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REPLY TO THE NECESSITARIANS.

REJOINDER TO DR. CARUS.

§ 1. In *The Monist* for January, 1891, and in the number for April, 1892, I attacked the doctrine that every event is precisely determined by law. Like everybody else, I admit that there is regularity: I go further; I maintain the existence of law as something *real and general*. But I hold there is no reason to think that there are general formulæ to which the phenomena of nature *always* conform, or to which they *precisely* conform. At the end of my second paper, the partisans of the doctrine of necessity were courteously challenged and besought to attempt to answer my arguments. This, so far as I can learn, Dr. Carus alone, in *The Monist* of July and October, 1892, has publicly vouchsafed to do. For this I owe him my particular thanks and a careful rejoinder.

§ 2. I number the paragraphs of his papers consecutively. The following index shows the pages on which those paragraphs commence, and the numbered sections of this rejoinder in which they are noticed.

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§ 3. Dr. Carus's philosophy is hard to understand. Some phrases which he frequently uses lead the reader to imagine that he is listening to an old-fashioned Königsberg Kantian. What, then, is our surprise when we find (¶ 14) that he sneers at the Kantian, Sir William Hamilton (whom he calls Mr. Hamilton) as having "no adequate conception of the *a priori*." In his "Ursache, Grund und Zweck" (1883), an admirably clear and systematic exposition of much of his thought, he takes a Schleiermacherian view of the *a priori*. He admits it to be founded in the universal conditions of cognition; but he thinks it is among the objective rather than the subjective conditions. This is an opinion to which Hamilton is also at times inclined. It is a weak conception, unless the whole distinction between the inward and the outward world be reformed in

the light of agapastic and synechistic ontology. For to deny that the *a priori* is subjective is to remove its essential character; and to make it both subjective and objective (otherwise than in the sense in which Kant himself makes it objective) is uncalled for, and is cut off by Ockham's razor. But when synechism has united the two worlds, this view gains new life.

Another thing which has astonished me is Dr. Carus's extravagant laudation (§ 17) of Venn's highly enlightened and remarkably bright-thinking, yet blundering little book, "The Logic of Chance."* This is the way he speaks of it: "This admirable work, we will make bold to say, marks a new epoch in the study of logic." He adds that it "paves the way which Mr. Peirce has actually followed." But the question of the nature of probability had long before that publication engaged the attention of some of the most powerful intellects in England; and my opinion concerning it was fully made up before I saw the book. I do not think I learned anything from that except a classification of the philosophies of probability. However, after all his eulogy, Dr. Carus only uses the book to quote from it Mill's rewording of Kant's definition of causation, which he would better have quoted direct.

Let me say, not to Dr. Carus, but to the younger generation of readers, that if they imagine that Hamilton, because he is antiquated, is not worth reading, they are much mistaken. The Scotistic elements of his philosophy, and his method in the notes on Reid are especially worthy of attention. As for Mill, though his philosophy was not profound, it is, at least in his "Examination of Hamilton," admirably set forth. Whoever wishes to appeal to the American

* J. S. Mill had in the first edition of his *Logic* decisively taken an objective conception of chance and probability; but in his second edition he had become puzzled and had retracted, leaving that chapter, and with it his whole logic, a melancholy wreck, over which the qualified reader sighs, "And this once seemed intelligible!" Venn in the first edition of his book set forth the same objective conception with great clearness, and for that he was entitled to high praise, notwithstanding his manifest inadequacy to the problems treated. But in his second edition, he too has fallen away from his first and correct view, and has adopted a theory which I shall some day show to be untenable. Venn's whole method in logic, as well as his system, is in my opinion of the weakest.

philosophical mind needs to be quite familiar with the writings of these two men.

Dr. Carus himself accepts all that I hold for erroneous in Kant's definition of causation as universal and necessary sequence. Mill merely substitutes the exacter words *invariable* for "universal," and *unconditional* for "necessary."* In giving his form of the definition, Mill shows why it is not applicable to the sequence of day and night, namely, that that is not necessary. Yet Dr. Carus writes (§ 18) of this very same sequence as if it came under Mill's definition !†

Again, why should he make it "the immortal merit of the great Scotchman" (§ 22), that is, of Hume, that he admitted the truth of Leibniz's principle?

The famed puzzle of causation is peculiarly understood by Dr. Carus. The difficulties which the perusal of Hume suggested to the mind of Kant,‡ were such as belonged to all categories, or general conceptions of the understanding. The precritical Kant inherited a very decided nominalism from Leibniz and Wolf; and the puzzle for him was simply the usual difficulty that plagues nominalism when it finds itself confronted with a reality which has an element of generality. Necessity is, I need hardly say, but a particular variety of universality. But Dr. Carus (§ 24) passes over this, to dwell upon an entirely different objection to causation, namely, that it seems to be a creation out of nothing, and a miracle.

I find myself equally at cross-purposes with him, when in §§ 71-77, he speaks of the prevalent views of logicians concerning *comprehension*. This word, in logic, measures the amount of predicates or marks attached to a conception; but Dr. Carus's criticisms seem to be based upon the idea that by comprehension is meant

* Mill often did good service in substituting precise terms for ambiguous ones; as when in speaking of mathematical conclusions he prefers to say they are legitimate deductions rather than that they are necessary.

† In his *Ursache, Grund und Zweck*, Dr. Carus alludes to this passage. But he prefers the treatment of the question by Reid, whom he calls Mill's opponent (*Gegner*).

‡ It is of comparatively little consequence what Hume really meant. The main interest is in what Kant thought he meant.

logical breadth, or the amount of subjects to which the conception is applicable.

I am simply gravelled by his remarks (§ 95) concerning sundry English words.

No more do I know what to make of his praise (§ 123) of the German translation of a French phrase used in the theory of functions, meaning *univocally determined*.

§ 4. One habit which goes far to obscure Dr. Carus's meaning is that whenever he finds his opinion at variance with a familiar saying, instead of rejecting that formula, he retains it and changes the meaning. This is calculated to throw the whole discussion into confusion. Thus, nothing is more certain than that the so-called "law of identity," or A is A , was intended to express the fact that every term is predicable of itself. But Dr. Carus, simply because he finds that "meaningless and useless" (§ 96), thinks himself authorised to confuse the terminology of logic by making this formula, $A = A$, under the same old name, mean that things to which the same name is applicable are for some purpose equivalent.

In like manner, he changes the meaning of the word *freedom* (§ 165), so that the distinction between those who maintain and those who oppose the freedom of the will may, in words, disappear. It seems scarcely defensible for a thoroughgoing necessitarian, such as he is, to fly the flag of Free Will.

He, also, changes the meaning of *spontaneity* so far that, according to him, "masses gravitate spontaneously" (§ 191), and so pretends that his doctrine does not suppress the spontaneity of nature!

§ 5. There are other questions of terminology in which I am unable to agree with Dr. Carus. Thus, when I define necessitarianism as "the theory that the will is subject to the general mechanical law of cause and effect," Dr. Carus (§ 139) wishes to delete "mechanical." But the result would be to define a doctrine to which the advocates of free will would generally subscribe, as readily as their opponents. In order properly to limit the definition, it is quite requisite to exclude "free causation." By "mechanical" causation, I mean a causation entirely determinative, like that of dynamics, but not necessarily operating upon matter.

Dr. Carus mentions (§ 84) that there are several different ideas to which the term necessity is applied. It seems to me that what lies at the bottom of all of them is the experience of reaction against one's will. In the simplest form, this gives the sense of reality. Dr. Carus himself admits (§ 46) that reality involves the idea of inevitable fate. Yet philosophical necessity is a special case of universality. But the universality, or better, the generality, of a pure form involves no necessity. It is only when the form is materialised that the distinction between necessity and freedom makes itself plain. These ideas are, therefore, as it seems to me, of a mixed nature. Dr. Carus (§§ 91-94) insists that by the necessary, he wishes to be understood to mean in all cases the *inevitable*. This is the idea of *fate*, and is not the conception which determinists usually attach to the term necessity. Yet he does not appear to be quite consistent. At one time (§ 88), he carefully distinguishes necessity from fate. At another time (§ 163), every element of compulsion is to be excluded from the conception of necessity.

§ 6. One important key to Dr. Carus's opinions is the recognition of the fact that, like many other philosophers, he is a nominalist tinged with realistic opinions.

He says (§ 103), that "there is no need of discussing the truism that, properly speaking, there is no absolute sameness." Now, upon the nominalistic theory, there is not only no absolute or numerical identity, but there are not even any real agreements or likenesses between individuals; for likeness consists merely in the calling of several individuals by one name, or (in some systems) in their exciting one idea. On the other hand, upon the realistic theory, the fact that identity is a relation of reason does not in the least prevent it from being real. On that theory, it is real unless it is *false* that anything is itself. Thus, upon either theory, identity is just as real as similarity. But Dr. Carus, being a nominalist leaning toward realism, is inclined to make dynamical relations real, and second-intentional ones unreal. This opinion, I think, is a transitional one.

The declaration (§ 198) that "natural laws are simply a description of nature as nature is," and that "the facts of nature ex-

press the character of nature," are nominalistic. But in another place (§§ 107-116), he says distinctly that uniformities are real.

He says (§ 70), "Mr. Peirce attempts to explain natural laws as if they were concrete and *single facts*." This is eminently nominalistic. The nominalist alone makes this sharp distinction between the abstract and the concrete,* which must not be confounded with Hegel's distinction for which the same words are used. The nominalist alone falls into the absurdity of talking of "single facts," or *individual generals*. Yet Dr. Carus says (§ 68) that natural laws describe the facts of nature *sub specie aeternitatis*. Now I understand Spinoza to be a realist. In § 117 he considers it "settled" "that there are samenesses." This is realistic. But in § 120, he holds "the whole business of science to be to systematise the samenesses of experience," which is nominalistic.

