the dream and lie of louis pasteur

R.B. Pearson

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It is a rather serious matter to attack the reputation of a famous man, one who has posed and been accepted as one of the world's greatest scientists. For many years, Pasteur has been looked upon as a founder and leader in serology; but it is always pertinent to look into the beginnings of any subject on which there is a difference of opinion, with the hope of finding the truth in the matter.

The writer has made an effort in his prior books and pamphlets to show that the germ theory is false, and that illness was practically always due to errors of diet or manner of living, the germs being present solely as scavengers of dead and waste tissues and foods, and *not as the cause of the disease*.

However, the erroneous belief that germs cause disease and must be controlled or eliminated before it can be cured is so widespread as to close the minds of many people to any other ideas on this subject.

For this reason it seems that a thorough investigation of this idea, the grounds on which it is based, and even the bona-fides of those who started it on its way, is necessary before any sane ideas as to the proper treatment of disease can be widely promulgated.

When Miss Ethel Douglas Hume brought out *Béchamp or Pasteur?* in 1923, it appeared to be just the thing that would fill this gap and end the use of serums and other biologicals forever. But it is now 19 years since that book, which should have marked an epoch in the healing arts, appeared. It did not receive the attention it deserved in medical circles and, though it is now in its second edition,[*] the medical profession are pushing biologicals harder than ever.

Hence it seems appropriate to go over the subject in order to show the truth regarding the falsity of Pasteur's ideas and claims to fame, and the fraudulent basis on which the germ theory rests, as was so well shown by Miss Hume in *Béchamp or Pasteur?,* and to add other facts and statistics that support the idea that the germ theory is false, in the hopes that it may receive wider circulation and more general attention, and possibly lead to a complete overhauling of the question of the treatment of disease, especially regarding serology.

The translations from the French, and other material in chapters 2, 3, 4 and 5 not otherwise credited, are from *Béchamp or Pasteur?* by Ethel Douglas Hume.

In closing, I wish to acknowledge my indebtedness to the Reverend and Mrs Wilber Atchison of Chicago for many suggestions and valuable assistance in the preparation of the manuscript. Miss L. Loat, secretary of the National Anti-Vaccination League of London, has also been very kind, responding to every request for information with more than could be used, some of it being especially compiled at the cost of considerable effort.

R. B. Pearson
January 15th, 1942

1

The prior history of the "germ theory"

If you back into the history of the medical profession and the various ideas regarding the cause of disease that were held by leading physicians before Pasteur first promulgated his notorious "germ theory", you will find convincing evidence that Pasteur discovered nothing, and that he deliberately appropriated, falsified and perverted another man's work.

The 'germ theory', so-called, long antedated Pasteur – so long, in fact, that he was able to present it as new; and he got away with it!

F. Harrison, Principal Professor of Bacteriology at Macdonald College (Faculty of Agriculture, McGill University), Quebec, Canada, wrote an *Historical Review of Microbiology*, published in *Microbiology*, a text book, in which he says in part:

> " Geronimo Fracastorio (an Italian poet and physician, 1483 – 1553) of Verona, published a work (*De Contagionibus et Contagiosis Morbis, et eorum Curatione*) in Venice in 1546 which contained the first statement of the true nature of contagion, infection, or disease organisms, and of the modes of transmission of infectious disease. He divided diseases into those which infect by immediate contact, through intermediate agents, and at a distance through the air. Organisms which cause disease, called *seminaria contagionum*, he supposed to be of the nature of viscous or glutinous matter, similar to the colloidal states of substances described by modern physical chemists. These particles, too small to be seen, were capable of reproduction in appropriate media, and became pathogenic through the action of animal heat. Thus Fracastorio, in the middle of the sixteenth century, gave us an outline of morbid processes in terms of microbiology."

For a book published more than three hundred years before Pasteur 'discovered' the germ theory, this seems to be a most astonishing anticipation of Pasteur's ideas, except that – not having a microscope – Fracastorio apparently did not realize that these substances might be individual living organisms.

