

THE
EXPERIMENTAL NOVEL
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AND OTHER ESSAYS

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EXPERIMENTAL NOVEL.

IN my literary essays I have often spoken of the application of the experimental method to the novel and to the drama. The return to nature, the naturalistic evolution which marks the century, drives little by little all the manifestation of human intelligence into the same scientific path. Only the idea of a literature governed by science is doubtless a surprise, until explained with precision and understood. It seems to me necessary, then, to say briefly and to the point what I understand by the experimental novel.

I really only need to adapt, for the experimental method has been established with strength and marvelous clearness by Claude Bernard in his "Introduction à l'Étude de la Médecine Experimentale." This work, by a savant whose authority is unquestioned, will serve me as a solid foundation. I shall here find the whole question treated, and I shall restrict myself to irrefutable arguments and to giving the quotations which may seem necessary to me. This will then be but a compiling of texts, as I intend on all points to intrench myself behind Claude Bernard. It will often be but necessary for me to replace the word "doctor"

by the word "novelist," to make my meaning clear and to give it the rigidity of a scientific truth.

What determined my choice, and made me choose "L'Introduction" as my basis, was the fact that medicine, in the eyes of a great number of people, is still an art, as is the novel.⁷ Claude Bernard all his life was searching and battling to put medicine in a scientific path. In his struggle we see the first feeble attempts of a science to disengage itself little by little from empiricism,* and to gain a foothold in the realm of truth, by means of the experimental method. Claude Bernard demonstrates that this method, followed in the study of inanimate bodies in chemistry and in physics, should be also used in the study of living bodies, in physiology and medicine. I am going to try and prove for my part that if the experimental method leads to the knowledge of physical life, it should also lead to the knowledge of the passionate and intellectual life. It is but a question of degree in the same path which runs from chemistry to physiology, then from physiology to anthropology and to sociology. The experimental novel is the goal.

To be more clear, I think it would be better to give a brief *résumé* of "L'Introduction" before I commence. The applications which I shall make of the texts will be better understood if the plan of the work and the matters treated are explained.

Claude Bernard, after having declared that medicine enters the scientific path, with physiology as its foundation, and by means of the experimental method, first

*Zola uses empiricism in this essay in the sense of "haphazard observation" in contrast with a scientific experiment undertaken to prove a certain truth.—TRANSLATOR.

explains the differences which exist between the sciences of observation and the sciences of experiment. He concludes, finally, that experiment is but provoked observation. All experimental reasoning is based on doubt, for the experimentalist should have no preconceived idea, in the face of nature, and should always retain his liberty of thought. He simply accepts the phenomena which are produced, when they are proved.

In the second part he reaches his true subject and shows that the spontaneity of living bodies is not opposed to the employment of experiment. The difference is simply that (an inanimate body possesses merely the ordinary, external environment, while the essence of the higher organism is set in an internal and perfected environment endowed with constant physico-chemical properties exactly like the external environment; hence there is an absolute determinism in the existing conditions of natural phenomena; for the living as for the inanimate bodies. He calls determinism the cause which determines the appearance of these phenomena. This nearest cause, as it is called, is nothing more than the physical and material condition of the existence or manifestation of the phenomena. The end of all experimental method, the boundary of all scientific research, is then identical for living and for inanimate bodies; it consists in finding the relations which unite a phenomenon of any kind to its nearest cause, or, in other words, in determining the conditions necessary for the manifestation of this phenomenon. Experimental science has no necessity to worry itself about the "why" of things; it simply explains the "how."

After having explained the experimental considerations common to living beings and to inanimate, Claude Bernard passes to the experimental considerations which belong specially to living beings. The great and only difference is this, that there is presented to our consideration, in the organism of living beings, a harmonious group of phenomena. He then treats of practical experiments on living beings, of vivisection, of the preparatory anatomical conditions, of the choice of animals, of the use of calculation in the study of phenomena, and lastly of the physiologist's laboratory.

Finally, in the last part of "L'Introduction," he gives some examples of physiological experimental investigations in support of the ideas which he has formulated. He then furnishes some examples of experimental criticism in physiology. In the end he indicates the philosophical obstacles which the experimental doctor encounters. He puts in the first rank the false application of physiology to medicine, the scientific ignorance as well as certain illusions of the medical mind. Further, he concludes by saying that empirical medicine and experimental medicine, not being incompatible, ought, on the contrary, to be inseparable one from the other. His last sentence is that experimental medicine adheres to no medical doctrine nor any philosophical system.

This is, very broadly, the skeleton of "L'Introduction" stripped of its flesh. I hope that this rapid *exposé* will be sufficient to fill up the gaps which my manner of proceeding is bound to produce; for, naturally, I shall cite from the work only such passages as are necessary to define and comment upon the experi-

mental novel. I repeat that I use this treatise merely as a solid foundation on which to build, but a foundation very rich in arguments and proofs of all kinds. Experimental medicine, which but lispes as yet, can alone give us an exact idea of experimental literature, which, being still unhatched, is not even lispings.

after facts, that is to say, investigation, is always accompanied by a reason, so that ordinarily the experimentalist makes an experiment to confirm and verify the value of an experimental idea. In this case you can say that experiment is an observation instigated for the purpose of verification."

To determine how much observation and experimenting there can be in the naturalistic novel, I only need to quote the following passages:

"The observer relates purely and simply the phenomena which he has under his eyes. . . He should be the (photographer) of phenomena, his observation should be an exact representation of nature. . . He listens to nature and he writes under its (dictation.) But once the fact is ascertained and the phenomenon observed, an idea or hypothesis comes into his mind, reason intervenes, and the experimentalist comes forward to interpret the phenomenon. The experimentalist is a man who, in pursuance of a more or less probable, but anticipated, explanation of observed phenomena, institutes an experiment in such a way that, according to all probability, it will furnish a result which will serve to confirm the hypothesis or preconceived idea. The moment that the result of the experiment manifests itself, the experimentalist finds himself face to face with a true observation which he has called forth, and which he must ascertain, as all observation, without any preconceived idea. The experimentalist should then disappear, or rather transform himself instantly into the observer, and it is not until after he has ascertained the absolute results of the experiment, like that of an ordinary observation, that his mind comes back to reasoning, comparing, and

I.

THE first question which presents itself is this: Is experiment possible in literature, in which up to the present time observation alone has been employed?

Claude Bernard discusses observation and experiment at great length. There exists, in the first place, a very clear line of demarcation, as follows: "The name of 'observer' is given to him who applies the simple or complex process of investigation in the study of phenomena which he does not vary, and which he gathers, consequently, as nature offers them to him; the name of 'experimentalist' is given to him who employs the simple and complex process of investigation to vary or modify, for an end of some kind, the natural phenomena, and to make them appear under circumstances and conditions in which they are not presented by nature." For instance, astronomy is a science of observation, because you cannot conceive of an astronomer acting upon the stars; while chemistry is an experimental science, as the chemist acts upon nature and modifies it. This, according to Claude Bernard, is the only true and important distinction which separates the observer from the experimentalist.

I cannot follow him in his discussion of the different definitions given up to the present time. As I have said before, he finishes by coming to the conclusion that experiment is but provoked observation. I repeat his words: "In the experimental method the search

judging whether the experimental hypothesis is verified or invalidated by these same results."

The mechanism is all there. It is a little complicated, it is true, and Claude Bernard is led on to say: "When all this passes into the brain of a savant who has given himself up to the study of a science as complicated as medicine still is, then there is such an entanglement between the result of observation and what belongs to experiment that it will be impossible and, besides, useless to try to analyze, in their inextricable *mélange*, each of these terms." In one word, it might be said that observation "indicates" and that experiment "teaches."

