sugar is added with most excellent results, in unfavorable wine years, as a corrective for the increased amount of acid.

Gall proposed to dilute acid wine with water, to the proportions found in wines of good years, and to add the requisite quantity of sugar, to produce the proportions of alcohol and acid, contained in wines made during good wine years.

There can be no doubt that all these processes are perfectly legitimate, and, if practised with the proper knowledge and care, can only be beneficial both to the wine-grower and consumer.

Cane-sugar or loaf-sugar is mostly used for such purpose, on account of its greater purity and freedom from non-fermentable constituents as well as albuminoid substances. Its composition differs from that of grape-sugar, $C_6H_{12}O_6$, by containing less water, namely, $C_{12}H_{22}O_{11}$, and during the fermentation it has to be converted into the glucose called grape-sugar, by the assimilation of water; 86.4 parts of cane-sugar perform, therefore, the same amount of work as 100 parts of pure crystallized grape-sugar.

The stages through which the starch in barley—the grain which is almost exclusively used in this country—passes before it reaches us as the fermented alcoholic extract, called beer, are more numerous, and probably of more complicated nature. They may be considered in the following order:—

- (1) Malting.
- (2) Mashing.
- (3) The fermentation of the wort.

In order to show a *raison d'être* for bringing before you the new substitute for malt, which we have termed "Dextrine-Maltose," or malt-sugar, I shall first dwell upon the composition of malt, and will endeavor to show you that, by a patient study of the constituents contained in malt before and after infusion, in connection with those contained in the fermented beer, much additional insight into the brewing process may be gained.

COMPOSITION OF MALT.

Chemists gain their knowledge of the composition of matter by certain analytical processes: that knowledge is the more perfect, the more perfect and reliable the analytical processes are which they have to employ. Now we possess pretty accurate methods for the quantitative estimation of moisture, ash, fat, cellular matter, and total albuminoid or nitrogenous matter; but little or no attention has hitherto been paid to the different varieties of albuminoid bodies contained in malt. The isolation and estimation of the starchy matter, or, as I would call it by preference, of the carbohydrates which, without doubt, form the most important constituents of malt, is more difficult, and great errors have been made, as we have to rely mostly upon chemical methods which are likely to mislead if not carefully checked by other observations, if possible by polariscopic experiments. I give it upon the authority of Mr. O'Sullivan, that of the many analyses of malt which have been published, not one can be relied on in this particular respect.

Thus it has always been stated, even by more recent careful inquirers, such as Oudemans, that malt contains dextrine (8 per cent). O'Sullivan can not find any dextrine, although he looked most carefully for it by processes which would have yielded it if it had been present in malt. This opinion seems to be shared by other recent investigators, for example, by Kühnemann*, although the proofs which he adduces are meagre, and do not appear to be sufficient to warrant the conclusions at which he arrives.

Again, the amount of sugar (the variety is never stated) is usually set down at from 4 to 1 per cent. This too, O'Sullivan considers absolutely wrong. He finds in malt from 16 to 20 per cent of a fermentable sugar.

About half of this is due to the transformation of starch, or a carbohydrate of a like character, during the malting process. The remainder is ready-formed in barley, and differs from the one produced by malting. O'Sullivan has not yet been able quite satisfactorily to isolate and determine the character of these sugars, but of their existence he is quite convinced.

There is in the starch of barley a carbohydrate of the starch type having a laevo-rotatory action on polarized light. Kühnemann calls this body "Sinistrin," but from its general character, O'Sullivan is inclined to think the body is "Inulin." These remarks may appear to some of you, perhaps, premature, and not sufficiently supported by analytical facts. I had, however, to refer to them in order to render comprehensible the subjoined analyses of malts, which may be taken as typical for most pale malts, although the percentages of albuminoids and soluble carbohydrates are capable, to some extent, of modification by changes in the malting process.