According to Harrison, the first compound microscope was made by H. Jansen in 1590 in Holland, but it was not until about 1683 that anything was built of sufficient power to show up bacteria. He continues:

> " In the year 1683, Antonius van Leenwenhoek, a Dutch naturalist and a maker of lenses, communicated to the English Royal Society the results of observations which he had made with a simple microscope of his own construction, magnifying from 100 to 150 times. He found in

> water saliva, dental tartar, etc., what he termed *animalcula*. He described what he saw, and in his drawings showed both rod-like and spiral form, both of which he said had motility. In all probability, the two species he saw were those now recognized as *bacillus buccalis maximus* and *spirillum sputigenum*.
>
> Leenwenhoek's observations were purely objective and in striking contrast with the speculative views of M. A. Plenciz, a Viennese physician, who in 1762 published a germ theory of infectious diseases. Plenciz maintained that there was a special organism by which each infectious disease was produced, that micro-organisms were capable of reproduction outside of the body, and that they might be conveyed from place to place by the air."

Here is Pasteur's great thought *in toto* – his complete germ theory – and put in print over a century before Pasteur thought of it(?), or published it as his own!

Note how concisely it anticipates all Pasteur's ideas on germs. While there seems to be no proof that Plenciz had a microscope, or knew of Leenwenhoek's *animalcula*, both are possible, and likely, as he was quite prominent; and he, rather than Pasteur, should have any credit that might come from such a discovery – *if* the germ theory has any value. This idea, which, to the people of that time at least, must have accounted easily and completely for such strange occurrences as contagion, infection and epidemics, would have been widely discussed in the medical or scientific circles of that time, and in literature available to Pasteur.

That it was widely known is indicated by the fact that the world-famous English nurse, Florence Nightingale, published an attack on the idea in 1860, over 17 years before Pasteur adopted it and claimed it as his own.

She said of 'infection'[1]:

> Diseases are not individuals arranged in classes, like cats and dogs, but conditions growing out of one another.
>
> Is it not living in a continual mistake to look upon diseases as we do now, as separate entities, which must exist, like cats and dogs, instead of looking upon them as conditions, like a dirty and a clean condition, and just as much under our control; or rather as the reactions of kindly nature, against the conditions in which we have placed ourselves?
>
> I was brought up to believe that smallpox, for instance, was a thing of which there was once a first specimen in the world, which went on propagating itself, in a perpetual chain of descent, just as there was a first dog, (or a first pair of dogs) and that smallpox would not begin itself, any more than a new dog would begin without there having been a parent dog.
>
> Since then I have seen with my own eyes and smelled with my own nose smallpox growing

up in first specimens, either in closed rooms or in overcrowded wards, where it could not by any possibility have been 'caught', but must have begun.

I have seen diseases begin, grow up, and pass into one another. Now, dogs do not pass into cats.

I have seen, for instance, with a little overcrowding, continued fever grow up; and with a little more, typhoid fever; and with a little more, typhus, and all in the same ward or hut.

Would it not be far better, truer, and more practical, if we looked upon disease in this light (for diseases, as all experience shows, are adjectives, not noun-substantives):

– True nursing ignores infection, except to prevent it. Cleanliness and fresh air from open windows, with unremitting attention to the patient, are the only defence a true nurse either asks or needs.

– Wise and humane management of the patient is the best safeguard against infection. The greater part of nursing consists of preserving cleanliness.

– The specific disease doctrine is the grand refuge of weak, uncultured, unstable minds, such as now rule in the medical profession. There are no specific diseases; there are specific disease conditions."

Here you have Florence Nightingale, one of the most famous nurses in history, after life-long experience with infection, contagion and epidemics, challenging the germ theory 17 years before Pasteur put it forward as his own discovery! (See Chapter 8, p.50).

She clearly understood it and its utter fallacy better before 1860 than Pasteur did, either in 1878 or later!

And, to see what a parasite Pasteur was on men who did things, let us digress and go back a few years, to the time when the study of germs was an outgrowth of the study of fermentation.

2

Béchamp, Pasteur, and fermentation[2]

About 1854, Professor Pierre Jacques Antoine Béchamp, one of France's greatest scientists, then Professor at the School of Pharmacy in the Faculty of Science at Strasbourg, later (1857-75) Professor of Medical Chemistry and Pharmacy at the University of Montpelier, a member of many scientific societies, and a Chevalier of the Legion of Honor, took up the study of fermentation.

He had succeeded in 1852 in so reducing the cost of producing aniline as to make it a commercial success, and his formula became the basis of the German dye industry. This brought him some fame, and many more problems to solve.

Up to this time, the idea prevailed that cane sugar, when dissolved in water, was spontaneously transformed at an ordinary temperature into *invert sugar*, which is a mixture of equal parts of glucose and fructose, but an experiment with starch had caused him to doubt the truth of this idea.

