So that sugar, starch, gum, &c., may be considered as composed of carbon and water only; vegetable acids, as composed of carbon, water, and oxygen; oils, resins, &c., as composed of carbon, water, and hydrogen. Now, as the great bulk of vegetable food consumed consists of starch, or gum, or sugar, it is not at all improbable, that from an imperfect, or deficient assimilation in the stomach, or even from no assimilation having taken place, a morbid process may convert such substances into sugar; hence the rationale of an animalized diet among the means of cure.

The pathology of the disease is still very obscure, but the following facts may be mentioned as evidently connected with it, and as indicating that the original disease is not in the kidney.

1. *Its morbid anatomy.*—Dr. Prout states, “the most constant diseased appearances I have noticed after death, in diabetic individuals, have been rather of a medico-chemical nature than strictly organic; and, generally speaking, hypertrophy of the kidney has been principally the morbid appearance exhibited in it; also it has been found as frequently complicated with organic disease of the lungs, liver, and lymphatic system.”

2. *The chemical relation between urea and sugar.*—This remarkable relation seems to afford much explanation of the phenomena of diabetes, and to prove that it consists in a depraved secretion of urea. Thus, urea and sugar contain exactly the same quantity of hydrogen, while the quantity of carbon and oxygen in sugar is twice that of those substances in urea; a morbid change therefore takes place in the composition of urea, and instead of its being eliminated from the system, as healthy function demands, sugar takes its place.

The morbid phenomena of diabetes may be considered to consist in a depraved condition of the assimilatory processes by which the aliment is converted into the nature of our body.

The deductions are,—that it is a highly dangerous complaint, and that when formed, it shews a very depraved condition of organic life;—that the mode of treatment should be regular and systematic, not depending too much upon diet in the way of regimen, or upon chemical combinations as regards medical means, but on the steady endeavour for the re-establishment of the vital powers.

The sympathetic and splanchnic nerves have been found enlarged; and this is not surprising when we remember how the nerves are concerned in secretion.

ON AMORPHOUS QUININE AS IT EXISTS IN THE SUBSTANCE KNOWN IN COMMERCE AS QUINOIDINE.

By BARON LIEBIG.

In the preparation of sulphate of quinine, after all the crystals which can be obtained are separated, a dark-coloured mother-liquor remains, having an extremely bitter taste. On the addition of an alkaline carbonate, this liquid loses its colour and bitter taste, depositing, at the same time, a yellowish-white, or brownish precipitate, which, after being rinsed with water, and exposed to a gentle heat, agglutinates into a coherent mass, exhibiting the appearance of resin.

From the experiments of Sertuerner, Thiele, Bucholz junior, Koch, and other chemists, it has been long known that this resinous substance possesses the properties of a base, that it neutralizes acids perfectly; but the salts which are formed by these combinations with acids, have baffled all attempts at crystallization.

Sertuerner, who was the first chemist to separate this resinous substance from the mother-liquor of sulphate of quinine, considered it to be a distinct and peculiar organic base, existing in yellow and red cinchona barks, associated with quinine and cinchonine. He assigned to this, as he supposed, new substance, the name quinoidine, and greatly extolled its medicinal efficacy, in which he declared it was in all respects equal to quinine. In his journal (*Ueber die neueste Fortschritte in der Chemie, Physik und Heilkunde*, Bd. iii., No. 2, page 269,) he terms it “a true fever-destroyer.”

Subsequently, this substance, under the term quinoidine, has been employed medicinally in many places, and even introduced into the list of commercial articles or price-currents of many of the druggists of Germany.

In certain mother-liquors of quinine left in the preparation of the sulphate, which were analyzed by Henry and Delondre, and also a sample of quinoidine examined by Geiger, these able chemists discovered an amount of quinine and cinchonine, accompanied by a resinous substance, which they considered impeded the crystallization of the sulphates of the two bases, and which in their experiments they failed to separate. The results obtained by these chemists, and the inferences obviously deducible from these results, rendered it indubitable that the medicinal efficacy of quinoidine must vary according to the greater or less proportion of quinine it may happen to contain. Now, there cannot be a doubt but that this uncertainty with respect to the relative amount of quinine in commercial quinoidine, has prevented many physicians from prescribing the latter as a remedy, notwithstanding the testimony borne to its efficacy.

Having occasion, some time since, to pass through Coblenz, I procured from Messrs. Jobst and Co., of that town, a sample of quinoidine, for the purpose of employing it for the preparation of quinoleine—a substance discovered by Gerhardt to result from the transformation of quinine, and to which much scientific interest attaches, in consequence of the recent discovery of Professor A. W. Hofmann, that quinoleine is identical with leucol, a body which is one of the components of the essential oil of tar, prepared from anthracite coal. It then occurred to me, that if the sample of quinoidine which I had procured contained quinine, it must yield a corresponding amount of quinoleine, and that, consequently, a very simple method of testing quinoidine for the amount of quinine it may contain, might be based upon this property of quinine to be transformed into quinoleine.

