) has a lower vapor pressure than the pressure of the water vapor ordinarily present in the air about us. Consequently, when the crystals of this salt are exposed they soon become moist and if left long enough they will dissolve completely in the water which has been condensed from the air. A hydrated salt, which is not deliquescent, will prevent the vapor pressure from diminishing below a certain amount, but will not prevent it exceeding that same amount. The vapor pressure of water in capillary openings differs very greatly from that at a free surface, and so porous substances, like paper and textiles, will hold water even when the vapor pressure of the air is below that of water at a free surface.

The moisture absorbed from a damp atmosphere by tobacco may form a solution with the salts present, it may form hy-

drated salts, it may be held by capillary forces in the leaf, or it may be in all three conditions. This question of the condition of the moisture in tobacco will not be discussed in this paper. That tobacco may be considered to have a 'vapor pressure' may be safely assumed from every-day experience, for if it is kept in a dry atmosphere it dries, and if in a moist atmosphere it becomes moist. The object of this investigation was to determine the magnitude of this vapor pressure. When this had been determined the next step was to find some material which would automatically maintain that vapor pressure.

Over two years ago the following experiments were conducted by the author under the direction of Professor Wilder D. Bancroft, of Cornell University. A plug cut tobacco (Old Gold) was used and the object of the first experiments was to find under what conditions the weight of the tobacco would remain the same as when the box was first opened. As the vapor pressure of sulphuric acid solutions had been determined quite accurately and over a great range of concentrations, solutions of sulphuric acid were employed in the tests. A number of solutions were prepared having densities varying from 1.24 to 1.38, and a large quantity of each (about 300 c.c.) was used so as to avoid material changes in composition. It was already known that the vapor pressure of tobacco probably lay between the vapor pressure of the two end solutions. These solutions were put into desiccators, such as are used in chemical laboratories, and the tobacco was placed on a watch glass which rested on a wire tripod, which in turn rested upon the shoulder of the desiccator. The weight of each sample of tobacco had previously been determined by weighing on the tared watch glass. After standing for two weeks in the closed desiccator the watch glass and the samples of tobacco were again weighed. Approximately the same quantities of tobacco were used in each desiccator, so that the surface exposed should be nearly the same throughout.

The samples of tobacco, which stood over solutions which tended to maintain in the air a greater percentage of moisture than the tobacco, would gain in weight, and on the contrary the solutions having the less vapor pressure than the tobacco would cause the tobacco to lose in weight. Also, the greater the difference between these pressures the faster would the loss or gain occur. The following are the results of this set of experiments:

TABLE I.

Change in the weight of plug-cut tobacco standing over sulphuric acid solutions of different strengths.

No.	Specific Gravity of H_2SO_4.	Initial Weight of Tobacco.	Weight After Two Weeks.	Per Cent. Loss or Gain in Weight.
1	1.376	2.4016	2.2630	5.76 loss.
2	1.354	2.4070	2.2844	5.01 "
3	1.325	2.0810	2.0162	3.11 "
4	1.296	2.5570	2.5290	1.09 "
5	1.283	2.6730	2.6802	0.27 gain.
6	1.272	2.7264	2.7568	1.12 "
7	1.250	2.2100	2.2856	3.43 "
8	1.237	2.6170	2.7414	4.74 "
9	No liquid present.	2.3004	2.2908	0.42 loss.