Therefore in May, 1854, Béchamp undertook a series of observations on this change, which came to be referred to as his "Beacon Experiment". In this experiment, he dissolved perfectly pure cane sugar in water in a glass bottle containing air, but tightly stoppered. Several other bottles contained the same solution, but with a chemical added.

In the solution without any added chemical, moulds appeared in about thirty days, and inversion of the sugar in this bottle then went on rapidly, but moulds and inversion did not occur in the other bottles containing added chemicals. He measured the inversion frequently with a polariscope.

These observations were concluded on February 3, 1855, and his paper was published in the *Report of the French Academy of Science* for the session of February 19, 1855.[3]

This left the moulds without an explanation, so he started a second series of observations on June 25, 1856 (at Strasbourg) in order to determine if possible, their origin, and on March 27, 1857, he started a third series of flasks to study the effects of creosote on the changes. Both series were ended at Montpelier on December 5, 1857.

In the second series he spilled a little liquid from flasks 1 and 2 during manipulation, so these two flasks contained a little air in contact with the liquid. In these two flasks, moulds soon appeared, and alteration in the medium ensued.

He also found that the changes were more rapid in the flask in which the mould grew more rapidly.

In the other nine flasks there was no air, no mould formed, and no inversion of the sugar occurred; plainly air was needed for the moulds and inversion to occur. This proved beyond any possibility of doubt that the moulds and inversion of the sugar could not be "spontaneous" action, but must be due to something carried in the air admitted to the first two flasks.

Yet Pasteur later called fermentation "life without air, or life without oxygen."[4]

At this time, it was quite generally believed that fermentation could not take place except in the presence of albuminoids, which were in general use by Pasteur and others as part of their solutions . Hence, their solutions could have contained these living organizations to start with.

Béchamp's solutions contained only pure cane sugar and water, and when heated with fresh-slaked lime did not disengage ammonia – ample proof that they contained no albumen. Yet moulds, obviously living organisms, and therefore containing albuminoid matter, had appeared in these two solutions.

Béchamp proved to his own satisfaction that these moulds were living organisms and that cane sugar was inverted, as he said "... only in proportion to the development of moulds. These *elementary vegetations* then acting as ferments."[5]

Pasteur, apparently overlooking the air contact, challenged Béchamp's statements, saying:

> " ... to be logical, Béchamp should say that he has proved that moulds arise in pure sugared water, without nitrogen, phosphates or other mineral elements, for that is an enormity that can be deduced from his work, in which there is not the expression of the least astonishment that moulds have been able to grow in pure water with pure sugar without any other mineral or organic principles."[6]

Béchamp's retort to this was:

> " A chemist *au courant* with science ought not to be surprised that moulds are developed in sweetened water, contained in contact with air in glass flasks. It is the astonishment of Pasteur that is astonishing"[7]

As Béchamp started with no nitrogen whatever except what was in the air in the first two flasks, it is probably the first time any growth or any kind of organism was proved to have absorbed nitrogen from the air. Apparently Pasteur could not grasp this idea!

In the preface to his last book, *The Third Element of the Blood*, Béchamp says that these facts impressed him in the same way that the swing of the cathedral lamp had impressed Galileo. He realized that some living organisms had been carried into these two flasks in the small amount of air admitted, and acting as ferments had produced the mould and the inversion in the sugar. He compared the transformation of cane sugar in the presence of moulds to that produced upon starch by *diastase*, the ferment that converts starch into sugar.

He sent in his report on these findings to the Academy of Science in December 1857, and an extract was published in its reports of January 4, 1858,[5] though the full paper was not published until September that year.[8]

He says of these experiments:

> " By its title the memoir was a work of pure chemistry, which had at first no other object than to determine whether or not pure cold water could invert cane sugar and if, further, the salts had any influence on the inversion. But soon the question, as I had foreseen, became complicated; it became at once physiological and dependent upon the phenomena of fermentation and the question of spontaneous generation. Thus from the study of a simple chemical fact, I was led to investigate the causes of fermentation, and the nature and origin of ferments." [9]

Although Schwann had suggested airborne germs in about 1837, he had not proved his ideas; here Béchamp proved them to exist.

Yet Pasteur in his 1857 memoirs still clings to the idea that both the moulds and ferments "take birth spontaneously", although his solutions all contained dead yeast or yeast broth which might have carried germs or ferments from the start.