On subjecting the sample I had obtained, (which amounted to several ounces,) to distillation with strong potass ley, I confess I was surprised at the large amount of quinoleine produced, which proved the presence of a far larger proportion of quinine than could have been anticipated. This unexpected result induced me to subject quinoidine to a stricter examination; and in order to avoid being misled by accidental circumstances, I procured, beside the Coblenz

sample, specimens from Messrs. Hess, Leissler and Fiedler, of Mayence, and from Messrs. Mettenheimer and Simon, at Frankfort, and also from a druggist, at Hamburg.

These various samples of quinoidine I received partly in irregularly-shaped masses, and partly as square cakes of a darker or lighter brown colour, which, by the warmth of the hand, became soft and flexible, but were readily pulverizable in the cold. The operation of powdering it imparted to it an extraordinary degree of elasticity. All these samples were completely insoluble in cold water, but scantily soluble in hot water, imparting to the latter a strongly bitter taste. I may here however observe, in passing, that some commercial specimens which I have since seen are soluble in cold water, arising from a considerable admixture of other substances; differing also, from the same cause, in many of the following properties:—

All the first samples I speak of dissolved in alcohol, in the proportion of one part to two of the menstruum; and from this alcoholic solution, water precipitates copious, yellowish-white, resinous flakes, which cohere into a mass like the original quinoidine. Dilute mineral acids, as well as most of the organic acids, dissolved my samples entirely, and by adding a sufficient amount of the substance, became completely neutralised. From these solutions in acids, ammonia and alkaline carbonates precipitated resinous flakes. On agitating the fluid containing these flakes and the flocculent precipitate with an equal volume of ether, the precipitate dissolves in the ether, *with the exception of a dark-brown residue*. On evaporating the ether, a resinous mass is obtained, having all the properties of an organic alkaloid.

Its salts are precipitated by tannic acid. Chloride of platinum produces in its solution in hydrochloric acid a yellow precipitate. Moreover, it dissolves completely in a solution of sulphate of copper with the separation of oxide of copper. Now there exists no resin, nor, indeed, any other substance similar to resin, which possesses this peculiar property.

These observations can leave no doubt whatever as to the chemical character of a considerable proportion of the residue to which the term quinoidine has been applied—namely, that it is a true organic base.

On subjecting the purified substance to elementary analysis, the following were the results:—

1st.—From the quinoidine of Mayence, 0.490 grammes yielded 1.3204 grammes of carbonic acid, and 0.3395 grammes of water.

2nd.—From the quinoidine of Frankfort, 0.618 grammes yielded 1.6575 grammes of carbonic acid, and 0.4250 grammes of water.

3rd.—From the quinoidine of Coblenz, 0.3475 grammes yielded 0.9475 grammes of carbonic acid, and 0.2375 grammes of water.

According to these analyses, this substance contains

	i.	ii.	iii.
Carbon . . .	73.49 . . .	73.14 . . .	74.33*
Hydrogen . . .	7.69 . . .	7.64 . . .	7.57

The determination of the nitrogen, by the method of Verretrapp and Will, yielded the following results:—

0.515 afforded 0.289 of platinum.
0.617 " 0.401 "

* Carbon—75, according to Prout and Dumas.

And, consequently, the substance under examination contains according to the first analysis, 8.04 of nitrogen; according to the second 9.54 of nitrogen,—the medium of the two analyses giving us as its amount of nitrogen, 879.

ANALYSES OF THE CHLORIDE OF PLATINUM AND THE BASE FROM QUINOIDINE, (AMORPHOUS QUININE.)

I.—0.6663 grammes of the double salt yielded 0.1755 of platinum; 0.8700 grammes of the double salt yielded 1.849 carbonic acid, and 0.303 of water.

II.—0.881 grammes of double salt yielded 0.224 of platinum.

III.—1.0668 grammes of double salt yielded 0.2715 of platinum.

From these analyses, therefore, the following are the proportions of carbon, hydrogen, and platinum, which exists in 100 parts of the chloride of platinum, and the substance derived from quinoidine:—

	i.	ii.	iii.
Carbon . . .	32.44	"	"
Hydrogen . .	3.86	"	"
Platinum . . .	26.33 . . .	26.32 . . .	26.45

Now, if we compare the proportion of carbon, hydrogen, and platinum, existing in the chloride of platinum and this base, derived from quinoidine, with the amount of the same elements present in the corresponding chloride of platinum and quinine; and, further, the amount of carbon, hydrogen, and nitrogen contained in the substance under examination, with the proportion of the same elements as they exist in quinine; we perceive at once that the two substances have identically the same composition.

Quinine, according to the formula,

contains—

Carbon, 74.33; hydrogen, 7.75; nitrogen, 8.62.

Chloride of platinum and quinine, according to the formula,

contains—

Carbon, 32.38; hydrogen, 3.53; platinum, 26.83.

The inference from these experiments, then, is irresistible: the uncrystalline substance derived from quinoidine bears exactly the same relation to ordinary quinine that uncrystalline sugar (barley-sugar,) bears to crystalline, (sugar-candy.) Both yield the same products of decomposition; both have the same atomic weight, and identically the same composition; they differ only in form: in one word, the one is crystalline, the other *amorphous*.

