the principle of life that stops the mutual action of these two substances in healthy circulating blood. The chemist will before long solve the problem why these two substances do not always act upon one another, since they can both be got out of the blood. The most probable answer is, that there is some slight difference of composition between these substances in circulating blood and as we obtain them from blood that has been drawn from the body. The fibrinoplastic substance is rapidly acted on by ozone. The fibrinogenic substance also is rapidly changed after it is formed, so that possibly the necessary quantity of these substances is not given the necessary time to act upon one another for the production of coagula.

The second of the unfinished discoveries which I wish to bring before you relates to the subject of digestion. In Dr. Prout's *Bridge-water Treatise* (p. 493), he says: "The stomach must have the power of organising and vitalising the different alimentary substances. It is impossible to imagine that this agency of the stomach can be chemical. This agency is vital, and its nature is completely unknown." In his work on *Stomach and Renal Disease* (5th ed., p. 490), he says: "The third or vitalising function may in some instances be suspended or otherwise deranged. Thus, when more food is taken by healthy individuals than is required for the purposes of the animal economy, there is reason to believe that, however perfectly the superfluous portion of the aliments may, for the sake of enabling them to pass through the system without producing great disorder, be dissolved and converted, the vitalising function is withheld; and that such superfluous matters are finally eliminated either with the bile or in the form of lithate of ammonia in the urine." In short, excess of urates in the urine after a large meal may depend on a want of vital action.

Some late researches of Kühne on the action of the pancreas (Virchow's *Archiv*, vol. xxxix, p. 130) appear to me to promise the solution of the problem why a portion of the albuminous food passes off as urates in the urine, whilst the larger portion remains as albumen in the blood. Kühne shows that albuminous and fibrinous substances when subjected to the continuous action of the pancreatic juice give rise to tyrosine, leucine, and an aniline-like substance in much greater quantity than happens when albumen is fused with potassa, or boiled with sulphuric acid, or allowed to decompose. Here is tyrosine thus prepared by the action of the pancreatic juice. It seems in the highest degree probable that, when an excess of albuminous food is taken, then, in consequence of the slower absorption, a portion of it remains long exposed to the action of the pancreatic fluid, and this continued action of the pancreatic fluid on albumen produces substances which are able, more or less immediately, to form uric acid.

The relation of some of these substances is seen in the following table:—

Tyrosine	=	C ⁹	H ¹¹	N	O ³
Creatine	=	C ⁸	H ⁷	N ³	O ⁴
Leucine	=	C ⁶	H ¹³	N	O ²
Uric acid	=	C ⁵	H ²	N ⁴	O
Urea	=	C	H ⁴	N ²	O

Measured by the carbon it contains, tyrosine is a higher product of albumen than leucine, uric acid, or urea. Whether it, or some other product from albumen in the blood or in the kidney, gives rise to uric acid, has to be determined. Certain it is that our chemical knowledge now entirely does away with all idea of any want of vital action, causing excess of urates in the urine, and a very slight advance will probably enable us to prepare uric acid in the laboratory from the albuminous substances.

The progress of animal chemistry proves more and more clearly that the matter in the body has no special chemical properties peculiar to life; but that matter within possesses the same chemical energy which it possesses out of the body. Life has no power to create or to destroy any chemical force in the matter of living things; but the very slightest difference in the circumstances under which any chemical action occurs, produces a variation in the effects that are produced. Ultimately, when all the circumstances under which vital chemical actions occur are fully made out, there will be found to be no difference between these actions and those which can be made to take place where no influence of life can be supposed to exist.

Another vital fluid, or principle, has been assumed to account for the phenomena displayed at the beginning of life in animal and vegetable bodies. Dr. Prichard says: "This vital principle assumes the character of a plastic or formative power. It presides over, and sets in action, the different processes by which growth and organisation are effected; and gives form and modification to the components parts of the animal and vegetable body, and contributes afterwards by a preserving influence to the maintenance of its existence for a definite portion of time. This doctrine ascribes to a thing which is supposed to be merely

a species of matter highly attenuated, properties and agencies which belong to the highest power and the highest intelligence." It appears, then, that, in the biological as in the abiological sciences, ideas of the union of matter and force have gone, or are going, through two identical phases. As in the abiological sciences the earliest ideas of matter were quite separate from the ideas of force, so vital force, in the first stage of our ideas, was originally pure spirit, void of all materiality, perfectly separable from matter.

In the second or transition stage in the abiological sciences, force was imperfectly separable from matter. Force was itself a highly attenuated volatile substance, an imponderable elementary principle; or the force was inseparably united with an imponderable fluid, gas, or æther, which gave to ponderable matter its energies whilst the union lasted. In the second, or transition, or Hunterian stage in the biological sciences, the vital force is either itself an imponderable solid, fluid, gas, spirit (*geist*), or ghost, or it is inseparably attached to an imponderable matter which can temporarily be diffused through ponderable matter.

In my next lecture I shall show you that the abiological sciences are far in advance of the biological sciences in the extent to which the third stage of ideas of the perfect union of matter and force is held to obtain. I shall try, also, by some examples in physiology, pathology, and therapeutics, to show you that in this third stage of perfect inseparability of matter and force, and in the principle of the conservation of energy, "we have," in the words of Mr. Faraday, "a new stimulus to investigation and a pilot which will lead to discoveries far beyond the region to which our present biological knowledge extends."

A CASE OF SYPHILITIC ULCERATION OF THE THROAT TREATED WITH SULPHUROUS ACID.

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WE are indebted to Dr. Dewar of Kircaldy, and Mr. Pairman of Biggar, for bringing more prominently under the notice of the profession, the various uses of sulphurous acid as a therapeutic agent; and several cases have been recorded in the medical journals in which this remedy has effected speedy cures. The following case, I think, testifies to its value.

Mr. Robert W., aged 30 years, consulted me on August 17th, 1867, for a hard chancre of a few days' duration, situated at the corona glandis, which I touched with strong nitric acid, and prescribed "black-wash" as a local application, with the green iodide of mercury internally. Under this treatment, he was apparently cured, and I lost sight of him till the following November. I may mention, he told me that about four years previously he contracted a chancre, and which was quickly followed by a bubo. The medical man he then consulted prescribed "Plummer's pill," and which occasioned profuse salivation. I again saw him in November, and found that he was labouring under a syphilitic affection of the throat, both tonsils and part of the pharynx being covered with an ash-coloured slough; he experienced great difficulty in swallowing, appetite bad, passed sleepless nights, and was extremely anxious about his present state of health; no cutaneous eruption visible. For upwards of eight weeks various remedies were tried, viz.: iodide of potassium, in ten grain doses three times a day, the bichloride and biniodide of mercury, gargles of chlorate of potash and alum, and solution of the nitrate of silver, twenty grains to the ounce, with opium at night to procure sleep. This treatment only checked the spread of the disease, which remained in *statu quo* till the middle of January, when I happened to see recorded in the *Lancet*, for October, 1867, a case, in which a patient of the London Hospital was treated for syphilitic ulceration of the throat by the application of sulphurous acid spray. I thought Mr. W.'s case likely to benefit by the same treatment, and commenced using the spray to the affected part three times daily on January 25th inst. At first I applied it for a short time only, but, finding that it gave no pain, the end of the instrument was brought nearly in contact with the part affected, and the application of the spray continued for several minutes each time. On Saturday, February 15th, the throat was perfectly well, and there has not been any return of the disease since.

I have at the present time under treatment a gentleman suffering from a syphilitic affection of the tongue, in which I am applying the sulphurous acid spray with the best results.