He does conclude that the ferment is a living being, yet states that this "cannot be irrefutably demonstrated".[10]

But Béchamp had demonstrated it "irrefutably" in his paper, and also had proved that water alone caused no alteration, there was no spontaneous alteration, and that moulds do not develop, nor inversion occur, without contact with the air; thus some airborne organism must cause the moulds and the inversion.

According to Miss Hume, Béchamp was also the first to distinguish between the "organized" or living ferment and the soluble ferment which he obtained by crushing the moulds, and which he found to act directly on the sugar, causing rapid inversion.

He named this substance *zymase*, in a paper *Memoirs on Fermentation by Organized Ferments*, which he read before the Academy of Science on April 4, 1864.[11]

Strange to say, exactly the same word is used by others whom various encyclopaedias have credited with this discovery in 1897, over 30 years later!

In this paper he also gave his final complete explanation of the phenomena of fermentation, as being due to the nutrition of living organisms; i.e. a process of absorption, assimilation, and excretion.

In the preface to his last work *(The Third Element of the Blood)*, Béchamp says (p.16):

> "It resulted that the soluble ferment was allied to the insoluble by the relation of product to producer; the soluble ferment being unable to exist without the organized ferment, which is necessarily insoluble.
>
> Further, as the soluble ferment and the albuminoid matter, being nitrogenous, could only be formed by obtaining the nitrogen from the limited volume of air left in the flasks, it was at the same time demonstrated that the free nitrogen of the air could help directly in the synthesis of the nitrogenous substance of plants; which up to that time had been a disputed question.
>
> Thus it became evident that since the material forming the structure of moulds and yeast was elaborated within the organism, it must also be true that the soluble ferments and products of fermentation are also secreted there, as was the case with the soluble ferment that inverted the cane sugar. Hence I became assured that that which is called fermentation is in reality the phenomena of nutrition, assimilation and disassimilation, and the excretion of the products disassimilated."

He explained further:

> "In these solutions there existed no albuminoid substance; they were made with pure cane sugar, which heated with fresh-slaked lime, does not give off ammonia. It thus appears evident that airborne germs found the sugared solution a favourable medium for their development, and it must be admitted that the ferment is here produced by the generation of fungi.
>
> The matter that develops in the sugared water sometimes presents itself in the form of little isolated bodies, and sometimes in the form of voluminous colourless membranes which come out in one mass from the flasks. These membranes, heated with caustic potash, give off ammonia in abundance."

This proved that albuminoids were present, hence the little bodies were living matter. It also proves that Professor Béchamp understood the formation and growth of moulds and ferments in 1857, years before Pasteur comprehended these physiological processes!

In 1859, over a year after Béchamp's paper covering his 1857 experiments was printed, Pasteur started another experiment more in line with Béchamp's ideas, in fact apparently inspired by them.

He omitted all yeast but used ammonia, which contains nitrogen, in his solutions, and then ascribed the origin of lactic yeast to the atmospheric air. He was surprised that animal and vegetable matter should appear and grow in such an environment.

He says:

> "As to the origin of the lactic yeast in these experiments, it is solely due to the atmospheric air; we fall back here upon facts of spontaneous generation."

After asserting that excluding atmospheric air or boiling the solution will prevent the formation of organisms, or fermentations, he says:

> "On this point, the question of spontaneous generation has made progress."

In a still later memoir[12] plainly inspired by Béchamp's Beacon Experiment, Pasteur again constantly refers to the spontaneous production of yeasts and fermentation.

There is no question but that he still believed in spontaneous generation of germs and ferments at this time, and his reasoning appears somewhat childish when compared to Béchamp's work.

However, in 1860, he started another experiment in which he prepared 73 phials of unfermented liquid to expose at various points on a much advertised-in-advance trip. He opened and resealed various phials at different places, the last twenty on the Mer de Glace above Chamonix.

He practically repeated Béchamp's experiments here, but of course he had to use a different and more spectacular method to get attention.

From this time he veered away from spontaneous generation, and began to explain the same occurrences (fermentation) as being caused by germs in the air.