The following table gives the detailed composition of two samples of pale malt:

	Malt No. 1.	Malt No. 2.
Starch	44.15	45.13
Other carbohydrates (of which 60 per cent to 70 per cent consist of fermentable sugars) Inulin(?) and a small quantity of other bodies soluble in cold water	21.23	19.39
Cellular matter	11.57	10.09
Fat	1.65	1.96
Albuminoids		
(a) Soluble in alcohol of sp. gr. .820 and in cold water	.63	.46
(b) Soluble in cold water and at 68° C.	3.23	3.12
(c) Insoluble in cold water, but soluble at 68° to 70° C.	2.37	1.36
(d) Insoluble at 68° to 70° C., but soluble in cold water (albumin proper)	.43	0.37
(e) Insoluble in cold water and at 70° C.	6.38	8.49
Ash	13.09	13.80
Water	2.60	1.92
	5.83	7.47
	100.12	99.76

* Ber. d. Chem. Ges. Berlin, viii. 202 and 387.

Every item in these analyses has been estimated directly, and not by difference. The further elucidation of the carbohydrates, other than ordinary starch, O'Sullivan reserves, should time allow him, for a communication to the Chemical Society.

I have on another diagram given, for comparison's sake, an analysis of the Dutch chemist, Oudemans's, hitherto looked upon as among the most reliable analyses of barley and malt.

Table showing composition of barley and malt (Oudemans's):

	Barley, air-dried.	Malt, air-dried.
Dextrine	5.6	8.0
Starch	67.0	58.1
Sugar	none	.5
Cellulose	9.6	14.4
Albuminoids	12.1	13.6
Fat	2.6	2.2
Ash	3.1	3.2
	100.0	100.0

Albuminoid compounds in malt (Oudemans's):

(a) Soluble in alcohol	.34
(b) Coagulable by heat	.45
(c) Not coagulable	2.08
(d) Insoluble albumin	6.23
	9.10

By starting thus with a more clearly defined knowledge of the starch present in malt, we shall have less difficulty in tracing the changes which it undergoes during its conversion into beer, and you will be able to judge whether the substitute for it, which we can produce on a manufacturing scale, and which we have called, not by some fanciful name, but by a name which expresses its proper chemical composition, namely, Dextrine-Maltose, will deserve your serious attention.

(To be continued.)

FRENCH ACADEMY OF SCIENCES—MARCH.

On the Storms termed "Foehn" in Switzerland.—M. Faye calls the attention of the Academy to a curious meteorological phenomenon peculiar to the Alpine regions of Switzerland. When a cyclone coming from the south-east meets the Alps, it very often produces over a clearly defined region in Switzerland, and not elsewhere, conditions altogether different from those ordinarily caused by cyclones. Instead of being accompanied by a sensible lowering of temperature, the "foehn" brings increased heat and dryness: the temperature rises suddenly several degrees, and the air, at first saturated with moisture, becomes no less suddenly extremely dry. M. Faye considers that this phenomenon can be produced only by the gyratory descent of a considerable mass of air totally or in great part deprived of the cirri which the whirlwinds formed in the superior currents ordinarily collect and draw down. Then this air becomes heated in descending from the high regions, and its degree of humidity lowers beyond the extreme point reached in temperate countries. On the other hand, where the descending air draws with it vesicular water, and especially ice crystals, the heat developed by compression hardly suffices to vaporize the water or melt the ice, and the air reaches the earth at a temperature relatively low, and at a degree of complete saturation.

On a New Apparatus for Determining the Intensity and Law of Development of Pressure in Bores of Fire-arms, with relation to Time. by General A. Morin.—MM. Reffye and Pothier have heretofore arranged a cylinder of lead in a tube containing a piston, said tube being screwed into the bore of the gun. Under the pressure of the gas, the lead was forced to flow in a suitably disposed canal, and results were obtained leading to the hope that the process would allow of more accurate determinations of the tension of the gas than the apparatus hitherto employed. But the softness of the lead and the facility with which it flows under moderate pressure limit the tension of which it may furnish a measure, and it can not be employed for determining those developed under the action of heavy charges of powder. Tin, however, appears to satisfy all conditions. The jets obtained increase in length proportionately to the pressures, with a regularity quite sufficient for all desired applications.