In the accompanying figure (1) the per cent. loss or gain in weight has been plotted

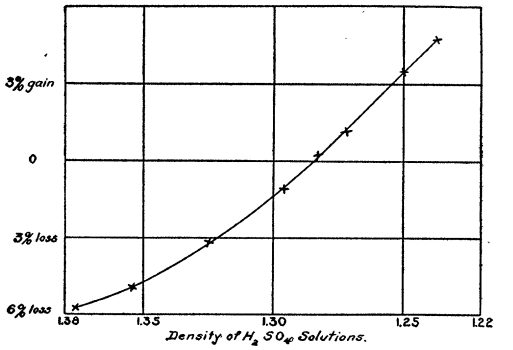

FIG. 1. Showing the loss or gain in weight in (Old Gold) plug cut tobacco after two weeks.

against the density of the acid solution. Both the table and the diagram indicate that the solution of sulphuric acid which would be best for keeping that particular tobacco in the condition in which it is put on the market, has a density lying between 1.283 and 1.296, rather nearer the former figure than the latter. Reading from the curve, the solution which causes no loss or gain in the weight of the tobacco has a density of 1.285.

No precautions were taken in the above experiment to control the temperature, and I have assumed that the temperature was 20° C., which is very close to the mean temperature of the laboratory at that season. The vapor pressures of solutions of sulphuric acid at different temperatures have been determined by Richards[2] and from his tables, the solution of sulphuric acid, having a density of 1.285, has a vapor pressure of 10.8 mm. at 20° C. The result of the experiment has been to show that for that particular tobacco a solution having a vapor pressure at 20° of 10.8 mm. will keep that tobacco (Old Gold plug cut) in the same condition of moisture as it had when the box was opened.

Now there is no automatic method of regulation of the composition of this solution, and so some method for this regulation had to be found. Here the principles of physical chemistry suggested the use of a saturated solution of some salt, which solution must have the proper vapor pressure. A saturated solution automatically controls the vapor content of the air space above it, for if the vapor pressure is above that of the solution, there is condensation tending to dilute the solution; but, as there is already solid salt present in the solution, it goes into solution until saturation is again reached. Conversely, if the vapor pressure of the air space is below that of the solution, there is evaporation from the surface of the solution, causing some of the salt to crystallize out. Thus a saturated solution containing some of the crystals of the salt is a means of preserving a constant vapor pressure in a confined space. A dry tobacco will absorb water and a very moist tobacco will lose water, the salt solution acting as a control.

There is, of course, this requirement to be filled, that the solid shall not itself evaporate and give any unpleasant taste or odor to the tobacco, such requirement being filled by almost any inorganic salt. From the measurements of Lescoeur[3] the following vapor pressures of solutions saturated at 20° have been taken:

Table II.

Vapor pressure of saturated solutions of various salts at 20°.

Salt.	Vapor Pressure of Saturated Solution at 20°.
Potassium iodide	11.2
Sodium sulphate	12.0
Sodium acetate	11.3
Barium bromide	10.7
Cadmium bromide	10.0
Manganese sulphate	11.3
Sodium nitrate	11.15
Cadmium nitrate	10.0

The saturated solution of barium bromide has a vapor pressure very nearly equal to that which was found for the tobacco, and Lescoeur's results also show that the solid salt ($BaBr_2.2H_2O$) has practically the same vapor pressure. Professor Bancroft has kept cigars for a long time in a desiccator containing barium bromide with very good results. This procedure has another advantage, for it not only keeps cigars and tobacco in good condition, but it may also be used to bring to a proper moisture condition, tobacco and cigars

[2] *Proc. Am. Acad.*, **33**, 23 (1897–98).

[3] *Ann. Chim. Phys.* (6), **16**, 378; **19**, 35, 533; **21**, 511; **25**, 423; **28**, 237; (7) **2**, 78; **4**, 213; **7**, 416; **9**, 537.

which have become dry and also those which are too moist for consumption. Mr. E. S. Shepherd, formerly of Cornell University, has successfully used this method to bring to a proper degree of moisture some cigars which had become thoroughly dried out. Similar results have been obtained in this laboratory. A box about three feet long, eighteen inches high, and twelve inches deep was provided with three shelves made of slats, so as to allow free circulation of the air inside the box. Several large evaporating dishes, each containing a saturated solution of sodium nitrate, and also an open box of cigars, which had become thoroughly dried out, were placed in this larger box. After a couple of weeks the cigars were examined and were pronounced by Mr. McNess, who is in charge of the tobacco investigations of this Bureau, as well as a number of others, to be in prime condition. The vapor pressure of saturated sodium nitrate solution is slightly greater than that of the barium bromide solution and will, therefore, keep the cigars rather moister than the latter solution.