Paul de Kruif in *Microbe Hunters* (a grandiose attempt to exalt some of the original experimenters in serumology), glosses over Pasteur's willingness to steal credit for the ideas of others, and after describing his use, without credit, of Ballard's suggestion of the swan neck bottle to admit dust-free and germ-free air into a flask, says of this "high Alps" experiment:

> "Then Pasteur invented an experiment that was – so far as one can tell from a careful search through the records – really his own. It was a grand experiment, a semi-public experiment, an experiment that meant rushing across France in trains, it was a test in which he had to slither on glaciers." (p.83)

However, de Kruif doubted thoroughly that it *was* Pasteur's, and well he might! Yet little did he realize how few of Pasteur's foolhardy claims were either his own or, in fact, even true in any particular.

In a discussion of spontaneous generation at the Sorbonne during a meeting on November 22, 1861, Pasteur had the nerve to claim, in the presence of Professor Béchamp, all credit for the proof that living organisms appeared in a medium devoid of albuminoid matter! Béchamp asked him to admit knowledge of Béchamp's

1857 work, but did not charge him with plagiarism, and Pasteur evaded the question, merely admitting that Béchamp's work was "rigidly exact". This was not an accident, but deliberate premeditated fraud; however, Béchamp was too much of a gentleman to make any unpleasant charges.

That it took several more years to get the spontaneous generation idea entirely out of Pasteur's head is indicated by the article on Pasteur in the 14th Edition of the *Encyclopaedia Britannica*, which says:

> " The recognition of the fact that both lactic and alcohol fermentation were hastened by exposure to air naturally led Pasteur to wonder whether his invisible organisms were always present in the atmosphere or whether they were spontaneously generated. By a series of intricate experiments, including the filtration of air and the famous exposure of unfermented liquids to the pure air of the high Alps, he was able to declare with certainty in 1864 that the minute organisms causing fermentation were not spontaneously generated but came from similar organisms with which ordinary air was impregnated."[13]

Here it is again – not until 1864 did he give up his idea of spontaneous generation – and the high Alps stuff was only high theatre, well advertised in advance, to enable him to grab Béchamp's discovery, and yet have some 'new stuff' to attract attention to himself. Of course, he could not follow exactly the same methods; some one might bring up Béchamp's memoirs, hence the "high Alps" and "slithering on glaciers".

His experiments made in 1859 also indicated knowledge of Béchamp's work without albuminoids, and his evasion of Béchamp's question at the Sorbonne meeting in 1861 lends further support to such a belief, while his attacks on Béchamp would indicate that he recognized a rival and was keenly jealous.

Note that this final acceptance of ideas that Béchamp had brought forward six years earlier did not come until *after* Béchamp had published his complete paper, with a full and most thoroughly proven explanation of the processes of fermentation.

However, Pasteur had, on completion of his "high Alps" experiment in 1860, accepted, or began to accept, the idea that germs of the air caused fermentation; and soon he leaped way ahead to the conclusion that these germs also caused disease, as Plenciz had suggested about a hundred years before!

Of this idea, he had no more proof than Plenciz, except that it was now known there were germs in existence, which Plenciz, apparently, did not prove.

Although Béchamp had made clear the physiological nature of fermentation in his paper on his 1857 experiments (published in 1858), and had given more complete details in his 1864 paper, Pasteur apparently had not fully grasped its true nature as late as 1872, when he published a paper in which he stated:

> "That which separates the chemical phenomenon of fermentation from a crowd of other acts and especially from the acts of ordinary life is the fact of the decomposition of a weight of fermentative matter much superior to the weight of the ferment."[14]

Could anyone make such a statement who really understood the true nature of fermentative action? Apparently Pasteur did not!

In collaboration with A. Estor, Béchamp answered this with an effort to make the nature of fermentation clear, in a paper printed on page 1523 of the same volume, in which he said:

> "Suppose an adult man to have lived a century, and to weigh on average 60 kilograms. He will have consumed in that time, besides other foods, the equivalent of 20,000 kilograms of flesh, and produced about 800 kilograms of urea. Of course there is no suggestion that this mass of flesh and urea could at any moment of his life form part of his being.
>
> Just as a man consumes all that food only by repeating the same act a great many times, the yeast cell consumes the great mass of sugar only by constantly assimilating and disassimilating it, bit by bit. Now, that which only one man will consume in a century, a sufficient number of men would absorb in a day.
>
> It is the same with the yeast; the sugar that a small number of cells would only consume in a year, a greater number would destroy in a day. In both cases, the more numerous the individuals, the more rapid the consumption."[15]

Is that not clear enough, even for a man whose diploma was marked "mediocre in Chemistry" (Pasteur) to comprehend? It seems that a child should be able to understand it.