Denoting by P the pressure in kilogrammes exercised per square centimeter on the base of the tin cylinder or the interior of the bore, by L, the length of the jet expressed in millimeters, it is found that $P = 237 L$. By this simple apparatus, therefore, the direct measure of the maximum pressures developed by the gas may be obtained with a precision superior to that heretofore obtained, since each millimeter (.039 inch) of length of the conical jet will correspond to nearly 237 kilogrammes pressure per square centimeter, or 3258.7 lbs. per square inch. It is further proposed to prolong the conical case of the eprouvette which receives the tin cylinder, by a small cylindrical canal in which a stem shall be placed to be driven ahead by the flowing of the cylinder which it touches. To this stem is attached a pointer which traces a line on a chronometric apparatus. The length of the jets thus registered furnish the measure of pressures, and at the same time the intensity of the efforts and the precise instant when which was exercised, also given by the line, allow of deducing the laws of their development. By this simple addition of an indicating stem connected with very small chronometric apparatus, since the length of the jets will not exceed some fractions of an inch, a means is afforded of studying the rapid and complex effects due to the inflammation and combustion of various powders.

On the Influence of Temperature on Magnetization.—M. J. M. Gauguier offers the following complete résumé of his investigations on the above subject:

1. If a bar of steel is placed in contact with the pole of a magnet, and if for a point M of said bar the value of the current of demagnetization at ordinary temperature be determined, and if thereafter the bar be lightly heated by an alcohol-lamp, it will be found that the current of demagnetization corresponding to the point is (very probably) augmented.

2. When the bar is allowed to cool in contact with the magnet, the magnetization does not retrograde, but even becomes slightly strengthened.

3. When the bar has returned to the ordinary temperature, it suffices to remove it from the magnet for a few moments to cause the disappearance of a portion of the augmented magnetization resulting from the heating. When the contact is re-established between the magnet and the bar, the same total magnetization as before the rupture of the contact is not found.

4. When, instead of heating the bar of steel in contact with the magnet very moderately, the temperature is gradually elevated until the bar attains a blue color, it is found

that the magnetization first increases, attains a maximum, and then retrogrades.

5. When the bar, after being highly heated, remains in contact with the magnet during the period of cooling, the total magnetization augments in degree as the bar cools, and when the surrounding temperature is reached, it retains a value much above that which it had before the heating of the bar. In a series of experiments made by the author, the value of total magnetization after heating was represented by 63.2, while previous thereto it was represented by 41.6.

6. We have seen (4) that when the temperature of the bar exceeds a certain limit, its total magnetization, instead of increasing, diminishes. From this it might be believed that the magnetization of the bar, brought back to ordinary temperature, equally diminishes when the temperature to which the bar is carried is elevated above the limit referred to above. This, however, is not the case. The total magnetization of the bar, returned to ordinary temperature, is as much greater as the bar has been more highly heated, as much less as said degree of heating falls below the temperature which imparts to steel a blue color.

7. When the bar regains ordinary temperature, it suffices to break for a few seconds its contact with the magnet in order to cause it to lose a portion of the increase of magnetization which results from heating—but it can be made to lose only a portion. Even after an interruption of the contact, the total magnetization is greater than before the heating.

If it be admitted that the magnetizing force exercised by the current of a coil on a steel bar diminishes when the temperature of the bar exceeds a certain limit, it must also be admitted that reciprocally the inductive action exercised by the bar on the closed circuit of the coil which surrounds it should equally diminish when the temperature exceeds the same limit.