By the use of solutions other than those which have been employed, the cigars may be made drier or moister, depending upon the solution employed. In this way the individual tastes of the consumer may be satisfied, some people preferring quite moist tobacco and others preferring it quite dry. By the proper choice of the solution, any degree of moisture in the tobacco may be attained and maintained. The use of solutions containing more than one salt offers possibilities of all gradations between a very wet and a very dry tobacco.

Experiments have been carried out in this laboratory using cigar wrapper, binder and filler tobaccos. Of course, the moisture content of these tobaccos in the proper condition for manufacture is different from that when the cigars are in proper condition for consumption. The object of these experiments has been to determine the proper condition under which the different cigar tobaccos must be kept preparatory to manufacture. A series of four desiccators contained different strengths of sulphuric acid and weighed samples of each

TABLE III.

Change in weight and condition of cigar filler tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	40.96 gm.	45.07 gm.	+10.0	Slightly water-stained, very slightly mouldy.
1.1190	38.53 "	39.43 "	+ 2.3	Fair condition.
1.1795	39.44 "	38.91 "	— 1.3	Good condition, no damage.
1.2445	46.49 "	41.43 "	—10.9	Too dry.

TABLE IV.

Change in weight and condition of cigar binder tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	18.43 gm.	20.17 gm.	+ 9.4	Mouldy on midrib, leaf tender.
1.1190	11.75 "	11.96 "	+ 1.8	Good condition, no damage.
1.1795	11.01 "	10.74 "	— 2.5	Slightly dry.
1.2445	15.53 "	13.83 "	—10.9	Entirely too dry

TABLE V.

Change in weight and condition of cigar wrapper tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	10.22 gm.	11.53 gm.	+12.8	Water-stained.
1.1190	13.95 "	14.87 "	+ 6.6	Slightly water-stained and slight white mould.
1.1795	10.61 "	10.49 "	— 1.2	Good condition, no damage.
1.2445	7.95 "	7.12 "	—10.4	Too dry.

kind of tobacco which were originally in fair condition were placed in each desiccator. After eighteen days the samples were again weighed, and the condition of the tobacco was carefully examined. The tables give the results of these experiments.

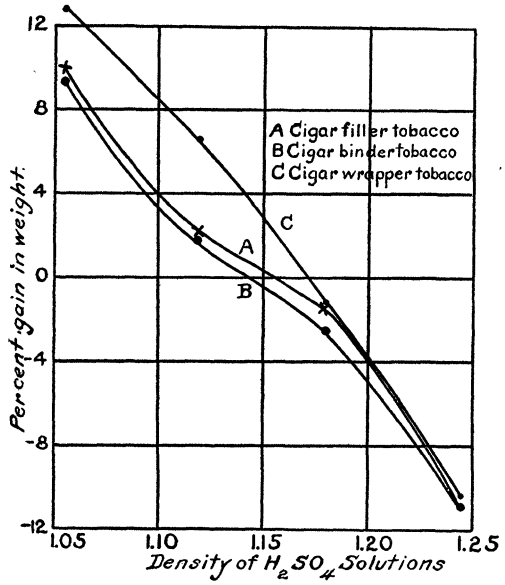

Fig. 2. Showing the loss or gain in weight in various cigar tobaccos.

