CHAPTER XIV

Modern Confirmations of Béchamp

As we have claimed that Béchamp laid the foundations of cytology, or the science of cellular life, it may be as well to give examples of modern views that bear out his early conclusions. For this purpose we cannot do better than quote the Presidential Address to the Zoological Section of the British Association for the Advancement of Science at Manchester in 1915 by Professor E. A. Minchin, M.A., Hon. Ph.D., F.R.S.

As we have seen, Béchamp combated Virchow's view of the cell as the anatomical unit, and did this in the sixties of the nineteenth century.

What is Professor Minchin's opinion in the year 1915?

"Many cytologists appear indeed to regard the cell, as they know it in the Metazoa and Metaphyta, as the beginning of all things, the primordial unit in the evolution of living beings. For my part, I would as soon postulate the special creation of man as believe that the Metazoan cell, with its elaborate organisation and its extraordinary perfected method of nuclear division by karyokinesis, represents the starting-point of the evolution of life."

Thus after the lapse of more than half a century we find this expert confirmation of Béchamp's teaching.

While Professor Béchamp and Professor Estor were working together they were struck by seeing the granules, the microzymas, in cells associate and threadlike forms develop. There seems little doubt that, all those years ago, they were already observing different stages in that complicated series of changes, known as karyokinesis or mitosis, which occur in the division of the cell-nucleus, in which is effected an equal division of the substance of the nucleus of the parent cell into the two new resultant nuclei.

This process, the chief phenomenon in the cleavage of a cell, is the mode of cell-multiplication for the up-building of those structures known as the bodies of all living species. According to the most popular modern view, it is effected by the granules which, on uniting, are known as chromatin threads, the name "chromatin" being applied to their substance because of the deeper shade it takes when stained for observation under the

microscope. Staining methods greatly facilitate, although they occasionally falsify, the work of present-day observers; but these were but little known in the middle of the last century, so that Béchamp must have been far ahead of his generation in his manner of microscopically investigating the intricacies of cellular life and in viewing phenomena not yet noticed by his contemporaries. That early axiom of his that minute living granules build up cells holds good to-day, more than half a century later, regardless of nomenclature. Indeed, when we come to names, the number and variety in use are sufficient to befog any clearness in the matter, and the pity seems that general use has not been made of Béchamp's comprehensive term "microzyma." In regard to Béchamp's priority in demonstrating the rôle of the granulations and the subsequent confusion of terminology, we may quote M. Nencki, a Swiss Professor of Medical Chemistry at Berne:[1]

"To my knowledge it is A. Béchamp who was the first to consider certain molecular granulations, which he named microzymas, to be organised ferments, and that he defended his view resolutely against various attacks."

In making his own acknowledgment of the molecular granulations of the pancreas, M. Nencki continues: "These are evidently the *microzymas* of Béchamp, the *coccus* of Billroth, the same thing as the *monas crepusculum* of Ehrenberg."

The outstanding names for the minute dots present in cell-substance and distinguishable under the microscope are, when arranged in chronological order, "molecular granulations," "microzymas," "microsomes," or "chromatin granules."

Call them which you will, it was these Béchamp intended when he wrote:[2] "The cell is a collection of little beings which have an independent life, a special natural history."

Professor Minchin, in his Presidential Address, without, however, rendering any acknowledgment to Béchamp, echoes his opinion: "To each such granule must be attributed the fundamental properties of living organisms in general; in the first place, metabolism, expressed in continual molecular change, in assimilation and in growth, with consequent reproduction; in the second place, specific individuality."