Yet Pasteur repeated his statement four years later in *Etudes sur la Bier* (1876), so Béchamp's clear explanation apparently failed to have any effect – at least on him.

Here is proof that from eight to fourteen years *after* Béchamp had completely disclosed the physiological nature of fermentation and described its action minutely, Pasteur had not yet grasped the facts regarding the process!

In its article on fermentation, the *Encyclopaedia Britannica* says:

> "Fermentation, according to Pasteur, was caused by the growth and multiplication of unicellular organisms out of contact with free oxygen, under which circumstances they acquire the power of taking oxygen from chemical compounds in the medium in which they are growing. In other words, 'fermentation is life without air, or life without oxygen'. This theory of fermentation was materially modified in 1892 and 1894 by A. J. Brown, who described experiments which were in disagreement with Pasteur's dictum."[16]

So did Béchamp over 35 years earlier – in 1855 and 1858 – and Pasteur appropriated and perverted his ideas.

Pasteur also jumped to the conclusion that each kind of fermentation had one specific germ, while Béchamp proved that each micro-organism might vary its fermentative effect in conformity with the medium in which it finds itself. He also showed that these micro-organisms, under varying conditions, might even change their shape, as has been recently proved so conclusively by F. Loehnis and N. R. Smith of the U.S. Dept. of Agriculture and others.[17]

Pasteur, however, proceeded to classify his germs and label each with a definite and unalterable function, wherein he was wrong again, as we shall see later.

3

Vinous fermentation

Another step that went along with the work on fermentation in general was the discovery of the causes of diseases in French grapes. Béchamp, hearing of the commotion over this trouble in the vineyards, quietly took up a study of it in 1862, the year before Pasteur turned his attention to the subject.

Béchamp exposed to contact with air:

1) grape-must as found on the vines,

2) grape-must filtered, and

3) grape-must decolorized by animal charcoal.

They all fermented, but not equally so, and the moulds or ferments developed were not identical in these three experiments, which of course caused him to seek a reason for this.

On further experiments, with the rigid exclusion of all air (the whole healthy grapes, with stalks attached, being introduced directly from the vine into boiled sweetened water, cooled with carbonic acid gas bubbling through it), fermentation took place, and was completed in this medium, proving that air was not required. Hence the ferment must have been carried on the grapes, and was not airborne.

Professor Béchamp concluded that the organism causing the must to ferment must be carried on the grape, its leaves, or the vines, and that it might also be an organism injurious to the plants.

He published a volume on vinous fermentation in 1863, entitled *Lecons sur la Fermentation Vineuse et sur la Fabrication du Vin*, in which he gave an intelligent discussion of the subject.

He also presented two papers on the making of wine to the Academy, entitled *Sur les Acids du Vin* and *Sur l'utilite et les Inconvienient du Cuvages Prolonges dans la Fabrication du Vin - Sur la Fermentation Alcoolique dans cette Fabrication*.[18]

In October 1864 he presented a communication to the Academy of Science on *The Origin of Vinous Fermentation*, an exhaustive account of the experiments described above.[19]

This paper was a complete study of the subject, in which he proved that vinous fermentation was due to organisms found on the skins of grapes and also often found on the leaves and other parts of the vine. Hence at times, diseased vines might affect the quality of the fermentation and the resulting wine.

So by October 1864, Béchamp had several papers in print, but where was his super-learned rival?

In 1862 Pasteur was admitted to the French Academy through the influence of Biot and the Mineralogical Section, which based its nomination and support on Pasteur's past work on crystallography; yet many attacks were made on his treatment of that subject, and he took the advice of friends to drop this line of work!

In March 1863, he met the Emperor and was soon sent to the vineyards to study the grape disease, with the prestige of having the Emperor's backing.

He published several papers on the vines and their troubles in the latter part of 1863 and in 1864, but apparently was still riding his spontaneous generation theory which Béchamp had so completely exploded in 1858, and he did not guess correctly as to the cause of the trouble with the vines.

In 1865 he offered five papers, and others came later, but he does not seem to have hit on the right answer to the problem until 1872, when he made the great discovery that Béchamp was right again! In this year, Pasteur presented a memoir entitled *New Experiments to Demonstrate that the Yeast Germ that Makes Wine comes from the Exterior of Grapes.* [20]

As Béchamp had made the same statement in his 1864 paper and it had not been disproven in the intervening eight years, it was a pretty safe bet for Pasteur to make!