From the above tables and Fig. 2 it will be seen that the *filler* and *wrapper* tobaccos are brought to a good physical condition by acquiring the same vapor pressure as a sulphuric acid solution of density about 1.18. The *binder* tobacco requires a somewhat weaker solution, 1.12. From the tables of Richards[4] for the vapor pressure of sulphuric acid solutions at 20°, the vapor pressure of a solution of density 1.16 is 15 mm. and of a solution of density 1.31 is 10 mm. A solution of sulphuric acid of density 1.18 has a vapor pressure of about 14 mm., while a solution of density 1.12 has a vapor pressure of about 16 mm. A solution of density 1.16 would probably keep all three kinds of tobacco in good condition. Lescoeur's results[5] have been consulted to find saturated solutions which yield vapor pressures at 20° in the neighborhood of 15 mm. The following table gives these figures.

Table VI.

Vapor pressure of saturated solutions of various salts at 20°.

Salt.	Vapor Pressure of Saturated Solution at 20°.
Potassium sulphate	14.4 mm.
Ammonium sulphate	14.8
Potassium nitrate	15.0
Zinc sulphate	15.3
Copper sulphate	15.2
Sodium sulphate	15.7

Of the above salts, zinc and copper sulphate are ruled out on account of their toxic action, if by any accident the salt should come in contact with the tobacco. Sodium sulphate has a rather high vapor pressure and is, therefore, best suited for the binder tobacco, while potassium sulphate with a vapor pressure below 15 mm. is best suited for filler and wrapper tobaccos. The best salts for all three are probably ammonium sulphate and potassium nitrate. Saturated solutions of ammonium sulphate have been used in the box which has been described and samples of the three cigar tobaccos which were very dry were placed on the shelves. At the end of ten days these tobaccos were pronounced by Mr. McNess, of this Bureau, to be in prime condition.

Thus, to bring cigar tobaccos into a proper condition of moisture preparatory to manufacture it is sufficient to place these tobaccos in a confined space in which there is exposed a large surface of a saturated solution of ammonium sulphate or potassium nitrate. After the cigars have been made up, they may be brought to a proper condition of moisture for consump-

[4] *Loc. cit.*

[5] *Loc. cit.*

tion by placing them in a confined space in which there is exposed a large surface of a saturated solution of sodium nitrate.

The following table gives the results of experiments upon Virginia fire-cured tobacco using the same solutions as had been used for the experiments upon cigar tobaccos.

TABLE VII.

Change in weight and condition of Virginia fire-cured tobacco.

Density of Acid.	Initial Weight of Tobacco.	Weight of Tobacco After 17 Days.	Per Cent. Change in Weight.	Condition.
1.0555	42.21 gm.	48.78 gm.	+15.6	Mid-rib very mouldy, leaf tender and covered with green mould.
1.1190	45.26 "	48.06 "	+ 6.2	Very mouldy and water-stained, leaf tender.
1.1795	42.63 "	43.29 "	+ 1.6	Less mouldy than above sample, but water-stained and tender.
1.2445	37.45 "	32.27 "	—13.9	Good condition, no damage.

Originally this tobacco was in a very wet condition and it was expected that the sample in the best condition would suffer a great loss in weight, and this is actually what happened. The atmosphere in contact with this tobacco must be very much drier than that in contact with any of the cigar tobaccos, and the solution which preserves this tobacco in good condition is a little less concentrated than the acid which kept (Old Gold) plug-cut tobacco in the same condition as it was when taken from the box.

It will be observed that different tobaccos require vastly different treatments to bring them to the proper moisture condition for manufacture or consumption. This work, however, brings out certain generalizations. All cigar tobaccos, whether filler, wrapper or binder, previous to manufacture require, within certain limits, very much the same treatment, *i. e.*, they are brought to the proper physical condition for manufacture by remaining a few days in an atmosphere which has acquired the concentration of water vapor, which is given off by a saturated solution of ammonium sulphate or of potassium nitrate. The second generalization is that all tobaccos, whether cigar or pipe, can be brought into proper physical condition for consumption by remaining a few days in an atmosphere which has acquired the concentration of water vapor given off by a saturated solution of sodium nitrate or some salt whose saturated solution gives approximately the same vapor pressure.