Now, to return to the novel, we can easily see that the novelist is equally an observer and an experimentalist. The observer in him gives the facts as he has observed them, suggests the point of departure, displays the solid earth on which his characters are to tread and the phenomena to develop. Then the experimentalist appears and introduces an experiment, that is to say, sets his characters going in a certain story so as to show that the succession of facts will be such as the requirements of the determinism of the phenomena under examination call for. Here it is nearly always an experiment "*pour voir*," as Claude Bernard calls it. The novelist starts out in search of a truth. I will take as an example the character of the *Baron Hulot*, in "*Cousine Bette*," by Balzac. The general fact observed by Balzac is the ravages that the amorous temperament of a man makes in his home, in his family, and in society. As soon as he has chosen his subject he starts from known facts; then he makes his experiment, and exposes *Hulot* to a series of trials,

placing him amid certain surroundings in order to exhibit how the complicated machinery of his passions works.) It is then evident that there is not only observation there, but that there is also experiment; as Balzac does not remain satisfied with photographing the facts collected by him, but interferes in a direct way to place his character in certain conditions, and of these he remains the master. The problem is to know what such a passion, acting in such a surrounding and under such circumstances, would produce from the point of view of an individual and of society; and an experimental novel, "*Cousine Bette*," for example, is simply the report of the experiment that the novelist conducts before the eyes of the public. In fact, the whole operation consists in taking facts in nature, then in studying the mechanism of these facts, acting upon them, by the modification of circumstances and surroundings, without deviating from the laws of nature. Finally, you possess knowledge of the man, scientific knowledge of him, in both his individual and social relations.

Doubtless we are still far from certainties in chemistry and even physiology. Nor do we know any more the reagents which decompose the passions, rendering them susceptible of analysis. Often, in this essay, I shall recall in similar fashion this fact, that the experimental novel is still younger than experimental medicine, and the latter is but just born. But I do not intend to exhibit the acquired results, I simply desire to clearly expose a method. If the experimental novelist is still groping in the most obscure and complex of all the sciences, this does not prevent this science from existing. It is undeniable

that the naturalistic novel, such as we understand it to-day, is a real experiment that a novelist makes on man by the help of observation.)

Besides, this opinion is not only mine, it is Claude Bernard's as well. He says in one place: "In practical life men but make experiments on one another." And again, in a more conclusive way, he expresses the whole theory of the experimental novel: "When we reason on our own acts we have a certain guide, for we are conscious of what we think and how we feel. But if we wish to judge of the acts of another man, and know the motives which make him act, that is altogether a different thing. Without doubt we have before our eyes the movements of this man and his different acts, which are, we are sure, the modes of expression of his sensibility and his will. Further, we even admit that there is a necessary connection between the acts and their cause; but what is this cause? We do not feel it, we are not conscious of it, as we are when it acts in ourselves; we are therefore obliged to interpret it, and to guess at it, from the movements which we see and the words which we hear. We are obliged to check off this man's actions one by the other; we consider how he acted in such a circumstance, and, in a word, we have recourse to the experimental method." All that I have spoken of further back is summed up in this last phrase, which is written by a savant.

I shall still call your attention to another illustration of Claude Bernard, which struck me as very forcible: "The experimentalist is the examining magistrate of nature." We novelists are the examining magistrates of men and their passions.

But see what splendid clearness breaks forth when this conception of the application of the experimental method to the novel is adequately grasped and is carried out with all the scientific rigor which the matter permits to-day. A contemptible reproach which they heap upon us naturalistic writers is the desire to be solely photographers. We have in vain declared that we admit the necessity of an artist's possessing an individual temperament and a personal expression; they continue to reply to us with these imbecile arguments, about the impossibility of being strictly true, about the necessity of arranging facts to produce a work of art of any kind. Well, with the application of the experimental method to the novel that quarrel dies out. The idea of experiment carries with it the idea of modification. We start, indeed, from the true facts, which are our indestructible basis; but to show the mechanism of these facts it is necessary for us to produce and direct the phenomena; this is our share of invention, here is the genius in the book. Thus without having recourse to the questions of form and of style, which I shall examine later, I maintain even at this point that we must modify nature, without departing from nature, when we employ the experimental method in our novels. If we bear in mind this definition, that "observation indicates and experiment teaches," we can even now claim for our books this great lesson of experiment.

The writer's office, far from being lessened, grows singularly from this point of view. An experiment, even the most simple, is always based on an idea, itself born of an observation. As Claude Bernard says: "The experimental idea is not arbitrary, nor purely

imaginary; it ought always to have a support in some observed reality, that is to say, in nature." It is on this idea and on doubt that he bases all the method. "The appearance of the experimental idea," he says further on, "is entirely spontaneous and its nature absolutely individual, depending upon the mind in which it originates; it is a particular sentiment, a *quid proprium*, which constitutes the originality, the invention, and the genius of each one." Further, he makes doubt the great scientific lever. "The doubter is the true savant; he doubts only himself and his interpretations; he believes in science; he even admits in the experimental sciences a criterion or a positive principle, the determinism of phenomena, which is absolute in living beings as in inanimate bodies." Thus, instead of confining the novelist within narrow bounds, the experimental method gives full sway to his intelligence as a thinker, and to his genius as a creator. He must see, understand, and invent. Some observed fact makes the idea start up of trying an experiment, of writing a novel, in order to attain to a complete knowledge of the truth. Then when, after careful consideration, he has decided upon the plan of his experiment, he will judge the results at each step with the freedom of mind of a man who accepts only facts conformable to the determinism of phenomena. He set out from doubt to reach positive knowledge; and he will not cease to doubt until the mechanism of the passion, taken to pieces and set up again by him, acts according to the fixed laws of nature. There is no greater, no more magnificent work for the human mind. We shall see, further on, the miseries of the scholastics, of the makers of systems, and those theorizing about the

ideal, compared with the triumph of the experimentalists.

I sum up this first part by repeating that the naturalistic novelists observe and experiment, and that all their work is the offspring of the doubt which seizes them in the presence of truths little known and phenomena unexplained, until an experimental idea rudely awakens their genius some day, and urges them to make an experiment, to analyze facts, and to master them.

to their conditions of existence or to their nearest causes."

It seems to me useless to enter into the complicated explanations and reasonings of Claude Bernard. I have already said that he insists upon the existence of an interior condition in living beings. "In experimenting on inanimate bodies," he says, "there is only one condition to be considered, that is, the exterior earthly condition; while among the higher living organisms there are at least two conditions to consider: the exterior condition or extra-organic, and the interior or inter-organic. The complexity due to the existence of an interior organic condition¹ is the only reason for the great difficulties which we encounter in the experimental determination of living phenomena, and in the application of the means capable of modifying them." And he starts out from this fact to establish the principle that there are fixed laws governing the physiological elements plunged into an interior condition, as there are fixed laws for governing the chemical elements which are steeped in an exterior condition. Hence, you can experiment on a living being as well as on an inanimate one; it is only a question of putting yourself in the desired conditions.

I insist upon this, because, I repeat once more, the important point of the question is there. Claude Bernard, in speaking of the vitalists, writes thus: "They consider life as a mysterious and supernatural agent, which acts arbitrarily, free from all determinism, and they condemn as materialists all those who endeavor to trace vital phenomena to definite organic and physico-chemical conditions. These are false ideas, which it is not easy to root out once they have become

II.

SUCH, then, is the experimental method. But for a long time it has been held that this method cannot be applied to living beings. This is the important point in the question that I am going to examine with Claude Bernard. The reasoning subsequently will be of the simplest; if the experimental method can be carried from chemistry and physics into physiology and medicine, it can be also carried from physiology into the naturalistic novel.²

Cuvier—to cite the name of only one scientific man—pretended that experiment as applied to inanimate bodies could not be used with living beings; physiology, according to his way of thinking, should be purely a science of observation and of anatomical deduction. The vitalists even admit a vital force in unceasing battle with the physical and chemical forces neutralizing their action. Claude Bernard, on the contrary, denies all presence of a mysterious force, and affirms that experiment is applicable everywhere. "I propose," he says, "to establish the fact that the science of the phenomena of life can have no other basis than the science of the phenomena of inanimate bodies, and that there are, in this connection, no differences between the principles of biological science and those of physics and chemistry. In fact, the end the experimental method proposes is the same everywhere; it consists in connecting, by experiment, the natural phenomena

domiciled in the mind; only the progress of science can dissipate them." And he lays down this axiom: "With living beings as well as inanimate, the conditions of the existence of each phenomenon are determined in an absolute manner."