§ 7. Dr. Carus seems to be in some doubt as to how far evolutionism ought to be carried. In §§ 48-51, he seems to side with my contention that it should be thoroughgoing. In § 116, he makes intellect an evolution from feeling. Yet he is sometimes (§ 125) "inclined" to say the world never was a chaos; he sometimes (§ 61) thinks it weak to suppose that real chance begets order; and he sometimes (§ 68) goes so far as to pronounce eternity to be the *conditio sine qua non* of natural law.

§ 8. Every reader of *The Monist* knows that our good editor's great word is "formal law." The clearest statement he has ever made of this doctrine I find in the following two sentences (§ 127):

"The *a priori* systems of thought are . . . constructions raised out of the recognition of the formal, i. e. relational samenesses that appear in experience. All possibilities of a certain class of relations can be exhausted and formulated in theorems." †

This is perspicuous. For example, of pairs, we can easily show that there are but two forms $A:A$ and $A:B$. This proposition,

* Along with the distinction, I would of course do away with this use of the words *abstract* and *concrete* to which no clear idea can be attached, as far as I can see.

† I cannot but disapprove of this use of the word "construction" to mean a studied theory, because the word is imperatively required in the theory of cognition to denote a mathematical diagram framed according to a general precept.

—theorem if you will,—exhausts the possibilities. If we make believe there is no danger of falling into error in mathematical reasoning,—and one danger, though not, perhaps, a very serious one, *is* eliminated,—then this proposition is absolutely certain. But I will say, at once, that such a proposition is not, in a proper sense, synthetic. It is a mere corollary from the definition of a pair. Moreover, its application to experience, or to possible experience, opens the door to probability, and shuts out absolute necessity and certainty, *in toto*.

Concerning points like this, Dr. Carus, in company with the general body of thinkers, is laboring under a great disadvantage from not understanding the logic of relatives. It is a subject I have been studying for a great many years, and I feel and know that I have an important report that I ought to make upon it. This branch of logic is, however, so abstruse, that I have never been able to find the leisure to translate my conclusions into a form in which their significance would be manifest even to a powerful thinker whose thoughts had not long been turned in that direction. I shall succeed in doing so, whenever I can find myself in a situation where I need think of nothing else for months, and not before. That may not be for thirty years; but I believe it is the intention of providence that it should be. Meantime, I will testify, and the reader can take my testimony for what he thinks it is worth, that all deductive reasoning, except that kind which is so childishly simple that acute minds have doubted whether there was any reasoning there,—I mean non-relative syllogism,—requires an act of choice; because from a given premise, several conclusions,—in some cases an infinite number,—can be drawn. Hence, Dr. Carus is altogether too hasty in his confidence (§§ 195, 196) that general thinking machines “are not impossibilities.” An act of original and arbitrary determination would be required; and it seems almost evident that no machine could perform such an act except within narrow limits, thought out beforehand and embodied in its construction. Moreover, positive observation is called for in all inference, even the simplest,—though in deduction it is only observation of an object of imagination. Moreover, a peculiar act which may properly be called

*abstraction** is usually required, consisting in seizing evanescent elements of thought and holding them before the mind as "substantive" objects, to borrow a phrase from William James. At the same time, the process I am describing, that is, relative deduction, is perfectly general and demonstrative, and depends upon the truth of the assumed premises, and not, like inductive reasoning, upon the manner in which those premises present themselves.

But the application of the logic of relatives shows that the propositions of arithmetic, which Dr. Carus usually adduces as examples of formal law (§ 15), are, in fact, only corollaries from definitions. They are certain only as applied to ideal constructions, and in such application, they are merely analytical.

The truth is our ideas about the distinction between analytical and synthetical judgments is much modified by the logic of relatives, and by the logic of probable inference. An analytical proposition is a definition or a proposition *deducible* from definitions; a synthetical proposition is a proposition not analytical. Deduction, or analytical reasoning, is, as I have shown in my "Theory of Probable Reasoning," a reasoning in which the conclusion follows (necessarily, or probably) from the state of things expressed in the premises, in contradistinction to scientific, or synthetical, reasoning, which is a reasoning in which the conclusion follows probably and approximately from the premises, owing to the conditions under which the latter have been observed, or otherwise ascertained. The two classes of reasoning present, besides, some other contrasts that need not be insisted upon in this place. They also present some significant resemblances. Deduction is really a matter of perception and of experimentation, just as induction and hypothetic inference are; only, the perception and experimentation are concerned with imaginary objects instead of with real ones. The operations of perception and of experimentation are subject to error, and therefore it is only in a Pickwickian sense that mathematical reasoning can be said to be perfectly certain. It is so, only under the condition that no error

* I apply this term because it is essentially like the passage from the concrete "virtuous" to the abstract "virtue," or from the concrete "white" (adjective) to the abstract "whiteness," or "white" (substantive).

creeps into it : yet, after all, it is susceptible of attaining a practical certainty. So, for that matter, is scientific reasoning ; but not so readily. Again, mathematics brings to light results as truly occult * and unexpected as those of chemistry ; only they are results dependent upon the action of reason in the depths of our own consciousness, instead of being dependent, like those of chemistry, upon the action of Cosmical Reason, or Law. Or, stating the matter under another aspect, analytical reasoning depends upon associations of similarity, synthetical reasoning upon associations of contiguity. The logic of relatives, which justifies these assertions, shows accordingly that deductive reasoning is really quite different from what it was supposed by Kant to be ; and this explains how it is that he and others have taken various mathematical propositions to be synthetical which in their ideal sense, as propositions of pure mathematics, are in truth only analytical.

Descending from things I can demonstrate to things of which various facts, in the light of those demonstrations, fully persuade me, I will say that in my opinion there are many synthetical propositions which, if not *a priori* in Dr. Carus's sense, are, at least, innate (notwithstanding his frequent denials of this, as in ¶ 15) though he is quite right in saying that their abstract and distinct formulation comes very late (¶ 126). But turn the facts as I will, I cannot see that they afford the slightest reason for thinking that such propositions are ever absolutely universal, exact, or necessary in their truth. On the contrary, the principles of probable inference show this to be impossible.

Dr. Carus adduces the instance of a geometrical proposition, namely, "that two congruent regular tetrahedrons, when put together, will form a hexahedron." (¶ 25.) This, he says, seems to be "a very wonderful thing" ; for why should not a larger tetrahedron be formed, just as two heaps of flour make a large heap of flour ? Yet, he continues, the probability that the two tetrahedrons

* I can never use this word without thinking of the explanation of it given by Petrus Peregrinus in his *Epistole de Magnete*. He says that physical properties are occult in the sense that they are only brought out by experimentation, and are not to be deduced from admixtures of *hot* and *cold*, *moist* and *dry*.

do always make a hexahedron is 1, "which means certainty" (§ 27). But as it happens, the proposition, in the form stated is quite erroneous. What is true is this. If two tetrahedra are so placed that one face of each is coincident with one face of the other, while all the other faces are inclined to one another, and if of the 8 faces, the 2 that are coincident are not counted, there remain to be counted $8 - 2 = 6$ faces. But there is nothing more wonderful about this than that $8 - 2 = 6$, which is an easy corollary from definitions. Very few propositions in mathematics that appear "marvellous" will hold water; and those few excite our astonishment only because the real complexity of the conditions are masked in an intuitional presentation of them.

Dr. Carus holds (§ 15) that formal knowledge is absolutely universal, exact, and necessary. In some cases, as where he says that, given the number of dimensions of space, the entire geometry could be deduced (§ 35), the boasted infallibility will prove on examination to be downright error. In all other cases, the propositions only relate to ideal constructions, and their applicability to the real world is at the best doubtful, and, as I think, false; while in their ideal purity, they are not synthetical.

Thus, my good friend and antagonist holds that the combination of oxygen and hydrogen to produce water is not "different in principle" from that of the tetrahedra to produce a hexahedron (§ 26). There is all the difference between the ideal and the real; which to my Scotistic mind is very important. But this is not the only passage in which he speaks as if form were the principle of individuation.

§ 9. Dr. Carus's position is even weaker than that of Kant, who makes space, for example, a necessary form of thought (in a broad sense of that term). But Dr. Carus appears to consider space as an absolute reality. For he says (§ 119) that "every single point of space has its special and individual qualities." Here again form is made the principle of individuation; whence the queer phrase, "individual qualities."

§ 10. Dr. Carus argues that whatever is unequivocally determinate is necessary. (§ 124.) Were the determination spoken of real

dynamic determination, this would be a mere truism. But the expression used, *eindeutig bestimmt*, merely expresses a mathematical determination, and therefore no real necessity ensues. The equation

$$x^2 - 23x + 132\frac{1}{4} = 0$$

determines x to be either 11.477 or 11.523. In this sense, x has necessarily one value or the other. The equation

$$x^2 - 12x + 6 = 0$$

determines x to be either 11.477 or 0.523. Together, the two equations uniquely determine x to be 11.477. This shows how much that argument amounts to.

§ 11. By "sameness," Dr. Carus means equivalence for a given purpose. (§§ 102, 106.) By the "idea of sameness," he means (§§ 77, 96) the principle that things having a common character are for some purpose equivalent. This, he says, "has a solid basis in the facts of experience." By a "world of sameness" (§ 113), he seems to mean one in which any two given concrete things are in some respect equivalent. He argues (§ 122) that a "world of sameness is a world in which necessity rules." I do not see this. It seems to me so bald a *non sequitur*, that I cannot but suppose the thought escapes my apprehension. If there were anything in the argument, it would seem to be a marvellously expeditious way of settling the whole dispute; and therefore it would have been worth the trouble of stating, so as to bring it within the purview of minds like mine.