On the Electric Conductibility of Pyrites.—M. Dufet's conclusions are that the conductivity of pyrites is a true metallic conductivity, very variable with the physical structure of the specimen, but which in a given crystal depends neither on the direction, nor the intensity, nor the duration of the current.

THE DIVISION OF POISONS.

By WALTER E. BIBBY, Ph.G.

As a large number of the medicines prescribed by physicians of the present day are very poisonous, it devolves upon the pharmacist to exercise the greatest care and caution in compounding prescriptions containing such poisonous substances as strychnia, hydrarg. chlor. cor., arsenious acid, narcotic extracts, etc. It often occurs that physicians prescribe these remedies in minute doses for children, aged persons, and delicate females; it is, therefore, exceedingly important that they should not receive a fraction over the quantity prescribed.

The greatest care and attention should be given to this class of prescriptions, so that, when a third is prescribed, a half grain may not be given, which, in all probability, would result very seriously, or produce a condition of affairs entirely different from that anticipated by the physician; moreover, the uncertainty attending the weighing of fractions of grains by ordinary scales, renders it necessary for the pharmacist to first weigh one grain and then divide this into the quantity prescribed; in other words, virtually guess at the quantity.

To remedy this, and at the same time secure to physicians and pharmacists absolute certainty, I would recommend the trituration of the poisons in common use be made of such a strength that each grain of the trituration shall represent a certain quantity of the poison, and the trituration be made only with sugar of milk. The reasons for using this substance are various. In the first place, sugar of milk is a harmless, hard, gritty, odorless and almost tasteless substance. It is less liable to attract moisture from the atmosphere than any other substance; in fact, it possesses all the qualities desired for making a perfect trituration. The proportions I would suggest are one grain of the poisonous substance to seven grains of sugar of milk, making in all eight grains, the whole to be thoroughly triturated. The process of trituration is too well known to pharmacists to require elucidation in this article, and they are also well aware how important it is to carry out this process in an exact and careful manner.

Now when a physician writes for a quarter of a grain of arsenious acid, all that is necessary is to weigh two grains of the trituration, and you have the quarter of a grain desired. This method I hold to be the safest in weighing poisons—a method by which very small fractions of grains may be obtained—and where children, the aged, or very delicate are interested, to be one of precision. The physician can also prescribe with a feeling of certainty when using those poisonous substances in this trituration, and he may have the assurance that, when he prescribes the one quarter of a grain, he obtains that amount; for the reason that two grains of any substance will turn the beam of an ordinary scale more readily than a quarter of a grain. I have seen scales in some of our first-class stores on which the half of a grain could not be weighed with any degree of certainty, but on which two or four grains could be weighed with accuracy.

Likewise, the pharmacist can be more expeditious in dispensing his order, thereby rendering the sick a prompt, safe, and reliable prescription, and one exactly in accordance with the physician's wants.

HYDROPHOBIA.

DR. O. DE STEFANO relates, in the *Gazzetta Italiana*, three instances of persons bitten by the same rabid dog. The first case was that of Napolitano Rosa, aged 60 years. The dog bit him severely on the back of the hand. Dr. Stefano was in the drug-store where the bitten man at once applied for relief. Dr. Stefano immediately had recourse to pledgets of lint dipped in liquid ammonia, having first washed the wound thoroughly. When they became dry, other pledgets, similarly moistened with liquid ammonia, were substituted for the first. In ten days the wound was quite healed. The second case was that of Antonio Capiraso, about ten years old, bitten by the same dog in the left leg. Dr. Stefano treated the boy precisely as he had treated the man, and with a like result.

The third case was that of Teresa, aged 60 years, bitten by the same rabid animal. The poor woman, unaware of her great peril, sought for no treatment, and consequently received none. After the lapse of six months, symptoms, as well marked as possible, of hydrophobia appeared, and the patient died. These cases certainly appear deserving of the utmost attention.—*The Doctor*.