The principles enunciated in this paper might also be employed for the keeping of paper and other absorbent materials whose physical condition is affected by humidity.

SUMMARY.

1. It has been pointed out that the present methods for keeping tobaccos in proper condition for use, and for bringing them to the proper condition are haphazard and unsatisfactory.

2. Solutions have been found which keep tobaccos in the required condition for manufacture and use. This method is automatic, for the composition of a solution, containing some of the solid salt, does not change upon evaporation or condensation of moisture, until all the water has evaporated from the solution, or until all the solid has been dissolved by condensed moisture. The solutions which have been proposed will not only preserve a proper degree of moisture, but will also bring wet or dry tobaccos into a proper moisture condition. The solutions which have been proposed are quite inexpensive.

3. Practical tests have been made of the

proposed solutions upon wet and dry tobaccos, always with satisfactory results.

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SCIENTIFIC BOOKS.

Sur le développment de l'analyse et ses rapports avec diverses sciences. By Emile Picard. Paris, Gauthier-Villars. 1905.

In this little volume of 167 pages Professor Picard has republished the lectures which he came to America to deliver at the decennial celebration of Clark University in 1899 and at the St. Louis Congress of Arts and Science in 1904. The book thus has a special interest for American readers, but quite apart from this it will prove stimulating to all lovers of mathematics who feel the need from time to time of taking comprehensive views of the great divisions of their subject under the guidance of a master.

Parts of these lectures give information of a general character concerning some of the most recent advances in such subjects as the theory of differential equations and of algebraic functions of two variables, in both of which fields M. Picard is one of the leading workers. These sections, which necessarily presuppose a considerable mathematical training on the part of the reader, have been brought down to date by footnotes added since the lectures were delivered. They would be even more useful than they are if provided with more precise bibliographical references. Other sections will be found accessible to readers of much less mathematical attainment, and we can not indicate the kind of inspiration and enjoyment to be derived from them better than by giving a few typical quotations.

Without wishing to generalize too much, it may be said that mistakes are sometimes useful, and that during really creative periods an incomplete or approximate truth may be more fruitful than the same truth accompanied by the necessary restrictions (p. 5).

After having explained that it is not always wise to restrict one's attention to analytic functions (that is to functions which may be developed by Taylor's theorem) in spite of the fact that these functions are in a certain sense sufficiently general for all 'practical' purposes and that their theory forms an elegant mathematical system complete in itself, the author goes on:

In general, let us admire highly systematized theories, but let us distrust a little their scholastic appearance which is in danger of stifling the inventive impulse (p. 30).

In speaking of the development of mechanics in the eighteenth century the author says:

Formal mathematical developments played at that time the main part; and the language of analysis was indispensable for the greatest development of these principles. There are moments in the history of science, and perhaps of society, when the mind is upheld and carried forward by the words and symbols which it has created, and when generalizations present themselves with the least effort (p. 131).

True rigor is fruitful, and is thereby distinguished from another kind of rigor, purely formal and tiresome, which casts a shadow on the problems which it touches (p. 148).

Those who had the privilege of hearing M. Picard when he was in America will miss from this volume only the charm of the spoken word, while finding there all the attractive qualities of style for which the author is so justly noted.

Maxime Bôcher.

Harvard University.

SCIENTIFIC JOURNALS AND ARTICLES.

The May number of the *Botanical Gazette* contains the following papers: A. D. E. Elmer contributes his third paper on 'New and Noteworthy Western Plants,' describing numerous new species from California; J. Y. Bergen discusses certain strand plants about the Bay of Naples, chiefly in reference to the toxic effect of sodium chloride, and shows wide variation in this regard; H. D. House describes with the help of illustrations new and noteworthy North American species of clover; Charles E. Lewis describes the basidium of *Amanita bisporigera,* having traced the nuclear divisions in connection with spore-formation. The number closes with the usual full review of current literature.