4

Béchamp’s microzymas or ‘little bodies’

As shown in the second chapter, Béchamp was the first to prove that the moulds accompanying fermentation were, or contained, living organisms, and could not be spontaneously generated but must be an outgrowth of some living organism carried in the air.

This much was in his 1858 memoir, six years before Pasteur came to the same conclusions.

Being first to realize that these moulds or ferments were living organisms, he naturally was also the first to attempt to determine their true nature and functions, and their origins.

On putting some under the microscope, he noted a diversity in appearance of the moulds and was soon involved in a study of cell life.

In his earlier experiments, Béchamp had used several salts, including potassium carbonate, in the presence of which the inversion of cane sugar did not take place. But when he repeated this experiment using calcium carbonate (common chalk) instead of the potassium carbonate, he found that inversion of the cane sugar *did* take place, even when creosote was added. This observation was so unexpected that he omitted it from his earlier memoir in order to verify it before publication of the fact.

In carefully controlled experiments he found that when chemically pure calcium carbonate, $CaCO_3$, was added to his sugar solutions, no inversion took place, but when ordinary chalk, even that chipped from the native rock without access of air, was used, inversion always occurred.

On heating the common chalk to 300 degrees, he found that it lost its powers of fermentation, and on examining more of the unheated common chalk under the microscope, he found it contained some “little bodies” similar to those found in prior observations, and which he found did not exist in the chemically pure $CaCO_3$, nor in the chalk that had been heated.

These “little bodies” had the power of movement and were smaller than any of the microphytes seen in fermentation or moulds, but were more powerful ferments than any he had encountered previously.

Their power of movement and production of fermentation caused him to regard them as living organisms.

He advised Dumas of his discovery of living organisms in chalk in December 1864, and later, on September 26, 1865, he wrote a letter which Dumas had published.

He stated:

> “ Chalk and milk contain already developed living beings, which is proved by the fact that creosote, employed in a non-coagulating dose, does not prevent milk from finally turning, nor chalk, without extraneous help, from converting both sugar and starch into alcohol and then into acetic acid, tartaric acid, and butyric acid,” [21]

Which was ample proof that there was a ferment, a living organism, present in both milk and chalk.

He said of these:

> “ The naturalist will not be able to distinguish them by a description; but the chemist and also the physiologist will characterize them by their function. [22]

Professor Béchamp found that the chalk seemed to be formed mostly of the mineral or fossil remains of a “microscopic world” and contained organisms of infinitesimal size, which he believed to be alive.

He also believed they might be of immense antiquity, as he had traced the block of limestone he had used to the Tertiary Period in geology; yet he found that stone cut from the solid ledge, with all air excluded, had “wonderful” fermentative powers, which he traced to the same “little bodies” as he had found to cause fermentation in his earlier experiments. He concluded that they must have lived embedded in the stone of the ledge for many thousands of years.

In 1866 he sent to the Academy of Science a memoir called *On the role of chalk in butyric and lactic fermentations, and the living organism contained in it*.[23]

In this paper, he named his “little bodies” *microzymas,* from the Greek words meaning *small ferment*.

He also studied the relations of his microzymas of chalk to the molecular granulations of animal and vegetable cells, with many more geological examinations, and wrote a paper entitled *On Geological Microzymas of Various Origins*, which was abstracted in *Comptes Rendus* of the session of April 25, 1870.[24]

He proved that the molecular granulation found in yeast and other animal and vegetable cells had individuality and life and also had the power to cause fermentation, and so he called them *microzymas* also.

He called his geological microzymas “morphologically identical” with the microzymas of living beings.

In innumerable laboratory experiments, assisted now by Professor A. Estor, another very able scientist, he found microzymas everywhere, in all organic matter, in both healthy tissues and in diseased, where he also found them associated with various kinds of bacteria.

After painstaking study they decided that the microzymas rather than the cell were the elementary units of life, and were in fact the builders of cell tissues. They also concluded that bacteria are an outgrowth or an evolutionary form of microzymas that occur when a quantity of diseased tissues must be broken up into its constituent elements.

In other words, all living organisms, he believed, from the one celled amoeba to mankind, were associations of these minute living entities, and their presence was necessary for cell life to grow and for cells to be repaired.