This was exactly Béchamp's teaching, and, moreover, he

[1] *Gesammelte Arbeiten I.*, p. 212 (1904).
[2] *Comptes Rendus de l'Académie des Sciences* 66, p. 859. *Les Microzymas*, p. 972 (Appendix).

showed that the microzymas are the transmitters of heredity. According to him, a plant or an animal is what it is by virtue of its microzymas. These are the link between the animal and vegetable kingdoms. Though appearing intrinsically the same, yet it is they that differentiate the substance of one living being from that of another. It is by reason of its microzymas that an acorn develops into an oak, a hen's egg into a chicken; microzymian influence decides the child's likeness either to father or mother. And here again we find the confirmatory modern view that in the chromatin lies the secret of heredity.

Professor MacBride[1] thus bears out the opinion of Béchamp: "There seems to be no escape from the position that the chromatin, viewed as a whole, is the bearer of the hereditary tendencies, for the influence of the father in determining the character of the offspring is as potent as that of the mother. Now, the head of the spermatozoon is the only part of the father that enters into the constitution of the progeny, and this appears to consist practically exclusively of chromatin. May not the chromosomes be simply groups of these determiners (of characteristics, qualities, etc.) adhering by mutual chemical affinity under the peculiar chemical conditions obtaining in the cell in the period preceding karyokinesis? If this be the case, the apparent total disappearance of chromosomes during the resting period could be accounted for."

It is possible that for want of modern appliances Béchamp may have overlooked the great importance of the cell nucleus in his cellular doctrine; but, even so, Professor Minchin confirms the correctness of his view in ascribing the supreme influence to what we may indifferently term the microzymian, granular or chromatinic entities.

"Already," says Professor Minchin, "one generalisation of cytologists has been torpedoed by the study of the Protista" (a very primitive form of micro-organism). "The dictum *'omnia nucleus e nucleo'* is perfectly valid as long as it is restricted to the cells of Metazoa and Metaphyta, to the material, that is to say, to which the professed cytologist usually confines his observations. But in the Protista it is now well established that nuclei can arise *de novo*, not from pre-existing nuclei, but from the extra-nuclear chromatin for which Hertwig first coined the term 'chromidia.' "

Let us run through Béchamp's early views as we find them expressed in his *Théorie du Microzyma*:[2] "Microzymas are

[1] Section D. Reports of British Association, 1915. *Discussion on the Relation of Chromosomes to Heredity*, by Professor E. W. MacBride, F.R.S.
[2] p. 319.

builders of cells, and by evolution become vibrios: they are histologically active; they are producers of zymases (ferments): they are physiologically active; and in noting that zymases are agents endowed with a chemical activity of transformation or decomposition, it may be said that microzymas can generate chemical energy; it is thanks to the microzymas that we digest and that we are able to transform and assimilate the materials that serve to nourish us. They are thus *chemically* active; placed in certain artificial surroundings, called putrescible, under favourable circumstances, they bring about decomposition (that is, fermentation); in other words, they nourish themselves while they multiply, no matter whether they evolve into vibrios or whether they do not do so. They are therefore individually organisms comparable to those we call living and organised ferments, etc., etc. Finally, they defy putrefaction, and if I add that they are not digested in the condition of animal matter where they are, one can say that *they are physiologically indestructible.*"

Now let us compare the modern views of Professor Minchin: "I regard the chromatin elements as being the constituents which are of primary importance in the life and evolution of living organisms mainly for the following reasons: the experimental evidence of the preponderating physiological rôle played by the nucleus in the life of the cell; the extraordinary individualisation of the chromatin particles seen universally in living organisms and manifested to a degree which raises the chromatinic units to the rank of living individuals exhibiting specific behaviour, rather than that of mere substances responsible for certain chemico-physical reactions in the life of the organism; and last, but by no means least, the permanence and, if I may use the term, *the immortality of the chromatinic particles in the life-cycle of organisms generally.*"

Here it may be objected that though Professor Minchin confirms Professor Béchamp's views as regards the individuality and immortality of the minute cellular granules, no confirmation is given of vibrionic, or as one would say more familiarly, bacterial evolution.

