

Force and matter : empirico-philosophical studies, intelligibly rendered with an additional introduction expressly written for this edition / by Louis Büchner ; edited, from the last edition of "Kraft und Stoff," by J. Frederick Collingwood.

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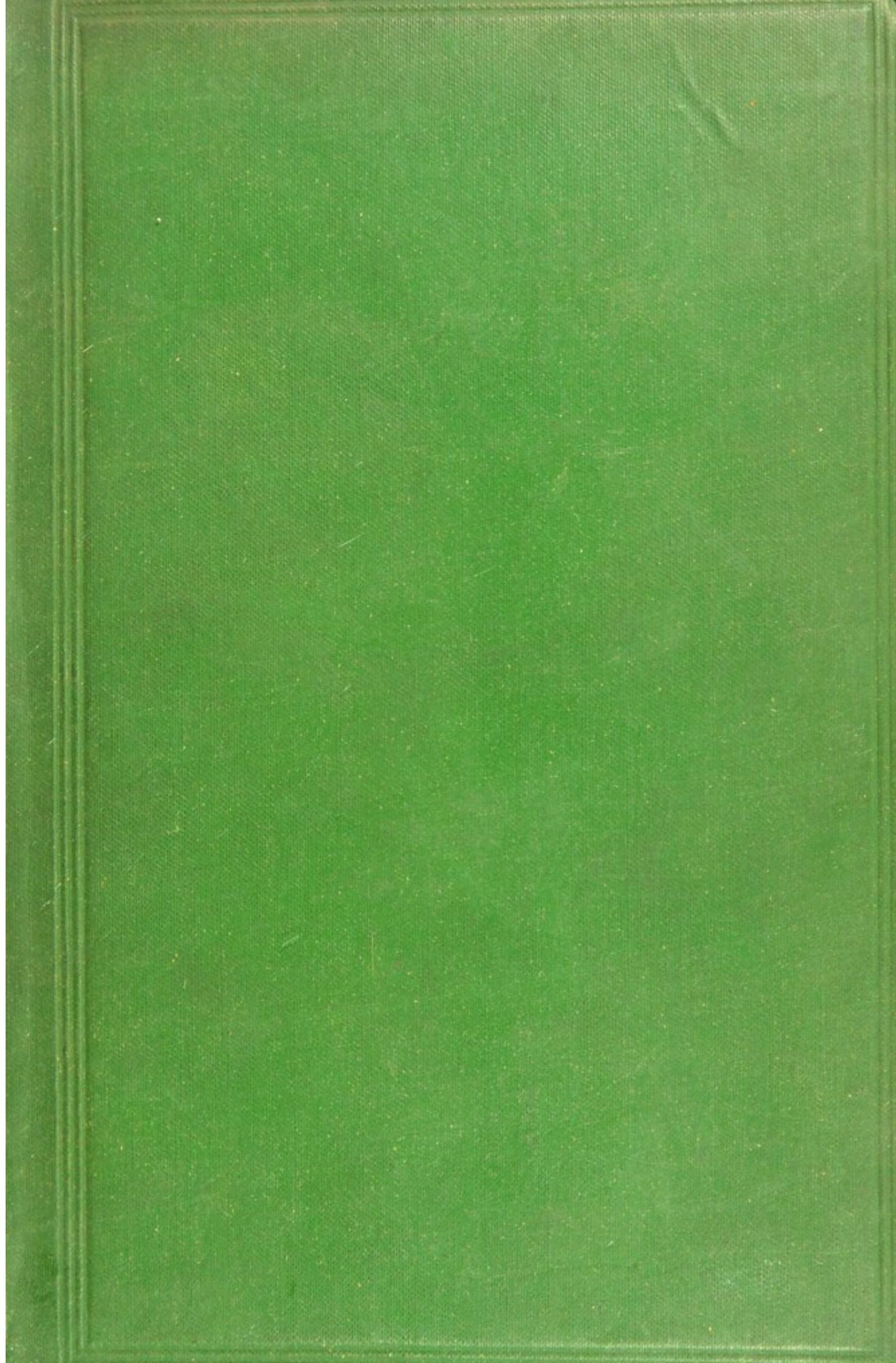
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Dr. L. Büchner

London, 6/8 1864.

FORCE AND MATTER:

EMPIRICO-PHILOSOPHICAL STUDIES,

INTELLIGIBLY RENDERED.

WITH AN ADDITIONAL INTRODUCTION EXPRESSLY WRITTEN

FOR THIS EDITION.

BY

Dr. Louis Büchner,

PRESIDENT OF THE MEDICAL ASSOCIATION OF HESSEN-DARMSTADT,
ETC., ETC.

EDITED,

FROM THE LAST EDITION OF "KRAFT UND STOFF",

BY

J. FREDERICK COLLINGWOOD,

F.R.S.L., F.G.S.

LONDON:

TRÜBNER & CO., 60 PATERNOSTER ROW.

1864.

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CONTENTS.

	PAGE
ADVERTISEMENT BY THE EDITOR	v
LETTER TO THE EDITOR	vii
PREFACE TO THE FIRST EDITION	xvii
PREFACE TO THE THIRD EDITION	xxi
PREFACE TO THE FOURTH EDITION	xliii
CHAPTER	
I. FORCE AND MATTER	1
II. IMMORTALITY OF MATTER	9
III. IMMORTALITY OF FORCE	16
IV. INFINITY OF MATTER	23
V. DIGNITY OF MATTER	28
VI. IMMUTABILITY OF THE LAWS OF NATURE ...	33
VII. UNIVERSALITY OF THE LAWS OF NATURE ...	44
VIII. THE HEAVENS	51
IX. PERIODS OF THE CREATION OF THE EARTH ...	56
X. PRIMEVAL GENERATION	63
XI. DESIGN IN NATURE	89

CHAPTER	PAGE
XII. BRAIN AND SOUL 	106
XIII. THOUGHT 	135
XIV. THE SEAT OF THE SOUL 	141
XV. INNATE IDEAS 	157
XVI. THE IDEA OF A GOD 	184
XVII. PERSONAL CONTINUANCE 	195
XVIII. VITAL FORCE 	215
XIX. THE SOUL OF BRUTES 	226
XX. FREE WILL 	239
XXI. CONCLUDING OBSERVATIONS 	251

ERRATA.

- Page 39 line 1 *for* "natual" *read* natural.
 76 ,, 5 ,, "Pesherais" ,, Pescheraes.
 86 in note ,, "facial" ,, cranial.
 110 line 7 ,, "Huscke" ,, Huschke.
 241 ,, 8 ,, "Dammars" Damaras.

ADVERTISEMENT BY THE EDITOR.

DR. Louis Büchner's *Kraft und Stoff*, of which the following pages are a complete translation from the last (eighth now publishing) edition, has attracted so much attention in Germany, and also in France, Russia, America, Denmark, and Holland, where it has been re-produced, that, in the opinion of the Editor, it should be admitted to the rolls of English literature. Its subject-matter may not be new to well informed persons, as it does not aim at original scientific investigation; but the manner of treatment adopted by its accomplished author will be highly appreciated by those who wish for the advancement of mankind through the free exercise of thought. The Editor does not bring out this volume as one entirely in ac-

cordance with his opinions, for he cannot always subscribe to the alleged facts contained therein, nor does he agree in all the inferences drawn from these facts; nevertheless, he finds much pleasure in introducing to the English Reader a work, whose great merit is an attempt to elicit truth and to overthrow prejudice, and whose chief attraction will be found in the clear, vigorous, earnest, and often eloquent language in which its arguments are conveyed.

The Author, in the following letter, written expressly for this edition, addresses the English public at some length, and thereby renders further comments of the Editor superfluous.

J. F. C.

London, April 1864.

LETTER TO THE EDITOR.

Darmstadt, October 23, 1863.

SIR,

Your communication, informing me of your intention to edit an English version of my work *Kraft und Stoff*, has afforded me greater pleasure than similar offers from other countries, chiefly for the subjoined reasons, which may serve as a preliminary to the *Introduction* which you request me to write. In the first place, I entertain the hope that the fusion of philosophy with actual observation which pervades my work, will be more acceptable to your countrymen than to my own compatriots, among whom the belief in the wonders of a supersensual speculation still appears to be stronger than the faith in reality, and that consequently my work may not in England have to struggle against such gross misinterpretations as was the case in Germany—at least as far as the facts are concerned. Secondly, because it is just the works of eminent Englishmen which have, within the last few

years, given an unhopèd for support to my mode of viewing natural phenomena, so that we may expect a reformation of the greater part of the hitherto prevalent theories about nature and the world. In writing this work I was, like your own authors, not merely influenced by the simple love for truth, but, in addition, by that philosophical principle in human nature, which does not rest satisfied with accepting the phenomena of nature as individual and incomprehensible facts, but endeavours to comprehend them in their intimate connection and their philosophical unity. I certainly soon perceived, that, in the then condition of science, such an attempt was too bold, perhaps too much for an individual, and that I should have to sustain a fierce struggle with the prejudices of the age, which might, moreover, compromise my social position. In spite of all this I made the attempt, without anticipating (what has since happened) that the progressive knowledge of the laws of nature would, within so short of time, confirm some of the most important fundamental principles of my work, then deemed so presumptuous.

When, nine years ago, I wrote *Kraft und Stoff*, I could not know that what I called "the immortality of matter," would soon find a necessary correlate in the now undoubted "conservation or immortality of force;" I could not know that the dogmata concerning the non-existence of primæval (spontaneous) generation, and the immuta-

bility of species, which were then considered almost too sacred for attack, would soon experience such severe shocks, and that the celebrated theory of Darwin would reduce the whole organic world, past and present, to one great fundamental conception; I could not know that the necessary scientific basis for either of these theories, or the cellular theory, would, within the same time, receive such a development as to be as applicable both to the animal and to the vegetable world; I could not know that the old and apparently unshakeable dogma of man's recent appearance on the earth would break down at once, and remove the age of man to such remote periods, that my assertion as regards the slow evolution of man from an animal form to his actual condition would thus become conceivable; I could not know that, on the one hand, species of apes would be discovered resembling man still more than the then known anthropoid apes, and that, on the other hand, fossil skulls and bones would be found which partly fill up the apparent gulf between man and brute; I could not know that the beautiful discovery of the analysis of the spectrum would confirm my assertion of the celestial bodies being composed of the same material elements, and that the geology which I defended would carry the day over the old geology with its catastrophes and revolutions; I could not foresee that the doctrine of the brain being the organ of the mind, which was then contested,

would by the progress of physiology and psychiatry be so soon placed beyond any doubt; or that my opinion in relation to the silly theory of vital force would be well supported and confirmed by the results obtained by synthetic chemistry; I could not know that my views regarding the doctrine of design in nature would be supported by Darwin's theory; finally, I could not anticipate that the boldness with which I condemned the German speculative or scholastic philosophy, at a time when it possessed great authority, and was by the great majority looked upon as containing the highest product of the human mind, a mystery accessible only to the select few, would so soon find its justification in the works of authors who possessed a greater knowledge of that philosophy than I lay claim to. A philosophy which searches out the truth for its own sake, and not, according to the axiom *Primum vivere, deinde philosophari*, to obtain a chair, will search for and find its nourishment upon the soil of experience and of facts, as all our knowledge grows up from this soil, and as all the wealth of the human mind is but an accumulation of the treasures so obtained. Infinitely slow has been the evolution of the human mind from its primitive state, oppressed, as it were, by the natural forces, until it arrived at an independent condition. With the growth of this independence, the fear of and the dependence on nature must give way, and the knowledge of the

laws immanent and immutable in nature must displace the superstition which torments the ignorant, and prevents the free development of his powers. With every step in advance, science conquers fresh soil for law and order, and removes superstition. That it must have taken a long time before the mind could shake off the fetters of the natural forces, so as to feel the desire of inquiring into the laws of nature, and finding a clue in the immense chaos of natural phenomena, will surprise no one acquainted with the history of science. The greatest difficulty which the human mind seems to have to contend with, is to find the link which connects man with nature in general, because man's pride of his self-consciousness, combined with the profound ignorance as regards this origin, tends to veil the truth from him. But, despite all obstructions, human knowledge appears to have reached a point, beyond which the human mind enters a region of light and truth. Well does your learned countryman, Professor Huxley, in his excellent work on "Man's Place in Nature," liken the mental development of humanity to the metamorphosis of the caterpillar into the butterfly, by the periodical castings of its skin; and that by the stimulating influences of the progress of physical science during the last fifty years, the human mind has entered another stadium, which renders a new ecdysis requisite. "Such a process," he adds, "is usually accom-

panied by pain and sickness ; and that it was consequently the duty of every good citizen to facilitate this process, and to ease the cracking of the old integument."

It may, with truth, be said that, in the history of human development, no ecdysis can be found equal in magnitude and importance to that which now seems imminent. What mental progress can be compared to the knowledge that man is not, as hitherto erroneously assumed, physically and mentally separated from and opposed to nature ; but that he is the product of nature's gradually developed forces ; and further, that this nature is not a chaos of incomprehensible lawless forces, but a connected whole, subject to eternal laws in a constant state of progressive development, so that, in the lapse of time, the most stupendous effects are produced by apparently insignificant causes ; and further, that the universe, the suns and planets, the wonderful organisms, from the minutest infusorium up to the antediluvian giants, and even the human mind in its grandest manifestations, are composed of and produced by the same materials and forces ! This is a stand-point which, in magnitude and sublimity, yields to no other ; and, could it be occupied by all (many years must elapse ere this may happen), a spirit of repose, serenity, and kindness would be infused into the minds of men, and genuine humanity would obtain the victory over the gloomy spirit

of the past. The silly disputes about religious things, which have done so much injury to humanity and prevented its progress, will cease; and the horrors and persecutions to which they gave rise will be superseded by universal philanthropy. Man, no longer deeming himself a stranger to nature which has formed and given him all he possesses, will now consider himself to be nature's noblest and best son; no childish fear of spirits or supernatural influences will frighten his mind or impede his free progress; nay, religion itself will become more spiritualised by the elimination of the crude and senseless imaginings of past times, inasmuch as the supreme government of the world will no longer be considered as the attribute of a personal arbitrary power, giving and interrupting its own laws, but as the highest law itself, the source of all phenomena. From this purification of our conceptions science will derive the greatest advantages, since nothing has so much impeded its progress as senseless natural and supernatural explanations. If this couch for mental laziness be removed, science will acquire a fixed character in the search for objective truth, and no appeal to supernatural influence or interference will blunt the stimulus which incites men of science to search out the truth. What cannot be traced in its connections, is on that account neither unnatural nor supernatural, but is simply a problem the solution of which is reserved for the future. That

our knowledge as regards the universe is confined within narrow limits, does not justify arbitrary and unscientific assumptions, which render real knowledge to a certain extent impossible.

You will, respected sir, thus perceive that our so-called materialism in Germany is neither so senseless nor baseless as our numerous opponents, in their multifarious polemical pamphlets, try to persuade the public; and that, in *ideal* value, it excels the majority of opposite theories. There can scarcely be a more ideal conception than the *unity* of all physical and mental existence in the same fundamental laws and causes! To conceive this unity may, perhaps, be easier for the unlearned than for the majority of our scholars, who, occupied with details, are less able to perceive the connection of the whole; many of whom, therefore, are the bitter opponents of our views of nature. This opposition is, however, of but small importance; as those only can claim the right of passing judgment who, having surveyed the facts ascertained by science, draw their inferences from the philosophical combination of all details.

“It is only the survey of the whole”—thus lately wrote to me a distinguished German scholar (whose fault is *not* to lose himself in details)—“which could point out the right path!”

“Comparative, assisted by microscopic, anatomy, broke down the old barriers; palæontology filled up the gaps by intermediate forms;

geology taught that the natural forces had never been different from what they are at present ; physiology showed the dependence of the intellectual capacities and their development on organisation ; psychology teaches that reason is an acquired faculty ; anthropology finally points out the development of the races ; history and philology exhibit the rude beginnings. All our civilisation, the basis of humanity, is not nature, but art—the toilsome education of the race and of individuals, effected in thousands of years : and the physical development, from the first moment of generation, is in every individual merely a repetition of the same laws of development to which the organic world owes its existence ! How simple does all this appear to us, how forcible the inferences, were not the ‘ifs’ and the ‘buts’ rendering the minds of so many men inaccessible to the truth ! That this mode of viewing nature will ultimately prevail, I entertain no doubt whatever.”

This much, sir, I felt urged to write, by way of introduction to your English edition of my so vehemently attacked work. You and your readers will find it but natural that, during the eight years which have elapsed since the first edition of this work was issued, my views should in their expansion have partly changed, or been confirmed, an account of which is contained in my, since then, published works, *Physiologische Bilder* (Leipzig, Thomas, 1861), and *Aus Natur*

und Wissenschaft; Studien, Kritiken und Abhandlungen (ibid., 1862).

I would request those of your critics who feel it their duty to pass judgment on my philosophy, to refrain doing so until they have perused the above two works.

Accept, sir, the assurance of my high esteem.

DR. LOUIS BÜCHNER.

To J. F. COLLINGWOOD, Esq., F.R.S.L., F.G.S., ETC.

PREFACE TO THE FIRST EDITION.*

“ Now, what I want is—facts.”

Boz.

THE following pages pretend neither to establish a system nor to be exhaustive. They are merely scattered, though necessarily connected, thoughts and observations, which, on account of the difficulty of mastering all the facts of empirical and natural science, may perhaps meet with some indulgence on the part of the scientific critic. If we may, at the outset, claim any credit, it is for our determination to speak the truth, regardless of the unavoidable consequences of our mode of viewing nature. Things cannot be represented different from what they *are*; and nothing appears to us more perverse than the efforts of respectable naturalists to introduce *orthodoxy* in the natural sciences. We do not boast of having produced anything new. Similar ideas have been promulgated at *all* times, partly by old Greek and Indian philosophers; but the necessary empirical basis furnished by modern science was then wanting. Hence the present views are, in respect to their clearness, a conquest of modern empirical science. The scholastic phi-

* Written at Tübingen in the year 1855.

losophy, still riding upon its high, though terribly emaciated horse, conceives that it has long ago done with such theories, and has consigned them, ticketed "materialism", "sensualism", "determinism", to the scientific lumber-room, or, as the phrase goes, has assigned them their "historical value". But this philosophy sinks daily in the estimation of the public, and loses its ground opposed to natural science, which gradually establishes the fact that macrocosmic and microcosmic existence obeys in its origin, life, and decay, mechanical laws inherent in the things themselves.

Proceeding from the fixed relation between matter and force as an indestructible basis, empirical philosophy must arrive at results which discard every kind of supranaturalism and idealism in the explanation of natural events, considering the latter as perfectly independent of any external power. The final victory of this kind of philosophical cognition cannot be doubted. The strength of its proofs lies in *facts*, not in unintelligible and empty phrases. There is, in the end, no fighting against facts; it is like kicking against the pricks.

It is needless to observe that our expositions have nought in common with the conceptions of the old "natural-philosophical" school. The singular attempts to construe nature out of thought instead of from observation have failed, and brought the adherents to that school into

such discredit, that the name "natural-philosopher" has become a byword and a nickname. It is clear that the reproach does only attach to a certain school, not to the philosophy of nature. Nature and observation is the watchword of our time. The failure of the attempts of the old school, clearly proves that the world is not the realisation of an individual creative intelligence, but a complex of things and facts, which we must examine as it is, not as our fancy imagines it. "We must take things as they really are," says Virchow, "not as we imagine them to be." We shall endeavour to support our views by plain facts, and avoid as much as possible that philosophical technical language which has brought theoretical philosophy, especially the German, into bad repute. It lies in the nature of philosophy that it should be common property. Expositions which are not intelligible to an educated man, are scarcely worth the ink they are printed with. Whatever is clearly conceived can be clearly expressed. The philosophical mists which envelope the writings of scholars, appear intended more to conceal than to exhibit their thoughts.

The times of scholastic bombast, of philosophical charlatanism, or, as Cotta says, of intellectual jugglery, are passing away. May our German philosophy soon perceive that words are not facts, and that, to be understood, we must use intelligible language.

We shall not be in want of opponents ; but we shall only notice those who speak from experience, and combat us with facts. Speculative philosophers may fight among themselves from their own points of view ; but they should not delude themselves into the belief that they alone are in possession of philosophical truth. " Speculation," says Ludwig Feuerbach, " is philosophy intoxicated ; let philosophy get sober again ; it will then be to the mind what pure spring water is to the body."

PREFACE TO THE THIRD EDITION.

“Nothing is so irresistible as truth, as nature.”

GEORGE FORSTER.

Two editions having been exhausted within a few months, the author, in taking up his pen to write a preface to this third edition, feels himself seized by conflicting emotions, of the nature of which he vainly endeavours to give a faithful representation. It is not vanity, though that might be excusable in an author who meets with so much success in his first work; it is a feeling superior to all selfish considerations. He ascribes his success rather to the remarkable intellectual direction of the time in which we live. *Apparently* sunk into a torpid and relaxed state, and seemingly incapable of taking any lively interest in progress, there is nevertheless a deep intellectual undercurrent not visible to the superficial observer.

On investigating the causes of this intellectual commotion, we believe they are to be found in the influence which the development of the natural sciences has for some years past exercised on mental activity. This influence proceeds slowly and noiselessly, but irresistibly. The great discoveries in these sciences have opened to nations

and to individuals new and vast prospects. By directing investigation to facts, they have compelled thought to leave the misty and sterile regions of speculative dreams, and to descend to real life. There has thus been given to thought a direction opposed to a blind belief in authorities, or mental slavery, which has produced an agitation that finally will lead to good results.

Having premised this much, the author hopes that the reader will excuse him if he now undertakes to reply to some criticisms and some public attacks, of which this work, since its appearance, has been the object.

Seizing upon some defects of style, expressions, and apparent contradictions, these opponents thought that they could refute views and inferences, the gist of which was, from want of scientific research, perfectly unintelligible to them. We were the less bound to break silence, from having, in our preface to the first edition, expressly declared that we should only notice such critics as meet us with facts. None of our opponents have attempted to do so; we merely hear the well-known phrases of philosophical intolerance, of religious fanaticism, and of gross ignorance. If, then, despite of our principle, we defend ourselves, we are induced to do so by the urgent desire of our publisher, and still more on account of the large number of our readers whose avocations may not enable them at first sight to detect the sophistry of our opponents.

An author, it is true, should not be very sensitive; and, however severe and lacerating a criticism may be, he must needs submit to it. But the tone which some of *our* critics have assumed transgresses the limits of legitimate censure, and is more adapted to that pothouse of which Carl Gutzkow speaks in his *Domestic Dialogues*; self-defence becomes then a necessity.

The attacks made upon the author and his work are too numerous to enable him to reply to all of them. We shall, therefore, confine ourselves to a few of the principal.

We shall pass over the fierce denunciations of the *Frankfurter Katholische Kirchenblatt* (vol. xxvi, page 55), conducted by parish priest Beda Weber. The melancholy notoriety which that individual has acquired, as one of the most eccentric of the Ultramontane party, permits us simply to dismiss him. We shall only tell the reader that the *Frankfurter Kirchenblatt* carries its hatred against the modern direction of science so far as to recommend the application of the criminal law against its representatives. The public may thus learn what these gentlemen are capable of, should they ever become possessed of power. The same bloody hatred with which science was once persecuted by religious fanaticism would revive anew, and with it the inquisition and *auto da fés*, and all the horrors with which a refined zealotism has tortured humanity, would be resorted to, to satisfy the wishes of these theolo-

gical cut-throats. We must turn from these enemies, quite unworthy of a serious refutation, to another opponent.

The *Allgemeine Zeitung*, it is well known, is better informed of everything which passes in heaven and upon earth than God himself. We were, therefore, not surprised to find in the supplement of the 21st August, 1855, an article entitled "Philosophy and Materialism", in which a learned Munich critic enlightens us and the public concerning the weakness of our position, and the wrong done to speculative philosophy. This critic considers our work perfectly insignificant, yet noteworthy as a sign of the times. The tone, however, shows that our metaphysician is somewhat doubtful whether the realistic tendency represented by us may not diminish the value of his philosophical lectures, to be delivered in the ensuing university terms. The little wooden thrones, from which these gentlemen were hitherto in the habit of exhibiting to the public their philosophical dissolving views, begin to totter and threaten to fall to pieces. It is not astonishing, then, that a cry of lamentation arises, which is always heard when life or property is in danger.

Our critic, as may be easily conceived, is not only wiser and better informed than we are, but is even superior to revelation, religion, and all philosophical systems, which he considers as views already estimated according to their value,

and which have only been subservient to prepare the ground for the last discovery of speculative philosophy. This mighty discovery—let the reader listen and be astonished, and let him not hesitate to take off his hat and bow in humble submission—consists in a “self-conscious, all-penetrating God”, in whom the critic finds “the basis for the effects in nature and history.” Modern philosophy has, according to him, proved that time and space are the forms in which the ideal being of spirit manifests and realises itself; so that God is not beyond, but fills and penetrates, time and space. If *this* be the quintessence of the new philosophy, certainly no one whom the sublime nonsense of this philosophical hypothesis cannot render happy, can entertain a doubt as to the justice of our remarks on the speculative absurdities of our philosophers. “Self-consciousness—all-penetrating—realisation of the ideal being of spirit—space and time filling”—truly a great deal for one God, who, as it seems, is not merely to satisfy the philosopher, but also the theologian! let, then, philosophy continue to find in this manner the basis of all the facts in nature and the events in history; natural science will never be tempted to follow it in its erratic flights.

The first principle, according to our critic, is our self-consciousness—the *cogito ergo sum*. It is a pity that the representatives of the latest philosophical theory were obliged to resort to an

antiquated logical *petitio principii* like the *cogito ergo sum* (I think, and therefore I exist). The "I think" pre-supposes the "I am", for he who is not, thinks not. We might as well say, the dog barks, therefore the dog exists. The plainest intellect must perceive that nothing is gained and nothing refuted by such a play upon words. That self-consciousness, or the cognition of the *ego* is nothing absolute, nothing supernatural, as spiritual philosophy asserts, but a purely relative notion, acquired in a sensual and objective way, may be inferred from the development of the child's mind, which only gradually and from experience arrives at the cognition of his personality (see the chapter on "Innate Ideas"). The animal also possesses an *ego* and self-consciousness; but nobody is inclined to consider this consciousness as something absolute or divine.

With regard to the relation of spirit and matter, our critic thinks he can refute us in pointing out the impossibility of explaining the mode of their connection. He must only have skimmed over what we stated on this subject. We have nowhere asserted that we are able to give any explanation. Here and there we only attempted to indicate the *possibility* of understanding the connection. The gist of our assertion lies in the regularity and necessity of the connection between matter and mind, and in their inseparability, assertions which we believe to have *proved*. He cannot be helped, who is wilfully

blind to facts. Our critic fights against wind-mills in bringing to his aid the passage of Vogt on the connection of brain and soul, inasmuch as we have written a separate chapter against Vogt's comparison.

This critic has, also, his peculiar views respecting the forces and causes producing the living organism. No naturalist, he contends, has yet been able to explain how, by merely mechanical, physical, or chemical forces, an eye, for instance, might be formed. Indeed, no naturalist has yet attempted such an unprofitable task. The naturalist merely proves that there are no other forces in nature beside the physical, chemical, and mechanical; and infers irresistibly that the organisms must also have been produced by these forces. As to the *how*, it must be admitted that our knowledge is but scanty, and perhaps can never be complete; but that it *is* so cannot be doubted. But to return to our critic, who believes that it is incogitable or impossible that the mechanical, physical, or chemical forces should have formed an eye: we might ask him, if *not these*, what else? Vital force cannot be appealed to; that is scientifically dead. The critic can only reply, "Self-conscious, all-penetrating divinity has formed it." We reply with a second question, "What has formed that God?" Answer: "He has either created himself, or he is eternal." But, if so perfect a being like God has created itself, why should not so imperfect

a being as the world, an organism, an eye, have been formed by its own forces? But if God is called eternal, the world is also eternal, and thus excludes the idea of a causal principle, or renders it unnecessary. Therefore—*quod erat demonstrandum*—nature, with its mechanical, chemical, and physical forces, is the producer of the organisms. The search of philosophers after a first cause is like ascending an endless ladder.

What our critic further says on the relation of modern philosophy to spiritualism on the one hand, and to materialism on the other, we confess it without shame, is perfectly unintelligible to us. The “thought filter” (to use his own expression) of our critic is, no doubt, more finely organised than ours, so that it can retain an obscure adage of mystical philosophy which escapes through the coarse loops of *our* cerebral fibres.

And because, finally, we have proved by facts that there subsists no *qualitative* but only a *quantitative* difference between the human and the animal soul, a subject easily to be understood, and about which there exists scarcely any difference of opinion among educated people, our critic maintains that we proclaim the brutalisation of humanity. If some one were to say, “the ass is a stupid animal because the oven is black”, the assertion would indicate as much acuteness as that of our opponent. In struggling with such pen-heroes, it seems to us that we are acting like

Don Quixote. We must, then, give in, and allow the *Allgemeine Zeitung* to spread its privileged old professorial and ex-cathedra wisdom over all Germany.

Another man now throws from his "domestic hearth" his blunt lance in our face. No one who has read our work can doubt that it is not adapted for conversation at the fire-side. Yet Mr. Karl Gutzkow could not deny himself the pleasure of bringing our "Titanic Force and Matter", as he is pleased to call it, before the forum of coffee-pots and frying-pans.* In such company he attacks the tendency of a philosophy which must certainly from such a stand-point appear "Titanic". Mr. Gutzkow, as is well known, has never impeded the daring flight of his genius by the ballast of science; and no one would have felt hurt if he had confined his observations within the modest sphere of his intellectuality, and had kept his thoughts concerning "Force and Matter" to himself. But his courageous ambition impelled him to attack the Titanic work on its strongest side. The author has no idea of instructing Mr. Gutzkow; and, to show to him how utterly untenable are his arguments in favour of poor, expiring vital force, he would only remind him, in his own interest, that the noble valour with which the "Domestic Hearth" defends the oppressed vitality is this

* See Karl Gutzkow, *Unterhaltungen aus häuslichen Herd*, No. 51, 1855, "Anregungen".

time not allied to discretion. When, therefore, Mr. Gutzkow observes that candour is praiseworthy, but that courage and discretion should be united, we cannot conceive why he did not follow the precept himself. If he would take the trouble of being for one or two terms a pupil of the philosopher of the *Allgemeine Zeitung*, to learn some speculative sophisms in regard to time and space, and an all-penetrating divinity, then he would, in case he should again attack our Titanic work, know how to unite domestic nonsense with undomestic unintelligibility. But let him, until he has done so, remain in the harmless sphere of his "Erwägungen", and let him apply his popular efforts to *learning* something from popular books, instead of showing a want of discretion in criticising them. In this manner the author of the *Ritter vom Geiste* may gradually succeed in acquiring some notions of the spirit which animates modern natural science.

From Mr. Gutzkow we pass to his quondam friend and fellow-labourer in the literary vineyard, Mr. Wolfgang Menzel in Stuttgart, whose very old and recently resuscitated *Literaturblatt* (No. 25, Jan. 1855) opened a similar crusade against us and the hydra of materialism. "Old love," says the proverb, "does not become rusty." We find, therefore, after a long enmity, the former demagogue and devourer of the French, and the quondam leader of Young Germany,

standing before the walls of materialism and attacking it with the same weapons. May this new harmony between them never again be disturbed!

Despite the change of his convictions, Menzel's manner has always remained the same as it was thirty years ago. He finds a singular pleasure in coarse epithets, such as "the most vulgar blasphemy," "man the son of a monkey, a bestial machine, a brute automaton, the meanest empiricism, contamination of youth," etc. However little such expressions are worthy of an educated man, they do not surprise us in Menzel, having been long accustomed to find them in his writings. Almost in every branch of literature there are some persons who, by a long-continued vulgarity, have acquired a license which they use at every opportunity.

We can the less conceive why Mr. Menzel should be so angry with us, inasmuch as he declares that we do not produce "a single new and original idea", but have merely copied "the well known principles of old and modern materialists." The same reproach has been made to us in several quarters. Thus the *Spencersche Zeitung* reproaches us for having appropriated other persons' thoughts, being deficient in original ideas. If this really be so—and we are not bold enough to say we could produce a thought which has not already been expressed before our time—if this be so, whence that violent anger which

Menzel and many others have exhibited against us? Have these terrible enemies, from whom we have copied, not been long exterminated by Menzel and his companions? The feeling of their own weakness in contending against our facts has blinded our opponents, so that they strike in the dark. They feel vexed that we were not so imprudent to venture *alone* upon the battle-field, but took the precaution of supporting our views by the opinions of noted scientific and philosophical writers of ancient and modern times. With regard to these facts, it is self-evident that they could not have been established by the author; for they are the results of the laborious investigations of a vast number of inquirers. Our opponents should, besides, consider that *we* are not the inventors of the world, and are therefore not responsible for the deductions which the contemplation of nature may impress upon the human mind. If Mr. Menzel is not pleased with the facts, which he is neither willing nor able to deny, he must quarrel with *his* creator, not with us.

But, though we may not be able to find any justification for Mr. Menzel's wrath with regard to the facts, we still think there is some other ground for it. In the introduction of Mr. Menzel's review of our work occurs the following passage: "This book, written with much apparent calmness, nay, with a certain unction and immense self-sufficiency, conceals yet beneath its

phlegmatic physiognomy the most virulent hatred of Christianity.”