§ 12. My candid opponent sometimes endorses emphatically the Leibnizian principle. "Necessitarianism must be founded on something other than observation. Observation is *a posteriori*; it has reference to single facts, to particulars; yet the doctrine of necessity . . . is of universal application. The doctrine of necessity . . . is of an *a priori* nature." (§ 11.) "Millions of single experiences . . . cannot establish a solid belief in necessity." (§ 14.) "No amount of experience is sufficient to constitute causation by a mere synthesis of sequences." (§ 22.) "Millions of millions of cases" constitute "no proof" that a proposition "is always so." (§ 29.)

Nevertheless, he holds that the law of "the conservation of matter and energy" so conclusively proves necessary causation, that

the obstinacy of Hume, himself, could not have withstood the argument. (§ 23.) One wonders, then, what is supposed to prove this "law of the conservation of matter and energy," if no amount of experience can prove it.

But the *a priori* itself can "be based on the firm ground of experience." (§ 14.) In that case, it is not prior to experience, after all! "The idea of necessity is based upon the conception of sameness, and . . . the existence of sameness is a fact of experience." (§ 87.) If absolute necessity can be irrefragably demonstrated from the fact that two things are alike, it is a pity Dr. Carus should not state this demonstration in a form that I, and men like me, can understand. That would be more to the purpose than merely saying it can be proved. Absolute chance is rejected as "involving a violation of laws well established by *positive evidence*." (§ 149.)

All these *denials* that absolute necessity can be established and absolute chance refuted by experiential evidence, mixed with as clear *assertions* of the same things, when taken together, have the appearance of an attempt, as the politicians say, to "straddle" the question.

§ 13. But the ingenious Doctor seeks to bolster up necessity by introducing the confused notion of "causation."

I do not know where the idea originated that a cause is an instantaneous state of things, perfectly determinative of every subsequent state. It seems to be at the bottom of Kant's discourse on the subject; yet it accords neither with the original conception of a cause, nor with the principles of mechanics. The original idea of an efficient cause is that of an agent, more or less like a man. It is prior to the effect, in the sense of having come into being before the latter; but it is not transformed into the effect. In this sense, it may happen that an event is a cause of a subsequent event; seldom, however, is it the principal cause. Far less are events the only causes. The modern mechanical conception, on the other hand, is that the relative positions of particles determine their accelerations at the instants when they occupy those positions. In other words, if the positions of all the particles are given at *two* instants (together with the law

of force), then the positions at all other instants may be deduced.* This doctrine conflicts with Kant's second analogy of experience, as interpreted by him, in no less than four essential particulars. In the first place, far from involving any principle that could properly be termed generation, or *Erzeugung*, which is Kant's word for the sequence of effect from cause, the modern mechanical doctrine is a doctrine of persistence, and, as I have repeatedly explained, positively prohibits any real growth. In the second place, one state of things (i. e. one configuration of the system) is not sufficient to determine a second; it is two that determine a third. To whomsoever may think that this is an inconsiderable divergence of opinions, let me say, study the logic of relatives, and you will think so no longer. In the third place, the two determining configurations, according to mechanics, may be taken at almost any two instants, and the determined configuration be taken at any third instant we like. *There is no mechanical truth in saying that the past determines the future, rather than the future the past.* We habitually follow tradition in continuing to use that form of expression, but every mathematician knows that it is nothing but a form of expression. We continue, for convenience, to talk of mechanical phenomena as if they were regulated, in the same manner in which our intentions regulate our actions (which is essentially a determination of the future by the past), although we are quite aware that it is not really so. Remark how Kant reasons :

"If it is a necessary law of our sensibility, and consequently a *formal condition* of all perceptions, that the preceding time determines the following, (since I can only come to the following through the preceding,) then is it also an indispensable *law of the empirical representation* of the time-series that the appearances of the preceding time determine every occurrence in the following."

What this leads to is a causality like that of mental phenomena, where it *is* the past which determines the future, and *not* (in

* It follows as a corollary from this that if the positions of the particles at any one instant, together with the velocities at that instant, and the law of force, are given, the positions at all instants can be calculated. Of course, to give the positions and velocities at one instant, is a special case of the giving of the positions at two instants. The two instants may be such that there will be more than one solution of the problem; but this is an insignificant detail.

the same sense) the reverse ; but the doctrine of the conservation of energy consists precisely in the denial that anything like this occurs in the domain of physics. Had Kant studied the psychological phenomena more attentively and generalised them more broadly, he would have seen that in the mind causation is not absolute, but follows such a curve as is traced in my essay towards "The Law of Mind" (*The Monist*, Vol. II, 550). Does our judicious editor deem it ungracious to find fault with Kant for not doing so much more than he did, considering what that hero-like achievement was? We must seem to carp, as long as thinkers can hold that achievement for sufficient. In the fourth place, Kant's "Analogy" ignores that continuity which is the life-blood of mathematical thought. He deals with those awkward chunks of phenomenon, called "events." He represents one such "event" as determined by certain others, definitely, while the rest have nothing to do with it. It is impossible to cement such thought as this into hermetic continuity with the refined conceptions of modern dynamics. The statement that every instantaneous state of things determines precisely all subsequent states, and not at all any previous states, could, I rather think, be shown to involve a contradiction.

The notion which Dr. Carus holds of a cause seems to be that it is a state, embracing all the positions and velocities of all the masses at one instant, the effect being a similar state for any subsequent instant. (§§ 21, 24.) This breaks at once with common parlance, with dynamics, and with philosophical logic. In common parlance, we do not say that the position and upward velocity of a missile is the cause of its being at a subsequent instant lower down and moving with a greater downward velocity.* In dynamics, it is the fixed force, gravitation, or whatever else, together with those relative positions of the bodies that determine the intensity and direction of the forces, that is regarded as the cause. But these causes are not previous to, but simultaneous with, their effects, which are the instantaneous accelerations. Finally, logic opposes our calling

* It would seem to follow from his notion that in uniform motion each minute's motion is the cause of that of the next. Yet he says (§ 19) "there is no cause that is equal to its effect."

one of two states which equally determine one another (as any two states of a system do, if the velocities are taken to be included in these states) *the* determinator, or cause, simply because of the circumstance that it precedes the other in time,—a circumstance that is upon the principles of dynamics plainly insignificant and irrelevant.

Everybody will make slips in the use of words that have been on his lips from before the time when he learned to think ; but the practice which I endeavor to follow in regard to the word *cause*, is to use it in the Aristotelian sense of an *efficient cause*, in all its crudeness. In short, I refuse to use it at all as a philosophical word. When my conception is of a dynamical character, I endeavor to employ the accepted terminology of dynamics;* and when my idea is a more general and logical one, I prefer to speak of the *explanation*.

§ 14. Dr. Carus thinks the element of necessity in causation can be demonstrated by considering the process as a transformation. "It is a sequence of two states which belong together as an initial and final aspect of one and the same event." (§ 21. Compare ¶¶ 20, 24.) He neglects to explain how he brings under this formula the inward causation of the will and character, as set forth by him in ¶¶ 163–167.

It is unnecessary for me to reply, at length, to an argument so manifestly inconclusive. On the one hand, it conflicts with the principle that absolute necessity cannot be proved from experience ; and on the other hand, it leaves room for an imperfect necessity.

Professor Tait has done an ill office to thought in countenancing the idea that the conservation of energy is of the same nature as the "conservation," or rather perduration, of matter. Dr. Carus says (¶ 121) that

"The law of the conservation of matter and energy rests upon the experience (corroborated by experiments) that causation is transformation. It states that the total amount of matter and the total amount of energy remain constant. There is no creation out of nothing and no conversion of something into nothing."

* But, as I have elsewhere said, I should like to persuade mathematicians to speak of "positional energy" as *Kinetic potency*, the *vis viva* as *Kinetic energy*, and the total "energy" as the *Kinetic entelechy*.

The historical part of this statement contains only a small grain of truth; but that I will not stop to criticise. The point I wish to make is that the law of the conservation of energy is here represented under a false aspect. The true substance of the law is that the accelerations, or rates of change, of the motions of the particles at any instant depend solely on their relative positions at those instants. The equation which expresses the law under this form is a differential equation of the second order; that is, it involves the rates of change of the rates of change of positions, together with the positions themselves. Now, because of the purely analytic proposition of the differential calculus that

$$D_t^2 s = \frac{1}{2} D_s (D_t s)^2,$$

the first integral of the differential equation of the second order, that is, the differential equation of the first order which expresses the same state of things, equates half the sum of the masses, each multiplied by the square of its velocity, to a function of the relative positions of the particles *plus* an arbitrary constant.* In order to fix our ideas, let us take a very simple example, that of a single particle accelerated towards an infinite plane, at a rate proportional to the n^{th} power of its distance from the plane. In this case, if s be the distance, the second differential equation will be

$$D_t^2 s = -a s^n,$$

and the first integral of it will be

$$(D_t s)^2 = -\frac{2a}{n+1} s^{n+1} + C.$$

By the first law of motion, and the Pythagorean proposition, the part of the velocity-square depending on the horizontal component is also constant.

The arbitrary constant, C , plainly has its genesis in the fact that forces do not determine velocities, but only accelerations. Its value will be fixed as soon as the velocity at any instant is known. This quantity would exist, just the same, and be independent of the time, and would therefore be "conserved" whether the forces were

* The differential equation being an ordinary, not a partial one, this is an absolute constant, determined by initial (or final, or any instantaneous) conditions.

“conservative,” that is, simply positional, or not. Now, this constant is the energy ; or rather, the energy is composed of this constant increased by another which is absolutely indeterminable, being merely supposed large enough to make the sum positive.