Yet the modern Professor has no hesitation in enunciating such a belief, if relegated to primeval eras and the realm of hypothesis and infancy, imagining the development of living forms from the earliest living beings, "minute, possibly ultra-microscopic particles of the nature of chromatin." "These earliest living things,"

he says, "were biological units or individuals which were the ancestors, in a continuous propagative series, of the chromatinic germs and particles known to us at the present day as universally-occurring constituents of living organisms." Moreover, he tells us: "The evolution of living things must have diverged in at least two principal directions. Two new types of organisms arose, one of which continued to specialise further in the vegetative mode of life, in all its innumerable variations, while the other type developed an entirely new habit of life, namely, a predatory existence. In the vegetative type the first step was that the body became surrounded by a rigid envelope. Thus came into existence the bacterial type of organism." Here is confirmation of belief in bacterial evolution from chromatinic, otherwise microzymian, granules, further supported by such statements as: "I agree with those who derive the bacteria as primitive, truly non-cellular organisms, directly from the biococcus (Mereschkowsky's term) through an ancestral form."

It is curious to compare this expert readiness of belief in a primeval evolution, a matter of pure conjecture, with the indifference displayed towards Béchamp's experimental demonstrations of bacterial development. In regard to this we may quote his opinion as follows:[1] "But you must not imagine that the microzymas are converted into bacteria without any transition: on the contrary, there are many intermediate forms between the microzymas and the bacteria. What you must bear in mind is that the medium has a great influence on the appearance of the various forms in their evolution from the microzymas and that there is an infinity of species which vary in their function; finally, that according to the nature of the medium the microzymas can produce cells in place of bacteria, true cellular microphytes, and moulds."

It has been argued that modern research has not confirmed Béchamp's statement:[2] "We have seen the microczymas of animal cells associate two by two, or in larger numbers, and extend themselves into bacteria." But it must be remembered that other declarations of Béchamp's, strenuously combated, have since met with confirmation. Take, for instance, his claim that bacteria could change their forms, the rod-shape pass into the spheroid, etc. This was denied by Pasteur. None the less, after the passing

[1] *Les Microzymas,* p. 140.
[2] *Les Microzymas,* p. 972 (Appendix).

of years a worker at the very institute that bears the latter's name has confirmed Béchamp's statement.

We may recall the prominence given in London papers to what was styled an "Important Discovery by a French Lady Scientist." The *Daily News* of the 8th April, 1914, provides a simple summary:

"PARIS, *Tuesday, March* 31."

"Mme. Victor Henri, the lady bacteriologist, has made one of the most important discoveries in that branch of research for many years. She has, by subjecting bacteria to the action of ultra-violet rays, succeeded in creating a new species of bacteria from a species already known. The experiment was made with the anthrax bacillus, which from a rod-shape was transformed into a spherical coccus."

Thus another contention of Professor Béchamp's meets with modern substantiation. And more than this, the statement that he saw microzymian evolution bring about the formation of primitive organisms is at the present day being confirmed by an acknowledged student of his, a Frenchman named Galippe. The following account of his work has been kindly summarised for us by Mr. E. J. Sheppard, a cytologist who formerly carried out some researches in connection with the late Professor Minchin and who himself is conversant with and subscribes to much of Béchamp's teaching.

"NORMAL PARASITISM AND MICROBIOSIS"

"Galippe[1] describes experiments with fruits and animal tissues which confirm the assumption of the existence of various parasites in the normal tissues of the vegetable and animal kingdom.

"But besides this more or less accidental normal parasitism, he says, there is another order of facts, more general, more constant, and dominating to a certain extent the life of the tissues, namely, the presence in the cell itself of living elements, elements indispensable to its functional activity.

"He accepts Béchamp's term of 'microzyma' for these, and calls the manifestations of the biological activity of these intracellular elements, 'microbiosis.'

"These infinitesimal elements may survive the destruction of the cell, and they may acquire forms and biological properties that they previously did not possess. They may function in a kind of autonomous manner and may adapt themselves to the new conditions in which they find themselves and continue their evolution.