It is, then, our calmness which so excites Menzel's bile. He finds it revolting that other persons do not write with such passionate coarseness as he does. The fact is, that every one who is solely intent in search of truth deduced from actual facts, will always write with calmness in treating of difficult problems. With regard to our presumed hatred of Christianity, we merely reply that it is never mentioned.

Galloping upon a higher steed than those already mentioned, we find a Mr. T., the correspondent of the Berlin *National Zeitung* (No. 401, 1855). Mr. T., a philosopher by his marks, commences his polemic by citing the old Grecian myth of Ixion, who, sitting at the table of the gods, fell in love with Juno, and was for his presumption cast straightway into the infernal regions. If, then, we have understood him rightly, he means to say that the attempt to solve the last problems of the world and of existence is pure presumption. The critic greatly overvalues our humble investigations, in attributing to us the pretension of solving these problems. In a passage (see the chapter on “Personal Continuance”) we expressly state the problem to be insoluble. No philosophy pretends less than ours to have grasped “the highest truth,” to use the expression of the critic. But, granting that the last problem is insoluble, how can any rational

man deduce from this admission that the philosophical investigation of actual existence from experience should be abandoned?

Like the critic of the *Allgemeine Zeitung*, Mr. T. passes over the main parts of our investigations, and attacks us immediately by pointing out the inexplicability of the relation of mind and matter, of brain and soul. We do not assert that we can give any explanation; we have merely endeavoured to prove by facts, which no one can deny, that matter and mind are inseparable, and necessarily determine each other, just as matter and force.

That we are able mentally to separate, and even to oppose, matter and mind, proves nothing in favour of the reality of their separate existence. The comparison of organic with mechanical activity, which Mr. T. considers as "frivolous," was expressly stated to be merely approximative. In consideration of such misconception, we regret even to have, in some passages, given some indications as to the possibility of understanding the relations of matter to mind. We should have taken the matter easy, and have said it is so, *explain* it in your own way. If Mr. T. has better words for expressing the inexplicable internal relations than we can command, let him give them to the thirsty world; we shall then see whether "confusion and want of clearness, awkwardness and obscurity of definitions," are more frequent among materialists than among the dialectic philosophers.

This "practised dialectician" is angry with us for using the expressions "ideal," "immaterial," etc., and calls us "Saul among the prophets." Mr. T. has, in spite of his philosophical education, not understood us. Let him point out a single passage in which we *deny* "the idea". We merely deny its origin from any source but the sensual world—a theory, it is true, which partly removes the ground upon which our school philosophy rests. We have as little thought of sitting in judgment on the ideal or rational qualities of the human mind—and we are unable to conceive how we can be accused of denying the existence of mind—which, with its laws of operation, is as much a natural fact as any other in existence. Whether man be considered as a product of nature or of a creative power—whether the human mind be the product of material combinations or self-existent, is of little importance to the investigations of the qualities it possesses, and the laws to which this mind is subject.

We have not, as Mr. T. reproaches us, diligently avoided giving a notion of organism, but we have treated of it at length in the chapter "Vital Force," which Mr. T. has very likely passed over. It was there—as well as in the chapters "Design" and "Primary Generation"—shown, that the organic types did not, to explain them, require the assumption of a supernatural scheme, but that they are the products of a gradual, slow, and unconscious action of na-

ture. Such a process seems, in the presence of the wonderful organic forms which surround us, miraculous to the uninitiated eye. But the eye of the investigator penetrates through countless periods backwards, and observes how one organic part has been slowly developed from another.

The reproach that we know philosophy only by hearsay does not hurt us, as we were prepared for it. It is not the author who combats the abstract philosophers; it is the time and a general disgust against every kind of philosophy not practical, which has seized all sober minds. Every mental strength is now directed towards the empirical sciences of nature and history, and philosophical phraseology is despised. That philosophical idealism is equally desirous to obtain facts we never doubted; but the difference between Mr. T. and empirical philosophy consists in the mode in which the facts are applied. There the facts are constrained in an *à priori* system, as in a Procrustean bed, and serve merely to set off the imaginative thoughts of the systemisers; here we reverse the process. Abstract philosophy avails herself of a general notion, obtained only empirically, to found upon it a philosophical structure of *thoughts* instead of *facts*; empirical philosophy, on the contrary, draws every deduction from the facts themselves. This contrast between empirical and abstract philosophy is as old as human thought, and the

history, especially of the natural sciences, exhibits the various phases of the struggle, the progress of every period being marked by the revival of experimental inquiries and the neglect of speculation. How the *National Zeitung*, which some years ago had not a little contributed to shake the faith in Hegel's theory of the construction of the world, now again defends Hegel's philosophy, is not easily explained. That we have taken the field against every kind of philosophy which is neither empirical nor abstract, but conceals its want of ideas behind a learned jargon, will be approved of by every rational person. The *National Zeitung* finally appeals again to the "last problem," which no scalpel, no microscope, etc., can solve. This constant appeal is flattering to us, showing how far our opponents have retreated.

The *Allgemeine Kirchen Zeitung* (No. 130, 1855) meets us with theological eccentricity. We shall leave untouched what it says, *à la R. Wagner*, in the introduction to a long-winded article on the general and moral consequences of our philosophy, as such rhodomontades as those of Wagner refute themselves. We are, moreover, not inclined to render ourselves morally responsible for the inference which by individuals or schools may be drawn from our empirical investigations. That the *Kirchen Zeitung* has misconceived our meaning with regard to the destruction of the embryo has been shown in our second edition.

If the *Kirchen Zeitung* thinks to beat us with our own expression "eternal," which is inconceivable by our limited faculties, we may ask whether the notions of a beginning, or a creation, upon which the religious theory rests, can be *better* conceived? One is as inconceivable as the other. Our thought is in time and space, without any absolute notions, hence we cannot emancipate ourselves from these limits. It deserves the more to be acknowledged, that empirical science necessarily leads to the recognition of an eternal world, by establishing that our finite thought only gave rise to the assumption of a primary cause of the world.

This critic, like many others, lays hold of several obscure or apparently contradictory expressions, as if their detection could effectually refute our positions. Where is the man from whose head there can spring forth an exposition of the relations of natural existence, which should be clear and perfect in every part? We have in our studies—of which we never thought that they would create such a sensation, and which were expressly stated to lay no claim to a system—simply endeavoured to expound some general philosophical results, based upon modern and unprejudiced investigations of natural science. Let those who may attempt to form a system fill up the existing gaps and defects. But the critic exhibits such a strange ignorance of natural science, that the misconceptions are his own. We

are by no means surprised that he finds our assertion, that man originated from the animal world, "whimsical." That the origin of man could not have proceeded otherwise than from an animal being standing next him can, on general grounds, be scarcely doubted, although the mode of the process may be unknown to us.

The *National Zeitung* lays particular stress upon the relation of modern science to religion and faith. We are not inclined to enlarge here upon the theme of knowing and believing. We have already in the first, and still more in the second, edition of this work declared that we remain perfectly indifferent and neutral in this respect. Let each individual believe as much or as little as he chooses. "We cannot," says Virchow, "scientifically contend with belief, for science and faith exclude each other." Our theologians are, however, in error in assuming that religion is incompatible with a philosophical conviction based upon a knowledge of nature, upon no other ground than because they are accustomed to look upon *their* religion and church as identical with *religion* and *church* in general.

That a religion is possible without the assumption of a supernatural being is shown by Buddhism (see the chapter on "Personal Continuance") and all natural religions. It is possible that the *Religion of the Future*, of which so much is spoken, may be a naturalistic system, in which the principle of *humanity* may supersede that of fear and self-interest. "When," ex-

claims George Forster, "will the time come that men will learn, that the spring of the noblest and most sublime actions has nothing to do with our notions of God and of a life after death!"

In our observations on design in nature the *Kirchen Zeitung* finds contradictions, in pointing out that we sometimes speak of necessity and sometimes of accident, which cannot be reconciled. But it is very easy to show that, during the origin of natural bodies, these momenta acted simultaneously. The mode of their action will ever remain recondite, but the fact is evident.

When the *Kirchen Zeitung* thinks that modern philosophy has explained the antithesis between "natural" and "supernatural," it may be convinced of its error on reading the lucubrations of the philosopher of the *Allgemeine Zeitung*. Whilst the latter finds the explanation of existence in a philosophical, self-conscious, all-penetrating God, the *Kirchen Zeitung* finds it in the "belief in a living God, who became man in Jesus Christ who redeemed the world." This, indeed, is not philosophical but theological; and the *Kirchen Zeitung* has the merit of having, for all who adopt this belief, overcome the antithesis between natural and supernatural.

The *Kirchen Zeitung* finishes with some pious ejaculations and heart-rending groans, which appear somewhat ludicrous after the triumphant manner in which it thinks to have refuted our views, reminding us of the French proverb, *Il n'y a que la vérité qui blesse*.

Not unlike the Berlin *National Zeitung*, the *Aachener Zeitung* (July 19, 1855) harps on the last problem, or "the last truth." It maintains that our views can never be adopted as truths, "as the supersensual cannot be conceived." But, according to this, the whole gist of our theory is adopted and admitted. Our opponents, philosophers and theologians, assert the comprehension of the supersensual, some by reasoning, others by faith and revelation. We, on the contrary, maintain that human thought and human knowledge are incapable of discovering, or knowing anything supersensual. This is the necessary general result of modern investigations. What more is required? Some arrived at this stage may exclaim, "There is no supersensual world;" others may say, "We begin to believe where our knowledge ends:" we do not feel bound to advise in this matter; let each one satisfy his conscience the best way he can.

To prove the existence of supersensual things, the *Aachener Zeitung* appeals to "conscience," and again to "life." But life is in relation to its final cause, like all existence, unfathomable; and what concerns conscience we believe we have, in the chapter "On Innate Ideas," proved the sensual origin of moral ideas.

The pious poet of the *Frankfurter Anzeiger*, who, on our account, paid for two insertions of his verses, is hereby informed that we have hitherto not yet been favoured by a visit from his little angel.

With regard to the alterations in the second and third edition of this work, we observe that the chapter "Man" has been omitted, as it did not appear to us to be in the right place, and gave rise to inferences representing that which was not exactly within the scope of our investigations. The chapter on "Free Will" was for the same reasons altered. On the other hand, the new editions have been considerably augmented and improved by additional quotations from recent works, treating of subjects pertinent to our inquiries.

We shall in self-defence conclude with the following remarks. We have been reproached, even by individuals approving of our views, for the popular tendency of our work. We should not consider this reproach as ill founded, if our work were really intended to be generally popular; but that it is only intended for an educated public, must be admitted by every one who merely glances at it. The expression "generally intelligible" was, on our part, merely intended to convey the idea that our mode of exposition will be in contrast to that philosophical jargon, so unintelligible to any one who is not himself a philosophical haruspicy. That we had no desire to write for this philosophical priesthood, but addressed ourselves to all whose education renders them capable of considering the questions discussed by us, is, we should think, perfectly legitimate.

THE AUTHOR.

Darmstadt, October 1855.

PREFACE TO THE FOURTH EDITION.

“The ignorant call him a heretic whom they cannot refute.”

CAMPANELLA, *Discorsi*.

WHEN the author some months since concluded his preface to the third edition of this work, he entertained the hope that he would now have some rest from the attacks which his love for truth had excited. The number of his critics, and the open or concealed attacks on his person, and the tendency of his unpretending volume, has, however, increased, and is still increasing. The literature concerning force and matter, spirit and body, knowledge and faith, nature and revelation, accumulates; and the table of the author groans under the weight of replies, pamphlets, and criticisms of his work. Under the protection of rusty traditions, all who can wield a pen rival each other in turning their weapons against the theories of the author and their tendencies; and there is scarcely anything printed, in which there is not found some thundering denunciation of the presumptuous materialistic philosophy. Enthusiastic writers, with flashing eyes, come armed with spear and club, to save the state and society, morals and manners, faith and religion, heaven and eternity,

from the dread grasp of philosophical disbelief. A general agitation has seized all timid minds, giving vent to strange ejaculations; and official science, in cap and gown, seems to have ordered a general day of humiliation, from which the modern revolutionists and atheists are to be excluded. The author must even submit, being in his immediate vicinity taken to task, commented upon, and refuted from the pulpit.

However deafening such a noise may be for many, it is little apt to affect and to confuse a man in advance of his age. He beholds the struggle of the contending parties from a higher point of view, and sees in the eccentricities of this contest merely the natural and necessary expression of the opposing elements which agitate our time, the character of which cannot be hidden from any one who looks merely at the surface of the social and political relations of the present time. From this struggle of extreme opinions, no rational man can doubt truth will finally emerge the victor.

It would be a futile attempt on the part of the author to repel all attacks directed against his person, or to ward off the whole pack which bark at him from every printing office. The gentle reader must, therefore, not consider it a sign of timidity on the part of the author, if in this preface he meets only a few of his opponents, chiefly one of them, who from his eminent position enjoys a wide-spread reputation, and who, though

he has not attacked the author personally, has assailed the tendency of his theories. It was not advisable to leave strictures coming from such a quarter unnoticed.

Our opponents, it seems, fight less against our expositions and views than against their own conceits and false inferences, which they draw from our positions—tactics which are as contemptible as they are used up—but which, among the multitude who neither read nor examine, fail not in their effects. The educated public, fortunately, takes sufficient interest in this discussion that the author may hope not to be condemned unheard, and to be in their eyes justified with regard to the scientific and logical consistency of his views.

The *Allgemeine Zeitung* of the 24th and 25th of January, 1856, contains a lecture “On Inorganic Nature and Organic Life”, which Liebig, one of our first scientific chemists, delivered in the chemical laboratory of Munich, and in which, according to the reporter of the *Allgemeine Zeitung*, he had “broken the staff” over the presumptions of materialism. We are unable to say whether the reporter has rightly understood Baron von Liebig; we merely know it from the published report, which has never been impugned by the Baron. This silence justifies us in assuming the correctness of the report, and in considering the opinions expressed therein as those of the lecturer. The public at large, and the lite-

rary world, have, indeed, not delayed to draw from the words of this celebrity all the inferences which suited them, and to use them as weapons against all philosophical tendencies resembling those of the author. As in all similar cases, they overshot the mark; so that the greater part of the inferences lost all their value on close examination. In the shape in which the address lies before us, it does not contain a tithe of what orthodox bigots inferred from it; it does not even contain what the sanguine reporter thinks he finds, viz. an attack against scientific materialism and kindred views. What the address really contains is, first an apology for "vital force"; and secondly, some short and by no means searching remarks on the relation of body and soul, and which, as we shall presently show, afford not a shadow of proof against our assertions. Let him, who can in these two expositions find a vindication of theological or philosophical prejudices, rejoice; the remaining portion of the public will not infer more from the words of the celebrated chemist than can rationally be inferred.

Proceeding from a chemical point of view, Liebig appears as the defender of what we erroneously had considered as sufficiently criticised, viz. "vital force", or "a peculiar, higher organic power acting in the living body", through which the phenomena of life are produced partly independent of the general laws of

nature. Baron Liebig commences the polemical part of his address in calling the dissenters from this doctrine "dilettanti and promenaders in the provinces of natural science." We are justified in raising our voice against such a kind of polemics; it being known that nothing is easier, and consequently more frequently resorted to, than to reproach opponents with ignorance or dilettantism. Such a convenient and personal argument cuts off at once any serious discussion. Science has nought to do with persons, but with objects; and whoever makes such reproaches, lays himself open to the suspicion that he is unable to meet his opponents on any other than personal grounds, and also to the danger that they will retort in a similar manner. The higher the position which a person occupies in the scientific world, the more is he called upon to be cautious in using such means, as his assertions carry great weight. He should despise casting a weight in the balance which, in the eyes of the uninitiated, seems heavier than it actually is.

With regard to the persons against whom these reproaches seem directed, the author is not vain enough to include himself; but against such men as Carl Vogt, Jacob Moleschott, and other authorities in science who dissent from Liebig in both the above views, the expressions used simply show that an excessive self-esteem may take prisoner the reason of even the most meritorious.

In what concerns "vital force", the author

would willingly, if space permitted, for the benefit of Baron Liebig and the "ignorant and credulous public" (the Baron's words), insert here a condensed anthology from the writings of our most esteemed physiologists and physicians, from which he and the public will perceive how unanimous is the judgment which these "children in the knowledge of nature" pass on the notion of "vital force".

"Old vitalism," says the celebrated Virchow (at present our most esteemed medical writer), in an essay just published, "Old and New Vitalism,* finds its centre in the theory of vital force. This doctrine has in Germany passed through so many critical ordeals, that it has almost disappeared from the mouth of the scholar, unless some one takes pleasure in giving it the *coup de grace*." Dubois Reymond declared already, in 1848, in his great work on animal electricity, "Those who preach the error of a vital power, *under any form or delusive disguise*, are, they may rest assured, heads which have never penetrated the gates of science." Virchow says, in another part of the essay cited above, "The old doctrine of a vital power is not merely erroneous but a pure superstition, which cannot conceal its relationship with the doctrine of the devil, and the search after the philosopher's stone."†

* Archiv für Pathol. Anatomie und Physiologie, ix Band.

† Professor Virchow, it is true, defends the retention of the words vital force as an imparted motion not inherent

Baron Liebig thinks that he can support his vote in favour of vital force from a chemical point of view. He overlooks the circumstance that chemistry alone is not competent to decide this question, but that physics and mechanics have also something to say, and that the final decision rests with physiology and medicine. Liebig is a great chemist, no doubt. Who can contest this? His reputation is general over the globe, and his fatherland is proud of him. But as *one* man cannot be *everything*, nobody will be surprised to hear that Liebig is not equally great as a physiologist; and that there are even well-informed individuals who consider Liebig, in spite of his great merit in the explanation of the phase of matter in plants and animals, even in this part of the inquiry as a mere "amateur and promenader." We are sorry to mention this, but there was no other way of enabling "the ignorant and credulous mob" to under-

in the materials. But he does so in a sense quite opposed to that hitherto attached to the expression. Thus he observes, page 23: "Of vital force, in the mechanical sense in which I take it, I have no doubt that it must be considered as the result of a definite joint action of physical and chemical forces." When the author, incited by Moleschott's expositions, formed the plan of this work, without anticipating its fate, he reluctantly introduced the chapter "Vital Force", as he then thought the subject had been sufficiently discussed and settled, so that there was no necessity to touch upon it. To his astonishment, the author found that he had misjudged the scientific attainments of his contemporaries.

stand and to estimate the personal and scientific position of Baron Liebig in relation to the question of vital force. We should be led too far, nor would it possess sufficient interest for our readers, were we, in this place specially, to discuss this important and complicated question, and to show *ab ovo* why this notion has been rejected. We must not, however, neglect to draw the attention of the reader to some patent misconceptions and contradictions in Liebig's views relative to vital force. "It is clear as the sun," says Liebig, "that chemical agents are active in the body." But then we find, in the introduction of the lecture, that the process in the plant is "a contrast to inorganic processes;" again, "air, water, oxygen, and carbon lose their chemical character in the organism of the plant;" again, "there is in the living body a cause which dominates the chemical and physical forces of matter;" again, "deficiency of knowledge in relation to inorganic forces, is the reason why many deny the existence of a peculiar force in organic beings, and why powers are ascribed to inorganic forces opposed to their nature and laws;" and, finally, "chemical forces act in the organism under the influence of a *non-chemical* force." How these assertions can be rationally reconciled is not easy to conceive. There are chemical forces acting in the living body, then again they are not acting, and an unknown "organic higher

power" is represented as the overseer and foreman of the subordinate inorganic forces! A strong faith is indeed required to adhere to such a doctrine, and it might be interesting to learn how Liebig expounds such an impossible relation. The organism either obeys or does not obey the chemical laws; but that it obeys them *here* and not *there*—that it serves them *here* and opposes them *there*, is impossible. That many chemical processes, *within* the organism, differ in mode from those out of the organism is undeniable; but are these processes on that account other than chemical processes determined by a non-chemical force? Why, then, is the science of organic decomposition and combination called organic chemistry? It is clear as the sun: the same elementary materials enter the organism as in inorganic bodies, and no real naturalist doubts that forces are but qualities or motions of matter, and that, consequently, no other forces can act in organic beings but such as pertain to such matter, *i.e.*, the general forces of nature. That the chief constituents of organic bodies exhibit different relations, because they are so infinitely complicated that the least variation in the arrangement of the atoms exhibits a variety of motions not observable in their inorganic combinations, and presents thus an impenetrable mystery with regard to their mode of action, all this cannot justify us in inferring that these materials are within the or-

ganism withdrawn from their immanent physical and chemical motions, and that they obey a peculiar, separate, designing, higher organic force. From not knowing the essential laws which regulate this action, mental indolence helped itself by reposing upon the easy chair of an unknown and incalculable higher power, and by admiring miracle—a proceeding which stops all further inquiry. Liebig's error consists in this: that he does not distinguish between life and vital force. Life in its inmost relations is certainly a book with seven seals—riddle upon riddle. It is true that, with all our knowledge, we skim only at the surface of life; it is true that life is something peculiar; that the elements are not in immediate relation, as in inorganic nature, but by the mediation of a peculiar organic formation—the cell; but, in spite of all this, we decidedly deny the existence of an independent force *dominating* the physical and chemical forces, which Baron Liebig assumes. As far as science has penetrated, life was ever seen to obey the direction given to it by chemical, physical, and mechanical laws. The term “vital force” is an improper designation of natural effects as yet unknown to us in their relations, and, according to Vogt, it is a mere periphrase for ignorance. “We cannot say,” observes Virchow, “that cell-formation is not mechanical, because we cannot reduce it to its mechanical value; for, with the same right, the aboriginal of New Holland might contend

that steam engines cannot be reduced to mechanical laws." And Baron Liebig seems to have forgotten that he once wrote in his *Chemical Letters* (page 18) : "Therefore they (ignorant physicians) present us with impossible theories, and furnish themselves, in the word *vital power*, with a wonderful thing, by which they explain all those phenomena which they do not understand. With a certain inconceivable, indefinite something, everything may be explained that is incomprehensible."

What right has now Baron Liebig to accuse these deniers of vital force that they wish "to expound to the ignorant and credulous public the origin of the world and of life"? That the world has not "originated", the deniers of vital force are very much agreed in. As to the *how* life originated, nothing but presumptions and hypotheses can be offered; but these hypotheses all agree that this origin proceeded from natural laws and forces, inherent in the things themselves, and determined by external nature. If Baron Liebig wishes to obtain some idea how we may conceive the first origin of an organic body from inorganic nature, we would recommend him to read the *Physiologische Vorträge* by *Bencke* (Oldenburg, 1856).

The question of the first origin of organic beings upon the earth contains, in fact, the gist of the whole matter in dispute in regard to vital force. Baron Liebig must have felt this, for he

immediately passes from his disquisition on vital force on to the question of spontaneous generation. Cells are, under our own eyes, developed from cells in the most natural way; and, presupposing the existence of a first organic element, there is not much difficulty in believing that the whole organic world was developed out of itself, without the assistance of a peculiar organic force. It is certainly unknown in what way the spontaneous generation of the first organic form was established, but it seems clear to us that this generation was natural, and arose under peculiar external circumstances. "It appears to me," says Virchow, "that every rational physiologist, who assumes an origin of life, cannot but deduce it from a conjoint action of chemical and physical forces." Nay, the circumstance which Baron Liebig mentions, that geological investigations have established the fact of a *beginning of organic life upon the earth*, leaves no doubt that it can only have arisen naturally and from inorganic forces, and it is perfectly indifferent whether or not we observe such a process now. "Chemistry," says Virchow, "has not yet succeeded in forming a *blastema*, nor physics in forming a cell: what does it matter? If the history of our earth shows us that there was a time when no *blastema* existed or could have existed—when we see that periods arrived in which these bodies combined and became organic forms, what else can we infer

but that this wonder, *i.e.*, this momentary manifestation of a latent law, happened under unusual conditions?"* In another place he says: "We can only imagine, that at certain periods of the development of the earth unusual conditions existed, under which the elements, entering into new combinations, acquired in *statu nascente* vital motions, so that the usual mechanical conditions were transformed into vital conditions." And again: "The law of their formation (organic generation, cells) must necessarily be an eternal law, so that every time when, in the course of natural processes, the conditions are favourable for its manifestation, organic formation is realised. The causes of this realisation can only be found in a peculiar arrangement of natural relations, in an unusual conjoint action of the common elements, which occurs only at certain moments, and the vital process must, at its first origin, and in its repetitions, be owing to a peculiar mode of mechanical force."

When Baron Liebig, moreover, thinks that all theories respecting spontaneous generation rest "upon false and superficial observations," it proves very little for his physiological knowledge. Notwithstanding all that has been said against *generatio æquivoca*, the question is still an open one, and the observations and experiments made to elucidate it are not superficial, but the most

* Gesammelte Abhandlungen zur wissenschaftlichen Medicin, 1856.

difficult and delicate of natural science, concerning which "the ignorant and credulous public" should be instructed in a more conscientious manner.

When, finally, Baron Liebig thinks that he sees in plants and animals "a formative idea," and thus refutes the deniers of a vital force, he does not seem to have considered that the notion may be differently applied. On the part of the author, at least, the existence of a formative principle in the organic and inorganic world was never denied: it was merely shown that the principle is not a personal being acting from design, but intimately connected with the objects in which alone it is manifested.

So much for vital force! In the second part of his discourse, Baron Liebig treats chiefly of the relation of brain and soul, of matter and thought, although these subjects have very little to do with chemistry. We must, therefore, not feel surprised at finding, in his very first remarks, errors as to fact. "The brain," he says, "is the only internal organ upon which the will has a direct power, whilst the will has no direct influence on the stomach or the motions of the heart." Physiology knows as little of the immediate influence of the will upon the brain, as of a voluntary motion without muscular fibres. Baron Liebig, moreover, appears not to have heard, that, in some rare instances, individuals have possessed a voluntary power over the action of the heart.

Passing from physiology to philosophy, Liebig singularly neglects that exact reasoning which he so imperatively demands of natural science. "The spiritual man," he maintains, "is not the product of his senses, but the performances of the senses are the products of the intelligent will of man." There is no need of discussing the latter part of this assertion. We can only explain it by assuming that Baron Liebig has become a disciple of Schopenhauer, who maintains that *the will produces the whole world*. Should Schopenhauer and Liebig be in the right, then we hope that the intelligent will may enrich us with a sixth sense, which would better enlighten us with regard to a supernatural existence than can be effected by our five senses.

Concerning the relation of brain and soul, Liebig observes, that all that we know concerning this relation is "the trivial fact that a head without a brain neither thinks nor feels." This is sufficient to prove that Baron Liebig is not at home in physiology. If, indeed, physiology, despite all efforts, had not succeeded in teaching us more of the functions of the brain than the above trivial fact, which is patent to every man in his senses, it would deserve to be pitied, and spiritualism would be in the right. Physiology and pathology fortunately know more than Baron Liebig; they have by experiments established facts which we need not here recapitulate, but which furnish foundations to build upon, and

which cannot be undermined by the gossip of philosophical psychologists.

We might here have concluded our strictures, but that we find in an earlier number of the *Allgemeine Zeitung* (No. 22, 1856), that Baron Liebig made some further remarks, not contained in our report, and which it seems did not fail to be received with great applause by "the ignorant and credulous public". These remarks refer again to the dispute between Moleschott and Liebig respecting the quantity of phosphorus contained in the brain, and are supported by arguments which can only have any value in the eyes of those who know nothing of the details of the dispute. Proceeding from the false assumption that Moleschott and his adherents deduce thought from the "phosphorescence of the brain", Baron Liebig makes merry at his opponents, by showing that, according to that view, the bones should produce more thought than the brain, as they contain four hundred times as much phosphorus as the brain! The author searches in vain for an adequate expression to designate such a mode of argumentation, which can only impose upon "an ignorant and credulous public". Why has not Baron Liebig rendered the contrast more striking, by showing that, as lucifers, from their quantity of phosphorus, contain four hundred times more thought than the brain, the match manufacturers could now sell thought at wholesale prices. Such as are desirous of

knowing more of the complete failure of Liebig's attack, we refer to Moleschott's *Kreislauf des Lebens*. The assertions and objections of Liebig are, in the second chapter of that work, entitled "Thought", so clearly refuted that every one who reads it must agree with the author. Proceeding from the fact that phosphorus, as a chemical constituent of the brain, must, like every other chemical constituent, have a definite function, Moleschott repeats in that work his axiom "no thought without phosphorus"; a proposition to which the author (see the chapter "Brain and Soul") assents from conviction, and which, as regards the visible world and the higher animals, will not be dissented from by any rational naturalist or physician.

The author regrets sincerely being obliged to speak once more of Karl Gutzkow. He will confine himself to quoting the following passage from the letter of a friend, whose indignation at Gutzkow's attacks induces him to write. "If to justify his (Gutzkow's) animosity he reproaches you for the exultation which you feel at the fact 'that we are but dust and ashes', 'manure for future manure', it is a mere fiction, refuted by your dignified and serious remarks on this subject. And when he pathetically quotes the example of regicide executioners who, kneeling, kiss the sword which is to decapitate their master, it is a ridiculous absurdity, at which we can only shrug our shoulders. It is as if science,

which proceeds according to inward necessity, without looking to the right or the left, were obliged to speak words of comfort, and to console all old women, whose illusions are unfortunately destroyed." We may also ask what opportunity Gutzkow has had of learning anything of the genius-mania which distinguishes the sphere in which we move. The author does not recollect to have seen or spoken to Mr. Gutzkow more than twice, and that but for a short time, and has for the last five or six years moved in a sphere quite inaccessible to him. Mr. Gutzkow, moreover, contradicts himself in saying that we have a rage for being considered a genius, while he considers our work as a mere compilation. We have too much self-respect to repeat here the concluding paragraph of Mr. Gutzkow's attack; it simply proves again that he writes from the "pothouse" he cites.

Mr. Gutzkow seems to dislike that other authors should meet with much success, especially in their first attempts. On our parts, we do not envy Mr. Gutzkow his reputation, and we acknowledge his talents more than those who praise him to his face, always excepting that he do not meddle with questions of science.

The witticisms in which Dr. Wilhelm Schulz-Bodmer of Zurich* indulges in relation to the views of the author, simply prove how little Mr.

* Froschmäusekrieg zwischen den Pedanten des Glaubens und Unglaubens. Brockhaus, 1856.

Schulz can prevail on himself to hold his tongue concerning things which are beyond his sphere of vision. He who conceives that the intellectual struggle which agitates the literary and scientific world is merely a war between frogs and mice, which he attempts to render ridiculous by miserable jokes, proves sufficiently his unfitness to judge of such questions. Mr. Schulz's remarks may produce stupendous effects among frogs and mice. The impression which they produce upon ourselves we prefer not to mention.* In order that the public, who have not read Schulz, may be able to judge how he treats his subject, we may by way of sample just state, that Mr. Schulz combats our assertion regarding the greater weight of the male brain in relation to the female, with the remark that, being a bachelor, we could know nothing "empirically" of such a relation. What can be said of such a mode of argumentation in relation to serious facts, established by ample experiments? That there are women who have more intellect than their husbands, the author doubts as little as Mr. Schulz. But, as exceptions prove nothing against a rule, the *personal experience* of Mr. Schulz may prove

* A reporter of the *Illustrierten Zeitung*, No. 653, says in an article entitled "Die Neue Weltanschauung und ihre Bekenner": "It is for the impartial observer more than usually interesting to contemplate the fight carried on by a small number of scholars against the most mighty existing powers, a struggle which concerns the highest goods of the human race."

sufficient for him, but not for science. The author of the *Frosch-mäusekriegs* uses everywhere similar arguments, and excites the laughter of his readers *at his own expense*.

A little anonymous libel against us, half prose, half poetry, appeared in Darmstadt, entitled "Dr. L. Büchner's *Kraft und Stoff*, or the Art of Making Gold out of Nothing." The author is said to be a pensioned captain, well known in his native place for his eccentricities. We should not have mentioned this catch-penny publication, had not the chief article which it contains been inserted in the *Allgemeine Zeitung* (Nos. 5 and 6, 1856) even before it was published. Although we experienced but an indifferent treatment from that journal, we might have expected that a paper, which pretends to be at the head of German journals, should have sufficient self-respect to exclude *such* aid. We cannot abstain from observing that, in *our* case, the *Allgemeine Zeitung* has been worse served than any other journal which has opposed our views.

To a category not much better than "the art of making gold from nothing" belongs a pamphlet just published by the grand-ducal physician Dr. A. Weber of Ulrichstein (Oberhessen), entitled "*Die neueste Vergötterung des Stoffs*," Gießen, 1856. A total unacquaintance with the rules of literary decency, is here combined with the most ingenuous ignorance of the results of modern science, in order to enlighten the world

of Ulrichstein concerning the most difficult and complicated questions of natural science and philosophy—a mode of enlightening which chiefly consists of old-fashioned and ill-digested reminiscences, which the aged author has carried away from Professor Wilbrand, during his studies at Giessen. For the purpose of writing a book, Mr. Weber attributes to materialism theories unknown to it, and places himself in contradiction to the plainest principles of natural science. He illustrates a terribly confused exposition of the problem of organic life, which nearly fills half the work, with the ingenuous remark that “we know nothing whatever of it.” When, under these circumstances, Mr. Weber calls his opponents unscientific, uneducated minds, idle talkers, and uses the expressions “nonsense, fatuity, monstrous abortions, reason run mad,” etc., and considers himself particularly called upon to serve as a guide, and to enlighten the educated world with regard to their highest interest, we really know not whether we should laugh or grieve at such simplicity; and we must console ourself with the thought that such a production may be indeed printed at Darmstadt, but can only have been written at such a place as Ulrichstein.