Thus, the law of energy does not prescribe that the total amount of energy shall remain constant ; for this would be so in any case by virtue of the second law of motion ; but what it prescribes is that the total energy diminished by the living force shall give a remainder which depends upon the relative positions of the particles and not upon the time or the velocities. It is also to be noticed that the energy has no particular magnitude, or quantity. Furthermore, in transformations of kinetical energy into positional energy, and the reverse, the different portions of energy do not retain their identity, any more than, in book-keeping, the identity of the amounts of different items is preserved. In short, the conservation of energy, (I do not mean the *law* of conservation,) is a mere result of algebra. Very different is it with the “conservation” of matter. For, in the first place, the total mass is a perfectly definite quantity ; and, in the second place, in all its transformations, not only is the *total* amount constant, but all the different parts preserve their identity. To speak, therefore, of “the conservation of matter and energy,” is to assimilate facts of essentially contrary natures ; and to say that the law of the conservation of energy makes the total amount of energy constant is to attribute to this law a phenomenon really due to another law, and to overlook what this law really does determine, namely, *that the total energy less the kinetic energy gives a remainder which is exclusively positional.*

§ 15. Dr. Carus does not make it clear what he means by *chance*. He does, indeed, say (§§ 145, 146):

“What is chance ?

“Chance is any event not especially intended, either not calculated, or, with a given and limited stock of knowledge, incalculable.”

This defines what he means by a chance event, in the concrete ; what he understands by probability, we are left to conjecture. But from what he says in § 147, I infer that he regards it as dependent upon the state of our ignorance, and therefore nothing real.

I am, therefore, much puzzled when I find him expressing a conviction (§§ 88, 156) that chance plays an important part in the real world. He explains very distinctly that "when we call a throw of the dice pure chance, we mean that the incidents which condition the turning up of these or those special faces of the dice have not been, or cannot be, calculated." (§ 147.) This is the commonest, because the shallowest, philosophy of chance. Even Venn might teach him better than that. However, according to that view, when he writes of "the important part that chance plays in the world,—not absolute chance . . . but that same chance of which the throw of the die is a typical instance" (§ 88), he can be understood to mean no more than that many things happen which we are not in condition to calculate or predict. This is not playing a part *in the world*, one would say—at least, not in the natural world; it is only playing a part in our ignorance.

Dr. Carus frequently uses phrases which make us suspect he penetrates deeper. Thus, he says, "we do not believe in absolute chance, but we believe in chance" (§ 144); and again, "Every man is the architect of his own fortune—but not entirely. There are sometimes coincidences determining the fates of men." (§ 161.) But when we remark the consecution of §§ 137–162, we feel pretty sure he really sees no further. To do so would have been to perceive that indefinitely varied specificness *is* chance.

For a long time, I myself strove to make chance that diversity in the universe which laws leave room for, instead of a violation of law, or lawlessness. That was truly believing in chance that was not absolute chance. It was recognising that chance does play a part in the real world, apart from what we may know or be ignorant of. But it was a transitional belief which I have passed through, while Dr. Carus seems not to have reached it.

As for absolute chance, Dr. Carus makes the momentous admission that it is "not unimaginable" (§ 150). If so, its negation, or absolute necessity, cannot be a formal principle.

§ 16. But it is time for me to leave the consideration of Dr. Carus's system and to take up his strictures upon mine. His philosophy is one eminently enlightened by modern ideas, which it

synthesises to an unusual extent. It is distinguished for its freedom from the vice of one-sidedness, and displays every facet of the gem of philosophical inquiry, except the one on which it rests, the question of absolute law. Its prominent faults, which I feel sure must have struck every competent reader, are that it shows little trace of meditation upon the thoughts of the great idealists, and that there is a certain want of congruity between different elements of it. How strangely it sounds, for instance, to find an apriorian, and one who is dinging "formal laws" so perpetually into our ears, one who holds that "in order to weave the woof of the *a posteriori* elements into coherent cloth, we want the warp of the *a priori*" (§ 15), to find this man declaring for a positivism "which accepts no doctrine, theory, or law, unless it be a formulation of facts," and proclaiming that "the whole business of science is to systematise the samenesses of experience, and to present them in convenient formulas" (§ 120). Now there is just one way of bringing such warring elements into harmony, and curing the greatest defect of the system,—and it is a way which would also bring the whole into far better concordance with natural science. It is to lop off the heads of all absolute propositions whose subject is not the Absolute, and reduce them to the level of probable and approximate statements. Were that defalcation performed, Dr. Carus's philosophy would, in its general features, offer no violent opposition to my opinions. Moreover, the Doctor has at heart the conciliation of religion and science. I confess such serious concern makes me smile; for I think the atonement he desires is a thing which will come to pass of itself when time is ripe, and that our efforts to hasten it have just that slight effect that our efforts to hasten the ripening of apples on a tree may have. Besides, natural ripening is the best. Let science and religion each have stout faith in itself, and refuse to compromise with alien and secondary purposes, but push the development of its own thought on its own line; and then, when reconciliation comes,—as come it surely will,—it will have a positive value, and be an unmixed good. But since our accomplished editor thinks himself called upon to assist in this birth of time, let me ask him whether of all the conditions of such peace, the first is not that religious thought should abandon

that extravagant absoluteness of assertion which is proper to the state of intellectual infancy, but which it has so long been too timid to let go? This pragmatism and unneeded absoluteness it is which is most deeply contrary to the method, the results, and the whole spirit of science; and no error can be greater than to fancy that science, or scientific men, rest upon it or readily tolerate it.

§ 17. Dr. Carus (§§ 56-64) condemns my method of investigation as contrary to that by which science has been advanced; and holds that a radically different, and thoroughly positivistic method is requisite,—a method so intensely positivistic as to exclude all originality. I suppose he will not object to my forming an opinion concerning the methods of science. I was brought up in an atmosphere of scientific inquiry, and have all my life chiefly lived among scientific men. For the last thirty years, the study which has constantly been before my mind has been upon the nature, strength, and history of methods of scientific thought. I have no space here to argue the question. In its logical aspect, I have partly considered it in various publications; and in its historical aspect, I have long been engaged upon a treatise about it. My critic says (§ 57) that I am “very positivistic in my logic of science.” This is a singular misapprehension. Few of the great scientific minds with whom I have come into personal contact, and from whom I endeavored to learn were disposed to condemn originality or the ideal part of the mind’s work in investigation; and those few, it was easy to see, really breathed an atmosphere of ideas which were so incessantly present that they were unconscious of them. Were I to name those of my teachers who were most positivistic in theory, a smile would be excited. My own historical studies, which have been somewhat minutely critical, have, on the whole confirmed the views of Whewell, the only man of philosophical power conjoined with scientific training who had made a comprehensive survey of the whole course of science, that progress in science depends upon the observation of the right facts by minds *furnished with appropriate ideas*. Finally, my long investigation of the logical process of scientific reasoning led me many years ago to the conclusion that science is nothing but a development of our natural instincts. So much for my *theory* of

scientific logic. It is as totally opposed as anything can be to Dr. Carus's theory (§ 69, note ; and "Ursache, Grund und Zweck," p. 2) that originality is out of place in science.

But in my *practice* of scientific reasoning, Dr. Carus accuses me of being what he calls a "constructionist"; that is, a theoriser unguided by indications from observation or accepted facts. To a mind upon whom that celebrated and splendid chapter of Kant upon the architectonical method failed to make a deep impression, I may appear so ; but *travesty* is in truth hardly too strong a word to describe the account of my method by Dr. Carus.

Perhaps exaggeration is not without its value. If so, let me sum up the method Dr. Carus recommends. Eschew originality, is its pious formula ; do not think for yourself, nor countenance results obtained by original minds. Distrust them ; they are not safe men. Leave originality to mathematicians and their breed, to poets, and to all those who seek the sad notoriety of having unsettled belief.* Flee all philosophies which smack of this aberrant nineteenth century.† This theory of Dr. Carus condemns itself ; for it is highly original, and soars into the free ether untrammelled by historic facts.

Keppler comes very close to realising my ideal of the scientific method ; and he is one of the few thinkers who have taken their readers fully into their confidence as to what their method really has been.‡ I should not feel justified in inflicting upon mine an autobiographical account of my own course of thought ; but some things Dr. Carus's accusation forces me to mention. My method of attacking all problems has ever been to begin with an historical and rational inquiry into the special method adapted to the special problem. This is the essence of my architectonical proceeding upon which Dr. Carus has commented very severely. To look an inch before one's nose involves originality : therefore, it is wrong to have a conscious method. But further, in regard to philosophy, not only

* Dr. Carus calls attention to the connection between my doctrine of the fixation of opinion and his anti-originalism.

† Dr. Carus passes a sweeping judgment on Post-Kantian philosophy, as being original.

‡ This was a remark of my father's.

the methods, but the elementary ideas which are to enter into those methods, should be subjected to careful preliminary examination. This, especially, Dr. Carus finds very unscientific. (§ 64, and elsewhere.) It is, undoubtedly, the most characteristic feature of my procedure. Certainly it was not a notion hastily or irreflectively caught up; but is the maturest fruit of a lifetime of reflection upon the methods of science, including those of philosophy; and if it shall be found that one contribution to thought on my part has proved of permanent service, that, I expect, will be the one. This method in no wise teaches that the method and materials for thought are not to be modified in the course of the study of the subject-matter. But instead of taking ideas at haphazard, or being satisfied with those that have been handed down from the good old times, as a mind keenly alive to the dangers of originality would have done, I have undertaken to make a systematic survey of human knowledge (a very slight sketch of which composed the substance of my paper on the "Architecture of Theories,") in order to find what ideas have, as a fact, proved most fruitful, and to observe the special utilities they have severally fulfilled. A subsidiary object of this survey was to note what the great obstacles are to-day in the way of the further advance of the different branches of science. In my "Architecture of Theories," I never professed to do more than make a slight sketch of a small portion of my preliminary studies, devoting thirteen lines to some hints as to the nature of the results. In the four following papers I have given a selection of a few of these results. Among those which remain to be reported are some of much more immediate importance than any of those hitherto set forth. If anybody has been surprised to find my subsequent papers developing thoughts which they were unable to foresee from my first, it is only what I warned people from the outset that they would find to happen. Nor have the greatest of these surprises yet been reached.*

The next series of facts reviewed was that of the history of philosophy. I waded right into this fearful slough of "originality," in

* A person in the last *Monist*, breaks in upon my series of articles to foretell what the "issues of synechism" will be. Were he able to do so, it would certainly be the height of ill-manners thus to take the words out of my mouth.

order to gather what seemed to throw a light upon the subject. Finally, I reviewed the general facts of the universe.