[1] *Bull. de l'Académie de Méd.*, Paris, July 1917, No. 29, pp. 30-76.

"The normal parasitism and the microbiosis may continue their evolution parallel to or independently of each other.

"In his experiments with apples, etc., Galippe relates that he was able to induce the appearance of micro-organisms from the microbiosis while excluding those from normal parasitism. The methods by which he realised this included mechanical trauma, contusions, etc., and he thus was able to trace certain manifestations of intracellular life and observe the appearance and evolution of certain living elements and cultivate them further.

"These facts of general biology are applicable to all tissues, he says, all cells, whatever their origin. The most striking example is in war wounds. The crushed tissues in the wounds favour the development of the phenomena due to microbiosis. The danger from leaving these contused tissues in the wounds is recognised now by all surgeons and the surgical cleansing of all wounds is now the routine practice.

"What they do not know, and what Galippe devotes the fifty pages of his monograph to prove is that on account of the normal parasitism and the microbiosis, the part played by the crushed tissues and the more extravasated blood is at the same time more important and more decisive. They may give birth directly, without foreign collaboration, to infectious elements, so that an absolutely aseptic projectile is capable of infecting a wound solely by its mechanical action in starting the abnormal evolution of the living intracellular elements already present.

"The research was undertaken in Landouzy's laboratory, and the data presented corroborate the lessons already learned from clinical observation."

In the *Vaccination Inquirer* for December 1st, 1920, Mr. Alexander Paul summarises from the Reports of the French Academy of Science[1] the results of other observations by M. V. Galippe of living microzymas and their modification into bacilli. Mr. Paul quotes the latter as follows: "Now, the microzymas form an integral part of the cell and cannot confer on the tissues a septic character which they do not themselves possess when they belong to a healthy organism. In spite of some failures, due without doubt to accidental causes, the brilliant results obtained in surgery by the process of grafting are an irrefutable proof of this. The grafts are not dead in the absolute sense of the word since they contain living elements capable of evolution *in situ,* or in the midst of appropriate cultures, as demonstrated by our experiments. Neither glycerine, nor alcohol, nor time destroy the microzymas of the tissues. These different agents can only

[1] *Comptes Rendus,* September, 1919.

diminish or suspend their activity. They are endowed with perennial life."

Mr. Paul refers to another Communication by M. Galippe to the Academy of Science[1] on "Living Micro-organisms in Paper: Their Resistance to the Action of Heat and of Time." In this the modern worker treats of cultivable elements found in all paper, even in ancient Chinese manuscripts and Egyptian papyrus, which have yielded micro-organisms endowed with movement.

Mr. Paul subsequently quotes Galippe's *résumé* of his research on flowers:[2] "Reviewing this long series of experiments, the facts that we have set forth show that the living part of the protoplasm is constituted of microzymas."

Finally, Mr. Paul refers to Galippe's discovery of microzymas in amber, and himself comments: "How sad to think that M. Béchamp, after his valiant struggles till a ripe old age with Pasteur and his school, whom he accused of perverting his discoveries and building upon them a false microbian hypothesis, should have gone down to the grave without enjoying the satisfaction of hearing that later research has established his position, and seeing the too long tabooed name 'microzyma' reinstated in the records of the Academy of Science!"

Béchamp's findings have certainly been borne out by Dr. J. A. Goodfellow, who writes on page 27 of his booklet *Hands Off Our Milk*[3] (September 1934): "I have recently been investigating the bacteria found in the clay strata beneath the coal measures. Talk of Rip Van Winkle and his century's slumber! These germs have been asleep, according to the computations of our geologists, for not less than 250 million years, but when I transferred some of them to a suitable liquid medium they woke up and got busy with as much vigour as if they had only been indulging in forty winks!"