I restrain myself for fear of complicating the argument to too great an extent.

Thus you see the progress which science has made. In the last century a more exact application of the experimental method creates physics and chemistry, which then are freed from the irrational and supernatural. Men discover that there are fixed laws, thanks to analysis, and make themselves masters of phenomena. Then a new point is gained. Living beings, in which the vitalists still admitted a mysterious influence, are in their turn brought under and reduced to the general mechanism of matter. Science proves that the existing conditions of all phenomena are the same in living beings as in inanimate; and from that time on physiology assumes little by little the certainty of chemistry and medicine. But are we going to stop there? Evidently not. When it has been proved that the body of man is a machine, whose machinery can be taken apart and put together again at the will of the experimenter, then we can pass to the passionate and intellectual acts of man. Then we shall enter into the domain which up to the present has belonged to physiology and literature; it will be the decisive conquest by science of the hypotheses of philosophers and writers. We have experimental chemistry and medicine; we shall have an experimental physiology, and later on an experimental novel. It is an inevitable evolution, the goal of which it is easy to see to-day.

All things hang together; it is necessary to start from the determinism of inanimate bodies in order to arrive at the determinism of living beings; and since savants like Claude Bernard demonstrate now that fixed laws govern the human body, we can easily proclaim, without fear of being mistaken, the hour in which the laws of thought and passion will be formulated in their turn. A like determinism will govern the stones of the roadway and the brain of man.

This opinion is to be found in "L'Introduction." I cannot repeat too often that I take all my arguments from Claude Bernard's work. After having explained that any completely special phenomena may be the result of the more and more complex combination and co-operation of the organized elements, he writes the following: "I am persuaded that the obstacles which surround the experimental study of psychological phenomena are in great measure due to difficulties of this order; for notwithstanding the marvelous nature and the delicacy of their manifestations, it is impossible, so it seems to me, not to bring cerebral phenomena, like all the phenomena of living bodies, under the laws of a scientific determinism." This is clear. Later, without doubt, science will find this determinism for all the cerebral and sensory manifestations of man.

Now, science enters into the domain of us novelists, who are to-day the analyzers of man, in his individual and social relations. We are continuing, by our observations and experiments, the work of the physiologist, who has continued that of the physicist and the chemist. We are making use, in a certain way, of scientific psychology to complete scientific physiology;

and to finish the series we have only to bring into our studies of nature and man the decisive tool of the experimental method. In one word, we should operate on the characters, the passions, on the human and social data, in the same way that the chemist and the physicist operate on inanimate beings, and as the physiologist operates on living beings. Determinism dominates everything. It is scientific investigation, it is experimental reasoning, which combats one by one the hypotheses of the idealists, and which replaces purely imaginary novels by novels of observation and experiment.

I certainly do not intend at this point to formulate laws. In the actual condition of the science of man the obscurity and confusion are still too great to risk the slightest synthesis. [All that can be said is that there is an absolute determinism for all human phenomena.] From that on investigation is a duty. We have the method; we should go forward, even if a whole lifetime of effort ends but in the conquest of a small particle of the truth. Look at physiology: Claude Bernard made grand discoveries, and he died protesting that he knew nothing, or nearly nothing. In each page he confesses the difficulties of his task. "In the phenomenal relations," he says, "such as nature offers them to us, there always reigns a complexity more or less great. In this respect the complexity of mineral phenomena is much less great than that of living phenomena; this is why the sciences restricted to inanimate bodies have been able to formulate themselves more quickly. In living beings the phenomena are of enormous complexity, and the greater mobility of living organisms renders them more difficult to

grasp and to define." What can be said, then, of the difficulties to be encountered by the experimental novel, which adds to physiology its studies upon the most delicate and complex organs, which deals with the highest manifestations of man as an individual and a social member? Evidently analysis becomes more complicated here. Therefore, if the physiologist is but drawing up his principles to-day, it is natural that the experimental novelist should be only taking his first steps: We foresee it as a sure consequence of the scientific evolution of the century; but it is impossible to base it on certain laws. Since Claude Bernard speaks of "the restricted and precarious truths of biological science," we can freely admit that the truths of the science of man, from the standpoint of his intellectual and passionate mechanism, are more restricted and precarious still. We are lispng yet, we are the last comers, but that should be only one incentive the more to push us forward to more exact studies; now that we possess the tool, the experimental method, our goal is very plain—to know the determinism of phenomena and to make ourselves master of these phenomena.

Without daring, as I say, to formulate laws, I consider that the question of heredity has a great influence in the intellectual and passionate manifestations of man. I also attach considerable importance to the surroundings. I ought to touch upon Darwin's theories; but this is only a general study of the experimental method as applied to the novel, and I should lose myself were I to enter into details. I will only say a word on the subject of surroundings. We have just seen the great importance given by Claude Bernard to

the study of those inter-organic conditions which must be taken into account if we wish to find the determinism of phenomena in living beings. Well, then! in the study of a family, of a group of living beings, I think that the social condition is of equal importance. Some day the physiologist will explain to us the mechanism of the thoughts and the passions; we shall know how the individual machinery of each man works; how he thinks, how he loves, how he goes from reason to passion and folly; but these phenomena, resulting as they do from the mechanism of the organs, acting under the influence of an interior condition, are not produced in isolation or in the bare void. Man is not alone; he lives in society, in a social condition; and consequently, for us novelists, this social condition unceasingly modifies the phenomena. Indeed our great study is just there, in the reciprocal effect of society on the individual and the individual on society. For the physiologist, the exterior and interior conditions are purely chemical and physical, and this aids him in finding the laws which govern them easily. We are not yet able to prove that the social condition is also physical and chemical. It is that certainly, or rather it is the variable product of a group of living beings, who themselves are absolutely submissive to the physical and chemical laws which govern alike living beings and inanimate. From this we shall see that we can act upon the social conditions, in acting upon the phenomena of which we have made ourselves master in man. And this is what constitutes the experimental novel: to possess a knowledge of the mechanism of the phenomena inherent in man, to show the machinery of his intellectual and sensory

manifestations, under the influences of heredity and environment, such as physiology shall give them to us, and then finally to exhibit man living in social conditions produced by himself, which he modifies daily, and in the heart of which he himself experiences a continual transformation. Thus, then, we lean on physiology; we take man from the hands of the physiologist solely, in order to continue the solution of the problem, and to solve scientifically the question of how men behave when they are in society.

These general ideas will be sufficient to guide us to-day. Later on, when science is farther advanced, when the experimental novel has brought forth decisive results, some critic will explain more precisely what I have but indicated to-day.

Elsewhere Claude Bernard confesses how difficult it is to apply the experimental method to living beings. "The living body," he says, "especially among the higher animals, never falls into chemical or physical indifference with the exterior conditions; it possesses an incessant movement, an organic evolution apparently spontaneous and constant; and notwithstanding the fact that this evolution has need of exterior circumstances to manifest itself, it is, however, independent in its course and movement.") And he concludes as I have: "In short, it is only in the physical and chemical conditions of the interior that we shall find the principle that governs the exterior phenomena of life." But whatever complexities may present themselves, and even when extraordinary phenomena are produced, the application of the experimental method is imperative. If the phenomena of life have a complexity and an apparent difference from those of inanimate bodies,

they do not offer this difference, except by reason of determined or determinable conditions which belong to them. Therefore, even should the sciences dealing with life differ from the others in their application and in their special laws, they are not to be distinguished by their scientific method."