The short observations which Mr. Julius Schaller makes in the preface of his work, *Leib und Seele*, evince an erroneous conception, which is, perhaps, partly owing to a want of precision

in expression on our part. We are the more inclined to think so, as it prevails in most of the attacks directed against us. The error consists in asserting that we proclaim the relation of brain and soul, or matter and mind, to be *congruent* or *identical with* matter and force. We do not recollect to have used expressions justifying such an inference. In the introduction to the chapter on "Personal Continuance", it is only said that in the law of nature, according to which there is no thought without a brain, and no brain without thought, the first principle of our empirical contemplation of nature—no matter without force, no force without matter—is *repeated*. However similar and essentially corresponding these two relations may be, the author cannot but acknowledge that, in the relation of brain and soul, phenomena occur which cannot be explained from the simple physical relation of force and matter. The author begs here, for the second time, to observe that he never had the intention of discussing the essence of the relation of spirit and matter by the aid of a useless hypothesis, but to prove merely by facts their necessary and intimate connection.

With regard to parsons and ecclesiastics, who never cease to enlighten and to assail us with their eloquence, we beg to repeat that we cannot discuss with them. These good people have from the beginning of the world had the privilege of using their zeal and ignorance in crying

down everything that does not suit their business. We shall not disturb them in their vocation. No rational man doubts the total incapacity of these gentlemen to enter upon such questions. There is no theological or ecclesiastical natural science; and there will be none, so long as the telescope does not reach the regions where angels dwell!

In conclusion, the author is reluctantly obliged to say a word to those who, unable to refute their opponents by arguments of reason, think to damage them in public opinion by casting suspicions on their moral character. Science has no concern with morals; and all free inquiry would be at an end if it were made dependent on them. The person of the investigator, and his moral convictions, have nought to do with his investigations, and such tactics merely prove the immorality of those who use them. Since the world began experience has shown, that those who always talk of morality have little in their hearts, and that virtue does not always dwell where it is used as a sign-board. Scientific materialism and the materialism of life are widely distinct, and can only be confounded by malice and ignorance. The most fruitful ideas have been spread by individuals, against whom in their lifetime accusations were raised similar to those in the present discussion. Not those who by study and sacrifices endeavour to fathom the laws of matter,

but those who prefer enjoyments, and banish the spirit from these laws, are the *genuine* materialists.

THE AUTHOR.

Darmstadt, May 1856.

FORCE AND MATTER.

CHAPTER I.

“The universe, containing all that exists, has been created neither by a God nor by a man ; but has always existed and will ever remain a vivifying fire, being kindled and extinguished according to definite laws.”

HERACLITUS OF EPHEBUS.

“FORCE is not an impelling God, not an essence separate from the material substratum of things. A force not united to matter, but floating freely above it, is an idle conception. Nitrogen, carbon, hydrogen, oxygen, sulphur, and phosphorus, possess their inherent qualities from eternity.”—
MOLESCHOTT.

“Fundamentally considered, there are neither forces nor matter. Both are merely abstractions, assumed from different points of view, of things as they are. They supplement and presuppose each other. *Separately they do not exist.* Matter is not like a carriage, to which the forces, like horses, can be put or again removed from. A particle of iron is, and remains, the same, whether it crosses the horizon in the meteoric stone,

rushes along in the wheel of the steam-engine, or circulates in the blood through the temples of the poet. These qualities are eternal, inalienable, and untransferable."—DUBOIS-REYMOND.

"No force can arise from nothing."—LIEBIG.

"Nothing in the world justifies us in assuming the existence *per se* of forces, independent of the bodies from which they proceed, and upon which they act."—COTTA.

These words of known naturalists may serve as an introduction to a chapter which is to remind us of one of the most simple and most pregnant, but, even on that account, least known and acknowledged truths. No force without matter—no matter without force! Neither can be thought of *per se*; separated, they become empty abstractions. Imagine matter without force, and the minute particles of which a body consists, without that system of mutual attraction and repulsion which holds them together, and gives form and shape to the body; imagine the molecular forces of cohesion and affinity removed, what then would be the consequence? The matter must instantly break up into a shapeless nothing. We know in the physical world of no instance of any particle of matter which is not endowed with forces, by means of which it plays its appointed part in some form or another, sometimes in connection with similar or with dissimilar particles. Nor are we in imagination capable of forming a conception of matter without force. In whatever

way we may think of an original substance, there must always exist in it a system of mutual repulsion and attraction between its minutest parts, without which they would dissolve and tracelessly disappear in universal space. "A thing without properties is a nonentity, neither rationally cogitable, nor empirically existing in nature" (Drossbach). Force *without* matter is equally an idle notion. It being a law admitting of no exception that force can only be manifested in matter, it follows that force can as little possess a separate existence as matter without force. Hence, as Mulder justly observes, forces cannot be communicated, but merely called into action. Magnetism can therefore not, as it may appear, be *transferred*, but merely called forth by changing the aggregate state of its medium. The magnetic forces are inherent in the molecules of iron, and are most perceptible externally, and least so in the centre of a magnetic rod. Imagine an electricity, a magnetism, without the iron or such bodies as exhibit these phenomena, and without the particles of matter the mutual relation of which is just the cause of these phenomena; nothing would then remain but a confused idea, an empty abstraction, to which we have given a name in order to form a better conception. *If the material particles capable of an electrical condition had never existed, there would have been no electricity, and we should never have been able by mere abstraction to acquire the least*

knowledge or conception of electricity. Indeed, we may say electricity would never have existed without these particles!

All the so-called imponderables, such as light, heat, electricity, magnetism, etc., are neither more nor less than changes in the aggregate state of matter—changes which, almost like contagion, are transmitted from body to body. Heat is a separation, cold an approximation of the material atoms. Light and sound are vibrating, undulating bodies. “Electrical and magnetic phenomena,” says Czolbe* “arise, as experience shows, like light and heat, from the reciprocal relations of molecules and atoms.”

For the above reasons, the authors quoted define *force as a mere property of the matter.* Force can as little exist without a substance, as seeing without a visual apparatus, or thinking without an organ of thought. “No one,” says Vogt, “has ever ventured to maintain that a power of secretion can exist independent of a gland, or contractility independent of muscular fibre.”

Nothing but the changes which we perceive in matter by means of our senses could ever give us any notion as to the existence of power which we qualify by the name of *force.* Any knowledge of them by other means is impossible.

What are the philosophical consequences of this simple and natural truth?

That those who talk of a creative power, which

* Neue Darstellung des Sensualismus, 1855.

is said to have produced the world out of itself, or out of nothing, are ignorant of the first and most simple principle, founded upon experience and the contemplation of nature. How could a power have existed not manifested in material substance, but governing it arbitrarily according to individual views? Neither could separately existing forces be transferred to chaotic matter, and produce the world in this manner; for we have seen that a separate existence of either is an impossibility. It will be shown in the chapter which treats of the imperishability of matter, that the world could not have originated out of *nothing*. A nothing is not merely a logical, but also an empirical nonentity. The world, or matter with its properties, which we term forces, must have existed from eternity, and must last for ever—in one word, the world cannot have been created. The notion “eternal” is certainly one which, with our limited faculties, is difficult of conception. The facts, nevertheless, leave no doubt as to the eternity of the world. The absurdities attending the belief in an individual creative power will appear from some subsequent considerations. That the world is not governed as is frequently expressed, but that the changes and motions of matter obey a necessity inherent in it, which admits of no exception, cannot be denied by any person who is but superficially acquainted with the natural sciences. But that a power—taken for the once in its abstract sense—could

only exist so long as it is active, is not less clear. In assuming, therefore, a creative absolute power, a primeval soul, an unknown x ,—it matters not what name we give it—as the cause of the world, we must, in applying to it the notion of time, say that it could not have existed either *before* or *after* the creation. It could not have existed *before*, as the notion of power is not reconcilable with the idea of nothing or inactivity. It could not have been a creative power without creating something. We must, therefore, suppose that this power has for a time been inert in the presence of chaotic and motionless matter—a conception we have already shown to be absurd. It could not have existed *after* the creation, as rest and inactivity are again incompatible with the notion of force. The motion of matter obeys only those laws which are inherently active; and their manifestations are nothing but the product of the various and manifold accidental or necessary combinations of material movements. At no time and nowhere, even in the most distant space reached by our telescope, could a single fact be established, forming an exception to this law, which would render the assumption of a force external and independent of matter necessary. *But a force which is not manifested does not exist, and cannot be taken into account in our reasoning.* To consider the power in eternal rest, and sunk in self-contemplation, is again an empty arbitrary abstraction, without any empirical basis.

There remains but a third possibility, the equally singular and unnecessary notion, that the creative power had suddenly and without any occasion arisen out of nothing, had created the world (out of what?), and had again in the moment of completion collapsed within itself and, so to say, dissolved itself in the universe. Philosophers and others have ever cherished this latter notion, believing that they could, by this mode of reasoning, reconcile the indisputable fact of a fixed and unchangable law in the economy of the universe with the belief in an individual creative power. All religious conceptions lean more or less towards this idea, with this difference—that they conceive the spirit of the world reposing after the creation, but yet, as an individual, capable of again suspending his own laws. Conceptions of this kind cannot concern us, not being the result of philosophical reasoning. Individual human qualities and imperfections are transferred to philosophical notions, and belief is made to occupy the place of actual knowledge.

With regard, therefore, to the philosophical aspect of this last idea, it would be like carrying owls to Athens, if we were to take the trouble of showing its inconsistency and uselessness. The mere application of a limited notion of time to creative power involves an absurdity; its origin out of nothing a still greater one. "No force can originate from nothing" (Liebig). "An absolute nothing is not cogitable" (Czolbe).

But, if it be inconceivable that a creative power existed either *before* or *after* the creation of things; if, further, we cannot imagine that it has only a momentary existence; if matter be imperishable; if there be no matter without force, nor force without matter;—then there can be no doubt that the world is not created, but existed from eternity. That which cannot be separated can never subsist separately! What cannot be destroyed could not have been created! “Matter is uncreatable, as it is indestructible” (Vogt).

CHAPTER II.

IMMORTALITY OF MATTER.

“Imperial Cæsar, dead and turn’d to clay,
 Might stop a hole to keep the wind away.
 O that that earth which kept the world in awe,
 Should patch a wall t’ expel the winter’s flaw !”

It is three hundred years since the great Briton enunciated in these words of deep import a truth which, in spite of its clearness and simplicity, is even to this day not generally acknowledged by our naturalists. Matter is immortal, indestructible. There is not an atom in the universe which can be lost. We cannot, even in thought, remove or add an atom without admitting that the world would thereby be disturbed, and the laws of gravitation and the equilibrium of matter interfered with. It is the great merit of modern chemistry to have proved in the most convincing manner that the uninterrupted change of matter which we daily witness, the origin and decay of organic and inorganic forms and tissues, do not arise, as was hitherto believed, from new materials, but that this change consists in nothing else but the constant and continuous *metamorphosis of the same elementary principles, the quantity and quality of which ever is, and ever remains, the*

same. Matter has, by means of the scales, been followed in all its various and complicated transitions, and everywhere has it been found to emerge from any combination in the same quantity as it has entered. The calculations founded upon this law have everywhere proved to be perfectly correct. We burn a piece of wood, and at first sight it appears as if its constituents had been consumed in fire and smoke. The balance of the chemist, on the other hand, teaches us that not only has nothing been lost of the wood in weight, but, on the contrary, the weight has been *increased*. It shows that the collected and weighed products not merely contain all the constituents of the wood, though in a different shape and combination, but in addition such materials as the constituents of the wood have attracted from the air during combustion.

“The carbon,” says Vogt, “which was in the wood is imperishable, it is eternal, and as indestructible as the hydrogen and oxygen with which it was combined in the wood. This combination, and the form in which it appeared, is destructible; the matter never.”

“The carbon we meet with in the spar crystal, in the woody fibre, or in muscle, may, after the destruction of these bodies, assume a different form in other groupings, but the elementary principle can neither be changed nor destroyed.”
(Czolbe.)

With every breath which issues from our mouth, we expire a portion of the food we eat, and of the water we drink. We change so rapidly, that we may be said, after the lapse of four weeks, to be different and new beings; the atoms are exchanged, but the mode of their combination remains the same. The atoms are in themselves unchangeable and indestructible; to-day in this, to-morrow in another form, they present by the variety of their combinations the innumerable forms in which matter appears to our senses. All this while the number of atoms in any element remains on the whole the same; not a single particle is formed anew; nor can it, when formed, disappear from existence. Proofs innumerable can be adduced to this effect. Dissolution and generation, growth and decay, proceed everywhere hand in hand—an eternal chain. With the bread which we eat, the air we respire, we attract the matter which has formed the bodies of our ancestors thousands of years ago; and we return a portion of our bodies to the external world, in order shortly after to receive it again.

Scholars call the eternal and continuous cycle of the minute particles of substance the phase of matter; and the bold fancy of the British poet has followed the matter which once formed the body of the great Cæsar to the phase where it stops a hole in the wall.

How a fact so simple and a truth so clear can

still be denied or not acknowledged, even by naturalists and physicians, seems scarcely conceivable, and proves how little the great discoveries in natural science have broken ground in some circles. Thus Schubert speaks of a spontaneous origin of water in sudden accumulations of clouds; Röbbelen thinks that the animal organism produces nitrogen; and even the celebrated Ehrenberg appears yet doubtful whether the organisms create, or merely transform, the materials they contain.* How can any one deny the axiom, that out of nothing, nothing can arise? The matter must be in existence, though previously in another form and combination, to produce or to share in any new formation. An atom of oxygen, of nitrogen, or of iron, is everywhere and under all circumstances the same thing, endowed with the same immanent qualities, and can never in all eternity become anything else. Be it wheresoever it will, it must remain the same; from every combination, however heterogeneous, must it emerge the self-same atom. But never can an atom arise anew or disappear: it can only change its combinations. For these reasons is matter immortal: and for this reason is it, as already shown, impossible that the world can have been *created*. How could anything be created that cannot be annihilated? Matter must have existed from eternity, and must last

* Zeise: Vorträge über das Endlose der grossen und der kleinen materiellen Welt, 1855, seite 50.

for ever. "The matter is eternal, its forms merely change" (Rossmässler).

There exists a phrase, repeated *ad nauseam*, of "mortal body and immortal spirit". A closer examination causes us with more truth to reverse the sentence. The body is certainly mortal in its individual form, but not in its constituents. It changes not merely in death, but, as we have seen, also during life : however, in a higher sense it is immortal, since the smallest particle of which it is composed cannot be destroyed. On the contrary, that which we call "spirit" disappears with the dissolution of the individual material combination ; and it must appear to any unprejudiced intellect as if the concurrent action of many particles of matter had produced an effect which ceases *with* the cause. "Though," says Fechner, "we are not annihilated by death, still we cannot save from death our previous mode of existence. We return visibly to the earth from which we were taken. But, whilst we change, the earth endures and is more and more developed ; it is an immortal being, and all the stars are so likewise."

The immortality of matter is now a fact scientifically established, and can no longer be denied. It is interesting to know, also, that the earlier philosophers possessed a knowledge of this pregnant truth, though not so clearly established then, as the actual proofs could only be given by our scales and retorts.

Sebastian Frank, a German who lived in 1528, says : " Matter was in the beginning in God, and is on that account eternal and infinite. The earth and everything created may pass away ; but we cannot say that that will perish out of which matter is created. The substance remains for ever. A thing crumbles into dust, but from the dust comes forth something new. The earth is, as Plinius says, a phoenix, and lasts for ever. When it grows old, it burns itself ; a new phoenix rises from the ashes, still the same, but younger."

The Italian philosophers of the middle ages express this idea still more plainly. Bernhard Telesius (1568) says : " The corporeal matter is the same in all things, and ever remains the same ; the inert matter can be neither increased nor diminished." And, finally, Giordano Bruno (who was burnt in Rome 1600) says : " What first was seed, becomes grass, then an ear, then bread, chyle, blood, semen, embryo, man, a corpse ; then again earth, stone, or some other mass, and so forth. Here we perceive something which changes in all these things, and ever remains the same. Thus there really seems nothing constant, eternal, and worthy of the name of a principle but matter alone. Matter considered absolutely, comprises all forms and dimensions. But the variety of forms which it assumes is not received from without, but is produced and engendered from within. When we say something dies, it is merely a transition to a new life, a dis-

solution of one combination and the commencement of another.”

But even at a much earlier period were already known the outlines of this truth, likely to become the basis of every exact philosophy. Empedocles, a Greek philosopher (450 B.C.), says: “Those are children or persons with a narrow sphere of vision, who imagine that anything arises that has not existed before, or that anything can entirely die and perish.”

CHAPTER III.

IMMORTALITY OF FORCE.

“What disappears in one place, must reappear in another.”

FARADAY—HESS.

“There is no breath of air so gentle, no wave breaking on the sands, but the vibrations of these movements run through all space.”

H. TUTTLE.

INDESTRUCTIBLE, imperishable, and immortal as *matter*, is also its immanent *force*. Intimately united to matter, force revolves in the same never ending cycle, and emerges from any form in the same quantity as it entered. If it be an undoubted fact, that matter can neither be produced nor destroyed, but merely transformed, then it must also be assumed as an established principle, that there is not a single case in which force can be produced out of, or can pass into, nothing; or, in other words, can be *born* or *annihilated*. In all cases, where force is manifested, it may be reduced to its sources; that is to say, it can be ascertained from what other forces a definite amount of force has been obtained, either directly or by conversion. This convertibility is not arbitrary, but takes place according to definite equivalents, so that not the smallest quantity of force can be lost.

Although the immortality of matter is now an established truth, the same cannot be said in regard to force, a truth which in spite of its simplicity has only recently engaged the attention of men of science. We call the truth simple and self-evident, because it results from a simple consideration of the relation of cause and effect. Logic and our daily experience teach us, that no natural motion or change, consequently no manifestation of force, can take place without producing an endless chain of successive motions and changes, as every effect becomes immediately the cause of succeeding effects. There is no repose of any kind in nature; its whole existence is a constant cycle, in which every motion, the consequence of a preceding motion, becomes immediately the cause of an equivalent succeeding one; so that there is nowhere a gap, nowhere either loss or gain. No motion in nature proceeds from or passes into nothing; and as in the material world every individual form can only realise its existence by drawing its materials from the immense storehouse of matter, so does every motion originate from the equally immense storehouse of forces to which sooner or later the borrowed quantity of force is again returned.

The motion may become latent, *i.e.* apparently concealed; but nevertheless it is not lost, having merely been converted into equivalent states from which it will escape again in some shape. During this process force has changed its mode, for force

may, though essentially the same, assume in the universe a variety of modes. The various forms may, as already stated, be converted into others without loss, so that the sum total of existing forces can neither be increased nor diminished, the forms only changing.* The science of the change and convertibility of forces is called *Physics*.

This science makes us acquainted with eight different forces—gravitation, mechanical force, heat, light, electricity, magnetism, affinity, cohesion, which, inseparably united to matter, “form and give shape to the world.” These forces are, with few exceptions, mutually convertible, so that nothing is lost in the process of conversion. In the universe, from which we derive an inexhaustible quantity, the forces are inherent: in the heavenly bodies in the form of light and heat; in the form of mechanical power, in the revolutions of planets round their central bodies; or as chemical difference, cohesion, and magnetism in ponderable substances.

We may cite a few instances of transformation or convertibility of forces. Heat and light are produced by combustion. Heat again is converted into mechanical power in steam, and mechanical force can again by friction be *reconverted*

* “The existing quantity of force,” says the author of an essay on the conservation of force, in the periodical *Unsere Zeit*, “is invariably the same. We may at pleasure change its effects, but only as regards quality; the quantity can neither be diminished nor increased.”

into heat, and as in the electro-magnetical machine, into heat, electricity, magnetism, and light. One of the most frequent conversions of force is that of heat into mechanical force, and *vice versâ*. Two pieces of wood produce by friction heat and light; heat is again, in the steam engine, reconverted into motion. Whilst during the combustion of coal, chemical difference is converted into heat, and that again into mechanical force, we can again convert mechanical power into heat by means of a wheel, which makes a massive wooden cylinder revolve in a closely adhering metal tube. The latter becomes heated to such an extent, that we are in this manner enabled, by means of a stream or a windmill, &c., to warm a room. Chemical affinities remain latent in gunpowder under ordinary circumstances. The spark equalises their chemical difference, and heat, light, and mechanical force are manifested. The chemical difference between zinc and oxygen is in the voltaic pile converted into an electric current, which can again, by the conducting wire, appear as light and heat, or as chemical difference, in the cells of decomposition.

The mechanical force of the arm turning the disc of an electrical machine, itself the produce of the equalisation of chemical difference (respiration), is converted into an electrical current, which may again, according to circumstances, become manifest as attraction (mechanical force), or as light, heat and chemical difference.

Mechanical force is, in the mutual shock of bodies, converted into heat, as may be observed in two inelastic balls (*e.g.* of lead), which become heated by concussion, whilst elastic bodies (*e.g.* billiard balls) do not become heated, the mechanical force being expended in repulsion. It is not improbable that all light and heat in the universe proceed from this source. The most common form in which force manifests itself is derived from the *light and heat of the central bodies in the universe*. All the forces manifested in the earth may be deduced from the *sun*. The flowing water, the current wind, the heat of the animal body, the combustibility of wood or coal, &c., may be directly ascribed to the sun. By the combustion of wood or coal, the whole quantity of heat which has disappeared and was deposited in these materials can be made to re-appear. The force with which the locomotive engine rushes along, is a minim of solar heat converted by a machine into labour, in the same manner as the labour which produces thoughts in the brain of the thinker, or forges nails under the arm of the forger. "The heat that warms our habitations," says Liebig, "is the heat of the sun; the light which dispels the darkness of the nights is borrowed from the sun." The light transmitted by the suns to celestial bodies does not disappear in them, but is converted into heat, while an increased degree of heat appears in these bodies as light.

Magnetism may, in the magneto-electrical machine, appear as an electrical current, and this may again re-appear under a variety of different forms.

Gravitation appears immediately as a mechanical force, and can be converted into all the forms already mentioned. The pendulum of every clock shows the conversion of gravitation into motion.

During these processes, a given quantity of force is rarely altogether converted, a portion passes into other forces, or is not converted at all. In the steam-engine, for instance, there is a large amount of the heat produced which is not converted into mechanical force, but escapes as heat with the steam or the water which condenses it. In the firing of a gun it seems as if a portion of the mechanical force were lost; but it is only lost in appearance and as concerning the immediate object, inasmuch as the force was expended in heating the barrel, and in the production of the sound.

The word "lost" is therefore an incorrect expression, for in all these and similar cases there is not a minim of power lost as regards the universe, but merely as regards the immediate object. The expended force has in reality only assumed different forms, the sum total of which is equivalent to the original force. Innumerable examples may be adduced to establish this law, which is expressed in the axiom that *force can*

neither be created, nor destroyed—an axiom from which results the immortality of force, and the impossibility of its having a beginning or an end.

The consequence of this recently discovered natural truth is the same as that deduced from the immortality of matter, and both form and manifest from eternity the sum of phenomena which we term *world*. The cycle of matter sides, as a necessary correlate, with the cycle of force, and teaches that nothing is generated anew, that nothing disappears, and that the secret of nature lies in an eternal and immanent cycle in which cause and effect are connected without beginning or end. That only can be immortal which has existed from eternity, and what is immortal cannot have been created.

CHAPTER IV.

INFINITY OF MATTER.

“The world is unlimited, infinite.”

COTTA.

IF matter be infinite in *time*, *i.e.* immortal, it is also without beginning or end in *space*; our usual notions of time and space cannot be applied to it. Whether we investigate the extension of matter in its magnitude or minuteness, we never come to an end or to an ultimate form of it. When the invention of the microscope disclosed unknown worlds, and exhibited to the eye of the investigator the infinite minuteness of organic elements, the hope was raised that we might discover the ultimate organic atom, perhaps the mode of its origin. This hope vanished with the improvement of our instruments. The microscope showed that in the hundredth part of a drop of water there existed a world of animalcules, of the most delicate and definite forms, which move and digest like other animals, and are endowed with organs, the structure of which we have little conception of. Their internal structure is still less known. “Shall we,” asks Cotta, “with instruments still more improved,

have to consider the monads as giants among the pigmies of minuter organisms?" The wheel animalcule, which occupies the tenth or twentieth part of a line, possesses jaws with teeth, an oesophagus, a stomach, an alimentary canal, glands, vessels, and nerves. The monad measures the 2,000th part of a line; a drop of liquid contains millions of them. The *vibriones*, microscopic animalcules of the smallest kind, appear as a cluster of scarcely perceptible dots or lines—a cubic line has been calculated to contain 4,000 millions of them. These animalcules must have organs of locomotion, the mode of which leaves no doubt that they also possess sensation and will, and that consequently they must have organs and tissues accordingly. But no clue has yet been obtained as to the quality of these organs. The seed grains of a grape fungus in Italy are so minute, that a human blood-corpuscule is a giant compared to them; yet these blood-corpuscles are so minute, that a single drop contains above five millions of them. In that seed-grain there exists the organic force of propagation, a peculiarly complicated grouping of material elements, of which we can have no conception from our limited visual power. We term the most minute particle of matter, which we imagine to be no longer capable of division, an *atom*, and consider matter to be composed of such atoms, acquiring from them its qualities, and existing by their reciprocal attraction and repulsion.

But the word *atom* is merely an expression for a necessary conception, required for certain purposes. We have no real notion of the thing we term *atom*; we know nothing of its size, form, composition, etc. No one has seen it. The speculative philosophers deny its existence, as they do not admit that a thing can exist which is no longer divisible. Thus neither observation nor thought lead us, in regard to the minuteness of matter, to a point where we can stop; nor have we any hope that we shall ever reach that point.

“The most powerful microscopes,” says Valentin,* “will never enable us to behold the form and position of the molecules, not even the minuter groups of atoms.” “A grain of salt, which we can scarcely taste, contains myriads of groups of atoms, which no eye will ever see.” We can, then, only say that matter and the world are infinite in minuteness; and it is of little consequence if our intellect, which is always accustomed to find a limit, is offended at the idea.

Like the microscope in respect to minuteness, so does the telescope conduct us to the universe at large. Astronomers boldly thought to penetrate into the inmost recesses of the world; but the more their instruments were improved, the more worlds expanded before their astonished eyes. The telescope resolved the whitish nebulae in the sky into myriads of stars, worlds, solar

* Lehrbuch der Physiologie.

and planetary systems ; and the earth with its inhabitants, hitherto imagined to be the crown and centre of existence, was degraded from its imaginary height to be a mere atom moving in universal space. The distances of the celestial bodies are so immense, that our intellect wanders at the contemplation of them, and becomes confused. Light, moving with a velocity of millions of miles in a minute, required no less than two thousand years to reach the earth from the galaxy ! And the large telescope of Lord Rosse has disclosed stars so distant from us that their light must have travelled thirty millions of years before it reached the earth. But a simple observation must convince us that these stars are not at the limit of space. All bodies obey the law of gravitation, and attract each other. In assuming now a limitation, the attraction must tend towards an imagined centre of gravity, and the consequence would be the conglomeration of all matter in one celestial body. However great the distances may be, such an union must happen ; but as it does not happen, although the world exists from eternity, there can be no attraction towards a common centre. And this gravitation towards a centre can only be prevented by there being, beyond the bodies visible to us, others still farther which attract from without—and so forth *ad infinitum*. Every imagined limitation would render the existence of the world impossible.

If, then, we can find no limit to minuteness, and are still less able to reach it in respect to magnitude, we must declare matter to be infinite in either direction, and incapable of limitation in time or space. If the laws of thought demonstrate an infinite divisibility of matter, and if it be further impossible to imagine a limited space or a nothing, it must be admitted that there is here a remarkable concordance of logical laws with the results of our scientific investigations.

We shall have another opportunity of establishing the identity of the laws of thought with the mechanical laws of external nature, of which the former are merely the necessary products.

CHAPTER V.

DIGNITY OF MATTER.

“The times are past when spirit was assumed to exist independently of matter. But the times are also passing away, in which it is contended that spirit is degraded because it manifests itself only in matter.”

MOLESCHOTT.

To despise matter and our own body, because it is material—to consider nature and the world as dust which we must endeavour to shake off—nay, to torment our own body, can only arise from a confusion of notions, the result of ignorance or fanaticism. Different feelings animate him who has, with the eyes of an observer, followed matter in its recondite gyrations; who has marked its various and manifold phenomena. He has learned that matter is not inferior to, but the peer of, spirit; that one cannot exist without the other; and that matter is the vehicle of all mental power, of all human and earthly greatness. We may, perhaps, share with one of our greatest naturalists his enthusiasm for matter, “the veneration of which formerly called forth an accusation.” Whoever degrades matter, degrades himself; who abuses his body, abuses his mind and injures himself to the same degree as,

in his foolish imagination, he believed to have profited his soul. We frequently hear those persons contemptuously called *Materialists*, who do not share the fashionable contempt for matter, but endeavour to fathom by its means the powers and laws of existence ; who have discerned that spirit could not have built the world out of itself, and that it is impossible to arrive at a just conception of the world without an exact knowledge of matter and its laws. In this sense, the name of materialist can now-a-days be only a title of honour. It is to materialists that we owe the conquest over matter and a knowledge of its laws, so that, almost released from the chains of gravitation, we fly with the swiftness of the wind across the plain, and are enabled to communicate, with the celerity of thought, with the most distant parts of the globe. Malevolence is silenced by such facts ; and the times are past in which a world, produced by a deceitful fancy, was considered of more value than the reality.

Pretended worshippers of God have, in the middle ages, carried their contempt for matter so far as to nail their own bodies, the noble works of nature, to the pillory. Some tormented, others crucified themselves ; crowds of flagellants travelled through the country exhibiting their lacerated backs. Strength and health were undermined in the most refined manner, in order to render to the spirit—considered as independent of the body—its superiority over the sinful flesh.

Feuerbach relates that St. Bernhard had, by his exaggerated asceticism, lost his sense of taste, so that he took grease for butter, oil for water ; and Rostan reports that in many cloisters the superiors were in the habit of frequently bleeding their monks, in order to repress their passions. He further states, that injured nature avenged itself, and that rebellion, the use of poison and the dagger against the superiors, were by no means rare in these living tombs.

Such aberrations are comparatively rare in our times. Increased knowledge has taught us to have more respect for the matter without and within us. Let us, then, cultivate our body no less than our mind ; and let us not forget that they are inseparable, so that which profits the one, profits the other ! *Mens sana in corpore sano.*

On the other hand, we must not forget that we are but a vanishing, though necessary, part of the whole, which sooner or later must again be absorbed in the universe. Matter in its totality is the mother, engendering and receiving again all that exists.

No people knew better how to honour what is purely human than the Greeks, and none knew better how to estimate the contrast between life and death. Hufeland relates, " When Demonax, the Greek philosopher, then nearly one hundred years old, was asked how he wished to be buried, he replied : Let not that concern you, the smell will bury the body. But would you, objected his

friends, serve as food to dogs and birds? And why not, he replied: I have endeavoured to be useful to man during my life, and why should I not, after my death, give something to the beasts?"

Our modern society certainly does not share these views. To barricade their miserable corpses with flagstones, or to be shut up in family vaults, some with rings on their fingers, appears to them more dignified than to render to nature what they have received from it, and what in due time they must return to it.

A medical theologian, Professor Leupoldt of Erlangen, the *alter ego* of the celebrated M. Rinseis, maintains, that those who start from matter instead of from God, must renounce any scientific conception, inasmuch as they themselves, but insignificant particles of matter, are incapable of conceiving, or of penetrating into, nature and matter. A reasoning more worthy of the theologian than of the physician! Have those who start from God and not from matter ever given us any clue as to the quality of matter and its laws after which they say the world is governed? Could they tell us whether the sun moves or is at rest? whether the earth is a globe or a plain? what was God's design? No! that would be an impossibility. "To start from God in the investigation of nature", is a phrase without meaning. The unfortunate tendency to proceed in the investigation of nature

from theoretical premises, and to construe the world and natural truths by way of speculation, is long abandoned : and it is by pursuing an opposite course of scientific investigation that the great advance of our knowledge of nature in recent times must be ascribed. Why should those who proceed from matter be incapable of forming a conception of it? All natural and mental forces are inherent in it; in matter alone can they manifest themselves; matter is the origin of all that exists. What else but matter could be our subject in the investigation of the world and of existence? All persons deserving the name of naturalists have ever proceeded in this manner; and no person aspiring to such a title can act differently. M. Leupoldt, though a physician, has never been a naturalist, otherwise such a droll idea would never have entered his brain.

CHAPTER VI.

IMMUTABILITY OF THE LAWS OF NATURE.

“The government of the world must not be considered as determined by an extramundane intelligence, but by one immanent in the cosmical forces and their relations.”

STRAUSS.

“We find in the constant harmony of nature a sufficient proof in favour of the immutability of its laws. Every miracle would involve their infraction; a process to which nature would submit as little as to any other intervention in its empire; in which every thing, from the gnat which dances in the sunbeam up to the human mind, which issues from the brain, is governed by fixed principles.”

TUTTLE.

THE laws according to which nature acts, and matter moves, now destroying, now rebuilding, and thus producing the most varied organic and inorganic forms, are *eternal* and *unalterable*. An unbending, inexorable necessity, governs the mass. “The law of nature,” observes Moleschott, “is a stringent expression of necessity.” There exists in it neither exception nor limitation; and no imaginable power can disregard this necessity. A stone not supported will in all eternity fall towards the centre of the earth; and there never was, and never will be, a command for the sun to stand still. The experience of thousands of

years has impressed upon the investigator the firmest conviction of the immutability of the laws of nature, so that there cannot remain the least doubt in respect to this great truth.