Many who seem never to have heard of Béchamp appear to be working slowly and laboriously towards his views. We may quote, for example, a passage from page 64 of *Health, Disease and Integration,* an interesting and advanced work by H. P. Newsholme, M.A., M.D., F.R.C.P., D.P.H., Medical Officer of Health for the City of Birmingham. "Thus we again reach a position," writes Dr. Newsholme, "in which, while not negating (*sic*) the rôle played by an extraneous virus in producing encepha-

[1] *Comptes Rendus,* November 3, 1919.
[2] *Comptes Rendus,* February 9, 1920.
[3] Printed and published by Wilfred Edmunds Ltd., Station Road, Chesterfield, at 3d., post free 4d.

litis lethargica, we nevertheless find reason for not rejecting the possibility that a purely natural enzyme or 'virus,' produced by the individual and not by any bacteria harboured by him or introduced from outside, may on occasion be the cause of particular cases of a syndrome indistinguishable from that arising from extraneous infection."

In conclusion we may say that not only have we evidence of modern confirmation of Béchamp's views, but indications are many that his explanation of cellular and micro-organic life will receive a warm welcome from disinterested, unprejudiced inquirers. For instance, we may quote from a work published in 1918, entitled *Philosophy of Natural Therapeutics,*[1] by Henry Lindlahr, M.D.

"Until a few weeks ago," writes Lindlahr, "I was not aware of the fact that a French scientist, Antoine Béchamp, as far back as the middle of the last century, had given a rational, scientific explanation of the origin, growth and life activities of germs and of the normal living cells of vegetable, animal and human bodies. This information came to me first in a pamphlet entitled *Life's Primal Architects,* by E. Douglas Hume.[2] . . . According to the teachings of Béchamp, cells and germs are associations of microzymas. The physical characteristics and vital activities of cells and germs depend upon the soil in which their microzymas feed, grow and multiply. Thus microzymas, growing in the soil of procreative germ plasm, develop into the normal, permanent, specialised cells of the living vegetable, animal or human organism. The same microzymas feeding on morbid materials and systemic poisons in these living bodies develop into bacteria and parasites. . . . How wonderfully the discovery of microzymas confirms the claims of Nature Cure philosophy, according to which bacteria and parasites cannot cause and instigate inflammatory and other disease processes unless they find their own peculiar morbid soil in which to feed, grow and multiply! . . . Knowledge of the researches and teachings of Béchamp came to me but recently, after the manuscript of this volume had been practically completed. It was most gratifying to discover at the last moment this missing link which corroborates so wonderfully my own experience and teachings. . . . What a wonderful

[1] It appears that, since the death of Henry Lindlahr, all references to Béchamp have been eliminated from later editions of the *Philosophy of Natural Therapeutics.*
[2] Chapter X of the first edition of *Philosophy of Natural Therapeutics* is, for the most part, a reprint of portions of *Life's Primal Architects.*

correspondence this theory of the origin of cell life bears to the latest scientific opinions concerning the constitution of the atom! As all elements of matter and their atoms are made up of electrons vibrating in the primordial ether, so all cells and germs are made up of the microzymas. As the electrons, according to their numbers in the atom and their modes of vibration, produce upon our sensory organs the effects of various elements of matter, so the microzymas, according to the medium or soil in which they live, develop into various cells and germs, exhibiting distinctive structure and vital activities. Modern biology teaches us that all permanent, specialised cells present in the complicated adult body are actually contained in the original procreative cell which results from the union of the male spermatazoon and the female ovum. Science, however, has failed to explain this seeming miracle—how it is possible that all the permanent cells of the large adult body can be present from the beginning in the minute procreative cell and in the rudimentary body of the fœtus. Béchamp's theory of microzymas brings the rational and scientific explanation. If these microzymas are as minute in comparison to the cell as the electrons are in comparison to the atom, and the atom in comparison to the visible particles of matter, then the mystery of the genesis of the complex human body from the procreative cell, as well as the mysteries of heredity in its various phases, are amenable to explanation. If the microzymas are the spores, or seeds, of cells, it is possible to conceive that these infinitesimal, minute living organisms may bear the impress of the species and of racial and family characteristics and tendencies, finally to reappear in the cells, organs and nervous system of the adult body."