I must say one word as to the limits which Claude Bernard assigns to science. (According to him we shall always be ignorant of the "why" of things; we can only know the "how.") It is this that he expresses in the following terms: "The nature of our minds urges us to seek the essence or the 'why' of things. In this we see further than the goal it has been given us to attain to; for experiment soon teaches us that we must not go beyond the 'how'; that is to say, beyond the nearest cause or the condition of the existence of any phenomenon." Further on he gives this example: "If we can discover 'why' opium and its alkaloids produce sleep, we shall know the mechanism of such slumber, and know 'how' opium or its essence produces sleep; for slumber only takes place because the active substance is about to put itself in contact with certain organic elements which it modifies." The practical conclusion of all this is the following: "Science has precisely the privilege of teaching us what we are ignorant of, through its substitution of reason and experiment for sentiment, and by showing us clearly the limit of our actual knowledge. But, by a marvelous compensation, in proportion as science humbles our pride, it strengthens our power." All these considerations are strictly applicable to the experimental novel. In order not to lose itself in philosophical speculations, in order to replace idealistic hypothesis by a slow conquest of the

unknown, it must continue the search after the "how" of things. This is its exact rôle, and it is from this that it must draw, as we are going to see, its reason for being and its moral.)

I have reached this point: the experimental novel is a consequence of the scientific evolution of the century; it continues and completes physiology, which itself leans for support on chemistry and medicine; it substitutes for the study of the abstract and the metaphysical man the study of the natural man, governed by physical and chemical laws, and modified by the influences of his surroundings; it is in one word the literature of our scientific age, as the classical and romantic literature corresponded to a scholastic and theological age. Now I will pass to the great question of the application of all this, and of its justification.

This, then, is the end, this is the purpose in physiology and in experimental medicine: to make one's self master of life in order to be able to direct it.) Let us suppose that science advances and that the conquest of the unknown is finally completed; the scientific age which Claude Bernard saw in his dreams will then be realized. When that time comes the doctor will be the master of maladies; he will cure without fail; his influence upon the human body will conduce to the welfare and strength of the species. We shall enter upon a century in which man, grown more powerful, will make use of nature and will utilize its laws to produce upon the earth (the greatest possible amount of justice and freedom. There is no nobler, higher, nor grander end.) Here is our rôle as intelligent beings: to penetrate to the wherefore of things, to become superior to these things, and to reduce them to a condition of subservient machinery.

Well, this dream of the physiologist and the experimental doctor is also that of the novelist, who employs the experimental method in his study of man as a simple individual and as a social animal. Their object is ours; we also desire to master certain phenomena of an intellectual and personal order, to be able to direct them. We are, in a word, experimental moralists, showing by experiment in what way a passion acts in a certain social condition.† The day in which we gain control of the mechanism of this passion we can treat it and reduce it, or at least make it as inoffensive as possible. And in this consists the practical utility and high morality of our naturalistic works, which experiment on man, and which dissect piece by piece this human machinery in order to set it going

III.

THE object of the experimental method in physiology and in medicine is to study phenomena in order to become their master. Claude Bernard in each page of "L'Introduction" comes back to this idea. He declares: "All natural philosophy is summed up in this: To know the laws which govern phenomena. The experimental problem reduces itself to this: To foresee and direct phenomena." Farther on he gives an example: "It will not satisfy the experimental doctor, though it may the merely empirical one, to know that quinine cures fever; the essential thing is to know what fever is, and to understand the mechanism by which quinine cures. All this is of the greatest importance to the experimental doctor; for as soon as he knows it positively, the fact that quinine cures fever will no longer be an isolated and empirical fact, but a scientific fact. This fact will be connected then with the conditions which bind it to other phenomena, and we shall be thus led to the knowledge of the laws of the organism, and to the possibility of regulating their manifestations." A striking example can be quoted in the case of scabies. "To-day the cause of this disease is known and determined experimentally; the whole subject has become scientific, and empiricism has disappeared. A cure is surely and without exception effected when you place yourself in the conditions known by experiment to produce this end."

through the influence of the environment. When things have advanced further, when we are in possession of the different laws, it will only be necessary to work upon the individuals and the surroundings if we wish to find the best social condition. In this way we shall construct a practical sociology, and our work will be a help to political and economical sciences. I do not know, I repeat, of a more noble work, nor of a grander application. To be the master of good and evil, to regulate life, to regulate society, to solve in time all the problems of socialism, above all, to give justice a solid foundation by solving through experiment the questions of criminality—is not this being the most useful and the most moral workers in the human workshop?

Let us compare, for one instant, the work of the idealistic novelists to ours; and here this word idealistic refers to writers who cast aside observation and experiment, and base their works on the supernatural and the irrational, who admit, in a word, the power of mysterious forces outside of the determinism of the phenomena. Claude Bernard shall reply to this for me: "What distinguishes experimental reasoning from scholastic is the fecundity of the one and the sterility of the other. It is precisely the scholastic, who believes he has absolute certitude, who attains to no results. This is easily understood, since by his belief in an absolute principle he puts himself outside of nature, in which everything is relative. It is, on the contrary, the experimenter, who is always in doubt, who does not think he possesses absolute certainty about anything, who succeeds in mastering the phenomena which surround him, and in increasing his power over nature." By

and by I shall return to this question of the ideal, which is in truth but the question of indeterminism. Claude Bernard says truly: "The intellectual conquest of man consists in diminishing and driving back indeterminism, and so, gradually, by the aid of the experimental method, gaining ground for determinism." We experimental novelists have the same task; our work is to go from the known to the unknown, to make ourselves masters of nature; while the idealistic novelists deliberately remain in the unknown, through all sorts of religious and philosophical prejudices, under the astounding pretense that the unknown is nobler and more beautiful than the known. If our work, often cruel, if our terrible pictures needed justification, I should find, indeed, with Claude Bernard this argument conclusive: "You will never reach really fruitful and luminous generalizations on the phenomena of life until you have experimented yourself and stirred up in the hospital, the amphitheater, and the laboratory the fetid or palpitating sources of life. If it were necessary for me to give a comparison which would explain my sentiments on the science of life, I should say that it is a superb salon, flooded with light, which you can only reach by passing through a long and nauseating kitchen."

I insist upon the word which I have employed, that of experimental novelists as applied to naturalistic novelists. One page of "L'Introduction" struck me as being very forcible, that in which the author speaks of the vital "circulus." "The muscular and nervous organs preserve the activity of the organs which make the blood; but the blood, in its turn, nourishes the organs which produce it. There is in this a social or

organic solidarity, which keeps up a perpetual movement, until the derangement or cessation of the action of a necessary and vital element has broken the equilibrium or brought about some trouble or stoppage in the play of the animal machinery. The problem of the experimentalist doctor consists in finding the cause of any organic disarrangement, that is to say, in seizing the initial phenomenon. We shall see how a dislocation of the organism, or a disarrangement the most complex in appearance, can be traced to a simple initial cause, which calls forth immediately the most complex effects." All that is necessary here is to change the words experimental doctor to experimental novelist, and this passage is exactly applicable to our naturalistic literature. [The social circulus is identical with the vital circulus; in society, as in human beings, a solidarity exists which unites the different members and the different organisms in such a way that if one organ becomes rotten many others are tainted and a very complicated disease results. Hence, in our novels, when we experiment on a dangerous wound which poisons society, we proceed in the same way as the experimentalist doctor; we try to find the simple initial cause in order to reach the complex causes of which the action is the result. Go back once more to the example of *Baron Hulot* in "Cousine Bette." See the final result, the dénouement of the novel? an entire family is destroyed, all sorts of secondary dramas are produced, under the action of *Hulot's* amorous temperament. It is there, in this temperament, that the initial cause is found. One member, *Hulot*, becomes rotten, and immediately all around him are tainted, the social circulus is interrupted, the health of that society

is compromised. What emphasis Balzac lays on the character of *Baron Hulot*; with what scrupulous care he analyzes him! The experiment deals with him chiefly, because its object is to master the symptoms of this passion in order to govern it. Suppose that *Hulot* is cured, or at least restrained and rendered inoffensive, immediately the drama ceases to have any longer any *raison d'être*; the equilibrium, or more truly the health, of the social body is again established. Thus the naturalistic novelists are really experimental moralists.