Science has gradually taken all the positions of the childish belief of the peoples; it has snatched thunder and lightning from the hands of the gods; the eclipse of the stars, and the stupendous powers of the Titans of the olden time, have been grasped by the fingers of man. That which appeared inexplicable, miraculous, and the work of a supernatural power, has, by the torch of science, proved to be the effect of hitherto unknown natural forces. The power of spirits and gods dissolved in the hands of science. Superstition declined among cultivated nations, and knowledge took its place. We have the fullest right, and are scientifically correct, in asserting there is no such thing as a miracle; everything that happens, does so in a natural way; *i.e.* in a mode determined only by accidental or necessary coalition of existing materials, and their immanent natural forces. No revolution on earth or in heaven, however stupendous, could occur in any other manner.

It was no mighty arm reaching down from the ether which raised the mountains, limited the seas, and created man and beast according to pleasure, but it was effected by the same forces which to this day produce hill and dale, and living beings; *and all this happened according to the strictest necessity.*

Wherever fire and water meet, vapours must arise and exert their irresistible power. Where the seed falls in the ground, there it will grow; where the thunderbolt is attracted, there it will strike. Can there exist any doubt as to these truths? No one who has only superficially observed the phenomena by which he is surrounded, who knows only superficially the results of science, can fail to be convinced of the necessity and unchangeableness of the laws of nature.

The fate of man resembles the fate of nature. It is similarly dependent on natural laws, and it obeys without exception the same stringent and inexorable necessity which governs all that exists. It lies in the nature of every living being, that it should be born and die; none has ever escaped that law; *death* is the surest calculation that can be made, and the unavoidable key-stone of every individual existence. The supplications of the mother, the tears of the wife, the despair of the husband, cannot stay his hands. "The natural laws," says Vogt, "are rude unbending powers, which have neither morals nor heart." No call can awaken from the sleep of death; no angel can deliver the prisoner from the dungeon; no hand from the clouds reaches bread to the hungry.

"Nature," says Feuerbach, "returns no answer to the questions and lamentations of man; inexorably it refers him to himself:" and Luther artlessly says, "for we observe from experience that God takes no interest in this temporal

life." A spirit independent of nature cannot exist; for never has an unprejudiced mind, cultivated by science, perceived its manifestations.

And how could it be otherwise? How is it possible that the unalterable order in which things move should ever be disturbed without producing an irremediable gap in the world, without delivering us and everything up to arbitrary power, without reducing all science, every earthly endeavour, to a vain and childish effort.

Apparent exceptions from the natural order have been called *miracles*, of which there have been many at all times. Their origin must be ascribed partly to superstition, and partly to that strange longing after what is wonderful and supernatural, peculiar to human nature. It is somewhat difficult for man, however evident the facts, to convince himself of the conformity which surrounds him; it creates in him an oppressive feeling, and the desire never leaves him to discover something which runs counter to this conformity. This desire must have had a larger sphere among primitive and uncultivated races: hence the number of their miracles. Even to this day there is no deficiency of miracles and powerful spirits among savage and ignorant tribes. We should only waste words in our endeavour to prove the natural impossibility of a miracle. No educated, much less a scientific person, who is convinced of the immutable order of things, can now-a-days believe in miracles. We find it

rather wonderful that so clear and acute a thinker as Ludwig Feuerbach, should have expended so much logic in refuting the Christian miracles. What founder of any religion did not deem it necessary, in order to introduce himself to the world, to perform miracles? And has not his success proved that he was right? What prophet, what saint is there, who has not performed miracles? The miracle-seeker sees them daily and hourly. Do not the table-spirits belong to the order of miracles? All such miracles are equal in the eye of science—they are the results of a diseased fancy. “Miracles,” says the celebrated *Système de la Nature*, “exist only for him who has not studied them.”

Is it possible that, at a period when the natural sciences have made such progress, the clergy of so enlightened a people as the English should parade before the whole civilised world their gross superstition, in their famous quarrel with Lord Palmerston. The clergy demanded that Government should appoint a general fast for the removal of the cholera. The noble Lord replied that the propagation of the cholera rested on natural conditions partly known, but that its progress was more likely to be arrested by sanitary measures than by prayers. This reply was considered to smack of atheism; and the clergy declared it to be a mortal sin not to believe that Providence might, from personal considerations, at any time transgress the laws of nature. What

a droll idea these people entertain of the God which they have created for themselves! A supreme legislator, who allows himself to be moved by prayers and sobs, to reverse the immutable order which he himself has created, to violate his own laws, and with his own hand to destroy the action of the natural forces! If these people had possessed the smallest notion of the natural conditions under which diseases are propagated, they would have perceived the absurdity of their demand.

“Every miracle, if it existed,” observes Cotta, “would lead to the conviction that the creation is not deserving the respect which all pay to it, and the mystics would necessarily be obliged to deduce from the imperfection of the created world the imperfection of the creator.”

“Miracles,” says Giebel, “are great horrors in the domain of science, where not blind faith, but conviction derived from knowledge, is of any value.”

And the Frenchman Jouvencel observes: “There is neither chance nor miracle; there exist but phenomena governed by laws.”

Dogmatic writers call it an unworthy view of God, to regard the world as clockwork going by itself; and to consider God as the constant regulator. Thus Humboldt has been blamed for having described his Cosmos as an assemblage of natural laws, and not as the product of *creative will*. We might as well blame the natural

sciences, that they exist ; for not natural history, but nature itself, has made known to us Cosmos as a system of unalterable laws. Anything that may be objected by theology or imperfect knowledge is refuted by the power of facts, which clearly decide for our view. The opponents of natural science no doubt have their own facts : God dried up the Red Sea in order that the Jews might pass over. By comets and eclipses he frightens humanity at all times ; he clothes the lilies, and feeds the birds. But what rational person can in these cases perceive any thing else but the eternal unalterable action of natural forces ? And is it a view more worthy of God to represent him as a power which now and then gives a new impulse to the world in its course, and puts on a screw, etc., like the regulator of a watch ? If the world has been created by God perfect, how can it require any repairs ?

The conviction of the immutability of the natural laws is general among naturalists ; they only differ in the mode by which they reconcile this fact with the existence of a so-called absolute or individual creative power. Naturalists, as well as philosophers, have in a variety of ways pursued this subject, and apparently with the same want of success. The attempts could not succeed by a scientific method. They either were opposed to the facts, or touched upon the province of faith, or took refuge under ambiguous phrases.

Thus the celebrated Oersted says, "The world is governed by an eternal reason, which makes known to us its actions by unalterable laws." But no one can comprehend how an eternal and *governing* reason can accord with unalterable laws of nature. Either the laws of nature govern, or eternal reason governs; if both govern together, they must be in continual conflict; the government of the latter would render that of the former unnecessary, whilst the action of unalterable laws admits of no personal interference, and can on that account scarcely be called governing. On the other hand, we must quote a passage of the same Oersted, in opposition to those who experience a degrading and oppressive feeling from acknowledging the immutability of nature's laws. "By this knowledge," observes Oersted, "the soul acquires repose, is brought into harmony with all nature, and is delivered from every superstitious fear that powers beyond the domain of reason should interfere with the eternal course of nature." *

* Since the results of modern natural science have by popular writings spread in wider, not exactly scientific, circles, there is from innumerable places and corners heard a cry of lamentation about the *disconsolate* nature of these results; which lamentations have been rather increased since the first edition of our book. The unexceptionable order which reigns in nature and the world, and the limits of which cannot be passed; the consciousness that nothing within and beyond him is arbitrary, but everything necessary, is, on the contrary, apt to produce in the mind of a rational man, besides a feeling of modesty, also that of con-

Still worse have those theorists fared, who assumed that the highest or absolute power is so intimately connected with the objects in nature, that everything happens through its immediate influence, though according to fixed laws; in other words, that the world is a monarchy governed by laws, in some sense a constitutional state. But the immutability of the laws of nature is of a kind that admits of no exception, that under no circumstances is the action of a compensating hand perceptible, and that its action is frequently quite independent of the rules of a higher reason, now constructing, now destroying, now full of design, then again perfectly blind and in contradiction with all moral and rational laws. That in the formation of organic and inorganic bodies, which are constantly being renewed, there can be no direct governing reason at work is proved by the most striking facts. The *nisus formativus* inherent in nature is so blind and so dependent on external circumstances, that the most senseless forms are

tentment and self-esteem, giving him a certain hold not resting upon fancies, but upon the knowledge of truth. Every other view, which deduces the destination of man from his relation to an unknown arbitrarily ruling and producing *something*, degrades him to the state of a puppet in the hands of unknown powers, and makes him the impotent and ignorant slave of an invisible master. "Are we sucking-pigs, which are whipped to death for princely tables, in order that their flesh should be more savoury?" (Herald, in George Büchner's *Danton's Tod.*)

frequently engendered, that it is often incapable of obviating or overcoming the slightest obstructions, and that frequently the contrary of what according to reason should happen, is effected. We shall have occasion to adduce examples of this kind in a subsequent chapter on teleology. This theory could, therefore, find but few adherents among naturalists, who have daily and hourly the most ample opportunities of convincing themselves of the purely mechanical mode of action of the natural laws.

A great number of adherents that theory found which admits that the laws of nature act mechanically, independent of any external influence, but that we must assume that it has not been so from eternity, and that a creative power, gifted with the highest reason, has created the matter and given it laws now inseparably united with it; that this creative power had then given the world the first impulse to set it in motion, after which that being had retired to rest.

“There are many naturalists,” says Rudolph Wagner,* “who assume a primitive creation, but maintain that after the creation the world had been left to itself, and is preserved by the excellence of its mechanism.” We have already expressed our objection to this view, and shall recur to it in the sequel when speaking of creation. It will be shown that a direct creation cannot be proved from the facts at our command,

* Ueber Wissen und Glauben, 1854.

that on the contrary every thing induces us to reject such an idea, and to consider the ever-changing action of the natural forces as the fundamental cause of all that arises and perishes.

It is not within our province to concern ourselves with those, who in their attempts to explain the secret of existence, turn to *faith*. We are occupied with the tangible sensible world, and not with that which every individual may imagine to exist.

What this or that man may understand by a governing reason, an absolute power, a universal soul, a personal God, etc., is his own affair. The theologians, with their articles of faith, must be left to themselves; so the naturalists with their science: they both proceed by different routes. The province of faith rests in human dispositions, which are not accessible to science; and even for the conscience of the individual, it does not appear impossible to keep faith and science separate. A respectable naturalist recently gave the ingenuous advice that we should keep two consciences, a scientific, and a religious conscience, which for the peace of our mind we should keep perfectly separate, as they cannot be reconciled. This process is now known by the technical expression of "book-keeping by double entry." We said the advice was ingenuous, because he whose conviction permits him to keep such a conscience by double entry, stands in no need of advice.

CHAPTER VII.

UNIVERSALITY OF THE LAWS OF NATURE.

“Who suspends *one* law of nature suspends them all.”

L. FEUERBACH.

WHEN it was perceived that the sun, moon and stars were not exactly candles fixed in the heavenly vault intended to illuminate by day and night the dwelling-places of the human race; nor that the earth was the footstool of God, but a mere speck in the universe,—then the human mind, deprived of a comparatively near field for its speculations, did not hesitate to search for one in the distance. Remote regions of worlds sparkled now in the marvellous splendour of the paradise. Distant planets were imagined to be peopled with races possessing ethereal bodies released from the burden of matter, and those who had taught that life was merely a preparatory school for a *beyond*, hastened to exhibit to their pupils the glorious and infinite prospect of a constantly ascending school-career from planet to planet, and from sun to sun, in which the industrious and well-conducted should always occupy the front, and the lazy always the back seats. However charming such a prospect may appear to

minds habituated to a school discipline, a sober contemplation of nature must reject these extravagant fancies. According to our present knowledge of the bodies which surround our globe, we cannot but conclude, that the same materials and the same laws govern the visible universe, and that they everywhere act in the same manner as in our proximity. Astronomy and natural philosophy afford a sufficient number of proofs. The laws of gravitation, *i.e.* the laws of motion and attraction, are in all space reached by the telescope, invariably the same. The motions of all and the most remote bodies take place according to the same laws by which on our earth a stone falls, or the pendulum vibrates, etc. All astronomical calculations regarding the motions of distant bodies, and which are based upon these known laws, have proved perfectly correct. Astronomers have pointed out the existence of stars, which were only discovered after being sought for in the spots indicated; they predict solar and lunar eclipses, and calculate the reappearance of comets in centuries to come. The form of Jupiter was deduced from the laws of rotation, and was verified by direct observation. We know that the planets have their seasons, days, and nights like the earth, though they differ in length.

The laws of light through all space are the same as on our earth. Everywhere has it the same velocity, and composition; and its refraction takes place in a similar manner. The light which

the most remote fixed stars transmit to us through a space of billions of miles, differs in nothing from the light of our sun ; it acts according to the same laws, and has the same composition. We possess not less sufficient grounds proving that the bodies in the universe possess two of the same properties as our earth, and the objects upon it, namely, impenetrability and divisibility. The laws of heat are like those of light, everywhere the same. The heat emanating from the sun acts according to the same principles as that radiating from the earth. But it is upon the relation of heat, that the solid, liquid, and aëriform states of bodies depend ; these states must therefore everywhere exist under the same conditions. Again—electricity, magnetism, etc., are so intimately connected with the evolution of heat, that they cannot be separated ; consequently, wherever heat is, that is to say, everywhere, there must also be these forces. The same may be asserted of the relation of heat to the mode of chemical combination and decomposition, which must everywhere take place in a similar manner. Meteoric stones, visible messengers from another world, afford a more direct proof. In these remarkable bodies which are projected from other heavenly bodies, or from the primordial ether, there has as yet no element been discovered, which is not already existing upon the earth ; nor is the form of those crystals different from those known to

us. The history of the origin and development of our earth is analogous to that of other heavenly bodies. The spheroidal forms of the planets prove that they, like the earth, were once in a fluid state, and the gradual development of the earth to its present form must, in a similar manner, have taken place in all other planets.

All these facts evidently prove the universality of the laws of nature, and that they are not confined to our earth, but pervade all space. Nowhere in this space is there a loophole for the imagination to engender its marvellous fancies, and to dream of an existence emancipated from the limits of these common laws.

It is not necessary for us to possess the means of tracing *every* natural force in its universality. The circumstance that this has been effected for some is quite sufficient to protect us from error. Where one law prevails, there prevail all the rest; their connection being so intimate as to be inseparable. Every exception, every deviation would immediately result in an irreparable confusion; for the equilibrium of forces is the fundamental condition of all existence. The world surrounding us is an infinite whole, composed of the same materials, and moved by the same forces. Oersted argues correctly when he maintains that, assuming the identity of the laws of nature and those of reason, we must also suppose a substantial equality of the perceptive power in the whole universe. If there be thinking beings upon

other planets—and this is probable, for why should not similar causes produce similar effects?—then their powers of thought must be similar to ours, though there may be a difference in degree. The corporeal structure of their organs must also be substantially the same, though varied in form according to the influence of external circumstances. It cannot, however, be denied, that even within the limits of existing materials and forces there are so many modifications and combinations possible, that our conclusions touch upon the province of theories and suppositions. However, there can be no doubt that the fundamental principles of corporeal and mental development, of organic and inorganic life, must everywhere be the same. Similar materials and forces produce in their combinations similar effects, though in an immense variety of colours and shades. Our *direct* investigation, however, ends here; whether with the improvement of our instruments, our knowledge may be enlarged, we cannot tell.

“And if,” says Zeise,* “what can scarcely be doubted, there exist higher organic beings upon distant worlds, they must in their higher development of thinking beings resemble man in his intellectual capacity, inasmuch as there is in the whole universe but *one* reason which can only be thought of as the same, and to which all the laws

* Das Endlose der grossen und der kleinen materiellen Welt. Altona, 1855.

of nature appear as the laws of reason." That spirit and nature are the same, that reason and the laws of nature are identical, must already have appeared from what we have stated on the relation of matter and force. What we term mind, thought, conception, is the result of natural, though peculiarly combined, forces, which, like every other force of nature, can only be manifested in certain materials. These materials are in organic life combined in an infinitely complicated mode, and produce on that account effects which at first appear wonderful and inexplicable, whilst in the inorganic world the processes and effects are more simple, and therefore more comprehensible. But in their essence they are both the same, and experience teaches us in every step that the laws of thought are the laws of the world.

"A main point of the proof," observes Oersted, "that the laws of nature are those of reason, is, that by thought we are able to deduce other laws of nature from those known to us, so that we find them in experience, and if this does not happen, we naturally conclude that we have formed erroneous conclusions."

This notion perfectly and necessarily agrees with the empirical results we shall obtain in the chapter treating of innate ideas, and the origin of the human soul. As the soul knows nothing of so-called absolute, supersensual, immediate, or transcendental ideas, but acquires all its

thoughts and knowledge from the observation of the ^{*}surrounding objective world, and is consequently merely a product of this world and of nature, it cannot be but that the laws of them should be reflected or repeated in the human mind. Though it may be difficult, nay impossible, to trace in detail the recondite processes of this relation, still it appears to us that on empirical grounds there can be no doubt as to the fact itself.

CHAPTER VIII.

THE HEAVENS.

“The world governs itself according to eternal laws.”

COTTA.

EVERY schoolboy knows that the sky is not a glass shade covering the earth, but that, in contemplating it, we behold an immense space interrupted by infinitely distant and scattered groups of worlds. These individual worlds, or solar systems, must have been formed from a shapeless mass of vapours by the rotary motion of specks, so as gradually to have become condensed into compact globular masses. These masses in space are in constant motion, a motion singularly combined and complicated, yet in all its modifications merely the result of a single universal law of nature—the *law of attraction*. This law, inherent in matter, and visibly manifested in every atom, is irresistibly obeyed by every body, however large or small, without the least deviation. All these motions may be determined and predicted with mathematical exactness. As far as the telescope of man reaches, the same law, the same mechanical arrangement, according to the same calculated mechanical formula, is found.

Nowhere is there a trace of an arbitrary finger, which has ordered the heavens, or pointed out the paths of comets. "I have searched the heavens," said Lalande, "but have nowhere found the traces of a God." And when the emperor Napoleon asked the celebrated astronomer Laplace why there was no mention of God in his *Mécanique Céleste*, he replied, "*Sire, je n'avais pas besoin de cette hypothèse.*" The more astronomy progressed in its knowledge of the laws and motions in the heavens, the more it repudiated the idea of a supernatural influence, and the easier it became to deduce the origin, grouping, and motions of the heavenly bodies, from the properties inherent in matter itself. The attraction of atoms rendered the bodies compact; whilst the law of attraction, in combination with their primary motion, produced the mode of their reciprocal rotation which we now observe.

True it is, that many, arrived at this point, seek for the first impulse not in matter itself, but in an extraneous cause which has imparted motion to the matter. But even in this remote position a personal creative power cannot hold its ground. Eternal matter must have been capable of eternal motion. Absolute rest in nature is as little cogitable, and as little in existence as an absolute nothing. There can be no material substance without a reciprocal manifestation of its inherent forces, which in themselves are nothing but various modes of material mo-

tions. Therefore the motion of matter is as eternal as matter itself. Why matter assumed a definite motion at a definite time is as yet unknown to us ; but the investigations of science are as yet incomplete, nor is it impossible that we may get some clue as to the period of the first origin of individual worlds. Even at this day, astronomers give cogent reasons that some of the nebular spots are worlds in embryo, which, by gradual condensation and rotation, will become worlds and solar systems. We have, therefore, concluding from analogy, a right to say that those processes through which the existing solar systems have arisen, can have formed no exception to the general laws inherent in matter, and that the cause of the first definite motion must have existed in the matter itself. We are the more justified in asserting this, as the many irregularities, contingencies, etc., in the economy of the universe and individual bodies, exclude the thought of an external personal activity. If it were the object of a personal creative power to create worlds and dwelling places for men and animals, why, we may ask, these enormous, waste, useless spaces, in which but here and there suns and planets swim, floating about as imperceptible points ?* Why are not all planets

* The celebrated astronomer Tycho de Brahe (1608) placed the fixed stars not far beyond the orbit of Saturn, then deemed the last planet ; he could not reconcile starless ethereal spaces with his idea of an all-penetrating deity. (F. Nobbe.)

of our system so formed as to be inhabited by man? Why is the moon without water and atmosphere, and consequently adverse to every organic development? Wherefore the irregularities and enormous differences in the size and distances of the planets of our solar system? Why the deficiency in order, symmetry, and beauty? Why have all comparisons, analogies, speculations in regard to the number and forms of the planets proved idle fancies? "Why," asks Hudson Tuttle,* "did the creator give rings to Saturn, which, surrounded by its eight moons, can have little need of them, while Mars is left in total darkness? If there was any special design in the plan of the solar system, the rings should be given to a moonless planet: that they were not, teaches the reverse." And again, "The moon's rotation round its axis is, in relation to that of the earth, such that it always presents to it the same surface. What is the reason of this? If there be design in this arrangement, it must be admitted that it is very imperfect. Why did the creator not impart to the celestial bodies that order from which the intention and the design could irresistibly be inferred?" Because the accidental concurrence of the elements knows of no higher order, and because a crushed stone does not separate in pieces regular in number and shape. Why did not creative power arrange the systems of worlds so that there may be no

* History and Laws of the Creation, 1860.

doubt as to its object. Some perceive in the position and relations of the earth to the sun, moon, and stars, a designing providence; but they do not consider that they confound cause and effect, and that we should be differently organised if the inclination of the ecliptic were different or not existing.

These questions might be multiplied at pleasure; but their number would not change the result—that empirical philosophy, wherever it may search for it, is nowhere able to find a trace of a supernatural influence either in time or space.

CHAPTER IX.

PERIODS OF THE CREATION OF THE EARTH.

“One generation passeth away, and another cometh, but the earth endureth for ever.” BIBLE.

“Thousands of years are, in the chronometer of nature, one stroke of the pendulum—a moment.”

TUTTLE.

THE investigations of geology have thrown a highly interesting and important light on the history of the origin and gradual development of the earth. It was in the rocks and strata of the crust of the earth, and in the organic remains, that geologists read, as in an old chronicle, the history of the earth. In this history they found the plainest indications of several stupendous successive revolutions, now produced by fire, now by water, now by their combined action. These revolutions afforded, by the apparent suddenness and violence of their occurrence, a welcome pretext to orthodoxy to appeal to the existence of supernatural powers, which were to have caused these revolutions in order to render, by gradual transitions, the earth fit for certain purposes. This successive periodical creation is said to have been attended with a successive creation of new organic beings and species. The

Bible, then, was right in relating that God had sent a deluge over the world to destroy a sinful generation. God with His own hands is said to have piled up mountains, planed the sea, created organisms, etc.

All these notions concerning a direct influence of supernatural or inexplicable forces have melted away before the age of modern science. Like astronomy, which with mathematical certainty has measured the spaces of the heavens, so does modern geology, by taking a retrospective view of the millions of years which have passed, lift the veil which has so long concealed the history of the earth and has given rise to all kinds of religious and mysterious dreams. It is now known that there can be no discussion about those periodic creations of the earth of which so much was said, and which to this day an erroneous conception of nature tries to identify with the so-called days of creation of the Bible; but that the whole *past* of the earth is nothing but an unfolded *present*.

However probable it may at first sight appear that the changes, the traces of which we find in the crust of the earth, must have resulted from sudden and violent convulsions, closer observation teaches, on the contrary, that the greater portion of these changes is merely the result of a gradual, slow action, continued through immeasurably long periods of time; and that this action may still be observed going on, though on so

reduced a scale that the effects do not particularly strike us. "For the earth," says Burmeister, "is solely produced by forces which, with corresponding intensity, are still acting; it has never essentially been subjected to more violent catastrophies; on the other hand, the period of time in which the change was effected is immense, etc. What is really surprising and stupendous in the process of development, is the immeasurable time within which it was effected."

As a drop of water may excavate a stone, so may apparently weak and scarcely perceptible forces produce in length of time incredible and surprising effects. It is known how the cataracts of the Niagara have broken up the bed of the river for many miles, and that they have pierced the firmest rocks. The earth changes continually, as it did formerly; strata are formed; volcanos burn; earthquakes tear up the ground; islands rise and sink; the sea leaves one part of the land and swallows up another.* We see at present all these slow and local effects, which millions of years have produced in their entirety, and cannot, therefore, divest ourselves of the idea of a direct creative power, whilst we are merely surrounded by the natural effects of natural forces. The whole science of the conditions of development of the earth is, however, the

* A detailed account of these facts will be found in the popular work of Rossmässler, *Geschichte der Erde*, Frankfurt bei Meidinger, 1856.

greatest victory over every kind of faith in an extramundane authority. This science, supported by the knowledge of surrounding nature and its governing forces, is enabled to trace the history of what has happened in infinite periods of time with approximating exactness, frequently with certainty. It has proved that everywhere, and at all times, only those materials and natural forces were in activity by which we are at present surrounded. Nowhere was a point reached, when it was necessary to stop scientific investigation and to substitute the influence of unknown forces. Everywhere it was possible to indicate or to conceive the possibility of visible effects from the combination of natural conditions; everywhere existed the same law, and the same matter. "The historical investigation of the development of the earth has proved that *now* and *then* rest upon the same base; that the past has been developed in the same manner as the present rolls on; and that the forces which were in action, ever remained the same." (Burmeister.)

"This eternal conformity in the essence of phenomena renders it certain that fire and water possessed at all times the same powers, and ever will possess them; that attraction, consequently the phenomena of gravitation, electricity, magnetism, the volcanic action of the interior of the earth, have never been different from what they are now. (Rossmässler.)

"Nature always works silently; convulsions

and revolutions form the exceptions. The catastrophies which the fancy of some authors has depicted with such a gloomy colouring, are either exaggerated or have never occurred. There have been great changes, terrible convulsions; but most of them have taken place with much less tumult than described, and in all cases they have *been produced by ordinary and known physical forces.*" (Tuttle.)

An enlightened intellect no longer requires the aid of that powerful hand which, acting from without, excites the burning spirits of the interior of the earth to a sudden rebellion, which pours the waters as a deluge over the earth, and shapes for its designs the whole structure like soft clay. How curious and whimsical is not the conception of a creative power, which conducts the earth and its inhabitants through various transitions and immense periods of time to a more developed form, in order to make it finally a fit dwelling-place for the most organised animal—man. Can an arbitrary and almighty power require such efforts to attain its object? Can it not immediately and without delay do and create what seems good to it? Why these roundabouts? The natural difficulties alone which matter meets with in the gradual combinations and formations of its parts, can explain to us the peculiarity of the origin of the organic and inorganic world.

Of the immensity of time which the earth required to attain its present form, an approximat-

ing notion may be formed from the calculations of geologists in regard to individual phases, or the formation of certain strata. The so-called coal formation alone required, according to Bischof, 1,004,177, according to Chevandier's calculation, 672,788 years. The tertiary strata, about 1000 feet in thickness, required for their development about 350,000 years; and before the originally incandescent earth could cool down from a temperature of 2000 degrees to 200, there must, according to Bischof's calculation, have elapsed a period of 350 millions of years. Volger finally calculates, that the time requisite for the deposit of the strata known to us must at least have amounted to 648 millions of years! From these numbers, we may form some notion as to the extent of these periods of time. They give us, moreover, another hint. The enormous distances in the universe, which stagger our imagination, in combination with these almost unlimited periods of time, lead us to acknowledge that both time and space are infinite and eternal. "The earth as a material existence is, indeed, infinite; the changes only which it has undergone can be determined by finite periods of time." (Burmeister.) "We must therefore assume, that the starry heaven is not merely in space, what no astronomer doubts, but also in time without beginning or end; that it never was created, and is imperishable." (Czolbe.)

Should religious ideas, which always represent

God as everlasting and infinite, have any advantage above the conceptions of science? Should the gloomy rage of the priest, which invented the eternity of hell-punishments, excel natural science in boldness of thought? "Whatever may be said of the end of the world, everything is as vague as the tradition of a beginning, which the childish intellect of the peoples has invented: the earth and the world are eternal, for this quality belongs to the essence of matter. But it is not unchangeable; and just because it is changeable does the shortsighted man, not yet enlightened by the investigations of science, consider it as finite and perishable." (Burmeister.)

That which modern science, by the aid of instruments, has nearly established as an incontrovertible fact, was already taught thousands of years ago, when logical thought was uninfluenced by the religious and philosophical prejudices of our time; and it seems incomprehensible how so simple and necessary a conception as that of the eternity of the world could ever have been lost to the mind. "Almost all the old philosophers agree in considering the world eternal. Ocellus Lucanus says expressly, in speaking of the universe, that the same had ever existed, and will ever exist. All unprejudiced individuals will ever feel the force of the axiom that, out of nothing, nothing can come. Creation, in the sense of the moderns, is a theological sophism." (*Système de la Nature*, première partie, note 7.)

CHAPTER X.

PRIMEVAL GENERATION.

“It is certain that the appearance of animal bodies upon the surface of the earth is an expression of such forces, a function which results with mathematical certainty from existing relations.”

BURMEISTER.

THERE was a time when the earth—a fiery globe—was not merely incapable of producing living beings, but was hostile to the existence of vegetable and animal organisms. It was only after having gradually cooled down, and, after the precipitation of the watery vapours which surrounded it, that the crust of the earth assumed a form which, in its further development, rendered the existence of various organic beings possible. With the appearance of water, and as soon as the temperature permitted it, organic life developed itself. In consequence of the reciprocal action of air, water, and stone, there was formed in the course of an immense number of years, a series of superincumbent strata, the examination of which has, within a comparatively short time, given the most important results concerning the history of the earth, and the organisms which existed, and still exist, upon it; as each indivi-

dual stratum contains well preserved remains and traces of these organisms, both of vegetable and animal origin. They are found even in the lowest deposits in which a diminished temperature and the existence of soil rendered the origin of organic beings possible. *Pari passu* with the development of the different strata is seen a gradually ascending development of vegetable and animal organisms which lived in them. The older such a stratum, the lower and more imperfect; the more recent, the more developed are its organic forms. There is exhibited at the same time, a constant relation of the external conditions of the surface of the earth to the existence of organic beings, and a necessary dependence of the latter on the condition of the earth. When the sea still occupied the greater portion of the surface, aquatic animals and plants only could preserve their existence. With the spread of land there arose endless forests, which attracted from the atmosphere its superabundant carbonic acid, an element indispensable to the existence of vegetable life. Only after the atmosphere had been purified from this element, detrimental to the life of air-breathing animals, was it possible for higher animal life to exist in it. The appearance of enormous vegetable feeders was in harmony with a gigantic vegetation. Carnivorous animals appeared later, when there was food sufficient for their existence. Thus every stratum exhibits its peculiar organic world; organic

forms disappear with the change of external conditions; new organisms appear, and are added to the old. With the degree of development of the earth itself, rises also its organic population from the simplest to the most complicated forms. This constantly increasing variety is the result of the now vivifying alteration of clouds and winds, of light and heat.

In the Jurassic period, the surface of the earth again changed its character; and in harmony with this change we find in that period peculiar intermediate organisms, those remarkable amphibial forms now perfectly extinct. But it was only with the present existing differences of climate, that the endless variety of organic forms appeared which we now behold. In the tertiary group, we meet with numerous mammals of singular shape, which are either extinct or exist only in feeble analogues, as the *dinotherium*, numerous *pachydermata*, mastodons, etc. Of man, the highest organic being of creation, not a trace was found in the primary strata: only in the uppermost, the so-called alluvial layer, in which human life could exist, he appears on the stage—the climax of gradual development.*

These palæontological characteristic relations of the condition of the earth and external influ-

* It is said that in Belgium there have been recently discovered in the diluvium, fragments of human bones which approach the African type; so that man may not, after all, be the last member of creation.

ences to the origin, growth, and propagation of organic beings, are partly still existing; and we are surrounded by proofs of this kind. A numerous class of animals, such as intestinal worms, are only developed in definite places, and exhibit the greatest variety in form and mode of life, accordingly as they exist in various animals and various organs. Upon the spot where a forest is burned down, certain species of plants appear; oaks and beeches grow where pines stood. "In places ravaged by fire, in spots rendered arable by clearing the forests, at the bottom of dried-up ponds, there frequently shoots up a vigorous vegetation, containing species not to be found in the vicinity. Where a saline spring gushes forth, there soon appear well-marked kalophites and salt-water creatures, no trace of which is to be found for many miles around." (Giebel.) Since the increase of pine plantations in the environs of Paris, there is met with the lamia (*lamia ædilis*), an insect belonging to Northern Europe, which had never been seen in the above region. Where air, heat, and moisture combine, there appears sometimes in a few moments an innumerable world of singularly shaped animals, which we term *infusoria*.

These examples might be multiplied; and it can be shewn how external influences produce *within* various species of plants and animals the most important modifications.