I now found myself forced by a great many different indications to the conclusion that an evolutionary philosophy of some kind must be accepted,—including among such philosophies systems like those of Aristotle and of Hegel. From this point the reasoning was more rapid. Evolution had been a prominent study for half a generation ; and much light had been thrown upon the conditions for a fruitful evolutionary philosophy. The first question was, how far shall this evolution go back? What shall we suppose *not* to be a product of growth? I fancy it is this cautious reflectiveness of my procedure which especially displeases Dr. Carus. It is not positivistic : it is architectonic. But the answer to the question was not far to seek. If an evolutionary explanation is to be adopted, philosophy, logic, and the economy of research all dictate that in the first essay, at least, that style of explanation be carried as far back as explanation is called for. What elements of the universe require no explanation? This was a simple question, capable of being decided by logic with as much facility and certainty as a suitable problem is solved by differential calculus. Being, and the uniformity in which being consists, require to be explained. The only thing that does not require it is non-existent spontaneity. This was soon seen to mean absolute chance. The conclusion so reached was clinched by a careful reëxamination of the office of chance in science generally, and especially in the doctrines of evolution. Arrived at this point, the next question was, what is the principle by which the development is to proceed? It was a difficult inquiry, and involved researches from different points of view.

But I will not trouble the reader with further autobiographical details. I have given enough to show that my method has neither been in theory purely empirical, nor in practice mere brain-spinning ; and that, in short, my friend Dr. Carus's account of it has been as incorrect as can be.

§ 18. The learned doctor (§¶¶ 6, 7, 8) pronounces me to be an imitator of David Hume, or, at least, classes my opinions as closely allied to his. Yet be it known that never, during the thirty years in

which I have been writing on philosophical questions, have I failed in my allegiance to realistic opinions and to certain Scotistic ideas; while all that Hume has to say is said at the instance and in the interest of the extremest nominalism. Moreover, instead of being a purely negative critic, like Hume, seeking to annul a fundamental conception generally admitted, I am a positive critic, pleading for the admission to a place in our scheme of the universe for an idea generally rejected. In the first paper of this series, in which I gave a preliminary sketch of such of my ideas as could be so presented, I carefully recorded my opposition to all philosophies which deny the reality of the Absolute, and asserted that "the one intelligible theory of the universe is that of objective idealism, that matter is effete mind." This is as much as to say that I am a Schellingian, of some stripe; so that, on the whole, I do not think Dr. Carus has made a very happy hit in likening me to Hume, to whose whole method and style of philosophising I have always been perhaps too intensely averse. Yet, notwithstanding my present disclaimer, I have little doubt apriorians will continue to describe me as belonging to the sceptical school. They have their wonderful ways of arriving at truth, without stooping to confront their conclusions with facts; and it is amusing to see how sincerely they are convinced that nobody can have science at heart, without denying all they uphold.*

My opponent has a habit of throwing out surprising opinions without the least attempt to illuminate them with the effulgence of reason. Thus he says (§ 8): "If Kant's answer to Hume had been satisfactory, Mr. Peirce would probably not have renewed the attack." What attack? All that Hume attacked I defend, namely, law as a reality. How could a defence of that which I defend as essen-

* As I am writing, I am shown a letter, in which the writer says: "Peirce with all his materialistic ideas, yet," etc. I never promulgated a materialistic idea in my life. The writer simply assumes that science is materialistic. As I am correcting the proofs, I notice that Mr. B. C. Burt, in his new *History of Modern Philosophy*, sets me down as sceptical, though doubtfully. There are a good many inaccuracies in the work. This was inevitable in a first edition. But the ingenious plan of the book admirably adapts it to the wants of just that class of students who cannot understand that no repertory of facts ever can be trusted implicitly.

tial to my position, cause me to surrender that position, namely, that real regularity is imperfect? In any sense in which Hume could have admitted the possibility of law, it must be precisely followed ; since its existence could consist only in the conformity of facts unto it. But perhaps Dr. Carus means that if one question had been completely settled, I should probably have confined myself to talking about that, instead of broaching a new one.

§ 19. Another misunderstanding of my position on the part of Dr. Carus (§§ 12, 13) is simply due to "boldly" having been twice printed where the reading should have been "baldly," in my paper on "The Doctrine of Necessity." (*The Monist*, Vol. II, p. 336, lines 20 and 25.) I wish printers would learn that I never use the word *bold*. I have so little of the quality, that I don't know what it means. As I read the "revise," as usual, it was presumably my fault that the *erratum* occurred. At any rate, had my meaning been clearly expressed, the proof-reader would not have been misled by my defective chirography. What I was trying to say was, in substance, this: Absolute chance is a hypothesis ; and, like every hypothesis, can only be defended as explaining certain phenomena.* Yet to suppose that an event is brought about by absolute chance is utterly illogical, since as a hypothesis it could only be admitted on the ground of its explaining observed facts ; now from mere non-law nothing necessarily follows, and therefore nothing can be explained ; for to explain a fact is to show that it is a necessary, or, at least, a probable, result from another fact, known or supposed. Why is not this a complete refutation of the theory of absolute chance? *Answer* : because the *existence* of absolute chance, as well as many of its characters, are not themselves absolute chances, or sporadic events, unsubject to general law. On the contrary, these things *are* general laws. Everybody is familiar with the fact that chance has laws, and that statistical results follow therefrom. Very well : I do not propose to explain anything as due to the action of

* Its being hypothetical will not prevent its being established with a very high degree of certainty. Thus, all history is of the nature of hypothesis ; since its facts cannot be directly observed, but are only supposed to be true to account for the characters of the monuments and other documents.

chance, that is, as being lawless. I do not countenance the idea that Bible stories, for instance, show that nature's laws were violated;—though they may help to show that nature's laws are not so mechanical as we are accustomed to think. But I only propose to explain the regularities of nature as consequences of the only uniformity, or general fact, there was in the chaos, namely, the general absence of any determinate law.* In fact, after the first step is taken, I only use *chance* to give room for the development of law by means of the law of habits.

§ 20. In ¶ 28, I read: "Mr. Peirce does not object to necessity in certain cases; he objects to necessity being a universal feature of the world." This is correctly stated, and so it is in ¶ 203. I object to necessity being universal, as well as to its ever being exact. In short, I object to absolute universality, absolute exactitude, absolute necessity, being attributed to any proposition that does not deal with the A and the Ω , in the which I do not include any object of ordinary knowledge. But it is careless to write (¶ 193) that I "describe the domain of mind as the absence of law." Is not one of my papers entitled "The Law of Mind"? It is true that I make the law of mind essentially different in its mode of action from the law of mechanics, inasmuch as it requires its own violation; but it is law, not chance uncontrolled. That it is not "an undetermined and indeterminable sporting" should have been obvious from my expressly stating that its ultimate result must be the entire elimination of chance from the universe. That directly negatives the adjective "indeterminable," and hence also the adjective "undetermined." Still more unwarranted is the statement (¶ 205) that I deny "that there are samenesses in this world." If the slightest excuse for such an accusation can be found in all my writings I shall be mightily surprised.

§ 21. Dr. Carus fully admits (¶ 9) the justice of my first reply to the argument that necessity is postulated in all scientific reasoning, which reply is that to postulate necessity does not make it true.

* Somebody may notice that I here admit a proposition as absolutely true. Undoubtedly; because it relates to the Absolute.

As this reply, if correct is complete, Dr. Carus was bound after that admission to drop the postulate-argument in favor of necessity.* But he takes no notice, at all, of my four-page argument to show that scientific reasoning does *not* postulate absolute universality, exactitude, or necessity (*The Monist*, Vol. II, pp. 324-327); but calmly asserts, four or five times over (§§ 5, 11, 16, 62, 79), without one scintilla of argumentation, that that postulate *is* made, and uses this as an argument in favor of necessity.

§ 22. He also fully admits (§§ 11, 14, 22) the justice of my argument that the absoluteness of universality, exactitude, and necessity, cannot be proved, nor rendered probable, by arguments from observation. That argument consisted in assuming that all arguments from observation are probable arguments, and in showing that probable inferences are always affected with probable errors.

Had I deemed it requisite, I might easily have fortified that argument by a more profound analysis of scientific reasoning. Such an analysis I had formerly given in my "Theory of Probable Inference" (in "Studies in Logic," Boston : Little and Brown).

But, notwithstanding his admissions, Dr. Carus sets up his *ipse dixit* against my argumentation. "We deny most positively," says the editorial Elohim, "that the calculus of probabilities is applicable to the order of the world, as to whether it may or may not be universal." (§§ 27, 31.)

To support this, he cites (§§ 31-34) four passages from articles written by me sixteen years ago. I hope my mind has not been stationary during all these years; yet there is little in those old articles which I now think positively erroneous, and nothing in the passages cited. My present views had, at that time, already begun to urge themselves on my mind; but they were not ripe for public avowal. In the first of the passages cited, I express the opinion, which I first uttered in my earlier lectures before the Lowell Institute, in 1866, afterwards in the *Popular Science Monthly* in 1877, in

* Indeed, to admit that reply is all but to admit the non-absolute grade of necessity.

still fuller elaboration in my "Theory of Probable Inference" in 1882, and maintain now as strongly as ever, that no definite probability can be assigned to any general arrangement of nature. To speak of an *antecedent* probability would imply that there was a statistical science of different universes; and a *deduced* probability requires an antecedent probability for one of its data.* This consideration only goes to fortify my present position, that we cannot conclude from observed facts with any degree of probability, and therefore *a fortiori* not with certainty, that any proposition is absolutely universal, exact, or necessary. In the absence of any weight of probability in favor of any particular exact statement, the formal presumption is altogether against any one out of innumerable possible statements of that kind.