I deem this to be an important discovery, when we consider the high price of quinine, the possibility of a check to the supply of cinchona bark from the countries producing it, and the amount of the crude quinoidine which has accumulated since the manufacture of sulphate of quinine was commenced. Quinine, indeed, seems to be absolutely indispensable for the treatment of diseases; the progress of civilization in modern times has depended, far more than has been conceived, upon the discovery of a remedy for the fevers which prevail where tillage is imperfect, and in new and unbroken soils.

This chemical investigation has thrown an interesting light upon the testimonies borne to the efficacy of

quinoidine in the treatment of fever, and the highest encomiums have been passed upon it; but the commercial specimens have differed very much in value; while some have consisted nearly altogether of amorphous quinine, others have contained only a small per centage.

It is necessary that the amorphous quinine should be separated from all admixtures and impurities, and prescribed in its pure state. There can be no doubt but the same substance will produce the same effect on the animal organism, whether exhibited in a crystalline or an amorphous state. The system, as we may say, makes no difference in such a case. As I have already observed, the mystery about quinoidine is completely solved by the discovery, that it usually contains a very large per centage of pure quinine in an amorphous state.

In a commercial point of view, it is certainly a matter of great importance that we should be able to judge by the mere external appearance of a remedy, of its purity; and consequently, how far we may rely upon its efficacy. This is thought to be the case with the crystalline sulphate of quinine, whilst the non-crystalline form of quinoidine has probably led to a disregard of the evidence for its usefulness, even more than the fact of its being, as usually sold, an admixture of various substances. But with respect to the mere amorphous form, when the quinine is separated from all its adhering impurities, it is in the same case with opium, castor, and many more of the most efficient remedies which we possess, particularly with the extracts of our pharmacopœias. It is necessary to be assured of their purity before we employ them, but their amorphous form does not prevent their use. In many of these cases, indeed, having no direct or ready way of testing them, we rely solely upon the honourable character of the merchant and dealer; but we have a completely satisfactory test for the purity of amorphous quinine. Few medicinal agents afford so ready a means of distinguishing them, and detecting admixtures, as the organic alkaloids; but if these tests are not employed, it is as easy to be deceived in purchasing crystalline sulphate of quinine, as the amorphous.

Amorphous quinine is completely soluble in dilute sulphuric acid, and in alcohol, as I have said above; it is also completely soluble in a solution of sulphate of copper, with separation of oxide of copper. And if its solution in a dilute acid yields, upon precipitation by means of ammonia, exactly the same amount of precipitate as the weight of the substance originally dissolved in the acid, there can be no doubt remaining as to the perfect purity of the sample under examination.

It only remains for me to observe, that no dependence should be placed upon the ordinary quinoidine of commerce. As I have already stated, some samples which I have seen, dissolve incompletely in water, forming a dark-brown muddy fluid; these have been probably produced by simply evaporating the mother-liquors of sulphate of quinine to dryness. They are, therefore, uncertain mixtures of various substances with sulphate of amorphous quinine, with or without excess of acid, so that in purchasing such specimens, the buyer is paying the price of an organic alkaloid for sulphuric acid, &c. The pure amorphous quinine should be

separated, and it would then form a most valuable remedial agent; but the prescriber must be assured of its purity, and the test I have given will suffice for this purpose.—*Lancet*.

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The facility with which arsenic, hydrocyanic acid, and other powerful poisonous agents, can be obtained for criminal purposes, and the frequent use made of them of late for the destruction in particular of infants, and young children, loudly call for some legislative check on the indiscriminate sale of all substances which are capable, in small quantities, of producing death. Considerable sensation was excited some time ago by the poisoning of several children in the county of Chester, with the view of obtaining the allowance from a burial club; and a similar instance has been detected within the last month at Runcorn, in the same county. In this latter case the lives of two children were sacrificed, and that of a third attempted, and it was only through the intelligence and vigilance of the medical attendant called in to the third child that the discovery took place. The late distressing case which has been brought to light in the county of Norfolk, where several children of a family were poisoned by arsenic, whether taken accidentally, or administered by design, is not clearly made out, is another instance; Mr. Taylor also relates a case in the Guy's Hospital Reports for October last, occurring in Berks, where a young boy was in this manner murdered by his father, and others have been recorded elsewhere.

It is important to observe, that in all the cases referred to, either the detection of the poisoning has taken place, and its nature been established by chemical examination, at periods of varying duration after interment, or the repetition of the crime has led to suspicion, and ultimately to the detection of its having been committed in preceding cases. How many may have occurred, therefore, which have escaped detection altogether, it is impossible to say, though we would fain hope, that the instinctive affection of the parent towards the offspring, in the absence of higher moral feeling, must have operated as a check to any very extensive prevalence of this enormity.

Arsenic, opium, and hydrocyanic acid, seem to be the chief poisonous agents by which fatal effects are either accidentally or designedly induced. The last of these is most commonly employed by adults, with suicidal intention. The various preparations of opium, and especially the whole tribe of soothing syrups, and other