Bacteria, they proved, can develop from microzyma by passing through certain intermediate stages, which they described, and which have been regarded by other researchers as different species!

The germs of the air, they decided, were merely microzymas, or bacteria set free when their former habitat was broken up, and they concluded that the "little bodies" in the limestone and chalk were the survivors of living beings of long past ages.

This brought them to the beginning of 1868, and to test these ideas they buried the body of a kitten[25] in pure carbonate of lime, specially prepared and creosoted to exclude any airborne or outside germs.

They placed it in a glass jar and covered the open top with several sheets of paper, placed so as to allow renewal of the air without allowing dust or organisms to enter. This was left on a shelf in Béchamp's laboratory until the end of 1874.

When opened, it was found that the kitten's body had been entirely consumed except for some small fragments of bone and dry matter. There was no smell, and the carbonate of lime was not discoloured.

Under the microscope, microzymas were not seen in the upper part of the carbonate of lime, but "swarmed by thousands" in the part that had been below the kitten's body.

As Béchamp thought that there might have been airborne germs in the kitten's fur, lungs or intestines, he repeated this experiment, using the whole carcass of a kitten in one case, the liver only in another, and the heart, lungs and kidneys in a third test. These viscera were plunged into carbolic acid the moment they had been detached from the slaughtered animal. This experiment began in June 1875 and continued to August 1882 – over seven years.

It completely satisfied him that his idea that microzymas were the living remains of plant and animal life of which, in either a recent or distant past, they had been the constructive cellular elements, and that they were in fact the primary anatomical elements of all living beings, was correct.

He proved that on the death of an organ its cells disappear, but the microzymas remain, imperishable!

As the geologists estimated that the chalk rocks or ledges from which he took his "geological microzymas" were 11 million years old, it was proof positive that these microzymas could live in a dormant state for practically unlimited lengths of time.

When he again found bacteria in the remains of the second experiment, as he had in the first, he concluded that he had proved, because of the care taken to exclude airborne organisms, that bacteria can and do develop from microzymas, and are in fact a scavenging form of the microzymas, developed when death, decay, or disease cause an extraordinary amount of cell life either to need repair or be broken up.

He wrote in 1869:

> "In typhoid fever, gangrene and anthrax, the existence has been found of bacteria in the tissues and blood, and one was very much disposed to take them for granted as cases of ordinary parasitism. It is evident, after what we have said, that instead of maintaining that the affection has had as its origin and cause the introduction into the organism of foreign germs with their consequent action, one should affirm that one only has to deal with an alteration of the function of microzymas, an alteration indicated by the change that has taken place in their form." [26]

This view coincides well with the modern view of all germs found in nature, except those in the body, which are still looked on as causing the conditions they are found with, rather than being the result of these conditions, which is their true relation to them.

The *Encyclopedia Britannica* says in the entry on bacteriology:

> "The common idea of bacteria in the minds of most people is that of a hidden and sinister scourge lying in wait for mankind. This popular conception is born of the fact that attention was first focused upon bacteria through the discovery, some 70 years ago, of the relationship of bacteria to disease in man, and that in its infancy the study of bacteriology was a branch of medical science. Relatively few people assign to bacteria the important position in the world of living things that they rightly occupy, for it is only a few of the bacteria known today that have developed in such a way that they can live in the human body, and for every one of this kind, there are scores of others which are perfectly harmless and far from being regarded as the enemies of mankind, must be numbered among his best friends.
>
> It is in fact no exaggeration to say that upon the activities of bacteria the very existence of man depends; indeed, without bacteria there could be no other living thing in the world; for every animal and plant owes its existence to the fertility of the soil and this in turn depends upon the activity of the micro-organisms which inhabit the soil in almost inconceivable numbers. It is one of the main objects of this article to show how true is this statement; there will be found in it only passing reference to the organisms which produces disease in man and animals; for information on these see *Pathology* and *Immunity*." [27]

The writer of the above thoroughly understands germs or bacteria with only one exception; the bacteria found in man and animals do not cause disease. They have the same function as those found in the soil, or in sewage, or elsewhere in nature; they are there to rebuild dead or diseased tissues, or rework body wastes, and it is well known that they *will not or cannot* attack healthy tissues. They are as important and necessary to human life as those found elsewhere in nature, and are in reality just as harmless if we live correctly, as Béchamp so clearly showed.

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