In spite of the enormous and almost irrecon-

cilable difference between individual races, the majority of naturalists are still of opinion that the assumption of the origin of the human race from one pair is not opposed to science, and that the differences which human beings exhibit may be considered as the results of external and gradual influences. "I believe," says Hufeland, "the differences of the dog species are greater than those of the human race. A greyhound differs more from a bulldog than a negro from an European. Are we now to believe that God has created each of these varieties, or rather that they have all descended from an original stock, and have gradually degenerated?"*

* The frequently discussed question in regard to the descent of the human race from one or several pairs, is unimportant for the object of our investigation. If nature was able to produce man by its innate forces in any one place, it could do so in several places. The results of scientific investigations leave scarcely any doubt that the human race has descended, not merely from several, but from very many pairs. The characteristic peculiarities of the so-called botanic and zoological provinces of the earth, both of the present and the past, and to which Agassiz first drew our attention, indicate unmistakably the existence of as many (to use the expression) centres of creation, from which plants, animals, and man must have taken their origin. The results of philology are still more in favour of this view. The roots of the various languages exhibit such decided differences, that a common origin is not to be thought of. From these results it may be fairly concluded, that not even the same variety descends from one pair, but that *e.g.* the Caucasian race has originated in different spots. A. W. Schlegel divides the various languages of the earth into three classes—the analytical, organic, and synthetic lan-

However important and powerful these influences may still be, it is certain that no permanent transmutation of one species of animals into another has as yet been observed, nor that any of the higher organisms was produced by the union of inorganic substances and forces without a previously existing germ produced by homogeneous parents. The general law at present seems to be *omne vivum ex ovo*, *i.e.* all living beings derive their origin from existing germs produced from homogeneous parents, or by direct generation, as from an egg, a seed, or by division, budding, etc. There must have existed individuals of the same species, to produce others of the same kind. This truth is allegorically expressed

guages; each of these groups having arisen in a different manner. The Chinese language belongs to the analytical. The organic languages again form two distinct subdivisions, between which there subsists no relationship whatever. These are the Indo-Germanic, and the Semitic languages. The Indo-Germanic family had their original dwelling place in Asia (Affghanistan). They subsequently separated: one part went to the East—these were the Indians; others went to Western Asia—the Persians and Armenians; others, again, took possession of Europe—the Celts, Romans, Greeks, Germans, Slaves. All these formed originally one family. The Semitic race, however, differs from them entirely with regard to their language. To this family belong the Arabs, Hebrews, Carthaginians, Phœnicians, Syrians, and Assyrians. Among the synthetic languages may be enumerated those of the old Egyptians, or Copts, the Finns and Laplanders, several nations in the interior of Russia, and the Hungarians. Whether those of the Turks, Tartars, and Mongols belong to it is questionable.

in the Old Testament, in the tradition that a pair of each living species of animals was received in the ark of Noah, to save them from the Deluge. Those who are not satisfied with the traditions of the Bible, necessarily raise the questions *whence?* and *how?* *i.e.* the question of the first origin of organic beings. If every organism is produced by parents, whence came the parents? Could they have arisen from the merely accidental or necessary concurrence of external circumstances and conditions, or were they created by an external power? And if the first supposition be true, why does it not happen to-day?

This question has ever occupied philosophers and naturalists, and has given rise to a variety of conflicting opinions. Before entering upon this question, we must limit the axiom *omne vivum ex ovo* to that extent, that, though applicable to the infinite majority of organisms, it does not appear to be universally valid. At any rate, the question of a *generatio æquivoca*, or spontaneous generation, is not yet settled. *Generatio æquivoca* signifies the production of organic beings without previously existing homogeneous parents or germs, merely by the accidental or necessary concurrence of inorganic elements and natural forces, or also from organic substances not produced by homogeneous parents. Although modern investigations tend to show that this kind of generation, to which formerly was ascribed an extended sphere of action, does not exactly pos-

sess a scientific basis, it is still not improbable that it exists even now, in the production of minute and imperfect organisms.*

But, granting the applicability of this law to

* According to the observations of Dr. Cohn of Breslau (*Hedwigia, Notizblatt für Kryptogamische Studien*, 1855), the death of the common house-fly in autumn is the consequence of a fungous development within the body. Numerous minute free cells appear in the blood of the animal, which, rapidly increasing, are transformed into a microscopic fungus, *empusa muscæ*. There are various grounds for believing that these *empusa* cells arise from a free cell formation in the morbidly changed blood of the fly. The so-called muscardine of the silkworm, an epidemic fungous disease of these animals, possibly arises in a similar manner. The author entertains from his point of view, and on general grounds, no doubt as to the actual existence of a *generatio æquivoca*, and that earlier or later it will be scientifically established. M. Rossmæssler reports that Professor Cienkowsky of St. Petersburg has observed the spontaneous origin of independent organisms from a single cell, starch granules in the tubercles of putrid potatoes; which phenomenon has, however, recently been differently interpreted by Professor Cienkowsky himself. From more recent experiments by M. Flach (*Archive Pharmaceutique*, 1860), and from a notice in the *Journal for Natural Science* (1860), it seems to result that the inferior plants, such as fungi, algæ, lichens, may be spontaneously produced and metamorphosed into each other under particular conditions. Cells, spores, tubular cells, are changed into monads. M. Pouchet has also recently performed experiments for the purpose of proving spontaneous generation. From his stand-point, that author seems to entertain no doubt on the subject, and insists that sooner or later science will be able to demonstrate it. Professor Giebel of Halle, also, has very recently, in his *Questions on Natural History*, expressed himself in favour of the theory of spontaneous generation.

all highly organised plants and animals, the question of their first origin remains yet open, and appears at first sight incapable of solution without the assumption of a higher power, which has created the first organisms, and endowed them with the faculty of propagation. Believing naturalists point to this fact with satisfaction; they remind us, at the same time, of the wonderful structure of the organic world, and recognise in it the prevalence of an immediate and personal creative power, which, full of design, has produced this world. "The origin of organic beings," says B. Cotta, "is, like that of the earth, an insoluble problem, leaving us only the appeal to an unfathomable power of a creator."

We might answer these believers, that the germs of all living beings had from eternity existed in universal space, or in the chaotic vapours from which the earth was formed; and these germs, deposited upon the earth, have there and then become developed, according to external necessary conditions. The facts of these successive organic generations would thus be sufficiently explained; and such an explanation is at least less odd and far-fetched than the assumption of a creative power, which amused itself in producing, in every particular period, genera of plants and animals, as preliminary studies for the creation of man—a thought quite unworthy of the conception of a perfect creator.* But we

* A scientific attempt to prove, not merely the eternity

stand in need of no such arguments. The facts of science prove, with considerable certainty, that the organic beings which people the earth owe their origin and propagation solely to the conjoined action of natural forces and materials; and that the gradual change and development of the surface of the earth is the sole, or at least the chief, cause of the gradual increase of the living world.

It is impossible at present to demonstrate with scientific exactness this gradual development, though we may hope that future investigations will throw more light on the subject. Our present knowledge is, however, sufficient to render it highly probable, nay, perhaps morally certain, that a spontaneous generation exists, and that higher forms have gradually and slowly become developed from previously existing lower forms, always determined by the state of the earth, but without the immediate influence of a higher power. This gradual development of the lowest organic forms into higher and more perfect organisms may, in spite of individual exceptions, be considered a fact established by palæontological investigations—a fact which indicates a fundamental law of nature mediating the origin of organic beings. In proportion as the earth of all organisms, of man and his varieties, but also of the earth and of the present existing order of the heavenly bodies—a theory opposed to the present state of cosmogony—will be found in a recently published work of Dr. Czolbe (*Neue Darstellung des Sensualismus*, 1855).

became more developed, the more varied became the structure of individual animals—proof sufficient for the dependence of animal forms in concrete upon external circumstances. The fossil relics of plants and animals are the gradually extinct immature parts of a progressive series of developments; and we find in them the most wonderful and harmonising types of succeeding organisms. The older such relics are, the more numerous are the forms of later organisms which they contain. Some simple fossil forms exhibit the fundamental types of succeeding, and partly in still living different modifications. *Sao hirsuta*, a trilobite in the Bohemian slates, is in its first state of development so unlike that of succeeding generations, that one would not take it to be the same animal, had not its various transitions been accurately determined. In the fossil *Cœlacanthus* lies the skeleton of all vertebrated animals. The Labyrinthodonts are, according to Burmeister, the true and most beautiful prototypes of the idea of an amphibium in its totality, which, in the course of millions of years, has been developed in a variety of forms. They exhibit a mixture of the most heterogeneous groups, which originated from them. The *Plesiosaurus* is in some respects the first attempt of nature to emerge from the period of reptiles and fishes. It has the body of a whale, the neck of a bird, the head of an alligator. The type is reproduced successively in varieties, and differently

modified. The Megalosaurus combines the anatomy of reptiles and mammalia. It shows itself a degree nearer to mammals in the shape of the Iguanodon—a gigantic lizard, “with which the creative power of nature appeared inclined to terminate the gigantic species of amphibia.” (*Buch der Geologie.*) The Pterodactylus, a remarkable and enigmatical animal of the Jurassic period, is a singularly shaped creature, half bat and reptile, half amphibious and bird, so that it has been numbered among all classes of animals. In the tertiary period, we find the Megatheria assuming the form of the mammalia, reminding us at the same time of reptiles. As the first representative of the higher class of mammalia, the Palæotherium appears, an interesting animal found in numerous examples, from the size of a hare to that of a horse, as varieties of this genus. It may be considered as the prototype of the class of mammalia, the forms of their varieties being concealed in it.*

These examples might be easily multiplied; but the whole science of palæontology is a continuous example. The lowest forms always appeared first; and from them proceeded an ascend-

* These transitions or intermediary forms have, in some few examples, been preserved, so that they might be termed “living fossils”. That singular creature in New Holland known by the name of ornithorhynchus, partakes of the nature of the quadruped, bird, and an amphibious animal. The scaly salamander (*lepidosiren paradoxa*) of South America and Africa, seems both an amphibian and a fish, breathing partly by branchiæ and partly by lungs.

ing scale of development, both in relation to genera and individuals. "The relics found in the earth," says Oersted, "exhibit a series of more or less developed forms, which succeeded each other until the conditions were prepared in which man, and an animal and vegetable world adapted to his existence, could subsist."

This law of a gradual development of primeval times is impressed upon the present living organic world. The whole science of comparative anatomy has for its main object to trace the conformity of anatomical forms through the whole animal series, and scientifically to establish the existence of a fundamental plan common to all animal forms, and only individually modified. An uninterrupted chain of transitions and similitudes connects the whole animal world, from the lowest to the highest types. Even man, who in his presumption deems himself so far superior to the animal world, forms no exception to this law. The Ethiopian race connects him by a number of the most striking similitudes with the animal world. The long arm, the shape of the foot, the thin calves, the long and narrow hands, the flattened nose, the projecting jaws, the depressed receding forehead, the elongated head, the short neck, the narrow pelvis, the pendulous belly, the beardless chin, the colour of the skin, the disagreeable odour, the sharp and piercing voice, are all characteristic marks which approach the *negro to the ape*. That his mind corresponds to

his *physique*, has been established by the best observers. (See the chapter "Brain and Soul").

But not merely the Negro, but a number of other savage tribes, such as Bushmen, Hottentots, Pesherais, Australians, exhibit in body and mind the distinct characters of the superior animals, from which they must have originated.*

The law of a gradual transition is thirdly manifested in the development of the animal taken individually. All animal forms are originally so much alike, that it is often impossible to distinguish the embryo of a sheep from that of a man, whose future genius may perhaps revolutionise the world. Successful attempts have been made to show how, in the history of development of every animal or of man, the embryo in its various degrees of bodily development represents and repeats the chief types of an inferior series of animals, thus constituting, in a measure, a series of creatures in miniature. "It is a general law," observes Vogt, "prevalent through the whole animal world, that the resemblance of a common plan of structure which connects various animals is more striking the nearer they are to their origin, and that these resemblances become fainter in proportion to the progress of their development, and their subjection to the elements from which they draw their nourishment." Vogt indicates in this sentence the important and de-

* See Reichenbach, *über Entstehung des Menschen*, 1854.

finite influence of external circumstances and conditions of life upon the development and formation of organisms. The younger the earth was, the more definite and powerful must these influences have been ; and it is, as we shall see, by no means impossible to imagine that the *same* germs might, by very different external circumstances, have conduced to very heterogeneous developments. A number of primeval forms perished, as we know, with the disappearance of external conditions ; essentially changed relations destroyed a former organisation, and produced a new one.

What intelligent person can deny that these influences must, in primeval times, have been more powerful than to-day ; that they were capable of producing effects, which are not generally observed at present ? We possess scientific reasons for such an assumption. The temperature, in the first place, was much higher than now. Siberia, which now produces only miserable shrubs, and animals accustomed to a cold climate, was formerly populated by numbers of elephants, which required for their existence an abundant vegetation. Remarkable plants, of strange and unknown forms, which could not resist the cold, and could only live in very hot and moist climates, were in the coal period spread nearly over the whole surface of the earth. Palms and cinnamon trees blossomed once on the declivities of the mountains of Saxony and Bohemia.

The comparatively greater force of nature in former periods is equally manifested in the singular forms of antediluvian animals, as well as in their enormous size. We know of no existing animal exhibiting such differences in size as the *Palæotherium*, already mentioned.

Under these circumstances, it does not appear to us that naturalists are justified in rejecting the theory of the gradual transmutation and unfolding of the organic world, upon the ground that, under existing conditions, it is constantly observed that similar parents produce similar young. What right have we, as regards this point, considering the insignificant span of time of which we have any experience, to conclude from the present conditions of the earth those of the endless past, in which nature was undoubtedly younger and more powerful in the production of organic forms? Under then existing conditions, it must have been possible that an organic germ, in essentially changed external relations, either accidental or necessary, may have developed in a form, species, or genus different from its progenitor. Carl Vogt, an opponent of the transmutation theory, says himself, "We have no grounds for denying the possibility that in primeval times animals produced young differing in many respects from their parents."

If, as we observe at present, the change which climate, mode of living, and external influences effect in animals, are, though considerable, yet

insufficient to change their specific form, we must also, besides the more powerful action of natural forces in former epochs, take into consideration the conjoined action of endless spaces of time during which apparently trifling causes may have produced great effects, and in which contingencies and combinations may have occurred of which we cannot in our short experience show an instance.

But we are wrong to say so, for we are not altogether without examples. We have the right to adduce in our favour the remarkable phenomena of the so-called alternation of generations, in which there takes place a transmutation of several low animal forms in an ascending line, with a perfectly deviating form, organisation, and mode of life—not a transmutation of the same individual, as in the metamorphoses of butterflies or frogs—and each individual form remaining the same during life; so that the phenomenon represents a real change of the species. This alternation has been observed in several intestinal worms; further, in the *salpadæ*, *medusæ*, *polyps*, *aphides*, etc. This alternation, it is true, is not unlimited—which it must be if it is to overthrow the law of a fixed species—but returns after several generations to the original type. However, we cannot but observe in these interesting phenomena an approach to the transmutation theory of animals; nor can we deem it impossible that this alternation of generation was

at earlier epochs less restricted than at present. Finally, we are in possession of a most important and pregnant discovery, made by one of our most distinguished physiologists, Johannes Müller, and which removes any doubt as to the possibility of a permanent development of one species from a different one. We mean the known discovery of the generation of snails in *holothuriæ*—a discovery which staggered its orthodox discoverer. *Holothuriæ* and snails belong to different divisions of the animal kingdom, of which the latter are much higher in the series; so that they neither resemble nor have any relation to each other. Müller himself confesses, somewhat reluctantly, that these phenomena have nothing to do with alternation of generation. This discovery proves that direct generation of one genus of animals from a different one, the possibility of which was hitherto denied, subsists even within the historical period; it exhibits a rare instance of a *new* creation, and of a law of transmutation which, in primeval times, manifested itself with greater force than at present; it demonstrates, also, that to this day exceptions to the law of homogeneous generation exist. “The appearance of various genera of animals in creation, is a fact in palæontology which must be considered as supernatural until this phenomenon is perceived in the act, or submitted to observation. Should this become possible, the phenomenon would be no longer super-

natural, but must be classed among the phenomena for which we must, by way of experience, find out the laws." (Müller.) Who can say that such metamorphoses do not frequently occur at the present time, and that, along with homogeneous generation, they do not possess an importance of which as yet we have no conception!

But if, under subsisting conditions, such an extraordinary process is possible that a holothuria should produce a snail, what naturalist can deny that conditions may once have subsisted, in which similar phenomena occurred; so that an ape, nay, any other animal, may have given birth to man? In the face of the above fact, and of what we have learned of the condition of the earth in the primeval epoch, it is no longer possible to ask the believer in a gradual transmutation of organic creation,—Why does it not occur at present? Nor is it any longer necessary to trace, as Oken did, the origin of man to the mud of the sea. "The soil," says Reichenbach,* "in which the first man originated was an animal, his first mother was an animal, and his first nourishment was the milk of an animal."

With the acknowledgment of a law of transmutation in this sense, in which the transmutation was not, as the old school would have it, very gradual, but rather *per saltum*, and must have already existed in the embryo, we have obtained a starting point in regard to the question,—

* Ueber die Entstehung des Menschen, 1854.

Whence came the organic beings, the rich and infinitely modified organic world by which we are at present surrounded? It is from the simplest organic element, produced in the way of spontaneous generation by the combination of inorganic elements, and from the simplest vegetable and animal cells, that, by the aid of intense natural forces and endless periods of time, there has progressively arisen that rich and infinitely modified organic world by which we are at present surrounded.*

“It is probable,” observed Professor Jaeger

* “The germs for the higher animals,” says Professor Baumgärtner (*Anfänge zu einer Physiologischen Schöpfungsgeschichte der Pflanzen und Thierwelt*, 1855), “could only be the eggs of lower animals. The most highly developed animals proceeded probably from the eggs of lower animals of the same class; and these, again, from a class beneath. This may have even occurred in mammalia. Extra-uterine impregnation and successful transplantation of the ovaria have demonstrated that the eggs may in these animals be developed in places not originally intended for them, etc. There occurred, therefore, alternations of generation during the periods of creation in the whole series of animals, and likewise in plants.”

“Besides the advance of the vegetable and animal world in development, there occurred in that period the formation of new original germs, which formed the basis of new metamorphoses,” etc.

Baumgärtner further explains the transmutations of organic germs, and their multiplication by division during the periods of creation. The first men proceeded, according to him, from the germs of animals immediately beneath them, but lived first in a *larva state*. He further considers that the human race have not descended from *one* pair, but appeared immediately in numerous races.

of Vienna, in his course of lectures, "that primitive creatures, which owed their existence to primeval generation, were zoophytes resembling those now existing." Such of the latter, as originated partly from animals and partly from plants, still resemble each other in form and mode of life. The plants which remained stationary at this inferior degree of organisation, were outstripped by the animal kingdom, which in its progressive development attained that perfection from the summit of which man looks down upon the organic world.

We must not be understood to maintain that the whole organic world originated from a single centre. All facts and investigations prove, on the contrary, that it must have arisen from innumerable independent central points, both as regards the vegetable and animal world. The similarity and differences between these centres prove the fundamentally independent force of nature.

We do not, like some naturalists, consider this inquiry to be an idle one; for, according to our present state of knowledge, it would be too venturesome to attribute to spontaneous generation the *immediate* origin of all organic genera, and even of man, in the primeval epochs. What would be the object of the evident law of gradual development and formation of prototypes, this similarity in the first development of individuals, if it did not indicate the possibility of a separation into different forms and kinds under differ-

ent conditions? Spontaneous generation played, no doubt, a more important part in the primeval epoch than at present; nor can it be denied that in this way beings of a higher organisation were produced than now. We possess, however, neither certainty nor well-founded data on this point, and are ready to confess our ignorance. But, though as regards organic creation much may be doubtful, we may still positively assert *that it may have, and has, proceeded without the interference of external forces.*

If the contemplation of surrounding nature strikes us so much by its grandeur, that we cannot divest ourselves of the idea of a direct creative cause, the origin of this feeling is owing to the fact, that we contemplate as a whole, the united effects of natural forces through a period of millions of years; and, thinking only of the present, and not of the past, cannot imagine that nature has produced all this out of itself. The law of analogies; the formation of prototypes; the necessary dependence upon external circumstances which organic bodies exhibit in their origin and form; the gradual development of higher organic forms from lower organisms; the circumstance that the origin of organic beings was not a momentary process, but continued through all geological periods; that each period is characterised by creatures peculiar to it, of which some individuals only are continued in the next period;—all these relations rest upon incontrovertible facts, and are perfectly irrecon-

cilable with the idea of a personal almighty creative power, which could not have adopted such a slow and gradual labour, and have rendered itself dependent upon the natural phases of the development of the earth. "An important question," says Zimmermann,* "is this: Whence came these animals? How did they originate? The assumption that God has created them of his free will is not only not satisfactory, but unworthy of God. The great spirit of the world, who created (?) solar systems and galaxies, can scarcely work in pottery (which we are according to this view), nor can he form animals by way of experiment, and seeing that they are not good, make others with improvements."

The work of nature, with its half-accidental half-necessary products, has, on the contrary, been infinitely slow, gradual, and not premeditated. We nowhere perceive in this work an origin indicative of a personal will. "Nature," said Linnæus, "performs nothing *per saltum*;" and, indeed, every new discovery in natural history confirms this axiom. The plant passes imperceptibly into the animal, the animal into man. All endeavours to fix the limits between vegetable and animal life have hitherto failed; nor is there any existing insurmountable barrier between man and animal, of which we hear so much.

Geologists compute the age of the human race from eighty to one hundred thousand years—the age of the alluvial stratum; whilst the history of

* Die Wunder der Urwelt.

human existence dates only from a few thousand years. What period must not have elapsed until man rose to such an intellectual height as to feel the desire of recording his experience for the benefit of posterity! And what right have we to cite the present cultivated human being, standing upon the uppermost step of a ladder of one hundred thousand years, as a product of a supernatural power? Taking into consideration his origin, our judgment must be altered. In the earlier epochs, man certainly resembled the animal; and the oldest dug-out skulls exhibit a rude undeveloped animal shape.* How much more perfect the structure of the skull of Europeans has become in the course of historical times will be mentioned in the chapter "Brain and Soul."

Were we now, contrary to philosophical reasoning, to assume that the immediate hand of the Creator has conducted these processes, scattered as they are through space and time, we

* The oldest human skulls found in various spots of the earth, together with the bones of animals, exhibit a primitive undeveloped form, distinguished by a very receding and remarkably flat forehead. Such a skull was recently found in the Neander valley (between Düsseldorf and Elberfeld). It was of a type in such a low state of development, according to Dr. Schaafhausen, that it can scarcely be matched with the skulls of any of the most degraded living races. It approaches the animal form, and reminds us in the facial bones of the expression of the ape. The skeleton may have belonged to an individual of the savage tribes which inhabited Northern Europe before the immigration of the Indo-Germanic races, and which were by civilisation destroyed, like the American and Australian tribes of our own period.

should approach to pantheistic ideas, and could not but admit that this relation still continues, inasmuch as the development of the earth, and of the animals and plants living upon it, has not ceased, but continues as formerly. We must, then, also assume that no lamb is born without the action of this creative power, and that every gnat which lays eggs has some claim upon that power for the provision of its offspring. Science, however, has long banished every thought of supernatural interference in demonstrating the mechanical and accidental processes in these phenomena. These relations speak in favour of our views; as we are justified in deducing from the naturalness of the present process, that it was the same in the beginning, and *vice versâ*. "Who says A, must also say B. A supernatural beginning requires necessarily a supernatural continuance." (Feuerbach.)

"The earth, taken individually," says Burmeister, "remained in certain immutable relations to surrounding media, and whatever happened upon it, independent of these conditions, was produced by its own inherent force; for there neither was nor is there any force upon the earth, than that it actually possesses. By this force was the earth developed, and as far as this force extends, so far are the effects manifested. Wherever the terrestrial forces are wanting all effects cease, and whatever the earth is unable to produce has never existed and will never be produced." And Professor Giebel of Halle ob-

serves: "These laws of animal life were unalterably the same from the beginning; for nature does not experiment like nations and princes, who improvise constitutions, abrogate laws, and dictate new ones. Human nature is pliable, but the laws of nature are immutable and eternal. Nature is perfect in itself, being in its development governed by unalterable laws."

Science has never obtained a greater victory over those who assume an extramundane or supernatural principle to explain the problem of existence, than by means of geology and petrifications; never has the human mind more decisively saved the rights of nature.* Nature knows neither a supernatural beginning nor a supernatural continuance. Nature, the all-engendering and all-devouring, is its own beginning and end, birth and death. She produced man by her own power, and takes him again. May not the present human race perish, and a more perfect one take its place? Or will the earth retrograde, and destroy the results of so many years labour? No one knows, no one will know it, but the survivors!

* The words of Agassiz show that the task was not a light one. "Those only who are familiar with the history of science, know what trouble it cost to establish the fact that fossils were indeed the relics of extinct animals. It was then necessary to prove that these relics were not those of the Mosaic deluge, an opinion so generally prevalent even among men of science. It was only after Cuvier had rendered it evident that the remains were the relics of extinct animals, that palæontology acquired a firm basis. *And even now*, how many questions remain yet to be solved!"

CHAPTER XI.

DESIGN IN NATURE (TELEOLOGY).

“It is reflecting reason which brought design into the world, and which admires a wonder created by itself.”

KANT.

“Every process of nature determined by laws, every form the result of the vital principle, contains within itself the tendency of what man terms adaptation to a certain end.”

TUTTLE.

“We should not place the works of nature on one side, and nature on the other. Nature is a work, and not a person.”

DE JOUVENCEL.

DESIGN in nature has ever been, and is still, one of the chief arguments in favour of the theory which ascribes the origin and preservation of the world to a ruling and organising creative power. Every flower which unfolds its blossoms, every gust of wind which agitates the air, every star which shines by night, every wound which heals, every sound, everything in nature affords to the believing teleologist an opportunity for admiring the unfathomable wisdom of that higher power. Modern natural science has pretty much emancipated itself from such empty notions, and abandons these innocent studies to such as delight in contemplating nature rather with the eyes of the feelings, than with those of the intellect.

The combination of natural materials and forces must, in giving rise to the variety of existing forms, have at the same time become mutually limited and determined, and must have produced corresponding contrivances, which, superficially considered, appear to have been caused by an external power. Our reflecting reason is the sole cause of this apparent design, which is nothing but the necessary consequence of the combination of natural materials and forces. Thus, as Kant says, our intellect admires a wonder which it has created itself. How can we speak of design, knowing the objects only in one form and shape, and having no idea how they would appear to us in any other? What natural contrivance is there which might not be imagined to be rendered more perfect in design? We admire natural objects without considering what an infinite variety of other contrivances and forms have slumbered, and are still dormant, in the lap of nature. It depends on an accident whether or not they will enter into existence. Are not the huge forms of plants and animals, which we know only from their relics, long extinct? May not at some future time this beautiful world, so full of design, be destroyed by a revolution, and would it not again require another eternity until these or other dormant forms should again become developed? Numbers of arrangements in nature apparently full of design, are nothing but the results of the influence of external natural

conditions ; an influence, it must never be forgotten, which continued for millions of years, to become dominant. Can the experience of the short space of time known to us judge of the power of such an influence ?

Animals inhabiting the north have a thicker fur than those of the south ; and likewise the hair and feathers of animals become thicker in winter, and fall out in summer. Is it not more natural to consider these phenomena as the effects of changes in the temperature, than to imagine a heavenly tailor who takes care of the summer and winter wardrobes of the various animals ? The stag was not endowed with long legs to enable him to run fast, but he runs fast because his legs are long. He might have become a very courageous animal, instead of a timid one, had his legs been unfit for running. The mole has short spatulated feet for digging ; had they been different, it would have never occurred to him to dig. Things are just as they are, and we should not have found them less full of design, had they been different. How many unfortunate attempts may not nature, or the materials endowed with force, have made in the production of these various forms. These attempts failed when all conditions necessary for their existence did not concur.* Such forms as could preserve them-

* When the author, seven years ago, wrote these lines, he did not expect that the progress of natural history would in so short a time furnish the most convincing proofs in support of his opinion. The learned Darwin, in his excellent work, *On the Origin of Species* (1860), clearly proves that, in

selves are now seen in a well ordered series, in mutual relation to each other and to surrounding natural forces ; and this order, established by natural conditions, appears to us as produced by design. What is now existing in the world, are the remains of an infinite number of beginnings.

This exposition may be opposed to a remark made by Dr. Spiesz of Frankfort, against the old pantheistic theory. "If it was merely an accidental concurrence of the elements to which natural beings owe their origin, we cannot conceive why new combinations, and with them new

the perpetual struggle of living beings for existence, only those forms which possessed some, however feeble, an advantage over their contemporaries, were able to sustain themselves. The transmission and the successive development of these advantages may, perhaps, explain the growth of the organic world. Thus the colours of some animals, *e.g.* of green insects and the partridges of the Pyrenees, are the result of natural selection ; animals of a different colour soon succumbed to their enemies, who transmitted to their offspring their superior qualities. An animal with thick fur has a greater chance of preserving its species in a cold climate than one less favoured in this respect, and transmits this advantage to its descendants. The superficial observer looks upon this arrangement as a divine adaptation for a certain end ; whilst the scientific inquirer sees in it the effect of natural causes. The most perfect organ in the body, the eye, is, according to Darwin, the gradual development of a simple sensitive nerve, having arrived at its actual condition by numerous imperfect gradations, and is yet susceptible of a much greater development before arriving at the greatest perfection, etc. Empedocles, the Greek philosopher, already taught that, when matter assumed shape, there were many irregular forms which could only partly sustain themselves, and which only slowly attained forms adapted to certain ends.

beings, should not arise from similar accidents!" But there is no accident in nature in the sense in which Dr. Spiesz uses the term. There reigns everywhere, in consequence of the immutability of nature's laws, a certain necessity which admits of no exception. It is, therefore, impossible that accident should, under similar conditions, produce new combinations. When, however, the conditions are essentially changed, the products of the natural forces change with them; and it may not be unknown to Dr. Spiesz, that what he desires from the accidental concurrence of elements is actually existing, as every stratum of the earth conceals different combinations and organisms.

If, further, we believe the assertion of the celebrated geologist Lyell, that new organisms are continually arising, and that the earth produces from time to time new species of animals, which are looked upon as merely newly discovered, then there is still going on under our eyes what Dr. Spiesz requires from the accidental concurrence of the elements.*

* * "The multitude of living being," says De Jouvencel, (*Genèse selon la Science*, 2nd ed.), "presents itself before us, not as the execution of a natural plan, but as an historical result, continually modified by a multitude of causes, which have acted consecutively, and in which every accident, every irregularity, represents the action of a cause. The plan—in the sense in which the expression is employed—does not exist. The forces act necessarily blindly, and from their concurrence beings take their origin. To believe that nature follows a serial plan would be a grave error. The series is a

Taking, then, into consideration that nature does not act from a conscious design, but according to an immanent necessary instinct, it becomes obvious that it must be guilty of many purposeless absurdities. In contemplating, therefore, nature in relation to design, it is an easy task to shew distinctly how nature, when opposed in its action by external obstacles, commits the most ridiculous faults and absurdities. No one can, in the first place, deny that in its unconscious and necessary creative impulse, nature has produced a number of beings and contrivances, in which no design can be detected, and which are frequently more apt to disturb than to promote the natural order of things. The existence of dangerous animals has, therefore, ever been a thorn in the side of theologians, and the most comical arguments have been used to justify their existence; with what little success, is proved by the assumption of those religious systems which consider sin as the cause of that abnormality. According to Meyer and Stilling,* dangerous reptiles and insects are the consequence of the curse pronounced on the earth and its inhabitants. Their frequently monstrous form, etc., is made to represent sin and destruc-

resultant, and not an idea of nature: it is nature itself. The human mind, however, evidently perceives that, if the forces of the universe are continually acting on the globe in the same way, in order to modify their organisms, their work must constitute a complete and perfectly graduated series."

* Blätter für höhere Wahrheit.

tion! The old German heathens looked upon these animals as evil spirits, from which all diseases originated. These whimsical explanatory attempts prove how little was effected in showing the usefulness or the design in these troublesome and disgusting creatures. We know, on the other hand, that very innocent, or even useful, animals have become extinct, without nature taking any means to preserve their existence. Such, within historical times, was the case with the Irish elk, the *rytina stelleri*, the dodo, etc. There are other useful animals which are constantly diminishing, threatening to become extinct; whilst very many injurious animals, as field mice, are so fruitful, that their extinction cannot be thought of. Locusts and migratory pigeons form swarms which darken the horizon, and bring destruction, famine, and death over the spots they alight upon. "Whoever," says Giebel, "expects to find in nature nothing but wisdom, conformity, and design, let him exercise his acumen in the study of the natural history of the tape-worm. The main object of its life consists in the production of eggs, the development of which can only be effected by the sufferings of other creatures. Millions of such eggs perish; some few are developed and transformed into a sucking and productive scolex, the progeny of which again produce eggs which putrify in the excrements. In this process there is, according to human conception, neither beauty, wisdom, nor design."

For what purpose, we may further ask, are the hosts of "diseases", and of physical evils in general? * Why that mass of cruelties and horrors which nature daily and hourly practises on her creatures? Could a being acting from goodness and benevolence endow the cat, the spider, and man—the crown of creation—with a nature capable of all these horrors and cruelties?