Just as Dr. Lindlahr has accepted Béchamp's microzymian doctrine as the explanation of pathogenic and other mysteries, so we cannot but anticipate a similar acceptance on the part of other workers, and considerable advance, as an ever-widening circle claims acquaintance with Béchamp's epoch-making discoveries.

A deeply interesting tribute to his teaching by Lord Geddes may be found in a reprint of speeches in the House of Lords on February 2nd, 1944, on a motion standing in the name of Lord Teviot, asking whether the Royal Commission appointed to investigate the birth rate and trends of population would cover, in its terms of reference, the condition of the soil in relation to the health of man, animal and plant.

"Lord Portsmouth moved the motion in the absence through

illness of Lord Teviot. Lord Glentanar and Lord Hankey supported the motion, as did Lord Geddes. Lord Geddes referred to the controversy regarding the food required and the use of chemical fertilisers. He said it goes back for nearly a century and has been made a very difficult controversy to follow by the dominance for so many years of the German school in connection with biology. 'The German school—Virchow, Schwann, Liebig—laid the emphasis upon the cell out of which, in their millions, our bodies are created, and they regarded food for the cell as all that was required. Apart from that, and really obliterated and eclipsed by the German school, very likely as a result of the Franco-Prussian War and the prestige the Germans got through that war, there was a French school, of which Professor Béchamp was the leader, working at Montpellier in the 'fifties of last century. This school had a quite different idea about the structure of the body and the vitality and vigour of the body, and I think it was a great pity that, as a result of the Franco-Prussian War and various things that followed it in the 'seventies, a great deal of the work of Professor Béchamp was entirely ignored and overlooked.'

"Lord Geddes then described the great contribution Professor Béchamp made, a contribution his lordship had been familiar with for over thirty years, to the whole idea of life, namely, that the cell is not the unit of life, but that there is a much smaller, more minute unit of life, which he called, in his later reports to the Academy of Science, the 'microzymas,' but which in his earlier reports he always referred to as the 'little bodies.' Lord Geddes showed how these little living bodies have the power of organising life, and suggested that as they are not present in artificial chemical manures, the German school, which we have in this country largely followed in biology for many years, overlooked something of great importance, which may be necessary for our human bodies, if they are to maintain their full vitality by receiving in their food a continuous supply of the little living bodies.

"Lord Geddes emphasised that there is a real divergence of opinion between two schools which have existed for a long time, one of which has become dominant and out of whose practice and beliefs the whole of the chemical industry has arisen and has been able to show results of the most remarkable kind in boosting production in the plant's growth and those portions of the food that are required as fuels. But he suggested that the composters

had got hold of the real source of vitality. The little bodies could be seen in drops of blood under a microscope, and during the course of that week he had examined a great many and had seen most extraordinary differences between people fed in different ways and in different states of health. He thought that the research that was wanted was investigation of the point: Is the supply of these little living bodies in the food essential to the continued vitality of human beings or is it not? He trusted that nothing he had said would be taken as meaning that this thing is true, but he thought there was the possibility, many think the extreme probability, that the presence of these little living bodies in the food is essential to health.

"He went on to describe how these little bodies are found in the most antique remnants of life, and how they can start organisation in a sugar solution that is sterile and dead; and concluded by saying that the problem could best be answered with a combination of research by the Agricultural Research Council, and of observation carefully conducted and carefully checked on the people of the country fed on different foods."

We would repeat the prophecy of the *Moniteur Scientifique* that time will do justice to Béchamp's work and make it known in its entirety. And with this end in view we would advise all students to go direct to the writings of this brilliant Frenchman who, even in that epoch of intellectual giants, is seen in perspective to have been an outstanding genius of the nineteenth century!