And I reach thus the great reproach with which they think to crush the naturalistic novelists, by treating them as fatalists. How many times have they wished to prove to us that as soon as we did not accept free will, that as soon as man was no more to us than a living machine, acting under the influence of heredity and surroundings, we should fall into gross fatalism, we should debase humanity to the rank of a troop marching under the baton of destiny. It is necessary to define our terms: we are not fatalists, we are determinists, which is not at all the same thing. Claude Bernard explains the two terms very plainly: "We have given the name of determinism to the nearest or determining cause of phenomena. We never act upon the essence of phenomena in nature, but only on their determinism, and by this very fact, that we act upon it, determinism differs from fatalism, upon which we could not act at all. Fatalism assumes that the appearance of any phenomenon is necessary apart from its conditions, while determinism is just the condition essential for the appearance of any phenomenon, and such appearance is never forced. Once the

search for the determinism of phenomena is placed as a fundamental principle of the experimental method, there is no longer either materialism, or spiritualism, or inanimate matter, or living matter; there remain but phenomena of which it is necessary to determine the conditions, that is to say, the circumstances which play, by their proximity to these phenomena, the rôle of nearest cause." This is decisive. All we do is to apply this method in our novels, and we are the determinists who experimentally try to determine the condition of the phenomena, without departing in our investigations from the laws of nature. As Claude Bernard very truly says, the moment that we can act, and that we do act, on the determining cause of phenomena—by modifying their surroundings, for example—we cease to be fatalists.

Here you have, then, the moral purpose of the experimental novelist clearly defined. I have often said that we do not have to draw a conclusion from our works; and this means that our works carry their conclusion with them. An experimentalist has no need to conclude, because, in truth, experiment concludes for him. A hundred times, if necessary, he will repeat the experiment before the public; he will explain it; but he need neither become indignant nor approve of it personally; such is the truth, such is the way phenomena work; it is for society to produce or not to produce these phenomena, according as the result is useful or dangerous. You cannot imagine, as I have said elsewhere, a savant being provoked with azote because azote is dangerous to life; he suppresses azote when it is harmful, and not otherwise. As our power is not the same as that of a savant, as we are

experimentalists without being practitioners, we ought to content ourselves with searching out the determinism of social phenomena, and leaving to legislators and to men of affairs the care of controlling sooner or later these phenomena in such a way as to develop the good and reject the bad, from the point of view of their utility to man.

In our rôle as experimental moralists we show the mechanism of the useful and the useless, we disengage the determinism of the human and social phenomena so that, in their turn, the legislators can one day dominate and control these phenomena. In a word, we are working with the whole country toward that great object, the conquest of nature and the increase of man's power a hundredfold. Compare with ours the work of the idealistic writers, who rely upon the irrational and the supernatural, and whose every flight upward is followed by a deeper fall into metaphysical chaos. We are the ones who possess strength and morality.

IV.

I HAVE said before that I chose "L'Introduction" because medicine is still looked upon by many as an art. Claude Bernard proves that it ought to be a science, and in his book we see the birth of a science, a very instructive spectacle in itself, and which shows us that the scientific domain is extending and conquering all the manifestations of human intelligence. Since medicine, which was an art, is becoming a science, why should not literature also become a science by means of the experimental method?

It must be remarked that all things hang together. If the territory of the experimental doctor is the body of man, as shown in the phenomena of his different organs both in their normal and pathological condition, our territory is equally the body of man, as shown by his sensory and cerebral phenomena, both in their normal and pathological condition. If we are not satisfied with the metaphysical man of the classical age we must, perforce, take into consideration the new ideas on nature and on life, with which our age has become imbued. We continue necessarily, I repeat, the work of the physiologist and the doctor, who have continued, in their turn, that of the physician and the chemist. Hence we enter into the domain of science. I will not touch on the question of sentiment and form but will reserve that for another time.

Let us see first what Claude Bernard says about

medicine: "Certain doctors contend that medicine can only be conjectural, and they conclude that a doctor is an artist, who ought to make up for the indeterminism in particular cases by his genius and his personal tact. All sciences have necessarily commenced by being conjectural; there are still to-day in every science conjectural parts. Medicine is still nearly all conjecture. I do not deny that; but I only want to say that modern science should make an effort to come out of this provisional state, which does not constitute a definite scientific condition—not any more for medicine than for the other sciences. The scientific condition will be longer in taking shape and more difficult to obtain in medicine by reason of the complexities of its phenomena; but the end of the medical savant is to reduce in his science, as in all the others, the indeterminate to the determinate." The mechanism of the birth and the development of a science is here clearly defined. Men still look upon the doctor as an artist, because there is in medicine an enormous place still left to conjecture. Naturally, the novelist merits still more the name of artist, as he finds himself buried still deeper in the indeterminate. If Claude Bernard confesses that the complexity of its phenomena will prevent medicine, for a long time yet, from arriving at a scientific state, what shall we say of the experimental novel, in which the phenomena are much more complicated still? But this does not prevent the novel from entering upon the scientific pathway, obedient to the general evolution of the century.

Moreover, Claude Bernard himself has indicated the evolutions of the human mind. "The human mind," he says, "at various periods of its progress has passed

✓ successively through feeling, reason, and experiment. First, feeling alone, dominating reason, created the truths of faith, that is to say, theology. Reason, or philosophy, becoming afterward the mistress, brought forth scholasticism. Finally, experiment, that is to say, the study of natural phenomena, taught man that the truths of the exterior world were to be found formulated, in the first place, neither in reason nor in feeling. These last are, indeed, our indispensable guides, but to obtain the truth it is necessary to descend into the objective reality of things, where they lie concealed under their phenomenal form. Thus it is that in the natural progress of things the experimental method appears, which sums up the whole, and which supports itself successfully on the three branches of this immovable tripod: feeling, reason, and experiment. ✓ In the search after truth by means of this method, feeling has always the initiative; it engenders the idea *a priori* or intuition; reason, or the reasoning power, immediately develops the idea and deduces its logical consequences. But if feeling must be guided by the light of reason, reason in its turn must be guided by experiment."

I have given this passage entire, as it is of the greatest importance. It shows clearly the rôle that the personality of the novelist should play, apart from the style. ✓ Since feeling is the starting point of the experimental method, since reason subsequently intervenes to end in experiment, and to be controlled by it, the genius of the experimentalist dominates everything, and this is what has made the experimental method, so inert in other hands, such a powerful tool in the hands of Claude Bernard. I have said the word: method is but

the tool; it is the workman, it is the idea, which he brings, which makes the *chef-d'œuvre*. I have already quoted these lines: "It is a particular feeling, a *quid proprium*, which constitutes the originality, the invention, or the genius of each one." This, then, is the part taken by genius in the experimental novel. As Claude Bernard says again: ✓ ("The idea is the seed; the method is the soil which furnishes the conditions for developing and prospering it, and bringing forth its best fruits, according to nature.") Thus everything is reduced to a question of method. If you are content to remain in the *a priori* idea, and enjoy your own feelings without finding any basis for it in reason or any verification in experiment, you are a poet; you venture upon hypotheses which you cannot prove; you are struggling vainly in a painful indeterminism, and in a way that is often injurious. Listen to these lines of "L'Introduction": "Man is naturally a metaphysician and proud; he believes that the idealistic creations of his brain, which coincide with his feelings, represent the reality. ✓ Thus it follows that (the experimental method is not innate and natural to man,) for it is only after having wandered for a long time among theological and scholastic discussions that he ends by recognizing the sterility of his efforts in this path. Man then perceives that he cannot dictate laws to nature, because he does not possess in himself the knowledge and the criterion of exterior things; he realizes that in order to arrive at the truth he must, on the contrary, study the natural laws and submit his ideas, if not his reason, to experiment, that is to say, to the criterion of facts." What becomes of the genius of the experimental novelist? The genius, the idea

a priori, remains, only it is controlled by experiment. The experiment naturally cannot destroy his genius; on the contrary, it confirms it. To take the case of a poet, for example: To show he has genius is it necessary that his feeling, his idea, *a priori*, should be false? Evidently not, for the genius of a man will be so much the greater when experiment has proved the truth of his personal idea. Our age of lyricism, our romantic disease, was alone capable of measuring a man's genius by the quantity of nonsense and folly which he put in circulation. I conclude by saying that in our scientific century experiment must prove genius.