It is said, that the colour of the flowers is there to gladden the eyes of man. But how long blossomed flowers which the human eye never saw, and how many blossom now which the eye never sees? Since the invention of the diving-bell, we listen with surprise to the narrations of

* The assertion frequently heard from the mouth of theologians and orthodox naturalists (see Klenke, *Sonntagsbrief eines Naturforschers an seine Religiöse Freundin*, 1855—*Sunday Letters of a Naturalist to his Religious Friend*), that disease was nothing normal in nature, but was produced by moral sin, and artificially introduced by the corruption of humanity, rests upon the most ridiculous ignorance of nature and history. Disease is as old as organic life itself. Palæozoology knows numerous instances of morbidly changed bones of animals; and the oldest documents mention diseases. Modern medicine knows that disease has not an external individual existence hostile to an organism, but is a vital process modified by abnormal conditions, an altered metamorphosis of materials produced in the same way as normal formations, and is therefore a necessary consequence of the laws acting on the body, and nothing abnormal. The younger, the more primitive, the less cultivated a people is, the more subject is it to destructive and disgusting diseases. Geography and the history of disease fully confirm this view. A paradise not accessible to disease and evil is, for the clear eye of the naturalist, a myth invented by the childish mind of the peoples.

the divers, who speak of a flora of magnificent colours flourishing at the bottom of the sea, and of a not less magnificent animal world. Coral-ines of the most beautiful tints, inhabited by innumerable swarming populations, are seen beneath the sea. Why these colours and beauties ; why this life, at a depth into which the eye of diver only can penetrate ?

Comparative anatomy, as already stated, has for its chief object to find out the conformity in the corporeal structure of various animals, and to indicate the fundamental plan in each genus and species. This science, accordingly, makes us acquainted with a number of physical characters which are perfectly useless to the animal possessing them, and which appear merely as the rudiments of an organ which in another species is more developed, and consequently useful to the animal. The vertebral column of man terminates in an appendage perfectly useless to him, and which by many anatomists is considered as indicative of the tail of animals. Contrivances apparently purposeless are numerous in the structure of animals and plants. No one knows the object of the vermiform process, or of the mammary gland in man. Vogt relates that there are animals which are perfect hermaphrodites, possessing developed organs of both sexes, yet incapable of reproduction, as two individuals are required for copulation. "What is the purpose," he asks justly, "of such a contrivance ?

The fruitfulness of many animals is so great, that, abandoned to themselves, they would in a few years fill up the seas and cover the earth. Why such an arrangement, as space and materials are wanting for such a number of animals?"

For what purpose did nature place a mammary gland on the shoulder of a man aged thirty-four (case recently described by Dr. Klob of Vienna)? There are animals which never swim, and yet their fingers are provided with the requisite membranous apparatus. The sting of the bee or the wasp causes the death of the insect when made use of, etc.

"We ought," says Tuttle, "to be able more rationally to interpret the aim of an almighty and benevolent creator. If there were such, would this being endow animals with organs of so little use to them? What can be the object and the use of the transition forms of the fœtus, in which the mammifers resemble fishes and reptiles before they assume their actual forms? Why have all mammals rudimentary organs, which are only developed in reptiles? Why in the male mammals are the genital organs of the opposite sex not developed, and *vice versa*?"

One of the most important facts which speaks against the theory that nature acts with conscious design, is the production of monstrosities. The unsophisticated human mind could so little reconcile these phenomena with the belief in a creator acting with design, that they were for-

merly considered as indicative of the wrath of the gods ; and they are, even at present, not unfrequently looked upon as punishments from heaven. The author saw, in a veterinary cabinet, a goat fully developed in every part, but born without a head. Can we imagine anything more absurd than the development of an animal, the existence of which is impossible from the beginning? Professor Lotze of Göttingen surpasses himself in the following remarks on monstrosities. "If the foetus is without a brain, it would be but judicious, in a force having a free choice, to suspend its action, as this deficiency cannot be compensated. But, inasmuch as the formative forces continue their action, that such a miserable and purposeless creature may exist for a time, appears to us strikingly to prove, that the final result always depends upon the disposition of purely mechanical definite forces, which, once set in motion, proceed straight on, according to the law of inertia, until they meet with an obstruction."

This is plain language ; and it appears very singular how the same author can assert, in another place, "Nature, having no confidence in the inventive power of the mind, has endowed the body with certain mechanical contrivances," which, for instance, effect by coughing the expulsion of foreign bodies from the throat. Were it possible that such views should generally spread, there would be an end to all inquiries, and science would yield to a passive faith.

That a writer, looked upon as an authority, should pronounce in one breath two such contradictory sentences, proves how unsubstantial our present philosophy is. If, as Lotze thinks, nature had reason to distrust the inventive power of the mind, it might have found ample opportunities of making preventive contrivances for certain eventualities; *e.g.* that bullets should be repelled by the body, that swords should not cut it, etc. A foreign body in the trachea may be removed by coughing; but a foreign body in the gullet may induce suffocation. What a perverse arrangement; and no trace here of any distrust against the inventive power of the mind, which, however, has invented pincers, etc. ! The physician has daily and hourly opportunities of convincing himself of the helplessness of nature, and of the unsuitable, perverse, and unsuccessful methods it employs in its endeavours to heal. There would be no need of physicians, if nature acted with a purpose. Inflammation, mortification, suppuration, etc., etc., are chosen by it, and frequently become fatal; while she might have selected simpler means to effect a recovery. Is it by design that a foetus should fix itself and become developed in any other but its natural place, the uterus?—a case which frequently occurs, and conduces to the death of the mother. Or even that in such extra-uterine pregnancies, after the lapse of the normal time, pains are felt in the uterus, though nothing is to be expelled?

There is a *healing power* of nature in its usual sense, as little as there is a *vital power*. The organism proceeding in certain definite directions frequently adjusts morbid disturbances. At other times the contrary occurs. The existence of certain specifics against certain diseases, is frequently quoted as a striking argument in favour of design in nature. But there are no remedies which heal definite diseases with certainty and under all circumstances, and can be looked upon as intended to heal them. All rational physicians deny the existence of specific remedies in the above sense, and are of opinion that the effects of medicines are not the result of a specific neutralisation of the disease, but must be ascribed to very different causes, mostly accidental. Hence we must also abandon the theory that nature has created various plants to act as antidotes—a theory which imputes an absurdity to a creative power, which is to have created an evil with its antidote, instead of omitting the creation of either. A creative power acting with design could not have been guilty of so useless an act.

To return again to the subject of monstrosities, it may be mentioned, that they may be produced artificially by injuries done to the foetus or to the ovum. Nature has no means of remedying such an injury. The impulse once given is, on the contrary, followed in a false direction, and in due time a monstrosity is produced. The purely

mechanical process, in such cases, can be easily recognised. Can the idea of a conscious power acting with design be reconciled with such a result? And is it possible that the hand of the Creator should thus be bound by the arbitrary act of man? There is nothing gained by saying that nature has only given the original impulse for a certain end, but that subsequent action proceeds in a mechanical manner. For the impulse for a definite purpose necessarily implies its result. And where are we to search for this designing impulse, since the natural circumstances in which natural beings arise are known as such, and as we know that the traces of an active creating hand are nowhere found in the facts?

We possess, moreover, proofs that in the most remote periods nature committed faults similar to those just pointed out. She has not taken the precaution always to place organic beings in regions where the conditions most favourable to their well-being existed. There were in primitive times no horses in Arabia, where now the most noble variety of that race exists; there were no camels in Africa, where this ship of the wilderness alone renders it possible for man to exist with comfort; Italy had no olive trees, nor the Rhine vineyards. Is it design, to take an example from the structure of the universe, that light should, in spite of its prodigious swiftness, traverse space so slowly that thousands of

years are requisite before it reaches another star? Why these unwise restrictions in the manifestations of a creative will?

The curious relation in which the vegetable kingdom stands to the animal kingdom appears, superficially considered, a remarkable proof of design. The animal world cannot exist without the vegetable world, since the latter only possesses the capacity of producing ternary and quaternary combinations from inorganic elements. These combinations nourish the vegetable feeders, which again afford nutriment to carnivorous animals; so that, without that peculiar property of the vegetable world, animal life could not exist. This relation, though remarkable, is in nowise created; it is, on the contrary, produced in the most natural way, and could not have been otherwise. Whilst animals return to the world the carbon received from plants, to serve again as nourishment to plants, so as to continue its cycle, they in no way follow a supernatural order, but a strict necessity, which results from the things themselves and their relation to each other.

A number of pretended purposes are obtained by nature in a troublesome roundabout way, when it is undeniable that the same ends might have been obtained in a much simpler manner. The great pyramids of Egypt, and other gigantic structures, are formed of stones which owe their origin to the chalk shells of minute animals. The quarry stones of which nearly the

whole city of Paris is built, consists of the shells of animals, of which two hundred millions are computed in a cubic foot. The time which these stones required for their formation must be counted by æons. They are now useful to man, and appear to him as a proof of the provision of nature. The magnitude of object and means are, however, here strangely out of proportion. Such circumstances, generally, in which the slow workings of thousands of years suddenly appear before our eyes, impress us with the feeling of wonder; whilst the calm eye of the philosopher only perceives in it the necessary, slow, and finished course of nature.

Man is accustomed to look upon himself as the climax of creation, and to consider that the earth and all that it contains has only been created for his use and profit. A glance at the history of the earth might teach him modesty. How long did not the earth exist without him! and how little of it is as yet in his possession! "Man," says Helmholtz, "has the habit of measuring the greatness and wisdom of the universe, in proportion to the advantage it promises to his race; but the history of the earth shows how short and momentary is as yet the existence of the human race." And who would seriously maintain that the earth could not have been more comfortable for man? With what difficulties must he not struggle until he renders a little spot fit for a dwelling-place; and how many

regions are not, from climate, soil, etc., perfectly inaccessible to him! No being can have been destined to live merely for the good of man. All that lives has an equal right to exist; and it is merely the right of might which permits man to subject or to kill other living beings. There are no ends which nature had in view to favour a privileged being. Nature is an end in itself.

Physics* show that, as there was a time when no organic life existed on earth, so will the time arrive—no doubt an infinite and incommensurable period—when the physical forces now existing will be exhausted, and all animated beings plunged into night and death. What are, in the presence of such facts, the pompous phrases of a philosophy about the designs which became accomplished in the creation of man; the incarnation of God in history; the history of humanity as the subjective unveiling of the absolute; the eternity of conscience, liberty, and will, etc.? What are the life and the efforts of man, and all humanity, compared with the eternal, inexorable,† irresistible, half-accidental, half-necessary march of nature? The momentary play of an ephemeron, hovering over the sea of eternity and infinity.

* See Helmholtz, *On the Action of Physical Forces*, 1854.

CHAPTER XII.

BRAIN AND SOUL.

“Cerebral action must be proportionate to the mass of the brain.”

LIEBIG.

“It is by the brain that we ascend from matter to mind.”

TUTTLE.

“IF,” says Moleschott, “the axiom that composition, shape, and power, necessarily influence each other, that their alterations always go hand in hand, so that an alteration in one part presupposes a simultaneous change in another, also applies to the brain, then it must be admitted that material changes in the brain must influence thought. And inversely, that thought must be reflected in the material condition of the body.”

That the brain is the organ of thought, and that both stand in such an intimate and necessary relation that their separate existence cannot be imagined, is a truth which is scarcely doubted by a physician or physiologist; as daily experience and numerous striking facts forcibly impress him with this conviction.

The following exposition of facts is, therefore, intended rather for the public at large, to which the simplest and most evident truths in natural

history are frequently perfect enigmas. It is singular that it is just in relation to this question that the public have ever obstinately refused to acknowledge the power of facts ; it is, however, not difficult to guess the reason, which is chiefly of a selfish nature.

The brain is the seat and organ of thought ; its size, shape, and structure, are in exact proportion to the magnitude and power of its intellectual functions. Comparative anatomy furnishes us in this respect with the clearest proof by showing the prevailing law, that through all classes of animals, up to man, the intellectual energy is in proportion to the size and material quality of the brain. Animals which possess no brain proper, but merely nervous ganglia or rudimentary brains, generally occupy the lowest place in relation to mental activity, and appear rather to vegetate than to live. Man, on the contrary, occupying the highest place as an intellectual being, has absolutely and relatively the largest brain. If in some few of the largest animals the cerebral mass exceeds that of the human being, the anomaly relates only to such parts of the encephalon, which preside as central organs of sensation and motion, and which, in consequence of the great number and thickness of the nervous fibrils terminating in them, must exhibit a larger development ; whilst those parts engaged in the function of thought in no animal reach the size and shape of the corresponding

portions of the human brain. Those animals which possess the largest cerebral development, as the elephant, dolphin, ape, dog, etc., have always been considered as the most sagacious. We find, then, that there exists through the whole series of animals a gradual development of intellectual power corresponding to the size and form of the brain. Bibra, one of the latest and most conscientious inquirers, has made exact measurements of the brain of animals and man. The general and undoubted result of these measurements was : that man stands at the head ; that animals possess less brain in a descending ratio ; and that amphibia and fishes occupy the lowest rank.

This law of a gradual development of the brain through the animal kingdom in an ascending or descending line, is too evident and general to be denied, or for its validity to be questioned by the occurrence of apparently contradictory facts. The discovery of individual anomalies rests frequently upon false observation ; at other times upon wrong inferences. Persons do not consider that, in estimating the intellectual capacity of a brain, we must not merely regard its size and weight, but its shape, structure, the quality of its convolutions, and its chemical composition. Valentin* says : “ It is not merely the quantity, but the quality of the nervous tissues influencing the reciprocal action of the individual elements,

* Lehrbuch der Physiologie.

which decides the amount of mental activity." It is, therefore, possible that an apparent anomaly in one direction, may be balanced by a compensating development in another part.

The investigations in this respect are but scanty. Bibra has made some experiments to determine the comparative chemical composition of the brains of different animals. The general result seems to be, that the brains of the higher animals contain more fat, and consequently more phosphorus, which is combined with it, than the brains of the lower creatures. The quantity of cerebral fat is much less in the foetus and new-born children than in grown-up persons; the quantity of water being very considerable in the brains of children. There is more fat in the new-born child than in the foetus, and it increases rapidly with advancing age. The brain does not lose its fat like other parts of the body; which proves that cerebral function absolutely requires a certain amount of fat.

Small brains of large animals, as of the ox and horse, yield a proportionate large amount of fat; so that, according to Bibra, the quantity is compensated by the quality—a relation the existence of which is proved by many other facts. Schlossberger found the brain of a new-born boy to be much richer in water and poorer in fat than in grown-up persons. But, in determining the intellectual capacity of a brain, we must take into account, not merely its chemical composi-

tion, but also its morphological condition. The so-called convolutions of the brain have long excited the attention of inquirers, who endeavoured to find out their relation to the activity of the brain or of the soul. This relation has lately been determined by the investigations of Professor Huscke, who found that the more numerous these convolutions, the deeper the sulci between them; and the more asymmetrical and apparently irregular their structure, the more perfect and intellectually superior is the animal. Dr. T. Wagner reports that the brain of Beethoven presented anfractuosities twice as deep and numerous as those of an ordinary man.

The history of the development of the human being shows us the same law which pervades the development of the brain in all animals. The mental capacity of man is enlarged in proportion to the material growth of his brain, and is diminished according to the gradual diminution of its substance in old age. From exact measurements, Peacock found that the weight of the human brain increases steadily to the age of twenty-five, when it remains stationary until the age of fifty, when it begins gradually to decrease. According to Sims, the brain, increasing in man up to the fortieth year, attains its maximum weight and volume between forty and fifty. The brain of the aged becomes atrophied; that is, it shrinks, leaving cavities between the convolu-

tions, which previously adhered to each other. The cerebral substance becomes more tough, its colour more greyish, it is less vascular, the convolutions become smaller, and the chemical constitution approaches, according to Schlossberger, that of infancy. It is a fact known to every body, that the intelligence diminishes with increasing age, and that old people become childish. The great Newton, to whom we owe some of the most pregnant discoveries in natural philosophy, occupied himself in his old age with Daniel the Prophet and the Revelation of St. John!

“The greatest thinker of his age,” says Tuttle, “may in one hour during illness lose all his intelligence; in advanced age he enters a second childhood. The decay of the body induces decay of the mental faculties, which become extinguished with the last breath, like a lamp without sufficient oil, emitting only some feeble glimmers.”

The soul of the child becomes developed in the same degree as the material organisation of its brain becomes more perfect. The brain substance of the child is more fluid and pultaceous, richer in water, and poorer in fat, than that of the adult. The differences between the grey and white substance, and other microscopic peculiarities, become only gradually developed; thus the so-called fibrillation of the brain, which is so plainly seen in the adult, is not easily observable in the child. The more marked this fibra-

tion grows, the more manifest becomes mental activity. The grey substance on the surface is but little developed; the convolutions are sparing, and little vascular. "The histological development of many parts of the nervous centre appear very imperfect in the new-born." (Valentin.) "The different mental faculties," says Vogt, "develope themselves gradually with the growth of the hemispheres."

It is known that the female sex is intellectually inferior to the male sex. Peacock found, that the average weight of the male brain considerably exceeds that of the female; that of the former being fifty, and of the latter forty-four ounces.* Dr. Geist's investigations in the hospital of Nürnberg exhibit, according to Bibra's communications, the same results. Dr. Hoffmann of Silesia concludes, from sixty to seventy observations, that on the average the female brain is only two ounces lighter than the male. Lauret measured the heads of two thousand individuals, and found that both in diameter and circumference the female head is considerably smaller than the male. The same law prevails in the comparison of human brains, according to the manifestation of mental activity in the healthy or diseased state. The brain of the celebrated Cuvier weighed considerably above four pounds, whilst the normal weight of a human brain averages from three to three and a half

* London Journal of Medicine, 1851.

pounds. Tiedemann weighed the brains of three adult idiots, and found them to be between one and two pounds. The circumference of the heads of obtuse individuals, whether male or female, according to Lauret's measurements, is considerably below the average. Individuals whose heads are not sixteen inches in circumference are always imbecile. "An abnormal smallness of the brain is always combined with imbecility." (Valentin.) The celebrated poet Lenau became insane, and died idiotic; his brain, having become atrophied by disease, weighed only two pounds eight ounces. The gradual decline of the intellect, according to Parchappe, is connected with the diminution of the brain. Having taken the average in 782 cases, he proves by figures how the diminution of the weight of the brain was in proportion to the mental perturbation.*

Hauner, physician to the hospital for children in Munich, considers himself justified from his experience in asserting as follows :

"Having for many years examined the cranial development of all our children, we have gained the conviction that an abnormal smallness of the skull, though not always leading to cretinism and idiocy, is mostly accompanied with limited mental qualifications; whilst mental perturbations are rarely observable in those possessing abnormally large skulls."

The remarkable vivisections and experiments

* Comptes Rendus du 31 Juillet, 1848.

of Flourens prove our law so forcibly, that any refutation of it becomes next to impossible. Flourens performed his experiments on such animals, which from their physical constitutions were able to support considerable lesions of the skull and of the brain. He removed the superior parts of the brain in layers ; and it is not too much to assert that the mental capacities were removed in the same ratio. Flourens was thus enabled to place fowls in such a condition that every mental function, every capacity to perceive sensual impression, was obliterated, without extinguishing life. The animals, reduced apparently to a deep sleep, remained immovable on the spot where they were placed, insensible to any external stimulus, and were only preserved by artificial feeding. They were in a certain measure reduced to a vegetative life. In this state they remained for months and years, and even increased in weight. " If," says Valentin, " both hemispheres of a mammal are removed in layers, mental activity will be reduced in proportion to the mass removed. Perfect unconsciousness is generally the result if the loss extends to the ventricles." Can we desire any stronger proof as to the necessary connection of the soul and the brain than that afforded by the knife of the anatomist, who cuts off the soul piecemeal ?

Almost every extended range of mountains contains in its deep and damp valleys an unfortunate class of human beings, whose whole existence is

more allied to the brutes than to the human race. They are crippled, dirty, and disgusting; their heads are either small or abnormally large; the formation of the skull is angular, resembling that of the monkey; the forehead low and narrow; the organs of mastication large; the belly protuberant; the legs slender; they are deficient in sensibility, and are rarely able to utter articulate sounds. The organs of digestion and of propagation are the only organs developed; hence the desire for food and sexual gratification are their chief manifestations. Who has not, during a journey through mountainous districts, seen the cretins cowering on the wayside, or at the doors of their huts? The report of the Commission appointed by the Sardinian Government to inquire into the causes of cretinism, states that in all cretins there exists a defective formation of the cranium, and a defective development of the brain.

“The brain,” says Foerster,* “in cretinism is always smaller in the large hemispheres than usual; the cranium has an abnormal shape, and is characterised by smallness, asymmetry and malformation of the skullcap.” Dr. Knolz observes, that “the cretins remain children in old age, and act as such.” “In studying,” says Baillarger, “the chief features of the development of cretins, I found that the general forms of the body and of the limbs continued to re-

* Lehrbuch der Pathol. Anatomie.

semble those of children, and that their desires and inclinations were similar." Vrolik of Amsterdam communicates the following result of the *post mortem* examination of a young cretin aged 19.* "The skull was small, oblique, the forehead low, the occiput flattened; the convolutions few in number and imperfect, the sulci shallow, the cerebrum and cerebellum imperfectly developed and asymmetric, the lateral ventricles expanded by serum.

The physical and their corresponding mental differences between the varieties of the human race are too well known to require more than a few indications. Every one must have observed, either from nature or from delineations, the small ape-like skull of the Negro, and compared it with the expanded cranium of the Caucasian; and everyone is aware of the congenital mental inferiority of the black race, so that opposed to the white man the Negro appears as a child, and will always remain so. The brain of the Negro is much smaller than that of the European, approaching that of the animal; its convolutions being much less numerous. An acute observer in the *Allgemeine Zeitung* compares the Negroes, from their whole mental disposition and character, to children.

Count Görz† narrates of the Negroes in Cuba: "Their character is very degraded, the moral feeling entirely undeveloped; all their actions

* Verhandl. der K. Akademie der Wetenschappen, 1854.

† Voyage Round the World.

proceed from animal impulse, or a cunning calculation of their own advantage. Generosity and indulgence, exhibited by the white man, they consider as weakness. Power imposes upon them and excites their hatred, which would become dangerous were they not aware of their powerlessness. The only efficacious punishment for them is the whip. They delight in sowing discord, are thievish and revengeful; devoid of any religious feeling, they are given to the crudest superstition. Their frame is, however, well developed and powerful, their teeth magnificent, their legs slender; they digest like beasts of prey, etc."

"I have often tried," observes Burmeister, "to obtain an insight into the mind of a Negro; but it never was worth the trouble. The only valuable result obtained was, that there is not much mental life in the Negro, and that all his thoughts and actions are merely directed to the lowest requirements of human existence." The same may be said of other varieties inferior to the Caucasian race. The natives of Australia, in whom the superior parts of the brain are almost wanting, possess neither great intellectual capacity nor any sense of art or moral worth. All attempts of the English to civilise them have hitherto failed. The American Indians, with their small peculiarly shaped heads, are of a savage, cruel nature, and, according to the published reports, incapable of civilisation, and are likely to be exterminated by the progress of the Caucasian race.

Let us now pass from this anatomical sketch to some physiological facts, in order to establish the necessary and inseparable connection of brain and soul. It is through the nervous system radiating from the brain, and which may be considered as presiding over all organic functions, that the brain sways the whole mass of the organism, and reflects again to various parts external impressions, whether of a material or spiritual nature. The physical effects of mental emotions are sufficiently known. We grow pale from terror, we blush from shame or anger. The eye sparkles with joy, and the pulse is quickened. Terror causes sudden fainting; wrath, a copious secretion of bile. The mere thought of a disgusting object may cause instant vomiting; the sight of a favourite dish excites a rapid and copious secretion of saliva. The milk of the mother is by powerful emotions so rapidly altered in its nature, that it may prove highly injurious to the child. It is an interesting fact, that mental labour not merely increases the appetite, but, according to Davy, augments the animal heat. Men of a sanguine temperament live shorter and faster than others, because powerful mental excitement of the nervous system hastens the change of matter and consumes life more rapidly. The reverse is the case with phlegmatic persons. Short-necked individuals are lively and passionate; long-necked persons are calm and sedate, the brain being in the latter more distant from the heart,

the focus of the circulation. Parry relieved attacks of mania by compressing the carotid arteries; and Fleming (*Brit. Rev.*, April 1855) produced by the same manipulation sleep or feverish dreams in healthy individuals.

Still more than in man is the character of animals, *e.g.* of horses and dogs, estimated according to the length of the neck. Great mental power and knowledge produce a favourable influence on the physical frame. Alibert quotes as a constant observation of physicians, the disproportionately large number of old men found among scholars.

On the other hand, the various conditions of the body are again reflected in the mind. A copious secretion of bile has, as is well known, a powerful influence on the mental disposition. Degeneration of the ovaria produces satyriasis and nymphomania; diseases of the sexual organs frequently cause an unconquerable desire to commit murder or other crimes. How frequently is not pietism combined with excesses in physical love, etc.!

Finally, pathology furnishes us with an abundance of striking facts, and teaches us that no part of the brain exercising the function of thought can be materially injured without producing a corresponding mental disturbance. Should exceptional cases now and then occur, then it will be found that the injury is confined to one hemisphere only, the other acting vica-

riously. Tales of individuals who, in spite of the destruction of both hemispheres, are said to have experienced no loss of intellect, are fables. An inflammation of the brain causes delirium or mania; an extravasation of blood, stupefaction and unconsciousness; a permanent pressure upon the brain, weakness of intellect, idiocy, etc. Who has not seen the melancholy spectacle of a child suffering from hydrocephalus? Lunatics suffer either from an idiopathic disease of the brain, or from a reflex of other diseased organs. The greatest number of physicians and medical psychologists are now of opinion that all mental diseases are caused by physical affections, especially of the brain, though it may not in all cases, owing to the imperfection of our senses, be possible to establish the fact. And even those who do not entirely agree in this view, cannot but admit that no mental disease can be thought of without assuming a functional disturbance of the brain. Roman Fischer compared the results of 318 dissections in the lunatic asylum of Prague. Among these 318 cases, there were but 32 in which no pathological changes could be detected in the brain and its integuments, and in five only were there no pathological alterations whatever (the work appeared Luzern 1854). No physician can, according to the present state of science, doubt that, even in these five bodies, there must have been material pathological alterations, though they were not visible. Dr. Follet con-

cludes, from the autopsy of above a hundred lunatics, that the cerebral mass must, for the performance of several intellectual faculties, possess a certain thickness, and that the more this density diminishes and the ventricles become dilated, the weaker become memory and the intellectual faculties in general. According to this physician, mental diseases are the result of disturbed equilibrium of the innervation of the two hemispheres. "All intellectual perturbations," says Dr. Wachs-muth, "proceed from diseases of the brain, which is the organ of thought, as shewn by the pathology of the corporeal organ."

Physical affections or lesions of the brain frequently produce curious mental effects. It is credibly asserted that, in the hospital of St. Thomas in London, a man, after recovery from a severe injury of the head, spoke in a foreign language. The language proved to be his mother-tongue—Welsh—which, however, he had forgotten during a thirty years residence in London. The cases of lunatics or maniacs sometimes recovering the use of reason a short time before death, are frequently quoted in support of opposite opinions. We must, on the contrary, in such cases assume that the general exhaustion on the approach of death causes the brain to be freed from the morbid influences of the body. Viewed in this light, such cases speak in favour of our theory.

The pathological facts which support or prove

our opinion are so numerous and comprehensive, that volumes might be filled with them. The weight of our arguments has always been acknowledged by thoughtful men, being accessible to the most simple power of observation.

“If the blood,” says Frederick the Great, in a letter to Voltaire in the year 1775, “circulates too rapidly in the brain, as in intoxication or fevers, it confuses the ideas : if there be a small obstruction in the nerves of the brain, it causes madness ; if a drop of water spread within the cranium, it causes loss of memory ; a drop of extravasated blood, pressing upon the brain and the nerves, causes apoplexy, etc.”

The law that brain and soul are necessarily connected, and that the material expansion, shape, and quality of the former stand in exact proportion to the intensity of the mental functions, is strict and irrefutable, and the mind again exercises an essential influence on the growth and development of its organ, so that it increases in size and power just in the same manner as any muscle is strengthened by exercise. Albers of Bonn states that, having dissected the brains of many persons who had for years undergone much mental labour, he found in all of them the *substance of the brain very firm and the grey matter as well as the convolutions highly developed*. Comparisons between the skulls of the ancients and the heads of the present generation leave no doubt as to the fact

that the cranium of the European has, in the course of historical time, gained in circumference. The important and interesting researches of Abbé Frère, in Paris, have led to the result that the older and more primitive a human type is, the more developed is the skull in the occipital region, and the flatter is the forehead. The progress of civilisation seems to have produced the effect that the anterior portion of the skull became more arched, and the occipital part flatter. The rich collection of Abbé Frère, containing crania of all centuries of our era, exhibits the various phases of this development.*

In the face of facts like these, it can no longer be deemed an impossibility that the human race should, in the course of 80,000 years, have gradually risen from a crude and nearly brutish condition to its present state. A comparison of the cranial formation of the higher and lower classes of society yields a similar result. It is a daily observation of hatters that the educated classes require on the average much larger hats than the uneducated. It has been equally observed that the forehead and the parietal parts of the skull are less developed in the lower classes. The circumstance that clever persons have sometimes very small, whilst some stupid individuals have proportionately large heads, is frequently mentioned as an argument in refutation of the de-

* The collection is now in the new Museum of Anthropology of Paris.

pendence of mental power on the material quality of the brain. But though the facts are undoubted, the inferences drawn from them are wrong. We have already, in the beginning of the chapter, shown that it is not merely the size, but its shape and composition which determine its mental power, so that a deficiency in one direction is compensated by an excess in other respects, and *vice versa*. But what still more essentially modifies the relations, and which must be taken into account, is the influence of education. An individual may, though possessing good natural capacities, appear stupid from want of education, whilst another with a poor or moderate cerebral organisation may by study be enabled to conceal his original defect. A close and practised observer is, however, generally able to detect the original condition.

But enough of facts. The whole science of man is a continuous proof in favour of the connexion of brain and mind; and all the verbiage of philosophical psychologists in regard to the separate existence of the soul and its independence of its material organ is without the least value in opposition to the power of facts. We can find no exaggeration in what Friedreich, a well known writer on psychology, says on this point. "The exhibition of power cannot be imagined without a material substratum. The vital power of man can only manifest its activity by means of its material organs. In proportion

as the organs are manifold so will be the phenomena of vital power, and they will vary according to the varied construction of the material substratum. Mental function is hence a peculiar manifestation of vital power, determined by the peculiar construction of cerebral matter. The same power which digests by means of the stomach, thinks by means of the brain, etc.”

The material simplicity of the organs of thought in regard to form and composition has been adduced in refutation of our view as regards the connexion of brain and soul. The brain, it is said, presents in most of its parts a homogeneous soft mass, which is neither distinguished by a complicated structure nor peculiar chemical composition. How, then, is it possible that this homogeneous matter can be the sole cause of so infinite a variety of mental phenomena exhibited by the animal and human soul? The connexion must evidently be very slender, nearly accidental: infinitely complicated powers can only arise from infinitely complicated materials. The soul exists, therefore, *per se*, independent of earthy materials, and is only accidentally or for a short time connected with the substance we term brain.

This apparently well founded objection rests, in the first place, on wrong premises. The theory which considers the soul as the product of matter, must certainly grant that cause and effect must stand in exact relation: and that complicated effects presuppose complicated material condi-

tions. Now, in point of fact, we know in the whole organised world of no tissue which exhibits more delicate and wonderful forms, or a finer and more peculiar structure, and probably, also, a more remarkable chemical composition than the brain. Unfortunately, our knowledge is in this respect as yet very deficient and circumscribed. Yet, this much we know, that the brain is not a homogeneous mass, but consists mostly of extremely delicate and peculiarly constructed filaments or cylinders, containing an oily coagulable substance; and that the so-called primitive fibres, of the breadth of one thousandth part of an inch, decussate each other, and are peculiarly entwined. The minute anatomy of the brain is, however, as yet nearly a *terra incognita*, from the difficulties attending a microscopic examination of nervous matter. Microscopic anatomy, however, shows us in the interior parts of the brain, singularly entwined forms, of which the physiological functions are entirely unknown,* while upon the surface we observe deeply indented convolutions, in which the grey and white matter meet, and which, as already shown, stand in close relation to mental function. The so-called ganglionic globules, the second histological ele-

* "We find in the brain eminences and depressions, bridges and aqueducts, beams and vaults, screws and hooks, trees and sheaves, harps, etc. No one knows the functions of these singular forms." (Huschke, in his celebrated work, *Schädel, Hirn und Seele des Menschen*.)

ment of nervous matter which is chiefly found in the substance of the brain and the spinal cord, equally exhibit variations and peculiarities of structure. They are partly surrounded by primitive fibres, or united with them by bridges, and partly seem to emerge from them. There exists, consequently, no animal organ which can be compared with the brain in regard to delicacy and variety of form. The nerves of sense may perhaps be excepted, and may be considered merely as conductors to the nervous centre. The brain is, moreover, of all the organs receiving from the heart the largest quantity of blood, and in which the change of matter consequently proceeds rapidly. Chemists finally assure us that the chemical composition of the brain is by no means so simple as was hitherto believed, but that there are found in it peculiarly constituted bodies, such as cerebrin and lecithin, the chemical nature of which is as yet unknown, and which are not found in the same degree in other organic tissues. We are further assured that the chemical constitution of the nerves, and especially of the brain, is not, as in other organic tissues, the same everywhere, but on the contrary, that it varies essentially in different parts, so that it seems that the brain is composed of various organs possessing a different chemical constitution. We have already mentioned the peculiar part which the cerebral fat seems to play. Another constituent not less important in the chemistry of the brain is phos-

phorus, and the outcry raised against Moleschott's known adage, "without phosphorus no thought," merely proves the scientific ignorance of the clamourers. It follows, therefore, that however imperfect the anatomy and chemistry of the brain may be, it offers no valid objection against our view on the relation of mind and matter. But even if the apparent simplicity of the brain-material stood in contradiction to the multiplicity of its functions, it would not affect our argument, considered from the following point of view. Nature is quite capable of producing great and varied effects by the most simple means, owing to a different mechanical arrangement of the minute constituents of matter. Thus, isomeric bodies exhibit, though of the same chemical composition, different qualities. Among the alkaloids there are some of a very poisonous nature, whilst other alkaloids, of exactly the same chemical composition, produce such a different effect upon the animal economy, that they are employed as antidotes. From the investigations with respect to the power of refraction in isomeric bodies, we learn that their constituent atoms must be differently arranged to account for their various refractive qualities. If causes *apparently* so simple are capable of producing so great a variety of effects, how can it be deemed impossible that the same relation may exist in regard to the brain and the soul? Thus the ganglionic globules of the cortical portion of the brain,

which undoubtedly are concerned in the mental process, cannot anatomically be distinguished from the globules situated in the ganglia of the abdomen; still it may be possible that they act in a different manner. "The phenomena of the polarisation of light and heat," observes Valentin, "the magnetic and diamagnetic relations prove, that apparently homogeneous masses exhibit an essentially different arrangement of their constituent atoms. Nature works everywhere by means of an infinite number of infinitely minute particles."