The second passage cited is one in which I argue that the universe is not a chaos, or chance-medley. Now Dr. Carus admits (§ 28) that I do not to-day maintain that it is a chance-medley.

The third passage cited is this: "A contradiction is involved in the very idea of a chance-world." This is in entire harmony with my present position that "a chaos . . . being without connection or regularity would properly be without existence." ("Architecture of Theories," *The Monist*, Vol. I, p. 176.)

The fourth passage is to the effect that "the interest which the uniformities of nature have for an animal measures his place in the scale of intelligence." This I still believe.

So much for my supposed contradictions. If I am not mistaken, our amiable editor, whose admirable editorship springs so largely out of his amiability, in copying out these passages was really not half so much intent on showing me to be wrong at present, as on showing me to have been right formerly. However hard he hits, he contrives to honey his sockdologers, and sincerely cares more to make the reader admire his antagonist when he is right than to condemn him when he is wrong. There is a touch of art in this that proclaims the born editor, and which I can hardly hope to imitate.

* I rightly go somewhat further in my *Theory of Probable Inference*; but that has no bearing on the present discussion.

Though Dr. Carus admits over and over again that necessity cannot be based on observation, he often slips back to the idea that it can be so based. He says, (§ 30) that "form is a quality of this world, not of some samples of it, but throughout, so far as we know of existence in even the most superficial way." But does he not see that all we *do* know, and all we *shall* to-morrow, or at any date know, is nothing but a sample of our possible experience,—nay, is but a sample of what we are in the future to have already experienced? I have characterised inductive inference as reasoning from samples; but the most usual way of sampling a class is by examining *all* the instances of it that have come under our observation, or which we can at once collect.

§ 23. Dr. Carus (§§ 44, 46) holds that from my social theory of reality, namely, that the real is the idea in which the community ultimately settles down, the existence of something inevitable is to be inferred. I confess I never anticipated that anybody would urge that. I thought just the reverse might be objected, namely, that all absoluteness was removed from reality by that theory; and it was many years ago that, in my "Theory of Probable Inference," I admitted the obvious justice, as it seemed to me, of that objection. We cannot be quite sure that the community ever will settle down to an unalterable conclusion upon any given question. Even if they do so for the most part, we have no reason to think the unanimity will be quite complete, nor can we rationally presume any overwhelming *consensus* of opinion will be reached upon every question. All that we are entitled to assume is in the form of a *hope* that such conclusion may be substantially reached concerning the particular questions with which our inquiries are busied.

Such, at least, are the results to which the consideration of the doctrine of probability brings my mind irresistibly. So that, the social theory of reality, far from being incompatible with tychism, inevitably leads up to that form of philosophy. Socialistic, or as I prefer to term it, agapastic ontology seems to me likely to find favor with many minds at an early day, because it is a natural path by which the nominalist may be led into the realistic ways of thought, ways toward which many facts and inward forces impel him. It is

well, therefore, to call attention to the circumstances that the realism to which it leads is a doctrine which declares general truths to be real,—independent of the opinions of any particular collection of minds,—but not to be destined, in a strictly universal, exact, and sure acceptation, to be so settled, and established. Now to assert that general truths are objectively real, but to deny that they are strictly universal, exact, and certain, is to embrace the doctrine of absolute chance. Thus it is that the agapastic ontologist who endeavors to escape tychism will find himself “led into” that “inextricable confusion” which Dr. Carus (§ 4) has taken a contract to show that I am led into.

§ 24. Conservatism is wholesome and necessary ; the most convinced radical must admit the wisdom of it, in the abstract ; and a conservative will be in no haste to espouse the doctrine of absolute chance. I, myself, pondered over it for long years before doing so. But I am persuaded, at length, that mankind will before very long take up with it ; and I do not believe philosophers will be found tagging on to the tail of the general procession.

My little dialogue between the tychist and the necessitarian (*The Monist*, Vol. II, pp. 331–333) seems to have represented pretty fairly the views of the latter ; for Dr. Carus, in §§ 151–155, does little more than reiterate them, without much, if at all, reinforcing them. His §§ 158–160 merely work out, in a form perhaps not quite clear, what is manifest from the elementary principles of dynamics, and was considered in my dialogue.

His arguments in this connection, apart from those already noticed, are that absolute chance is something which if it existed would require explanation, that the manifold specificcalness of nature is explained by law without any aid from chance, and that absolute chance if it existed, in the sense in which it is supposed to exist in my chaos, could not possibly breed law as supposed by me. To the consideration of these arguments I proceed to apply myself.

§ 25. One of the architectonic—and, therefore, I suppose, by Dr. Carus considered as highly reprehensible—features of my theory, is that, instead of saying off-hand what elements strike me as requiring explanation and what as not doing so, which seems to be his

way, I have devoted a long time to the study of the whole logical doctrine of explanation, and of the history of explanations, and have based upon the general principles so ascertained my conclusions as to what things do and what do not require to be explained.

Dr. Carus (§ 67) defines *explanation* as a description of a special process of nature in such a way that the process is recognised as a transformation. This I cannot quite grant. First, I cannot admit that "special processes of nature" are the only things to be explained. For instance, if I were to meet a gentleman who seemed to conform scrupulously to all the usages of good society, except that he wore to an evening party an emerald satin vest, that would be a fact calling for explanation, although it would not be a "special process of nature." Second, I cannot admit that an explanation is a description of the fact explained. It is true that in the setting forth of some explanations, it is convenient to restate the fact explained, so as to set it under another aspect; but even in these cases, the statement of *other* facts is essential. In all cases, it is *other facts*, usually hypothetical, which constitute the explanation; and the process of explaining is a process by which from those other facts the fact to be explained is shown to follow as a consequence, by virtue of a general principle, or otherwise. Thus, a "special process of nature" calling for explanation is the circumstance that the planet Mars, while moving in a general way from west to east among the fixed stars, yet retrogrades a part of the time, so as to describe loops in the heavens. The explanation is that Mars revolves in one approximate circle and we in another. Again, it has been stated that a warm spring in Europe is usually followed by a cool autumn, and the explanation has been offered that so many more icebergs than usual are liberated during a warm spring, that they subsequently lower sensibly the temperature of Europe. I care little whether the fact and the explanation are correct or no. The case illustrates, at any rate, my point that an explanation is a special fact, supposed or known, from which the fact to be explained follows as a consequence. Third, I cannot admit that every description which recognises the fact described as a transformation is an explanation; far less that "it is complete and exhaustive" (§ 67).

A magician transforms a watch into a dove. Recognise it as a transformation and the trick is explained, is it? This is delightfully facile. Describe the change from a caterpillar to a butterfly as a transformation, and does that explain it? Fourth, I cannot admit that every explanation recognises the fact explained as a transformation. The explanation of the loops in the motion of Mars is not of that nature. But I willingly recognise in Dr. Carus's definition an attempt,—more or less successful,—to formulate one of the great offices of scientific inquiry, that of bridging over the gap between the familiar and the unfamiliar.

Explanation, however, properly speaking, is the replacement of a complex predicate, or one which seems improbable or extraordinary, by a simple predicate from which the complex predicate follows on known principles. In like manner, a *reason*, in one sense, is the replacement of a multiple subject of an observational proposition by a general subject, which by the very conditions of the special experience is predicable of the multiple subject.* Such a reason may be called an explanation in a loose sense.

Accordingly, that which alone requires an explanation is a coincidence.

Hence, I say that a uniformity, or law, is *par excellence*, the thing that requires explanation. And Dr. Carus (§ 51) admits that this "is perfectly true."

But I cannot imagine anything further from the truth than his statement (§ 66) that "the only thing in the world of which we cannot and need not give account is the existence of facts itself." I should say, on the contrary, that the existence of facts is the only thing of which we need give account. Forms may indulge in whatever eccentricities they please in the world of dreams, without responsibility; but when they attempt that kind of thing in the world of real existence, they must expect to have their conduct inquired into. But should Dr. Carus reply that I mistake his meaning, that it is only "being in general" (§ 66) that he holds unaccountable, I

* Dr. Carus, in his *Ursache, Grund und Zweck*, well says that *reasons* are discovered by induction, in the strict sense. It is often admitted that *causes* can only be inferred by hypothetical reasoning.

reply that this is simply expressing scepticism as to the possibility and need of philosophy. In a certain sense, my theory of reality, namely that reality is the dynamical reaction of certain forms upon the mind of the community, is a proposed explanation of being in general; and be it remarked that the mind of the community, itself, is the thing the nature of whose being this explanation first of all puts upon an idealistic footing.

Chance, according to me, or irregularity,—that is, the absence of any coincidence,—calls for no explanation. If *law* calls for a particular explanation, as Dr. Carus admits it does, surely the mere absence of law calls for no further explanation than is afforded by the mere absence of any particular circumstance necessitating the result. An explanation is the conception of a fact as a necessary result, thereby accounting for the coincidence it presents. It would be highly absurd to say that the absence of any definite character, must be accounted for, as if it were a peculiar phenomenon, simply because the imperfection of language leads us so to talk of it. Quite unfounded, therefore, is Dr. Carus's opinion that "chance needs exactly as much explanation as anything else" (§ 53);—an opinion which, so far as I can see, rests on no defensible principle.