This is the drift of our quarrel with the idealistic writers. They always start out from an irrational source of some kind, such as a revelation, a tradition, or conventional authority. As Claude Bernard declares: "We must admit nothing occult; there are but phenomena and the conditions of phenomena." We naturalistic novelists submit each fact to the test of observation and experiment, while the idealistic writers admit mysterious elements which escape analysis, and therefore remain in the unknown, outside of the influence of the laws governing nature. This question of the ideal, from the scientific point of view, reduces itself to a question of indeterminate or determinate. All that we do not know, all that escapes us still, that is truly the ideal, and the aim of our human efforts is each day to reduce the ideal, to conquer truth from the unknown. We are all idealists, if we mean by this that we busy ourselves with the ideal. But I dub those idealists who take refuge in the unknown for the pleasure of being there, who have

a taste but for the most risky hypotheses, who disdain to submit them to the test of experiment under the pretext that the truth is in themselves and not in the things. These writers, I repeat, accomplish a vain and harmful task, while the observer and the experimentalist are the only ones who work for the strength and happiness of man, making him more and more the master of nature. There is neither nobility, nor dignity, nor beauty, nor morality in not knowing, in lying, in pretending that you are greater according as you advance in error and confusion. The only great and moral works are those of truth.

What we alone must accept is what I will call the stimulus of the ideal. Certainly our science is very limited as yet, beside the enormous mass of things of which we are ignorant. This great unknown which surrounds us ought to inspire us with the desire to pierce it, to explain it by means of scientific methods. And this does not refer only to scientific men; all the manifestations of human intelligence are connected together, all our efforts have their birth in the need we feel of making ourselves masters of the truth. Claude Bernard explains this very clearly when he writes: "The sciences each possess, if not a special method, at least special processes, and, moreover, they reciprocally serve as tools for one another. Mathematics serves as a tool to physics, to chemistry, and to biology in very different measure; physics and chemistry serve as powerful tools to physiology and medicine. In this mutual help which the sciences are to each other, you must distinguish clearly the savant who advances each science and he who makes use of it. The physician and the chemist are not mathematicians because they

employ calculation; the physiologist is not a chemist or a physician because he uses chemical reactions or medical instruments, any more than the chemist and the physician are physiologists because they study the compositions or the properties of certain liquids and certain animal or vegetable tissues." This is the reply which Claude Bernard can be said to make for us naturalists to the critics who taunt us with making pretensions to science. We are neither chemists nor physicians nor physiologists; we are simply novelists who depend upon the sciences for support. We certainly do not pretend to have made discoveries in physiology which we do not practice; only, being obliged to make a study of man, we feel we cannot deny the efficacy of the new physiological truths. And I will add that the novelists are certainly the workers who rely at once upon the greatest number of sciences, for they treat of them all and must know them all, as the novel has become a general inquiry on nature and on man. This is why we have been led to apply to our work the experimental method as soon as this method had become the most powerful tool of investigation. We sum up investigation, we throw ourselves anew into the conquest of the ideal, employing all forms of knowledge.

Let it be well understood that I am speaking of the "how" of things and not of the "why." For an experimental savant, the ideal which he is endeavoring to reduce, the indeterminate, is always restricted to the "how." He leaves to philosophers the other ideal, that of the "why," which he despairs of determining. I think that the experimental novelists equally ought not to occupy themselves with this unknown

quality, unless they wish to lose themselves in the follies of the poets and the philosophers.) It is surely an object large enough to try to know the entire mechanism of nature, without troubling one's self for the time being with the origin of the mechanism. If we some day succeed in knowing it, we shall doubtless owe our knowledge to method, and it is better then to begin at the beginning with the study of phenomena, instead of hoping that a sudden revelation will reveal to us the secret of the world. We are the workmen; we will leave to the metaphysicians this great unknown of the "why" they have struggled with so vainly for centuries, in order to confine our efforts to that other unknown of the "how," which is cleared away more and more every day by our investigation. The only ideal which ought to exist for us, the naturalistic novelists, should be one which we can conquer.

Besides, in the slow conquest which we can make over this unknown which surrounds us, we humbly confess the ignorant condition in which we are. We are beginning to march forward, nothing more; and our only real strength lies in our method. Claude Bernard, after acknowledging that experimental medicine is in its infancy still, does not hesitate to give great credit to empirical medicine. "In reality," he says, "empiricism, that is to say, observation or accidental experiment, has been the origin of all science. In the complex sciences dealing with man empiricism necessarily governs the practice much longer than in those of the more simple sciences." And he is willing to admit that at the crisis of a disease, when the determinism or nearest cause of the pathological phenomena has not been found, the best thing to do is to act

empirically; as, moreover, happens in the growth of knowledge, since empiricism invariably precedes the scientific condition of any branch of knowledge. Certainly if doctors must resort to empiricism in nearly every case, we have much greater reasons for using it, we novelists whose science is more complicated and less determined. I say once more, it is not a question of creating the science of man, as an individual and as a social being, out of the whole cloth; it is only a question of emerging little by little and with all the inevitable struggles from the obscurity in which we lie concerning our own natures, happy if, amid so many errors, we can determine one truth. We experiment, that is to say that, for a long time still, we must use the false to reach the true.

Such is the feeling among strong men. Claude Bernard argues fiercely against those who persist in seeing only an artist in a doctor. He knows the habitual objection of those who pretend to look upon experimental medicine "as a theoretical conception of which nothing for the moment justifies the practical reality, because no fact demonstrates the attainment in medicine of the scientific precision of the experimental sciences." But he does not let this worry him; he shows that "experimental medicine is but the natural outcome of practical medical investigation directed by a scientific mind." And here is his conclusion: "Without doubt it will be a long time before medicine becomes truly scientific; but that does not prevent us from conceiving the possibility of such a thing, and doing all that we can to help it by trying daily to introduce into medicine the method which is to lead us to it."

All this, which I will not tire you by repeating, applies perfectly to the experimental novel. Put the word "novel" in place of "medicine," and the passage remains equally true.

I will address to the young literary generation which is growing up around me these grand and strong words of Claude Bernard. (I know none more manly.) "Medicine is destined to escape little by little from empiricism, and she will escape, as have all the other sciences, by the experimental method. This profound conviction sustains and controls my scientific life. I am deaf to the voices of those doctors who demand that the causes of scarlatina and measles shall be experimentally shown to them, and who think by that to draw forth an argument against the use of the experimental method in medicine. These discouraging objections and denials generally come from systematic or lazy minds, those who prefer to rest on their systems or to sleep in darkness instead of making an effort to become enlightened. The experimental direction which medicine is taking to-day is definitely defined. And it is no longer the ephemeral influence of a personal system of any kind; it is the result of the scientific evolution of medicine itself. My convictions in this respect are so strong that I endeavor to impress them clearly upon the minds of the young medical students who are following my course at the Collège de France. The students must be inspired before all else with the scientific spirit, and initiated into the ideas and the tendencies of modern science."