The so-called *contagia* depend, no doubt, upon some definite material condition of those organic substances which transmit them, yet neither chemistry nor the microscope have hitherto succeeded in throwing any light on the subject, so, for instance, as to distinguish pus impregnated with a specific contagion from ordinary pus. We must also bear in mind the remarkable facts of the transmission of mental and physical dispositions and diseases from parent to offspring. How insignificantly minute is the matter yielded by the father for the production of the germ! Yet, though the substance appears everywhere the same in regard to form and chemical composition, still the child resembles the father in his physical and mental peculiarities. The molecular relations of the minute matter which transmits the future physical and mental qualities are imperceptible to our senses.*

* So long as nothing was known of the existence of

Finally, we must, in refutation of this objection, never forget that the minute material condition of organic bodies, however much light the microscope and chemistry may throw upon it, is only known to us in its external aspect. We possess not the slightest conception of the recondite condition of the infinitely minute matter and of its possible manifestation of effects. This is strikingly illustrated by the difficulties of the physician in fathoming the cause of certain diseases. All our diagnostic signs are insufficient for this purpose. No one is enabled to distinguish blood pregnant with certain morbid matter from healthy blood, and yet it cannot be doubted that the disease is the result of material changes which may destroy the whole organism. But as little as our ignorance of these conditions gives us the right to assume the existence of unknown dynamic effects independent of matter, so little can the *apparent* simplicity of the substance of the brain form a valid objection against our view of the connection of brain and soul. Thus it has been deemed impossible that the faculty of *memory* spermatozoa (tailed corpuscles, capable of rapid motion) which form the essential element of the semen of the animal, and fecundate the female ovulum, so long could the remarkable fact of the transmission of mental peculiarities be quoted as an argument in favour of the existence of an immaterial soul. This is no longer possible. The seminal animalcule penetrates the ovulum, and furnishes a material basis for the transmission of mental capacities. This fact cuts off all ground for asserting that anything spiritual can be transmitted by any other than a material vehicle.

should be considered as dependent on the combination of the substance of the brain, inasmuch as the one is permanent during the whole life, whilst the matter is in a state of constant change. Nevertheless, the facts leave even in this respect, however inexplicable the subject may be, no reasonable doubt that memory is merely the product of material combinations. There is no other mental quality which suffers to the same extent from physical affections of the brain, as memory. It is known that traumatic lesions or internal affections of the brain considerably influence or diminish the faculty of memory. It has even been observed that the loss of particular portions of the cerebral mass has, in some persons, induced a loss of memory in regard to certain periods of their existence. In old age, as every one knows our memory is much enfeebled. The brain matter undergoes, no doubt, a constant change, but the *mode of its combination* which determines individual consciousness ever remains the same. That this modification is both inexplicable and incomprehensible, proves nothing against the fact itself. Who can explain why certain morbid conditions are transmitted to the third instead of the second generation? Is not such a phenomenon more wonderful than the connection of brain and memory? Yet no rational physician doubts that it can only be the result of material conditions, the laws of which are, and probably will ever remain, unknown to us.

Under these circumstances, we have no right to deny to matter the possibility of wonderful effects, though its form and composition are apparently not very complicated. And from these points of view, and in the face of the adduced facts, it is not very difficult to assume the possibility that the soul may be the product of a peculiar combination of matter. We are astonished at the effects, chiefly because the connection of the springs is hidden from our eyes. Does not the locomotive engine, as it rushes along, appear to us as a living being endowed with intelligence? Do not the poets speak of a steam horse—a fire horse? It is the peculiar combination of matter and force, which imbues us involuntarily with the idea that there is life in the engine. A watch, equally a mechanical product of the human hand, has, as is frequently said, a head of its own; it goes, it stops, frequently in a manner that makes it appear to have a will of its own. But how singularly crude and simple is the combination of matter and force in these machines, compared with the complex mechanical and chemical composition of the animal organism!

The comparison is in many respects imperfect, and is not intended to prove anything beyond affording a slight hint as to the possibility of the production of the soul from material combinations. But for the gist of our question, it is a matter of perfect indifference to us to know the

mode by which such a connection is rendered possible. It is enough for our purpose to have, by facts, shown the inseparableness of matter and mind, of soul and body, as well as the necessity of their causal relations. This law admits of no exception, and pervades the whole animal creation. The most minute infusorial animalcule exhibits sensation and will : consequently mental function. Its body is dried up by the rays of the sun, and it dies ; that is to say, the phenomena of its corporeal organisation, which require water for their manifestation, disappear. In this state it may remain for years, until an accidental drop of water excites again the vital capacity of the matter, and with it the mental force which seemed extinguished. The animal begins a new life, in order, perhaps, shortly to experience a similar fate.

What kind of soul can it then be, which lives and thinks independently of matter ? Where was it whilst the matter lay in a death-sleep ? However incomprehensible may be to us the *how*, in the connection of matter and spirit, the fact that it is so can scarcely be doubted by intelligent persons.

Philosophers and philosophical psychologists have, in a variety of ways, endeavoured to get over this forcible fact—and it appears to us with very little success. Some tried to explain it by admitting the connection of body and soul, but looked upon man as an essentially spiritual creature, whose body must only be considered as a

subordinate appendage of the soul. Such phrases do but obscure the question, and nothing is gained by them. The relation of body and soul is, on the whole, very definite, and if it sometimes appears that either the mind or the matter predominates, such relations are merely individual.

In some men the intellectual, in others the physical nature will be found to predominate; the one may be compared to the gods, the other to brutes. There exists an uninterrupted scale of mental qualifications from the animal to the most cultivated man. Physical and mental nature determine each other; but no direct comparison can be made between them—it can only be asserted that they are inseparable. To what insoluble difficulties an internal dualism, and an external inseparable connection of matter and mind must lead in relation to individual consciousness, cannot concern us in this question, which is purely one of facts.

CHAPTER XIII.

THOUGHT.

“Thought is a motion of matter.”

MOLESCHOTT.

“There subsists the same relation between the thought and the electrical vibrations of the filaments of the brain, as between colour and the vibration of ether.”

HUSCHKE.

THE author was induced to write this chapter by the well-known and much attacked expression of Vogt, that “Thought stands in the same relation to the brain, as bile to the liver, or urine to the kidneys;” an expression which is, however, qualified by the preceding sentence: “to express myself rather coarsely.”

Without in the least joining in the cry of condemnation raised by this sentence in the scientific, literary, and theological world, we cannot help considering this comparison very badly chosen. We are not able, after the maturest consideration, to find any analogy between the secretion of bile and urine and the process by which thought is produced in the brain. Urine and bile are visible, tangible, and ponderable substances; they are, moreover, excretions of used up materials: but, thought, spirit, soul, are not material, not a substance, but the effect of the conjoined action of

many materials endowed with forces or qualities. When a machine, made by the hand of man, has for its object to set itself or other bodies in motion, to indicate the hour and so forth, this effect is certainly, considered apart, something very different from the material excretions which may be produced at the same time. The steam-engine is in a certain sense endowed with life, and produces, as the result of a peculiar combination of force-endowed materials, a united effect, which we use for our purposes, without, however, being able to see, smell, or touch the effect itself. The steam expelled by the engine is a secondary thing, it has nothing to do with the object of the machine, and may be seen and felt as matter. Now, in the same manner as the steam-engine produces motion, so does the organic complication of force-endowed materials produce in the animal body a sum of effects, so interwoven as to become a unit, and is then by us called spirit, soul, thought. The sum of these effects is nothing material: it can be perceived by our senses as little as any other simple force, such as magnetism, electricity, etc.—merely by its manifestations. We have defined force as a property of matter, inseparable from it, yet, with regard to our *conception*, they are widely distinct, and in a certain sense opposed to each other. At least, we know not how to define force or spirit otherwise than by something immaterial or opposed to matter. In contrast with this, we find that bile and urine are

not a sum-total of ideal force effects, but are themselves material bodies and the proceeds of materials. The liver and the kidneys must afford materials for producing the secretions ; the brain furnishes no materials for secreting thought, but preserves them, though they are subjected to constant change. It is true that the brain produces a material substance, it secretes a small quantity of fluid in some of its cavities, which, as is known, may be much increased in a diseased state. But this secretion has nothing whatever to do with mental activity, and no one now pretends to find in it an analogy to, or the cause of, thought.* This secretion is, on the contrary, when abnormally increased, inimical to mental activity. The brain is, then, only the carrier and the source, or rather the *sole cause* of the spirit, or thought; but not the organ which secretes it. It produces something which is not materially permanent, but which consumes itself in the moment of its production. The secretion of the liver and kidneys proceeds imperceptibly, and produces a tangible substance ; the activity of the brain is impossible without perfect consciousness, it discerns not materials, but forces. All vegetative functions : respiration, circulation, digestion, and secretion, proceed whether we are asleep or awake ; but the manifestations of the soul are suspended from the moment that the brain sinks

* Kant, as is well known, looked for the seat of the soul in the water contained in the ventricles of the brain.

into sleep, owing to a diminished circulation of the blood. This circumstance indicates, besides, how little the quoted comparison is admissible. No organ but the brain *sleeps*; none other requires so much relaxation and rest—a circumstance which demonstrates, not merely an essential distinction between the organs mentioned, but also between psychical and mechanical activity. The heart beats so long as it receives blood: the machine works so long as it is nourished—nor does it become fatigued. The function of the brain, on the contrary, can only continue in activity during a definite time; growing weaker and ceasing altogether if deprived of rest. The same may be said of those muscles which are set in motion by the brain through the nervous system—the voluntary muscles.

Electricity, a force the manifestations of which were hitherto only observed in the inorganic world, plays, according to modern investigations, a very essential part in the physiological functions of the nervous system. Electric currents constantly surround the nerves when at rest. These currents cease, or become weaker, whenever the nerve is excited to activity. The nerves, therefore, are not the conductors, but generators of electricity. This generation ceases with the activity of the nerves, that is, with sensation or the exertion of the will. Psychical activity accordingly was, by some, defined as latent electricity! and sleep as a relaxed function of the electrical

nerves ! Experimental inquiry may, perhaps, lead us to a more intimate knowledge of psychical functions.

Our inquiry assumes a different character when we examine the true and fundamental idea of Vogt's expression. We then find this idea to agree with that in favour of which we have, in the preceding chapter, adduced numerous examples—in the law that mind and brain necessarily determine each other, that they stand to each other in inseparable causal relations. As there is no bile without liver, no urine without kidneys, so is there no thought without a brain : mental activity is a function of the cerebral substance. This truth is simple, clear, easily supported by facts, and indisputable.

Acephali, are children born with a merely rudimentary brain. These miserable creatures, which give a very unfavourable testimony as regards design in nature, are incapable of any mental activity, and soon die ; as they are deficient in the most essential organ of human existence and thought. " Nothing is more certain," says Lotze, " than that the physical state of corporeal elements constitutes the conditions upon which the existence of our mental state necessarily depends."

Thought vanishes with the matter !

" Why," exclaims Hamlet, in the celebrated churchyard scene, " might not that be the skull of a lawyer ? Where be his quiddits now, his

quilllets, his cases, his tenures, and his tricks? Why does he suffer this rude knave now to knock him about the sconce with a dirty shovel and will not tell him of his action of battery?—

“Where be your gibes now, poor Yorick? Your gambols? Your songs? Your flashes of merriment, that were wont to set the table on a roar? Not one now, to mock your own grinning? Quite chap-fallen?”

CHAPTER XIV.

THE SEAT OF THE SOUL.

“Physiology teaches with the greatest certainty, that the brain is the seat and the organ of all intellectual faculties, and of all sensual perceptions.”

BENEKE.

THE brain is not merely the organ of thought and of all higher mental faculties, but also the sole and exclusive *seat of the soul*. Every thought is produced in the brain, every kind of feeling and sensation, exertion of the will and voluntary motion, proceeds from it.

However simple this truth may be ; however clearly it may be established by innumerable physiological and pathological facts, it took, nevertheless, a long time before it was recognised, and it is even to this day difficult for those who are not physicians, to convince themselves of its correctness.

Plato, it is true, declared the brain to be the seat of the soul ; but his pupil, Aristotle, placed it in the heart. Heraclitus, Critios, and the Jews sought for it in the blood, Epicurus in the chest.

Among the moderns, Ficinus placed it again in the heart ; Cartesius in the pineal gland—a

little organ situated in the centre of the brain, and containing sandy particles. Sömmering looked for it in the ventricles, and Kant in the water contained in them. Long did they search for the soul in this or in that part of the brain, without considering that its functions can only be the result of the activity of the *whole* organ. Among the more recent inquirers we find Ennemoser, who, by way of speculation, made the acute discovery that the *whole body* was the seat of the soul; whilst philosopher Fischer entertains no doubt that the soul is immanent in the whole nervous system.

These philosophers are singular people. They talk of the creation of the world as if they had been present on the occasion; they define the Absolute as if they had sat at its table for years; they babble about the nothing and the something, the ego and non-ego, the *per se* and *in se*, universals and particulars, perishability and absolute existence, the unknown x , etc., etc., with a confidence as if a celestial codex had given them exact information about all these ideas and things, and they plaster up the simplest notions with such a confused mass of high-sounding and learned, but incomprehensible words and phrases, as to turn the head of rational man.

But in spite of all this, upon their metaphysical eminence they are not unfrequently so far off from any positive knowledge, that they commit the most amusing blunders—especially in

those cases in which philosophy and science meet, and when the latter threatens to destroy the results of metaphysical speculation. Thus, almost all philosophical psychologists have struggled with rare energy against the theory of the seat of the soul in the brain, and continue in their opposition without taking the least notice of the progress of experimental science. Fortlage, the author of a big work on Psychology which appeared in 1855, says: "There are certain errors in the human mind, etc. The error of the seat of the soul in the brain is one of them." If Fortlage had taken the trouble of reading, merely superficially, any manual of Physiology, he would have kept this remark to himself.

Philosopher Fischer, of Basle, says: "That the soul is immanent in the whole nervous system is proved, as it feels, perceives, and acts in every part thereof. I do not feel pain in a central part of the brain, but in a particular spot and place."

And yet, what Fischer denies is undoubtedly the fact. The nerves themselves do not perceive; they merely call forth sensations by conducting the impressions received to the brain. We do not feel pain in the place injured, but in the brain. If a nerve of sensation be divided in its course to the brain, all the parts which are supplied by it lose their sensibility—for no other reason than that the conducting of the impression to the brain is no longer possible. Every

man who has no knowledge of physiological processes, believes the feeling of hunger to be in the stomach. This is not so, the brain alone makes us conscious of the feeling. If the nerve uniting brain and stomach be divided, hunger is at an end, nor does it return. Neither does anger arise in the liver, or courage in the chest, but in the brain only. The heart, to which in common language so many feelings are ascribed, has nothing whatever to do with mental actions. It is nothing but a hollow muscle, which propels the blood. That mental feelings are indicated by its more or less frequent pulsations is caused by the mediation of a nerve, which connects heart and brain. This sympathy ceases with the destruction of the nerve. We see not with the eye or the optic nerve, but with the brain. If the optic nerve be divided, seeing is at an end. This also happens on the removal of the tubercula quadrigemina, though the eyes may remain perfect.

Habit and external appearance have led to the false notion, that we feel in places subjected to external irritation. Physiology calls this relation "the law of eccentric phenomena." According to it we falsely attribute the feeling perceived in the brain to the place where the impression is made. On this account it is pretty much the same where the impression is made in the tract of the nerve; we always feel it only in the peripheral expansion of the nerve. If the elbow

nerve receives a shock, we do not feel it at the elbow but in the fingers. If an exostosis presses upon the facial nerve at its issue from the cranium, the most intolerable pain is felt in the face, though the peripheral expansions of the nerve are quite sound. If a piece of skin taken from the forehead is transplanted to the nose, the person operated upon thinks he feels his forehead in touching his new nose. Persons who have lost their arms or legs by amputation often feel during their whole lives, in atmospheric changes, pains in limbs which they no longer possess. If all his limbs were removed, man would still feel them.

From these facts, it can scarcely be doubted that there must exist in the brain a topography by means of which the various sensations of the different parts of the body arise. Every part of the body which can be separately perceived, must have a corresponding spot in the brain which in some degree represents it in the forum of consciousness. It may easily happen that the irritation conducted by the corresponding nerve to the central point is not confined to it, but is communicated to neighbouring centres of sensation. In this way arise the so-called sympathies. Persons suffering from a hollow tooth generally feel pain in the whole cheek.

What is said of sensations is equally applicable to the exertion of the will. Only in the brain, and not in the muscles, arise acts of the will. The nerves conduct the irritation, and bring to

the muscles the message of the brain. The effect ceases immediately on the division of the nerve. Affections of the spinal cord cause lameness, the nervous connection between the legs and the brain being interrupted. Apoplexy is an extravasation of a quantity of blood into the interior of the brain. The moment that this happens in sufficient quantity to suspend the cerebral function in that part, there ceases also in the corresponding half of the body every kind of sensation and motion. Who has not had an opportunity of observing the melancholy state of an individual struck by apoplexy? Similar results follow the division of the spinal cord in all the parts below the division.

The origin of the nerves of voluntary motion must, like those of sensation, be distributed in the brain in a certain topographical manner, in order that they may individually obey the will. This relation has very aptly been compared to the keys of a piano, upon which the person plays. The will, like the player, requires practice to learn this play, in order to produce particular movements by touching different keys. Very frequently the player cannot succeed, and he strikes several keys together and thus produces involuntary movements. We wish, for instance, to move one finger, and move all of them. The grimaces whilst speaking rest upon this sympathy. These kinds of movements are best observed in children, who have not yet learned to isolate the actions of the will: if they wish to

execute a simple motion, they move the whole body.

Let us now turn to the objections of another philosopher. Professor Erdmann of Halle says, in his psychological letters :

“The theory that the soul has its seat in the brain, must lead to the result that, when the body is separated from the head, the soul should continue to exist”!

This undoubtedly would be the case, if we were able in an artificial manner to supply the brain with a continued stream of blood necessary for its nourishment, integrity, and action. But, in consequence of the separation from the body, the flow of blood ceases, and with it every cerebral function and every mental activity.

There have been a few instances of men in whom, by some accident, a dislocated cervical vertebra compressed the spinal cord in such a manner that the connection between the brain and the body was severed. Respiration and pulsation continued, however ; and with them the nutrition of the brain. Such a state is a living death. The whole body is perfectly insensible and motionless—a corpse ; the head only lives, with its immediate adjoining parts. The intellect, however, remains in such persons intact ; they are living corpses.

The theory that the brain is the seat of the soul is so incontrovertible, that it has long been adopted in the rules of law in regard to mon-

strosities. A monstrosity with one body and two heads counts for *two* persons; one with two bodies and one head, only for one person. Monstrosities without a brain, so-called acephali, possess no personality.

Mr. Ennemoser found that the soul resides in the whole body. Had Mr. Ennemoser ever had the misfortune of losing a leg by amputation, he would be greatly surprised to find that his soul had lost nothing of its integrity.

Attempts have recently been made to weaken the axiom of the brain being the sole seat of the mind, by ascribing to the spinal cord a share in sensation and voluntary motion. The experiments performed on animals to support this theory are by no means convincing; whilst the reasons against it are so strong, that science is by no means inclined to adopt it.

We may also mention that some authors imagined that the soul, under certain circumstances, leaves the brain for a short time and occupies another part of the nervous system. The solar plexus, a concatenation of sympathetic nerves situated in the abdomen, was especially pointed out as the favoured spot. The sympathetic nerve running along the vertebral column is apparently but slightly connected with the cerebro-spinal system, and exhibits in its functions such a physiological independence, that the organs supplied by it are, in their normal state, independent of the will and of consciousness. This nerve is,

however, not the least concerned in mental acts ; and physiology has never yet succeeded in proving such manifestations, either in man or animals.

Theorists, nevertheless, did not hesitate to make this innocent nerve an accomplice in the mystical and speculative *sins* of our age, and lay to its charge a number of those phenomena which are designated as the *night-life of the soul*. This nerve, it was said, rendered it possible that somnambulists could read sealed letters or indicate the time of a watch placed on the pit of the stomach.

We are compelled to enter into some details respecting these phenomena, not merely to prove our proposition that the brain is exclusively the seat of the soul, but for other reasons. Some of these phenomena, *clairvoyance* especially, have been laid hold of to prove the existence of supernatural and supersensual phenomena. They were considered as the link of connection between the spiritual and material world ; and it was surmised that these phenomena opened a gate through which man might pass, and succeed in obtaining some immediate clue regarding transcendental existence, personal continuance, and the laws of the spirit. All these things are now, by science and an investigation of the facts, considered as idle fancies which human nature is so much inclined to indulge in to satisfy its longing after what appears miraculous and supersensual.

This propensity has given rise to the most curious errors of the human mind. Though it sometimes appears that the progress of science arrests its development in some place, it suddenly breaks forth with greater force at some other place where it was least expected. The events of the last few years afford a striking example. What the belief in sorcery, witchcraft, demoniac possession, vampirism, etc., was in former centuries, reappears now under the agreeable forms of table-moving, spirit-rapping, psychography, somnambulism, etc.

The educated classes think that the belief in what is wonderful and supersensual is more peculiar to the ignorant classes; but history has just proved the contrary. How many educated persons are there not who dislike to sit at a table when the number amounts to thirteen! How many do not consider Friday as an unfortunate day, or consider the meeting with certain animals a bad omen! What success do not magnetisers and clairvoyants meet with in the higher classes! Among the phenomena constituting the so-called "night-life" of the soul are usually enumerated the following: The frightening of pregnant women, animal magnetism with its attendant phenomena of clairvoyance, somnambulism, forebodings, second sight, apparitions, sympathetic cures, etc.

The influence upon the foetus by sudden frights experienced by the mother is of little importance in our inquiry, being rejected by the best authorities.

Magnetic sleep, induced either by continued passes on the body, or spontaneously without external means, as in idiosomnambulism, is stated to be frequently attended by an intellectual ecstasy, which in certain privileged persons, chiefly females, rises to what is called *clairvoyance*. In this state, those persons are said to exhibit mental faculties not natural to them, to speak fluently foreign languages, and to discuss things perfectly unknown to them in the waking state. Such a somnambulist is further said to have something ethereal, something glorified in his whole bearing, reminding us of his new relations to superior spheres; his voice is stated to be sweet and solemn. If this state passes into clairvoyance proper, the person now perceives things beyond the sphere of his senses, he reads sealed letters, guesses the thoughts of other persons, reveals the past, etc. Finally, such individuals sometimes give us information about the arrangements in heaven and hell, our state after death, and so forth; but we cannot help mentioning that these revelations are ever in remarkable harmony with the religious views of the church, or of the priest under whose influence the patient may be for the time.

Clairvoyance is only a modern invention in its form, not in its essence. Pythia of the Greeks, prophesying upon her tripod, was a clairvoyante in an antique form, who was as much prompted in her answers as our modern somnambulists.

The various gambols of religious maniacs in the middle ages were attended with similar phenomena of inspirations. The history of that kind of exaltation which occurred in Languedoc is an instance in point.

There can be no doubt that all pretended cases of clairvoyance rest upon fraud or illusion. Clairvoyance, that is a perception of external objects without the use of the senses, is an impossibility. It is a law of nature which cannot be gainsaid, that we require our eyes to see, our ears to hear, and that these senses are limited in their action by space. No one can read an opaque sealed letter, extend his vision to America, see with closed eyes what passes around him, look into the future, or guess the thoughts of others. These truths rest upon natural laws, which are irrefutable, and admit, like other natural laws, of no exception. All that we know, we know by the medium of our senses. There exist no supersensual and supernatural things, and capacities; and they never can exist, as the eternal conformity of the laws of nature would thereby be suspended. As little as a stone can ever fall in any other direction than towards the centre of the earth, so little can a man see without using his eyes.

Cases so repugnant to the laws of nature have never been acknowledged by rational unprejudiced individuals. Ghosts and spirits have hitherto only been seen by children, or ignorant and

superstitious individuals. All that has been narrated of the visits of departed spirits is sheer nonsense ; never has a dead man returned to this world. There are neither table-spirits nor any other spirits. The naturalist entertains, from observation and experience, no doubt as to these truths ; a constant intercourse with nature and its laws has convinced him that they admit of no exception. The majority of human beings think differently ; they must, therefore, be instructed.

The scientific impossibility of clairvoyance has been confirmed by an examination of the facts by sober and unprejudiced observers, and were proved to be deceptions and illusions. The Faculty of Medicine of Paris many years ago took the trouble of submitting a number of such cases to a scientific examination ; they were all proved to be deceptions, nor could a single case be established of a perception without the use of the senses. In 1837 the same academy offered a prize of 3,000 francs to any one who could read through a board. No one gained the prize. Some years since a scientific commission in Geneva, appointed for the purpose, made some experiments with M. Lassaigne and Mlle. Prudence Bernard, a famous Parisian somnambulist, which all turned out so many failures. Whenever proper means were employed to prevent deception, clairvoyance was at an end. It is known that the celebrated somnambulist Alexis of Paris, who turns the heads and lightens the purses of

the people, keeps agents in all the hôtels of Paris, who inform him of the conditions of strangers. The author has himself had an opportunity of examining a clairvoyante, of whom remarkable things were told, under circumstances when a deception on the part of the magnetiser was out of the question. The lady failed in all her indications; they were either absolutely false, or so expressed that nothing could be made of them. She, moreover, made the most ridiculous excuses for her shortcomings. As she failed in her clairvoyance, she preferred to fall into a state of heavenly ecstasy, in which she discoursed with her "ange" or tutelary genius, and recited religious verses. In reciting a poem of this kind, she once stopped short and recommenced the verse to assist her memory. She manifested, withal, in this ecstasy, no superior mental capacities; her language was common, and her manner awkward. The author left with the conviction that the lady was an impostor who deceived her patron. Still, several gentlemen present were by no means convinced of the deception practised on them!

In the annals of forensic medicine there may be met with numbers of such cases of pretended somnambulists, who were found guilty of such practices. In all these cases, a close examination established imposition and fraud. Louise Braun, the well known "wonderful girl" of the Schifferstrasse in Berlin, who in 1849 attracted thousands,

and was even called upon to render sight to a blind king, was in 1853 sentenced at the assizes to imprisonment as a common cheat. Dr. Wittcke relates in the *Journal of Medicine* the history of a somnambulist who, for a variety of deceptions, had been sentenced to imprisonment and the pillory. The superior court, however, quashed the conviction, on the ground that the deception was not sufficiently proved. She naturally recommenced her practices, and gained a large sum of money. This person was an uneducated peasant woman, and attempted to speak in foreign languages, to assume a high dialect, to hold spiritual discourses, etc. ; by which many were deceived. A second and closer examination, made by Dr. Wittcke, proved her to be a complete impostor.

After all this, it can no longer be doubtful that such supersensual and supernatural mental capacities have never existed, and that the assertion that the soul takes, under such circumstances, refuge in the sympathetic system, where unconsciously it performs things not natural to it, is an empty phrase and nothing else. "Nothing," says Hirschel, "is so improbable but a German will find a theory for it." Sympathetic or miraculous cures are all based upon deception or imagination. Their empire is as large as the world, and as old as history. To say anything more regarding their natural impossibility, would be to insult the intellect of the reader.

All that has been said may also be applied to apparitions, no matter in what form they may appear—whether as spectres, table-spirits, or demons.

Sleep-walking (*somnambulism*) is a state which is, unfortunately, as yet little known from actual observation, although it is highly interesting on account of its scientific importance. However, though not possessing an exact knowledge of its nature, we are justified in considering the curious tales related of sleep-walkers as so many fables. No somnambulist can climb up a wall, or speak unknown languages, or perform any intellectual labour which exceeds his comprehension.

“Deny, then, who can,” says Ule, “that the senses are the source of all truth and of all error, and that the human mind is a product of the change of matter.”

CHAPTER XV.

INNATE IDEAS.

“Nihil est in intellectu, quod non fuerit in sensu.”

“There is nothing in our intellect, which has not entered by the gate of the senses.”

MOLESCHOTT.

THE question whether there be innate ideas is a very old one, and, in our opinion, one of the most important in relation to the contemplation of nature. It decides to some extent whether man, considered as the product of a higher world, has received a form of existence as something foreign and external to his essence, with the tendency to shake off this earthly covering, and to return to his spiritual home: or whether both in his spiritual and bodily capacity man stands to the earth which has produced him in a necessary inseparable connection, and whether he has received his essential nature from this world, so that he cannot be torn from the earth, like the plant which cannot exist without its maternal soil. The question is, at the same time, one which does not dissolve itself in a philosophical mist, but which, so to speak, has flesh and blood, and, resting upon empirical facts, can be discussed and decided without high-sounding phrases. It is for

this reason that the question has been chiefly discussed by the French and English, as the languages of these nations do not admit of an empty jugglery of words, which is frequently termed "philosophy" by the Germans.

The advice has frequently been given, and with some justice, we think, that the philosophical works of the Germans should be translated into foreign languages, so as to sift the grain from the chaff. We are afraid that little would remain after such an ordeal. Nothing is more repulsive than that apparently profound philosophical spirit which breaks forth in hollow rhapsodies, but which, fortunately, is now somewhat arrested by the solid progress of empirical science. After the splendid but short career of the fashionable philosophy of Hegel, our German philosophers have pretty much lost their authority, and are now but little attended to.

The French philosopher Descartes assumed that the soul entered the body endowed with all possible knowledge, but, forgetting it at birth, gradually recollects it. Locke rejected this view, and victoriously disproved the theory of innate ideas. We do not hesitate, supported by plain facts, also to declare against innate ideas. Moleschott calls man a product of his senses; and, indeed, observation teaches that all that we know, think, or feel, is merely a reflex of what we or other men before us have received, by the medium of our senses, from without. Any

supernatural absolute knowledge reaching beyond the world, not accessible to our senses, does not exist, and is impossible. Daily experience teaches us that man begins his intellectual life only with the gradual development of his senses, and in proportion as he enters into a definite relation to the external world; and that the development of his intellect keeps pace with that of his organs of sense and his organ of thought, and also with the number and importance of the impressions received. "Every unprejudiced observer," says Virchow, "has arrived at the conviction that thought is only gradually developed in man." The new-born child thinks as little, and has as little a soul as the unborn child; it is, in our view, living in the body, but intellectually dead. Man and animals generally, grow from a scarcely visible vesicle to a certain size, when the embryo can move in the womb; but these motions are involuntary, not determined by a mental act: the embryo neither thinks nor feels, and is not conscious of its existence. Man recollects nothing of this state, nor of the first period of his existence in which the senses were dormant; and this perfect unconsciousness proves his spiritual non-existence at that period. The reason can only be that, during the foetal state, there are no impressions whatever received from without, and so weak and imperfect are they in the first few weeks, that the intellect cannot be said to exist.

It is of some interest with regard to this question, to mention the somewhat ludicrous discussion about the period of the animation of the embryo; a question which became important at the time when the destruction of the embryo was beginning to be considered a crime.

The question to be decided was, at what time the soul entered the body of the embryo, as a crime could only be committed after the period of its animation. The scientific and logical impossibility of determining the time proves the absurdity of the whole theory, which assumes that a higher power breathes the soul into the nostrils of the fœtus. The Roman lawyers accordingly did not look upon the fœtus as an individual being, but as a part of the mother. The destruction of the fœtus was therefore permitted to the women of Rome, and we find that Plato and Aristotle had already adopted the same view. The Stoics held that the soul entered the body of the child with the first act of respiration. It was not until the time of Ulpian that the destruction of the fœtus was forbidden. The Justinian code fixed the fortieth day after conception as the time of the animation of the fœtus. Some modern lawyers look upon conception and animation as occurring simultaneously—a theory irreconcilable with scientific experience. Any one who has ever seen a human or animal ovulum under the microscope, can only smile at the assumption of an egg-soul. These

germs must no doubt possess natural dispositions capable of mental development; but the actual presence of a soul in that state is out of the question. Such philosophical and religious exaggerations, which exhibit the most simple things in a wrong light, did not exist in former times. Moses and the Egyptians entertained a decided opinion that the child was not animated while in the womb. In some countries they know nothing of an animated foetus. The destruction of the foetus and infanticide is, according to Williams, a common occurrence in Madagascar. It is also very common in Otahaiti, China, and the Society Islands.*

Even at birth, when the child is separated from the mother, it is impossible to assume that a ready-made soul, lying in wait, should suddenly rush in and take possession of its new habitation. This soul, on the contrary, is only gradually developed in proportion to the relations which, by the awakening senses, are now established between the individual and the external world. It is possible, perhaps certain, that already in the womb the physical organisation of the new individual, chiefly determined by hereditary transmission, possesses predisposi-

* We by no means intend to convey the opinion that such customs might be desirable in our present social state. Our investigations are without reference to such practical questions. The state may have numerous reasons for protecting the foetus against external violence, which can only be questioned by the political economist.

tions which, subsequently excited by external impressions, are developed into mental qualities and peculiarities; but no conception or idea can be innate.*

The assertion recently promulgated by Rudolf Wagner, one of our most distinguished physiologists, that the transmission of mental peculiarities from parent to child presupposes the existence of a transferable immaterial substance, is perfectly untenable, as it rests upon the false idea that the germs of animals contain a psychical substance, which certainly can neither be divided nor transferred.