Equally hasty is his oft repeated objection (§§ 55, 58, 61) that my absolute chance is something ultimate and inexplicable. I go back to a chaos so irregular that in strictness the word existence is not applicable to its merely germinal state of being; and here I reach a region in which the objection to ultimate causes loses its force. But I do not stop there. Even this nothingness, though it antecedes the infinitely distant absolute beginning of time, is traced back to a nothingness more rudimentary still, in which there is no variety, but only an indefinite specificability, which is nothing but a tendency to the diversification of the nothing, while leaving it as nothing as it was before. What objectionable ultimacy is here? The objection to an ultimate consists in its raising a barrier across the path of inquiry, in its specifying a phenomenon at which questions must stop, contrary to the postulate, or hope, of logic. But what question to which any meaning can be attached am I forbidding by my absolute chance? If what is demanded is a theological backing,

or rational antecedent, to the chaos, that my theory fully supplies. The chaos is a state of intensest feeling, although, memory and habit being totally absent, it is sheer nothing still. Feeling has existence only so far as it is welded into feeling. Now the welding of this feeling to the great whole of feeling is accomplished only by the reflection of a later date. In itself, therefore, it is nothing ; but in its relation to the end, it is everything.

More unreasonable yet is Dr. Carus's pretension, that the manifold specificcalness, which is what I mean by chance, is capable of explanation (§§ 142, 143) by his own philosophic method. He may explain one particularity by another, of course ; but to explain specificcalness itself, would be to show that a specific predicate is a necessary consequence of a generic one, or that a whole is without ambiguity a part of its part. Remark, reader, at this point, that chance, whether it be absolute or not, is not the mere creature of our ignorance. It is that diversity and variety of things and events which law does not prevent. Such is that real chance upon which the kinetical theory of gases, and the doctrines of political economy, depend. To say that it is not absolute is to say that it,—this diversity, this specificcalness,—can be explained as a consequence of law. But this, as we have seen, is logically absurd.

Dr. Carus admits that absolute chance is "not unimaginable" (§ 150). Chance itself pours in at every avenue of sense : it is of all things the most obtrusive. That it is absolute, is the most manifest of all intellectual perceptions. That it is a being, living and conscious, is what all the dullness that belongs to ratiocination's self can scarce muster hardihood to deny.

Almost as unthinking is the objection (§ 61) that absolute chance could never beget order. I have noticed elsewhere the historic oblivescence of this objection. Must I once again repeat that the tendency to take habits, being itself a habit, has *eo ipso* a tendency to grow ; so that only a slightest germ is needed ? A realist, such as I am, can find no difficulty in the production of that first infinitesimal germ of habit-taking by chance, provided he thinks chance could act at all. This seems, at first blush, to be explaining something as a chance-result. But exact analysis will show it is not so.

In like manner, when the eminent thinker who does me the honor to notice my speculation, objects that I do not, after all, escape making law absolute, since the tendency to take habits which I propose to make universal is itself a law, I confess I can find only words without ideas in the objection. Law is a word found convenient, I grant, in describing that tendency ; but is there no difference between a law the essence of which is to be inviolable (which is the nominalistic conception of mechanical law, whose being, they say, lies in its action) and that mental law the violation of which is so included in its essence that unless it were violated it would cease to exist ? In my essay, "The Law of Mind," I have so described that law. In so describing it, I make it a law, but not an absolute law ; and thus I clearly escape the contradiction attributed to me.

§ 26. In my attack on "The Doctrine of Necessity," I offered four positive arguments for believing in real chance. They were as follows :

1. The general prevalence of growth, which seems to be opposed to the conservation of energy.
2. The variety of the universe, which is chance, and is manifestly inexplicable.
3. Law, which requires to be explained, and like everything which is to be explained must be explained by something else, that is, by non-law or real chance.
4. Feeling, for which room cannot be found if the conservation of energy is maintained.

In a brief conversation I had with him, my friend remarked (and if it was an inconsiderate concession, I certainly do not wish to hold him to it) that while the theory of tychism had some attractive features, its weakness consisted in the absence of any positive reasons in its favor. I infer from this that I did not properly state the above four arguments. I therefore desire once more to call attention to them, especially in their relations to one another.

Mathematicians are familiar with the theorem that if a system of particles is subject only to positional forces, it is such that if at any instant the velocities were all suddenly reversed, without being altered in quantity, the whole previous history of the system would

be repeated in inverse succession. Hence, when physicists find themselves confronted with a phenomenon which takes place only in one order of succession and never in the reverse order,—of which no better illustration could be found than the phenomena of growth, for nobody ever heard of an animal growing back into an egg,—they always take refuge in the laws of probability as preventive of the velocities ever getting so reversed. To understand my argument number 1, it is necessary to make this method of escape from apparent violations of the law of energy quite familiar to oneself. For example, according to the law of energy, it seems to follow (and by the aid of the accepted theory of light it does follow) that if a prism, or a grating, disperses white light into a spectrum, then the colors of the spectrum falling upon the prism or grating at the same angles, and in the same proportions, will be recombined into white light; and, everybody knows that this does in fact happen. Nevertheless, the usual and prevalent effect of prisms and gratings is to produce colored spectra. Why? Evidently, because, by the principles of probability, it will rarely happen that colored lights converging from different directions will fall at just the right angles and in just the right proportions to be recombined into white light. So, when physicists meet with the phenomena of frictional and viscous resistance to a body in motion, although, according to their doctrine, if the molecules were to move with the same velocities in opposite directions the moving body would be accelerated, yet they say that the laws of probability, applied to the trillions of molecules concerned, render this practically certain not to occur. I do no more, then, than follow the usual method of the physicists, in calling in chance to explain the apparent violation of the law of energy which is presented by the phenomena of growth: only instead of chance as they understand it, I call in absolute chance. For many months, I endeavored to satisfy the data of the case with ordinary *quasi* chance; but it would not do. I believe that in a broad view of the universe, a simulation of a given elementary mode of action can hardly be explained except by supposing the genuine mode of action somewhere has place. If it is improbable that colored lights should fall together in just such a way as to give a white ray, is it not an equally

extraordinary thing that they should all be generated in such a way as to produce a white ray? If it is incredible that trillions of molecules in a fluid should strike a solid body moving through it so as to accelerate it, is it not marvellous that trillions of trillions of molecules all alike should ever have got so segregated as to create a state of things in which they should be practically certain to retard the body? It is far from easy to understand how mere positional forces could ever have brought about those vast congregations of similar atoms which we suppose to exist in every mass of gas, and by which we account for the apparent violations of the law of energy in the phenomena of the viscosity of the gas. There is no difficulty in seeing how sulphuric acid acting on marble may produce an aggregation of molecules of carbonic anhydride, because there are similar aggregations in the acid and in the marble; but how were such aggregations brought about in the first place? I will not go so far as to say that such a result is manifestly impossible with positional forces alone; but I do say that we cannot help suspecting that the simulated violation of the law of energy has a real violation of the same law as its ultimate explanation. Now, growth *appears* to violate the law of energy. To explain it, we must, at least, suppose a simulated, or *quasi*, chance, such as Darwin calls in to produce his fortuitous variations from strict heredity. It may be there is no real violation of the law, and no real chance; but even if there be nothing of the sort in the immediate phenomenon, can the conditions upon which the phenomenon depends have been brought about except by real chance? It is conceivable, again, that the law of the conservation of forces is not strictly accurate, and that, nevertheless, there is no absolute chance. But I think so much has been done to put the law of the conservation of forces upon the level of the other mechanical laws, that when one is led to entertain a serious doubt of the exactitude of that, one will be inclined to question the others.

Besides, few psychologists will deny the very intimate connection which seems to subsist between the law, or *quasi*-law, of growth and the law of habit, which is the principal, if not (as I hold it to be) the sole, law of mental action. Now, this law of habit

seems to be quite radically different in its general form from mechanical law, inasmuch as it would at once cease to operate if it were rigidly obeyed; since in that case all habits would at once become so fixed as to give room for no further formation of habits. In this point of view, then, growth seems to indicate a positive violation of law.

Let us now consider argument number 3: and remark how it fortifies number 1. Physical laws that appear to be radically different yet present some striking analogies. Electrical force appears to be polar. Its polarity is explained away by Franklin's one-fluid theory, but in that view the force is a repulsion. Now, gravitation is an attraction, and is, therefore, essentially different from electricity. Yet both vary inversely as the square of this distance. Radiation, likewise follows the same formula. In this last case, the formula, in one aspect of it, follows from the conservation of energy. In another aspect of it, it results from the principle of probability, and does not hold good, in a certain sense, when the light is concentrated by a lens free from spherical aberration. But neither the conservation of energy nor the principle of probability seems to afford any possible explanation of the application of this theory to gravitation nor to electricity. How, then, are such analogies to be explained? The law of the conservation of energy and that of the perduration of matter present so striking an analogy that it has blinded some powerful intellects to their radically different nature. The law of action and reaction, again, has often been stated as the law of the conservation of momentum. Yet it is not only an independent law, but is even of a contrary nature, inasmuch as it is only the algebraical sum of opposite momenta that is "conserved."* How is this striking analogy between three fundamental laws to be explained? Consider the still more obvious analogy between space and time. Newton argues that the laws of mechanics prove space and time to be absolute entities. Leibniz, on the other hand, takes them as laws of nature. Either view calls for an explanation of the

* The conservation of a vortex, which consists of the preservation of a certain character of motion by the same particles, though derived from the coöperation of other laws, is, in form, quite different.

analogy between them, which no such reflection as the impossibility of motion without that analogy can supply. Kant's theory seems to hint at the possibility of an explanation from both being derived from the nature of the same mind. Any three orthogonal directions* in space are exactly alike, yet are dynamically independent.

These things call for explanation ; yet no explanation of them can be given, if the laws are fundamentally original and absolute.

Moreover, law itself calls for explanation. But how is it to be explained if it is as fundamentally original and absolute as it is commonly supposed to be? Yet if it is not so absolute, there is such a phenomenon as absolute chance.