Though I have frequently written the same words and given the same advice, I will repeat them here: "The experimental method alone can bring the novel

out of the atmosphere of lies and errors in which it is plunged. All my literary life has been controlled by this conviction. I am deaf to the voices of the critics who demand that I shall formulate the laws of heredity and the influence of surroundings in my characters; those who make these discouraging objections and denials but speak from slothfulness of mind, from an infatuation for tradition, from an attachment more or less conscious to philosophical and religious beliefs. The experimental direction which the novel is taking to-day is a definite one. And it is no longer the ephemeral influence of a personal system of any kind, it is the result of the scientific evolution, of the study of man himself. My convictions in this respect are so strong that I endeavor to impress them clearly upon the minds of the young writers who read my works; for I think it necessary, above all things else, to inspire them with the scientific spirit, and to initiate them into the ideas and the tendencies of modern science."

V.

BEFORE concluding it is necessary for me to touch upon several secondary points.

If it is necessary to state the facts precisely on any one subject, it is on that of the impersonal character of the method. Some have accused Claude Bernard of wishing to pose as an innovator; and he has replied to these attacks as follows: "I have certainly not pretended to be the first to propose the application of physiology to medicine. That was recommended a long time ago, and numerous attempts have been made in this direction. In my works, and in my lectures at the Collège de France, I have only followed out an idea which has already borne fruit in its application to medicine." This is what I myself have replied when they have accused me of wishing to pose as an innovator and the leader of a new school. I have said that I introduce nothing, that I simply endeavor to apply in my novels and critical essays the scientific method which has been in use for a long time. But naturally they have pretended not to hear me, and they still continue to talk of my vanity and my ignorance.

I have already repeated twenty times that naturalism is not a personal fantasy, but that it is the intellectual movement of the century. Perhaps they will believe Claude Bernard, who speaks with greater authority on this subject than I can lay claim to; he declares that: "The revolution which the experi-

mental method has caused in science consists mainly in the substitution of a scientific criterion for a personal authority. It is the characteristic of the experimental method to depend only on itself, as it carries within itself its criterion, which is experiment. It recognizes no authority but that of facts, and it frees itself from personal authority." Consequently, it no longer admits the authority of any theory either. "The idea should always remain independent; it must be enchained neither by scientific, nor philosophical, nor religious beliefs. Man must be strong and free in the manifestation of his ideas, must follow his instinct, and not dwell upon the puerile fears of the contradiction of any theories; . . . he must modify theory by adapting it to nature, and not nature by adapting it to theory." From this there results an incomparable breadth. "The experimental method is the scientific method which proclaims the liberty of thought. It not only throws off the philosophical and theological yoke, but it no longer admits scientific personal authority. This is not said from pride or boastfulness. The experimentalist, on the contrary, shows his humility in denying personal authority, for he doubts his own knowledge, and he submits the authority of men to that of experiment and the laws which govern nature."

This is why I have said so many times that naturalism is not a school, as it is not embodied in the genius of one man, nor in the ravings of a group of men, as was romanticism; that it consists simply in the application of the experimental method to the study of nature and of man. Hence it is nothing but a vast movement, a march forward in which everyone is a workman, according to his genius. All theories are admitted,

and the theory which carries the most weight is the one which explains the most. There does not appear to me to be a literary or scientific path larger or more direct. Everyone, the great and the small, moves freely, working and investigating together, each one in his own specialty, and recognizing no other authority than that of facts proved by experiment. Therefore in naturalism there could be neither innovators nor leaders; there are simply workmen, some more skillful than others.

Claude Bernard explains the defiance which we should assume toward theories thus: "You must have a strong faith and yet not believe; I will explain myself by saying that it is necessary in science to believe firmly in the principles and to doubt the formulas; in fact, on one side we are sure that determinism exists, but we are never certain of possessing it. We must be immovable on the principles of experimental science (determinism), and yet not believe in the theories absolutely." I will quote the following passage, in which he announces the end of systems: "Experimental medicine is not a new system of medicine, but, on the contrary, the negation of all systems. In fact, the coming of experimental medicine will result in dispersing from science all individual views, to replace them by impersonal and general theories, which will be, as in other sciences, but a regular co-ordination deduced from the facts furnished by experiment."

If Claude Bernard repels the charge of being an innovator, or rather, an inventor, who brings a personal theory with him, he refers also several times to the danger there would be in a savant's meddling with philosophical systems. "The experimental doctor,"

he says, "should neither be a spiritualist nor a materialist. These names belong to an old school of natural philosophy which has fallen into disuse in the progress of science. We shall never fully understand either mind or matter; and, if this were the proper place, I could easily show that on one side as on the other you soon reach scientific negation, from which it follows that all considerations of this kind are idle and useless. It is for us to study only phenomena, to know the material conditions of their manifestations, and to determine the laws of these manifestations." I have said that in the experimental novel it is best for us to hold to the strictly scientific point of view if we wish to base our studies on solid ground; not to go out from the "how," not to attach ourselves to the "why." However, it is very certain that we cannot always escape this need of our intelligence, this restless curiosity which makes us desire to know the essence of things. I think that it is best for us to accept the philosophical system, which adapts itself the best to the actual condition of the sciences, but simply from a speculative point of view. For example, transformism is actually the most rational system, and is the one which is based most directly upon our knowledge of nature. Behind a science, behind a manifestation of any kind of the human intelligence, there always lies more or less clearly what Claude Bernard calls a philosophical system. To this system it is not well to attach one's self devotedly, but to hold tenaciously to the facts, free to modify the system if the facts call for it. But the system exists none the less, and it exists so much the more as science is less advanced and less firm. For us naturalistic novelists, who are still in the lisp-

stage, hypothesis is fatal. By and by I will take up the rôle of hypothesis in literature.

Nevertheless, if in practice Claude Bernard thrusts aside philosophical system, he recognizes the necessity of philosophy. "From a scientific point of view, philosophy represents the eternal desire of the human reason after knowledge of the unknown. Hence philosophers always confine themselves to questions that are in dispute, and to those lofty regions that lie beyond the boundaries of science. In this way they communicate to science a certain inspiration which animates and ennobles it. They strengthen the mind—developing it by an intellectual gymnastics—at the same time that they ever carry it toward the never-completed solution of great problems. Thus they keep up a cult of the unknown, and quicken the sacred fire of investigation, which ought never to be extinguished in the heart of a savant." This passage is very fine, but the philosophers have never been told in better terms that their hypotheses are pure poetry. Claude Bernard evidently looks upon the philosophers, among whom he believes he has a great many friends, as musicians often gifted with genius, whose music encourages the savants while they work and inspires the sacred fire of their great discoveries. But the philosophers, left to themselves, will sing forever and never discover a single truth.

I have neglected until now the question of form in the naturalistic novel, because it is precisely there that individuality shows in literature. Not only is a writer's genius to be found in the feeling and in the idea *a priori* but also in the form and style. But the question of method and the question of rhetoric are distinct

from each other. And by naturalism, I say again, is meant the experimental method, the introduction of observation and experiment into literature. Rhetoric, for the moment, has no place here. Let us first fix upon the method, on which there should be agreement, and after that accept all the different styles in letters which may be produced, looking upon them as the expressions of the literary temperament of the writers.

If you wish my true opinion upon this subject, it is this: that to-day an exaggerated importance is given to form. I have a great deal to say on this subject, but it would carry me beyond the limits of this essay. In reality, I think that the form of expression depends upon the method; that language is only one kind of logic, and its construction natural and scientific. He who writes the best will not be the one who gallops madly among hypotheses, but the one who walks straight ahead in the midst of truths. We are actually rotten with lyricism; we are very much mistaken when we think that the characteristic of a good style is a sublime confusion with just a dash of madness added; in reality, the excellence of a style depends upon its logic and clearness.