Thus, the chance which growth calls for is now seen to be absolute, not *quasi* chance.

Now consider argument number 2. The variety of the universe so far as it consists of unlikenesses between things calls for no explanation. But so far as it is a general character, it ought to be explained. The manifold diversity or specificcalness, in general, which we see whenever and wherever we open our eyes, constitutes its liveliness, or vivacity. The perception of it is a direct, though darkling, perception of God. Further explanation in that direction is uncalled for. But the question is, whether this manifold specificcalness was put into the universe at the outset, whether God created the universe in the infinitely distant past and has left it to its own machinery ever since, or whether there is an incessant influx of specificcalness. Some of us are evolutionists ; that is, we are so impressed with the pervasiveness of growth, whose course seems only here and there to be interrupted, that it seems to us that the universe as a whole, so far as anything can possibly be conceived or logically opined of the whole, should be conceived as growing. But others say, though parts of the universe simulate growth at intervals, yet there really is no growth on the whole,—no passage from a simpler to a more complex state of things, no increasing diversity.

Now, my argument is that, according to the principles of logic,

* In speaking of directions, we assume the Euclidean hypothesis that the angles of a triangle are equal to two right angles.

we never have a right to conclude that anything is absolutely inexplicable or unaccountable. For such a conclusion goes beyond what can be directly observed, and we have no right to conclude what goes beyond what we observe, except so far as it explains or accounts for what we observe. But it is no explanation or account of a fact to pronounce it inexplicable or unaccountable, or to pronounce any other fact so. Now, to say no process of diversification takes place in nature leaves the infinite diversity of nature unaccounted for ; while to say the diversity is the result of a general tendency to diversification is a perfectly logical probable inference. Suppose there be a general tendency to diversification ; what would be the consequence? Evidently, a high degree of diversity. But this is just what we find in nature. It does not answer the purpose to say there is diversity because God made it so, for we cannot tell what God would do, nor penetrate his counsels. We see what He *does* do, and nothing more. For the same reason one cannot logically infer the existence of God ; one can only know Him by direct perception.

It is to be noted that a general tendency to diversification does not explain diversity in its specific characters ; nor is this called for. Neither can such a tendency explain any specific fact. Any attempt to make use of the principle in that manner would be utterly illogical. But it can be used to explain universal facts, just as quasi-chance is used to explain statistical facts. Now, the diversity of nature is a universal fact.

To explain diversity is to go behind the chaos, to the original undiversified nothing. Diversificacity was the first germ.

Argument No. 4 was, upon its negative side, sufficiently well presented in my "Doctrine of Necessity Examined." Mechanical causation, if absolute, leaves nothing for consciousness to do in the world of matter ; and if the world of mind is merely a transcript of that of matter, there is nothing for consciousness to do even in the mental realm. The account of matters would be better, if it could be left out of account. But the positive part of the argument, showing what can be done to reinstate consciousness as a factor of the universe when once tyichism is admitted, is reinforced in the later papers. This ought to commend itself to Dr. Carus, who shows

himself fully alive to the importance of that part of the task of science which consists in bridging gaps. But consciousness, for the reason just stated, is not to be so reinstated without tychism ; nor can the work be accomplished by assigning to the mind an occult power, as in two theories to be considered in the section following this. As might be anticipated, (and a presumption of this kind is rarely falsified in metaphysics,) to bridge the gap synechism is required. Supposing matter to be but mind under the slavery of inveterate habit, the law of mind still applies to it. According to that law, consciousness subsides as habit becomes established, and is excited again at the breaking up of habit. But the highest quality of mind involves a great readiness to take habits, and a great readiness to lose them ; and this implies a degree of feeling neither very intense nor very feeble.

I have noticed above (§ 7) Dr. Carus's dubious attitude toward the first argument. I considered in the last section his attempted reply to the second. To the third argument, he replies (§ 65) that law ought to be accounted for by the principle of sufficient reason. But, of course, that principle cannot recommend itself to me, a realist ; for it is nothing but the lame attempt of a nominalist to wriggle out of his difficulties. Reasons explain nothing, except upon some theistic hypothesis which may be pardoned to the yearning heart of man, but which must appear doubtful in the eyes of philosophy, since it comes to this, that Tom, Dick, and Harry are competent to pry into the counsels of the Most High, and can invite in their cousins and sweethearts and sweethearts' cousins to look over the original designs of the Ancient of Days.

§ 27. My fourth argument it is which seems to have made most impression upon Dr. Carus's mind (§ 85), and his reply is rather elaborate.

While embracing unequivocally the necessitarian dogma, equally for mind and for matter (§ 193), Dr. Carus wishes utterly to repudiate materialism and the mechanical philosophy (§ 133). To facilitate his, thus, walking the slack-rope, he makes (§ 168) a division of events into "(1) mechanical, (2) physical, (3) chemical, (4) physiological, and (5) psychical events." The first three (§§ 169-171)

are merely distinguished by the magnitude of the moving masses, so that, for philosophical purposes, they do not differ at all. As for physiological events, though he devotes a paragraph (§ 172) to their definition, he utterly fails to distinguish them from the mechanical (including the physical and chemical) on the one hand, or from the psychical on the other. Dr. Carus seems to think (§ 176) that by this division he has separated himself entirely from the materialists; but this is an illusion, for nobody denies the existence of feelings.

The truth is, he distinctly enrolls himself in the mechanical army when he asserts that mental laws are of the same necessitarian character as mechanical laws (§ 193). The only question that remains as to his position is whether he is a materialist or not. He instances (§ 185) the case of a general receiving a written dispatch and being stimulated into great activity by its perusal, and causing great motions to be made and missiles to be sped in consequence. Now, the dilemma is this. Will Dr. Carus, on the one hand, say that the motion of those missiles was determined by mechanical laws alone, in which case, it would only be necessary to state all the positions and velocities of particles concerned, a hundred years before, to determine just how those bullets would move and, consequently, whether the guns were to be fired or not, and this would constitute him a materialist, or will he say that the laws of motion do not suffice to determine motions of matter, in which case, since they formally certainly do so suffice, they must be *violated*, and he will be giving to mind a direct dynamical power which is open to every objection that can be urged against tychism?

Now admire the decision with which he cuts the Gordian knot!

"THERE ARE NO PURELY MECHANICAL PHENOMENA." (§ 175.)

That is,

"*The laws of motion ARE applicable to and will explain all motions.*" (§ 177.)

But hold!

"The mechanical philosopher . . . feels warranted in the hope that . . . the actions of man . . . can be explained by the laws of motion . . . We may anticipate that this conclusion will prove ERRONEOUS. *And so it is.*" (§ 176.)

At the same time,

"NO OBJECTION CAN BE MADE *to the possibility of explaining the delicate motions*

in the nervous substance of the brain by the laws of molar or molecular mechanics."
(¶ 178.)

Yet,

"The simplest psychical reflexes, including those physiological reflexes which we must suppose to have originated by conscious adaptation CANNOT be explained from mechanical or physical laws alone." (¶ 186.)

However,

"We do NOT say that there are motions in the brain which form exceptions to the laws of mechanics." (¶ 187.)

Nevertheless,

"The brain-atoms are possessed of the same spontaneity as the atoms of a gravitating stone. Yet there is present an additional feature; there are present states of awareness Neither states of awareness nor their meanings can be weighed on any scales, be they ever so delicate, nor are they determinable in foot-pounds." (¶ 192.)

Clearness is the first merit of a philosopher; and what ¶ 192 comes to is crystal-clear. Dr. Carus wants to have the three laws of motion always obeyed; but he wishes the forces between the molecules to be varied according to the momentary states of awareness. All right: he is entitled to suppose whatever he likes, so long as the supposition is self-consistent, as this supposition is. It conflicts with the law of energy, it is true; for that law is that the forces depend on the situations of the particles alone, and not on the time. It is liable to give rise to perpetual motion. It was intended, no doubt, to be an improvement on my molecular theory of protoplasm, earlier in the same number. It escapes materialism. It supposes a direct dynamical action between mind and matter, such as has not been supposed by any eminent philosopher that I know of for centuries. I am sorry to say that it shows a dangerous leaning toward originality. The argument for thus rejecting the law of the conservation of energy, I leave to others to be weighed. It seems to suppose a much larger falsification of that law than my doctrine; but it is a pretty clever attempt to escape my conclusions. It rejects what has to be rejected, the law of the conservation of energy; and is far more intelligent than the theory of those (like Oliver and Lodge) who wish to give to mind a power of deflecting atoms, which would

satisfy the conservation of energy while violating the law of action and reaction. If it can have due consideration, I doubt not it will accelerate the acceptance of my views. Meantime, I do not see where that "inextricable confusion" into which I was to be led is to come in. (§ 4.)

§ 28. Little more requires to be noticed in Dr. Carus's articles. He admits (§ 2) that indeterminism is the more natural belief, which is no slight argument in its favor.

§ 29. The remarks upon the theological bearings of the theories, if they are found somewhat wide of the mark, are explained by the haste of the editor to show just what all the affiliations of my views were, before I had had time to explain what those views are. The remarks to which I refer will be found in §§ 3, 36, 81, 82, 83, 128, 203, 204. They are worth putting together.

§ 30. The doctrine of symbolism, to which Dr. Carus has recourse, seems to be similar to that of my essay "Some Consequences of Four Incapacities" (*Journal of Speculative Philosophy*, II.) (§§ 180, 183, 199.) On this head, I can only approve of his ideas.

§ 31. It is true that I wrote many definitions for one of the "encyclopedia lexicons." But they were necessarily rather vaguely expressed, in order to include the popular use of terms, and in some cases were modified by proof-readers or editors; and for reasons not needful here to explain, they are hardly such as I should give in a Philosophical Dictionary proper.

C. S. PEIRCE.