Claude Bernard considers that philosophers are really musicians who play a sort of Marseillaise made up of hypotheses, and swell the hearts of the savants as they rush to attack the unknown; and he has much the same idea of artists and writers. I have remarked that a great many of the most intelligent savants, jealous of the scientific certainty which they enjoy, would very willingly confine literature to the ideal. They themselves seem to feel the need of taking little recreations

in the world of lies after the fatigue of their exact labors, and they are fond of amusing themselves with the most daring hypotheses, and with fictions which they know perfectly well to be false and ridiculous. Claude Bernard was right when he said: "Literary and artistic productions will never grow old in the sense that they are the expressions of sentiments as unchangeable as human nature." In fact, form is sufficient to immortalize a work; the spectacle of a powerful individuality reproducing nature in superb language will interest all ages; only the works of a savant, from this same point of view, will be read always, for the reason that the thought of a great savant who knows how to write is much more interesting than that of a poet. However far astray the savant may be in his hypothesis, he still remains the equal of the poet, who is certain to have been equally mistaken. The point to be emphasized is this, that our domain is not limited to the expression of sentiments as unchangeable as human nature because it is essential also to exhibit the working of these sentiments.

We have not exhausted our matter when we have depicted anger, avarice, and love; all nature and all of man belong to us, not only in their phenomena, but in the causes of these phenomena. I well know that this is an immense field, the entrance to which they would willingly have refused us; but we have broken down the barriers and have entered it in triumph. This is why I do not accept the following words of Claude Bernard: "In art and letters personality dominates everything. There one is dealing with a spontaneous creation of the mind that has nothing in common with the verification of natural phenomena, in which

our minds can create nothing." I have here detected one of our most illustrious savants sharing in the attempt to refuse to letters the *entrée* to the scientific field. I do not know what letters he refers to in this definition of a literary work: "A spontaneous creation of the mind that has nothing in common with the verification of natural phenomena." Doubtless he has lyrical poetry in his mind, for he never could have written that phrase had he understood the experimental novel as shown in the works of Balzac and Stendhal. I can only repeat what I have said before, that apart from the matter of form and style, the experimental novelist is only one special kind of savant, who makes use of the tools of all other savants, observation and analysis. Our field is the same as the physiologist's, only that it is greater. We operate, like him, on man; and Claude Bernard recognizes this fact himself, that the cerebral phenomena can be determined the same as other phenomena. It is true that Claude Bernard can tell us that we are lost in hypotheses; but to conclude from this that we shall never arrive at the truth sits very badly on him, as he has struggled all his life to make a science of medicine, which the great majority of his contemporaries look upon as an art.

Let us clearly define now what is meant by an experimental novelist. (Claude Bernard gives the following definition of an artist: "What is an artist? He is a man who realizes in a work of art an idea or a sentiment which is personal to him." I absolutely reject this definition. On this basis if I represented a man as walking on his head, I should have made a work of art, if such happened to be my personal sentiments.

But in that case I should be a fool and nothing else. So one must add that the personal feeling of the artist is always subject to the higher law of truth and nature. We now come to the question of hypothesis. The artist starts out from the same point as the savant; he places himself before nature, has an idea *a priori*, and works according to this idea. Here alone he separates himself from the savant, if he carries out his idea to the end without verifying its truth by the means of observation and experiment. (Those who make use of experiment might well be called experimental artists; but then people will tell us that they are no longer artists, since such people regard art as the burden of personal error which the artist has put into his study of nature.) I contend that the personality of the writer should only appear in the idea *a priori* and in the form, not in the infatuation for the false. I see no objection, besides, to its showing in the hypothesis, but it is necessary to clearly understand what you mean by these words.

It has often been said that writers ought to open the way for savants. This is true, for we have seen in "L'Introduction" that hypothesis and empiricism precede and prepare for the scientific state which is established finally by the experimental method. Man commenced by venturing certain explanations of phenomena, the poets gave expression to their emotions, and the savants ended by mastering hypotheses and fixing the truth. Claude Bernard always assigns the rôle of pioneers to the philosophers. It is a very noble rôle, and to-day it is the writers who should assume it and who should endeavor to fill it worthily. Only let it be well understood that each time that a truth is

established by the savants the writers should immediately abandon their hypothesis to adopt this truth; otherwise they will remain deliberately in error without benefiting anyone. It is thus that science, as it advances, furnishes to us writers a solid ground upon which we should lean for support, to better enable us to shoot into new hypotheses. In a word, every phenomenon, once clearly determined, destroys the hypothesis which it replaces, and it is then necessary to transport your hypothesis one step further into the new unknown which arises. I will take a very simple example in order to make myself better understood: it has been proved that the earth revolves around the sun; what would you think of a poet who should adopt the old belief that the sun revolves around the earth? Evidently the poet, if he wishes to risk a personal explanation of any fact, should choose a fact whose cause is not already known. This, then, illustrates the position hypothesis should occupy for experimental novelists; we must accept determined facts, and not attempt to risk about them our personal sentiments, which would be ridiculous, building throughout on the territory that science has conquered; then before the unknown, but only then, exercising our intuition and suggesting the way to science, free to make mistakes, happy if we produce any data toward the solution of the problem. Here I stand at Claude Bernard's practical programme, who is forced to accept empiricism as a necessary forerunner. In our experimental novel we can easily risk a few hypotheses on the questions of heredity and surroundings, after having respected all that science knows to-day about the matter. We can prepare the

ways, we can furnish the results of observation, human data which may prove very useful. A great lyrical poet has written lately that our century is a century of prophets. Yes, if you wish it; only let it be well understood that these prophets rely neither upon the irrational nor the supernatural. If the prophets thought best to bring up again the most elementary notions, to serve up nature with a strange religious and philosophical sauce, to hold fast to the metaphysical man, to confound and obscure everything, the prophets, notwithstanding their genius in the matter of style, would never be anything but great geese ignorant whether they would get wet if they jumped into the water. In our scientific age it is a very delicate thing to be a prophet, as we no longer believe in the truths of revelation, and in order to be able to foresee the unknown we must begin by studying the known.

The conclusion to which I wish to come is this: If I were to define the experimental novel I should not say, as Claude Bernard says, that a literary work lies entirely in the personal feeling, for the reason that in my opinion the personal feeling is but the first impulse. Later nature, being there, makes itself felt, or at least that part of nature of which science has given us the secret, and about which we have no longer any right to romance. The experimental novelist is therefore the one who accepts proven facts, who points out in man and in society the mechanism of the phenomena over which science is mistress, and who does not interpose his personal sentiments, except in the phenomena whose determinism is not yet settled, and who tries to test, as much as he can, this personal sen-

timent, this idea *a priori*, by observation and experiment.

I cannot understand how our naturalistic literature can mean anything else. I have only spoken of the experimental novel, but I am fairly convinced that the same method, after having triumphed in history and in criticism, will triumph everywhere, on the stage and in poetry even. It is an inevitable evolution. Literature, in spite of all that can be said, does not depend merely upon the author; it is influenced by the nature it depicts and by the man whom it studies. Now if the savants change their ideas of nature, if they find the true mechanism of life, they force us to follow them, to precede them even, so as to play our rôle in the new hypotheses. The metaphysical man is dead; our whole territory is transformed by the advent of the physiological man. No doubt "Achilles' Anger," "Dido's Love," will last forever on account of their beauty; but to-day we feel the necessity of analyzing anger and love, of discovering exactly how such passions work in the human being. This view of the matter is a new one; we have become experimentalists instead of philosophers. In short, everything is summed up in this great fact: the experimental method in letters, as in the sciences, is in the way to explain the natural phenomena, both individual and social, of which metaphysics, until now, has given only irrational and supernatural explanations.

A LETTER TO THE YOUNG PEOPLE OF FRANCE.