The further development of the child's mind by means of the senses, education and example, etc., always determined by physical organisation and predisposition, proves so clearly the objective growth of the mind, that no theory can subvert the fact. In proportion as the senses are exercised and gain strength, and external impressions are multiplied and frequently repeated, there arises slowly and gradually an internal picture of the external world in the material organ of thought, and conceptions and ideas are formed. A long period elapses before the human being

* The sucking of a new-born child at the breast is not the result of a conscious idea, or an act of the will, but, as is well known, a reflex act; *i.e.* produced mechanically by means of a physiological process perfectly independent of the will and of consciousness. Hence the child sucks, not merely at the breast of the mother, but at every object placed into its mouth.

arrives at a perfect self-consciousness, and until he learns to use his organs and limbs for definite purposes; indeed, until he can distinguish his personal individuality. Children, as is well known, rarely use at the outset the first personal pronoun. This gradual and imperceptible intellectual growth induces man, when in full possession of his powers, to forget his origin, to despise the external world, his mother, and to look upon himself as a son of heaven, from which he had received knowledge as a gift. An unprejudiced glance at his past state, or at the condition of those whom nature has deprived of one or more of their senses, might have taught him better.

What does a person born blind know of colour, light, and the splendour of this world? Night and darkness are the normal state of his existence, like that of the lowest animals which possess no eyes. What does a deaf-mute know of sound, of language, music, and melodies? For him there is eternal silence, and he stands in this respect in the same intellectual position as the house-fly, which, wanting the organ of hearing, is not frightened by any noise. Deaf-mutes are unfortunate creatures who can only with great trouble be mentally improved. Hirzel relates of a deaf-mute named Meystre, of good natural disposition, that it had cost him immense trouble to impress upon Meystre the use of language. The first word which Meystre learned was "*Ami*", the Christian name of a blind inmate of the institution. As

often as he pronounced this word the blind man came to him. Meystre thus learned, to his great surprise, that by means of speech one might render himself intelligible at a distance. He had no idea of God; and, when it was attempted to give him a conception of it, he always confounded God with the sun. Deaf-mutes are, therefore, in most civilised countries considered irresponsible beings, on account of the weakness of their intellect. We read sometimes in the newspapers of the brutal state of those unfortunate beings, whom avarice or cruelty had from their early childhood kept confined in dark cellars, and excluded from all social intercourse or intellectual excitement. The physical and mental state of such individuals is mere vegetation, not a developed human existence. Where, then, in such creatures is the supersensual spirit? Why is it not developed, in spite of external obstructions, and obtain a victory by its own inherent power? It was impossible to impart to the well known Caspar Hauser the idea of a horse. When the word was pronounced, he thought of a wooden toy which he played with during his imprisonment, being unable to attach any meaning to the word horse but in this connection. Let us imagine a man born without *any* senses. Is it possible that any idea should arise within him, or any intellectual faculty be developed? Certainly not. He would, if nourished and attended to, vegetate physically, in some such manner as

the animals deprived by Flourens of their brain. Corresponding observations have been made on men, who from their earliest childhood had lived and grown up among animals, removed from the society of men. They lived and supported themselves like animals; they had no spiritual wants; they could not speak, and exhibited not a trace of that "divine spark" which is said to be "innate" in man. Mental diseases arising from psychical causes rarely occur in infancy, and not at all during the first years of existence; for that which does not exist cannot become diseased. The frequency of diseases of the mind is again lessened in old age; because, as we have already shown in a former chapter, brain and soul begin to retrograde at that time.

The animal world offers equally good arguments against the theory of innate ideas, although the so-called *instinct* of animals has been quoted as an argument in its favour. In a subsequent chapter we shall endeavour to show that an instinct, in the accepted meaning of the term, *i.e.* an irresistible impulse of nature, does not exist; but that animals think, learn, and deliberate like man, but in a much less degree. Animals, like man, are taught by the example of parents, and by surrounding circumstances, though their physical organisation renders them more apt for certain qualifications. Hounds brought up in the house exhibit no trace of that strong inclination

for the chase so peculiar to the race. Carnivorous animals only become greedy for a flesh diet after they have tasted it, as may be observed in the domestic cat. Tame animals change their character in the wilderness, whilst wild animals become tame in confinement. The nightingale, brought up in solitude, does not sing; it learns it from other birds. It has been observed that birds, finches for instance, have different melodies in different countries. It is asserted that the idea of a hexagonal cell is innate in the bee, and that it is impelled to build it in such a form. But the bee now and then constructs cells of a different form; and if a bee-hive composed of artificial cells is placed in their way, the bees have so much intellect, and so little instinct, that they make use of them without thinking of building cells of their own. Another argument in favour of innate ideas was this: Animals, it was said, also possess senses, frequently more acute than those of man, and yet they always remain brutes. This has no solid foundation. The senses are not the immediate generators, but merely the *mediators* of mental qualities; they conduct external impressions to the brain, which receives, digests, and reproduces them according to its material energy. This process cannot go on *without* the senses, consequently all mental activity originates from this source; but this process must, even with the most acute senses, be defective, if the apparatus of thought

be indifferently organised. We have already spoken of the relation of the animal to the human brain. There are *innate predispositions* dependent on the different material qualities of the animal organisation, but no innate intuitions or ideas. Even the dispositions ever remain without development in absence of the senses, which are as necessary for the origin of an idea as a chemical substance is required to form with another body a third substance by chemical combination. It must also be admitted, that much, perhaps most, of what is usually called innate talent, proves when closely examined to be the result of an early training of certain senses; as the sense for music, painting, numbers, etc. An infinite number of mental differences among human beings is, moreover, the result of a variety of external circumstances. The more numerous our perceptions of the external world are, the richer will be the world of our thought, and the more comprehensive our intellect.

In order to refute the sensual theory, certain universal ideas have been mentioned, which were said to be so forcibly impressed in individuals as well as nations, that an empirical origin of them is out of the question, and that we must assume that these ideas were originally implanted in the human mind. Such are especially metaphysical, æsthetical, and moral notions, as the ideas of truth, the good, and the beautiful.

We observe, it is said, that the mind of the

boy already revolts at the sight of a wrong with an intensity which exhibits his inner state, and that his pleasure in the beautiful is shown at a period when he is yet unable to institute comparisons. Against this view we must, in the first place, observe that what is usually termed an idea, is not an acquisition of every single individual, but a conquest of the whole human race, the result of spiritual battles fought during long periods of time. Man selects from the surrounding objective world that which is common to each, and conceives an ideal form, to which he gives the predicates of true, beautiful, or good. This mental process dates already from the time when man entered the historical period. The idea gradually acquired thereby an historical right and an objective form, so that an individual is no longer obliged to commence the mental process anew, but merely to receive what already exists. Without a retrospective glance at the origin of the idea, it must appear to him as innate. But this idea could never have been developed without a definite relation of the objective world to the power of perception of the individual. What man is to do with what he has received by his senses, or by the acquisition of what has been done and known before him, how he is to digest and combine these materials, to form conclusions and construct sciences—mathematics, for instance—is his own affair, and independent of sensual impressions; but these impressions

were originally the only means which could provide him with materials to work upon ; he never possessed an innate, an immediate perception. Oersted expounds the historical development of the idea as follows : " It could not be otherwise but that man presupposed in his fellow-creatures an intellectual being like himself. When one man excited an agreeable feeling in another, there arose love ; if the reverse was the case, hatred. Such influences may have given rise to the idea of a something in the actions of a man, which is to be approved or to be rejected ; and this small beginning became the seed of the notion of right and wrong." None but a mind prejudiced in favour of a supernatural influence can assert, like Liebig, " We know nothing of the origin of an idea."

The supernatural, divine, and innate origin of ideas, asserted by idealists, is forcibly refuted by the following considerations. If æsthetical, moral, or metaphysical conceptions were innate, they should be identical, uniform, and have everywhere the same absolute value. We find, however, in fact, that this value is relative in the highest degree, and that, with regard to individuals or nations, these ideas exhibit at different periods the greatest differences ; sometimes so great, as to become opposed to the original idea, which owed its origin to different circumstances. The white man paints the devil black, the Negro paints him white. Savages paint their bodies

and wear nose-rings—a fashion which disgusts us. There cannot be a more striking proof of the relative value of æsthetical notions than so-called *fashion*, which delights in contrast. Our notions of the beautiful resemble our notions of design. We find something beautiful and proper just because it is so, and might probably have found it not less beautiful had it been different. The Greeks, that highly cultivated people, combine in their sculptures human and animal forms, which we at present consider degrading and opposed to beauty. The Greeks and Romans knew little or nothing of the beauties of nature which we so much admire; and the rustic inhabitants of beautiful mountainous districts have generally no appreciation of the beauties by which they are surrounded. The Chinese consider it beautiful in a woman to be very fat, and to have feet so small that she can scarcely walk. The Javanese consider only a yellow skin beautiful, and colour their teeth black, as they consider it disgusting to have “white teeth like a dog”; whilst our poets speak with enthusiasm of the splendid white teeth of their lady-loves. Mr. L. C. Schmarda writes that the inhabitants of Ceylon have, by chewing betel, become so accustomed to the sight of black teeth, that the sight of white teeth excites in them disgust. The same author also observes that the Chinese conquerors of that island found the long noses of the Cingalese, in comparison with their own, so abominable, that

they wrote to their friends: "The Cingalese are a detestable people, with beaks instead of noses." The Batokas in South Africa extract at the time of puberty the superior incisors, which, causing the inferior to attain a large size, gives a horrid aspect to the face. Yet every girl who has not yet undergone this operation considers herself ugly. These instances of an essential difference in æsthetical notions might be easily multiplied.

If there be anything common in these notions, it is the result of education and experience. No art has ever been able to create an idea the individual parts of which were not borrowed from nature! And in the arts and thoughts of every nation may easily be recognised the influence of external circumstances.

Moral notions are justly considered as the result of gradual experience. Nations in a state of nature are deficient in moral qualities, and commit cruelties and bestialities for which civilised nations have no words; and friends and enemies consider such acts as perfectly in order. They have very little, if any, notion of the rights of property; hence the propensity to theft found among all uncivilised nations. A well executed theft is, among the Indians, considered a highly meritorious act. The New Caledonians, according to the reports of Captain Montravel, share whatever they possess with every individual requiring it, and present the first comer with what they had

just received, so that objects of considerable value pass rapidly through many hands, etc. Even among nations more civilised, the notion of the right of property is very feeble indeed. Among the Chinese and Slaves, scruples about the right of property do not belong to the category of points of honour. Not merely theft, however, but murder and blood-revenge are quite common among uncivilised nations. There is in India a terrible association, that of the Thugs, who commit murders for religious purposes. The Damarras, a people in South Africa, live in polygamy, and have no scruples about incest. Anderson* found a mother and her daughter in the harem of one of the chiefs. Children grown up in the wilderness have no conception of any moral law, and possess only one desire—that of satisfying their appetites. We have already, in a previous chapter, mentioned the deficiency of the Negro as regards moral conceptions. Like all nations in a state of nature, they use their intellectual powers rather for evil than for good. Brehm† relates that the Negroes of East Sudan not merely justify deceit, theft, and murder, but consider them meritorious acts.” Deception passes with them as the victory of mental superiority over mental weakness.

Captain Speke observes of the Somalis, the inhabitants of a southern part of Aden, and se-

* Explorations in South Western Africa. London: 1856.

† Reiseskizzen aus Nordost Afrika. 1855.

parated by the gulf of Aden from the Arabian coast, that a well-executed theft is more agreeable to them than any other mode of gaining a livelihood, and that the narration of such exploits forms their greatest amusement.* Among the Fijis, shedding blood is no crime but a glorious action, whether the victim, man, woman or child, be slain in battle or treacherously murdered. To be acknowledged a murderer is the ambition of these islanders. Children kill their parents and the parents their children without the least scruple. Gratitude for benefits is unknown among them. The captain of a foreign ship took a wounded native on board, treated him kindly for two months till he was cured. Being about to leave, he asked the captain to make him a present of a gun; but being refused, he set fire to the store-room, which caused a damage of above three hundred dollars. Werner Munzinger† says of the Bogos, that their ideas of *good* and *bad* relate only to useful and useless. Intrepidity, revenge, dissimulation of hatred until the proper moment arrives, politeness, pride, indolence, hospitality, splendour, are in their eyes the marks of a virtuous man. Waitz‡ says, that a man interrogated about his notions respecting the difference between good and evil, first avowed his ignorance,

* Blackwood's Edinburgh Magazine.

† Manners and Laws of the Bogos.

‡ Anthropologie der Naturvölker. 1859. An English translation of the first volume is published by Messrs. Longman.

but after some reflection said, " Good is to carry off the wives of others, but bad when others steal our wives."

Experience, moreover, teaches us, that even among civilised nations, moral notions differ greatly, and sometimes to such a degree that they become contradictory. Depending on external circumstances and on individual intuitions, it has ever been impossible to give an exact definition of the notion *good*.* This can be proved by thousands of examples. If, then, there appears to us, at first sight, something fixed and unalterable in the chief commands of the moral law, the reason must be sought for in the definite form of those laws and social customs, which human society has from experience found necessary gradually to establish for its self-preservation. But even these precepts and customs are extremely varying, according to the conditions of external circumstances in regard to time and individual intuitions. The destruction of the foetus *in utero* was by no means considered an immoral act among the Romans; at this day it is severely punished. Among the heathens, to hate your enemies was considered the highest virtue; Christianity commands us to love our enemies. Which

* It is well known that the notion of good cannot be defined. The theologians help themselves by saying, that is good which agrees with God's commands. But the commands of God are made by the theologians themselves. Everyone can easily draw herefrom his conclusions.

of either sentiment is to be considered as moral? Many acts which are now branded as abominations were in former times considered perfectly lawful. Education and example make us now acquainted with moral precepts, and induce us to believe in an *innate moral law*, which is found to be made up, when closely examined, of paragraphs from the penal law. Again, there exists a considerable difference between the laws of the state and those of morality; and a still greater difference between the laws of the state, of custom, of religion, and those laws which are in every particular case prescribed to every individual by his own nature and power of reflection. Society and the State frequently brand some act as a crime which morally may be a great deed. That essential difference between "lawful" and "moral" is the best proof that the notion "good" has no general absolute value. Most crimes are committed by the lower classes, and are generally the consequences of a defective education, or intellectual weakness. The whole moral nature of man is intimately connected with his external relations. The higher the civilisation the greater the morality, and consequently there is a diminution of crime. "A glance at the history of civilisation," observes Kraemer, "teaches us that virtue, God, or right, had at all times different notions attached to them." An *innate* idea of *justice* is out of the question.

"All lawyers," says Czolbe, "assume the em-

pirical and existing reciprocal relations between men as the basis of justice, without which it can as little be thought of as the theorems of geometry without the assumption of lines, angles, etc. If there really were an objective right, how could there ever be any difference between *law* and *justice*?

The notion of *truth* is still more indebted to the progress of science for its origin and development; and though the laws of thought exhibit under certain circumstances an immutable necessity, they are analogous to the laws of nature in general, and dependent on actual, definite relations. Mathematics are thus founded upon actual tangible *relations* without which mathematical laws would be impossible, on which account most mathematicians are now of opinion, that mathematics belong to the natural, and not to the philosophical and speculative sciences. The notions of space, size, expansion, of height and breadth, are derived from sensual perception, and would not have existed without it. Numbers are not absolute notions, but arbitrary designations for one or more objects. The savage Negroes of Surinam cannot count further than twenty, using their fingers and toes. All that exceeds this number is called "wiri-wiri", or "much". There is no such thing as metaphysical or transcendental knowledge, and all metaphysical systems, however finely drawn, have come to nothing. All philosophical reason-

ings which leave the field of facts and objects, become unintelligible and untenable, and are merely arbitrary and subjective radiations of an empirical notion—a fantastic play of words.

Every person can try for himself whether he has any conception of a general proposition, called an abstraction, without necessarily referring to external objects as examples! “Even the highest ideas,” says Virchow, “are slowly and gradually developed from the accumulation of sensual experience, and their truth is only guaranteed by the possibility of finding concrete examples for them in real existence.”

With regard to the manifestations of general notions in children, it must be denied that such a manifestation ever takes place under circumstances when the influence of education and external conditions is entirely wanting. The sense of right or justice can only be developed in a boy who, living in community with others, is able to establish comparisons; nor is the pleasure he feels in the contemplation of the beautiful an innate intuition. Children have, on the contrary, the most singular tastes; they cannot easily distinguish between mine and thine, they have no notion of wrong, they exhibit no trace of a feeling of shame which subsequently is so much developed. The State imputes personal responsibility only after a certain age; proof sufficient that children are not supposed to possess an innate idea of what is right and just. Among

savage uncultivated nations we find the same want of sense or shame, the same moral irresponsibility, and the same deficiency in all elevated ideas as in children. Even the Greeks had no notion of what is now understood by decency and morality in relation to sexual intercourse. Adultery and all kinds of sensual excesses were quite common amongst them without any fear of blame or publicity. The Ismaelites, an oriental religious sect, are devoid of any feeling of shame; disgusting religious dogmas and revolting cynical usages form the chief features of their religious worship. Who, therefore, asserts with Liebig, that "the moral nature of man remains ever the same," must know little or nothing of the facts, which just prove the contrary.

The sense of the beautiful, of justice and truth, which is impressed upon every individual with a certain necessity, but only to a limited degree, from the objective world, must be exercised to acquire any power. How differently does the scholar, accustomed to thought, observe and form conclusions, from one engaged merely in manual labour! How different is the judgment of the experienced man, who has studied history, from that of an inexperienced youth, yielding to the pressure of an obscure impulse, in relation to right and justice! How different are the judgments of the connoisseur, from those of the unskilled in regard to beauty! Like the plant in the soil, so have we, with all our knowledge

and feelings, our footing in the objective world, though carrying our ideas beyond it; but torn from this foundation we die and decay like the plant.

There results from all this, that we can have neither any knowledge nor any conception of the *absolute*—of that which transcends the surrounding sensual world. However much metaphysicians may vainly attempt to define the absolute; however much religion may endeavour to excite faith in the absolute by the assumption of a revelation: nothing can conceal the defect of the definition. All our knowledge is relative, and results from the comparison of surrounding sensible objects. We could have no notion of darkness without light, no conception of high without low, of heat without coldness, etc.; absolute ideas we have none. We are not able to form any conception of “everlasting”, or “infinite” as our understanding, limited by time and space, finds an impassable barrier for that conception. From being in the sensual world accustomed to find a cause for every effect, we have falsely concluded that there exists a primary cause of all things, although such a cause is perfectly inaccessible to our ideas, and is contradicted by scientific experience.

“It is undoubted,” says Czolbe, “that innumerable natural phenomena are the effects of causes. Hence was deduced that imperfect conclusion that nature herself, or ‘all,’ has a

cause. Not merely are experimental reasons wanting for the proof that matter and space have been created, or can be destroyed, but we cannot even conceive such an idea. Matter and space must therefore be considered as eternal."

Phrenologists, who teach that the intellectual faculties are not uniformly distributed through the whole mass of the brain, but are located in particular spots, and that their energy is dependent upon the greater or lesser development of the corresponding parts, appear to believe that their theory is opposed to that which rejects innate ideas. They consider a certain congenital, material organisation of the brain as determining the character, and that an individual in his mental development, can only to a certain extent withdraw himself from this natural influence.

Assuming the correctness of this theory (against which there are, however, weighty scientific objections), it does not, on closely examining it, appear to us that there subsists any real contradiction between phrenology, and the theory which rejects innate ideas.

We have also seen, that the material organisation of the brain determines mental development, but this development can only proceed in union with the impressions of the objective world. If the latter be wanting, there will be no reflection of the images upon the material brain, however finely constructed, from external objects. The strength and vigour of the reflected image de-

pende on the structure of the brain. If it be true that particular mental qualities are located in particular parts of the brain, it merely follows, that external impressions separate, according to their character, in different directions, to become fixed in the corresponding parts; there takes place, so to speak, an internal attraction between certain impressions and individual parts of the brain. The greater the material development of these parts, the greater will be the power of attraction, and in proportion as the material substratum is developed, so will be the corresponding intellectual power. An analogous instance of such attraction is found, in the physical world, in the action of various medicines. Many medicines, after being received in the animal body, show a decided predilection for the individual organs, tissues, or systems of that body, especially for the nervous system and its subdivisions. Some act upon the peripheral nerves, others upon the spinal cord, others upon the brain. It is therefore manifest, that these medicines, carried with the blood through the whole system, are only attracted in certain spots. The localisation of external impressions may take place in a similar manner. We do not wish to contradict Noël, when he says that in observing children we are obliged to admit internal dispositions which induce them, more or less, to incline to different kinds of conceptions. But this proclivity is not the result of innate intellectual qualities, ideas, or perceptions;

but of material dispositions apt for the development of certain mental qualities founded upon sensual and empirical acquisitions. The propensities to destroy, to construct, to acquire, etc., could only be developed by objects, and would ever remain dormant *without* them. An organ of tune without sounds, of colour without colours, of locality without places, is not cogitable. The power of comparing and forming conclusions can only exist where there are things and objects.

It may further be observed that, the relation of phrenological organs to external impressions may be the converse of what has just been stated. If it be true, that the whole brain increases in size and power by continued psychical activity, it may, always supposing the correctness of phrenological principles, also be possible that, during the time of the growth and development of the brain, the corresponding organ should grow materially stronger by continued external impressions in one direction, just in the same manner as a muscle grows stronger by exercise.

There exist, therefore, no scientific facts which might compel us to assume the existence of innate ideas. Nature knows of no purpose and aim, nor of any material or spiritual conditions imposed from above! It has from the beginning developed itself, and is still developing itself from within. We conclude this important chapter with the remarkable words of Moleschott. "By the mode of instruction prevalent in our

schools, thought is rendered the more difficult, as the pupils are not induced to form conceptions, judgments and conclusions, from the existing fresh reality. However unsuccessful, the school still zealously endeavours to impress upon the pupil the necessity of withdrawing his attention from the green tree, and of abstracting thought from matter, in order to acquire abstract notions, *with which the tormented brain is moving in a world of shadows.*"

CHAPTER XVI.

THE IDEA OF A GOD.

“God is a blank sheet, upon which nothing is found but what you have yourself written.”

LUTHER.

“Man depicts himself in his gods.”

SCHILLER.

IF it be correct that there are no innate intuitions, then must the assertion of those be incorrect, who assume that the idea of a God, or the conception of a supreme personal being, who created, who governs and preserves the world, is innate in the human mind, and therefore incontrovertible by any mode of reasoning. The adherents to this view maintain that there exist neither individuals nor peoples, however uncivilised, among whom there was not found the idea of a God, or the belief in a supreme personal being. An exact knowledge, and unprejudiced observation of individuals and nations in an uncivilised state, prove the contrary to be the fact. Only a prejudiced mind can, in the worship of animals practised by ancient and existing nations, find something analogous to a real belief in a God. It by no means corresponds to the idea of a God, when we see man worshipping such

animals, as he from experience knows may injure or be useful to him; as when, for instance, the Egyptian worships the cow or the crocodile, the Indian the rattlesnake, the African the Congo snake, etc. A stone, a tree, a river, an alligator, a parcel of rags, a snake, form the idols of the Negroes of Guinea. Such a worship does not express the idea of an almighty being, governing the world and ruling nature and man, but merely a blind fear of natural forces, which frighten uncivilised man, or appear supernatural, as he is not able to trace the natural connection of things. Had the idea of a supreme being been really and indelibly impressed upon the human mind, it would appear impossible that it should be manifested in such an imperfect, rude, and unnatural way as in the worship of animals. The animal is in its entire nature inferior and subordinate to man; and a God in the shape of an animal is no God, but a caricature. English travellers in North America* relate that "the religious views of the Indians in Oregon are exceedingly low. It is doubtful whether they have any idea of a supreme being. Attempts were naturally made to translate the word God; but in no dialect prevalent in Oregon could missionaries and skilful interpreters find a corresponding expression. Their highest divinity is called *the Wolf*, and seems, according to their descriptions, to be a hybrid of a divinity and an animal." The

* London Athenæum, July 1849.

Kaloshes, an Indian tribe, have no religious mode of worship, and imagine the supreme being to be a raven. Lieut. Hooper, speaking of the Tusks, a people belonging to the Mongolian race inhabiting the north-eastern point of the Asiatic continent, and possessing a very good character, observes: "Whether they have any conception of a divine providence, of a governor of the world, could not be ascertained, nor a trace found whether they worship a benevolent spirit or demons." Burmeister relates of the *Corrados*, the former masters of the province of Rio de Janeiro, that they possess no desire for a religion. They pass by the church doors without turning their heads or taking off their hats. The South American aborigines have no conception of a religion; they receive baptism without knowing what it signifies. "The natives of Australia," observes Hasskarl,* "are deficient in the idea of a creator or moral governor of the world, and all attempts to instruct them terminate in a sudden break up of the conversation." The Bechuanas, one of the most intelligent tribes of the interior of South Africa, have no idea of a supreme being, and there is no word to be found in their language for the conception of a creator.† Moffat, the missionary, says of them: "I have often wished to find something to work upon the heart of the natives. I have asked them for the

* Australien und seine Colonien, 1849.

† See Andersson's Reise in Südafrika. London: 1856.

altar of the unknown God, for the faith of their ancestors in regard to the immortality of the soul, or any other religious idea: but they had never thought of such things. When I conversed with the chiefs about a creator, who governs heaven and earth—of original sin and redemption—of the resurrection of the dead, and eternal life—it appeared to them as if I spoke of things more fabulous and absurd than their idle tales of lions, hyænas, and jackals. When I told them that these and other religious teachings must be known and believed in, there only escaped from them exclamations of great surprise, as if these things were too absurd to be listened to by the most stupid.” Oppermann says of the Kaffirs, a race physically and intellectually much developed: “They have not the least notion of a supreme being—their chief is their God.”

Nearly every book of voyages contains similar descriptions of nations in a state of nature. The indolent Hottentots acknowledge a good and a bad divine principle, but have neither temple nor a proper mode of worship, except dancing at the time of the full moon. The dwarfed Bushmen, a degenerate tribe of the former race, possess no worship whatever. When the thunder rolls, they believe it to be the voices of evil genii, and reply by maledictions and imprecations. Paul Kane describes the Indian Chinooks, like most red-skins, to be without distinct religious

sentiments. They ascribe everything to the great spirit; but this great spirit is, according to their ideas, a very vague being, and not the object of any worship. Randall told the missionaries of the King's Mill Islands (Southern Micronesia): "They have no real religion, nor temples nor idols. They adore spirits; but since they have been decimated by an epidemic, they no longer put any confidence in them." A correspondent of the *Revue des deux Mondes* states of the Indians of New Granada: "They seem to know of no other religion than love of liberty; and I have never been able to ascertain whether they really believed in a great spirit, or the immortality of the soul. Only when the thunder rolls, they throw firebrands round, with loud cries, as if they wished to return sound for sound and flashes of lightning." From the reports of an English officer, we learn that the Kariens of Pegu (India) do not believe in a God, but only in the influences of two evil genii. The inhabitants of Pasamah Labar, in the isle of Sumatra, worship neither idols nor any natural objects, and have no idea of a supreme being. Ladislaus Magyar found no trace of religion among the Negroes of Oucanyama, one of the numerous stations of South Africa; it seems as if they worshipped their king, by sacrificing to him both human beings and animals. The Fiji islanders represent their supreme God (Ndengei) as a being without any other feeling but hunger; he

lives with his companion Uto in a secluded cave, eats and drinks, and replies to the questions of the priests. The original religion of Buddha knows neither of God nor immortality. The two religious systems of the Chinese are as atheistical as Buddhism; so that, according to Schopenhauer, the Chinese language has no words for God and creation. According to the same author, revelation and the idea of a personal God originated in one people only, the Jews, and was transferred from Judaism to Christianity and Mohammedanism.

We may observe such phenomena in the midst of us, of individuals in whom the idea of a supreme being has not been called forth by education or communication. We read pretty often of persons, who have to appear before the tribunals of Paris and London, who have no conception of God and immortality. The last census taken in England has shown that there are six millions who never cross the threshold of a church, and who know not to what religious sect they belong. Meystre the deaf-mute had, as already stated, no idea of God, nor could it be imparted to him.

If nature is incapable of prevailing without instruction, it must be concluded that it knows nothing of such original conceptions. If the conception of a God is to be called an innate idea, we might assert the same of the idea of an *evil being*, endowed with supreme power—a devil,

Satan, or demon. The belief in evil powers inimical to man, is clearly more prevalent among primitive peoples than the belief in a beneficent God. All these notions are the result of education or meditation, and not innate.

No one has better expounded the purely human origin of the idea of God than Ludwig Feuerbach. He calls all conceptions of God and divinity anthropomorphisms, *i. e.*, products of human fancies and perceptions, formed after the model of human individuality. Feuerbach finds this anthropomorphism in the feeling of dependence inherent in human nature. "An extraneous and superhuman God," says Feuerbach, "is nothing but an extraneous and supernatural self, a subjective being placed, by transgressing its limits, above the objective nature of man." The history of all religions is indeed a continuous argument for this assertion, and how could it be otherwise? Without any knowledge or any notion of the absolute, without any immediate revelation, the existence of which is indeed asserted by all but not proved by any religious sect—all ideas of God, no matter of what religion, can only be human; and as man knows in animated nature no being intellectually superior to himself, it follows that his conceptions of a supreme being can only be abstracted from his own self, and must represent a *self-idealisation*.

Hence the condition, wishes, hopes; the intellectual development and tendency of every

people are always faithfully and characteristically reflected in their religious notions, and we are accustomed to infer the intellectual state of any people from their religious worship. Let us think of the poetical heaven of the Greeks, inhabited by ideal forms, in which the gods in eternal youth and beauty enjoy themselves like human beings; they laugh, fight, form intrigues, and find a peculiar charm in interfering in human affairs—that heaven which inspired Schiller in the composition of his beautiful poem, *The Gods of Greece*. Think of the angry, gloomy Jehovah of the Jews, who punishes to the third and fourth generation; think of the Christian heaven, in which God shares his sovereign power with his Son, and determines the heavenly rank of the blessed quite according to human notions; think of the heaven of the Catholics, in which the Virgin Mary, resting on the lap of the Saviour, uses her gentle, womanly persuasive powers in favour of the guilty; think of the heaven of the Orientals, with its number of blooming houris, cascades, coolness, and sensual enjoyment; of the heaven of the Greenlander, with its abundance of blubber; of the heaven of the Indian hunter, in which abundant game is promised as a reward; think of the heaven of the Germans, who expect in Walhalla to drink mead out of the skulls of slain enemies, etc. The purely human conception of a God is also, as Feuerbach proves, evinced in the various modes of worship.

The Greek offers meat and wine to his gods ; the Negro spits masticated food into the faces of his idols ; the Ostiak besmears his idols with blood and grease, and fills their nostrils with tobacco ; the Christian and Mohammedan think to appease their God by prayers. Everywhere human weakness, human passion, human desires for enjoyment ! All nations and religions have the custom of placing eminent men among the gods or saints—a striking proof in favour of the human origin of the divine idea. How just and acute is the remark of Feuerbach, that an educated man is a much higher being than the God of savages, whose physical and mental qualities must be in due proportion to the degree of civilisation of his worshippers. This necessary connection of the human with the divine, and the dependence of the latter upon the former, must forcibly have been impressed upon Luther, when it made him say, “ If God sat alone in heaven, like a block, he would not be God.”

Already Xenophanes, the Greek philosopher (572 B. C.), reproved the superstition of his countrymen in the following terms :—“ Mortals seem to think that the gods possess their form, clothes, and language. Negroes worship black and flat-nosed gods ; Thracians, blue-eyed and red-haired gods. If beeves and lions had hands to make gods, they would depict their gods in similar shapes, etc.”

If the simple human intellect has not been

able to acquire a pure and abstract idea of the Absolute, the attempts of philosophers to define it have, if possible, been still less successful. Should any one take the trouble of comparing all philosophical definitions, which have been given of God, the Absolute, the Soul of the World, etc., there would result a most singular mixture, in which from the beginning of historical times until now, in spite of the pretended progress of philosophy, nothing essentially new has been said. Fine words and high-sounding phrases will not be found wanting, but these offer no compensation for a defect of truth.

“Are we,” asks Czolbe, “a single step further in the knowledge of the supersensual than a thousand years ago? What else do we possess but empty words and names?” “Hence it follows,” says Virchow, “that man can only comprehend his own self, and that anything beyond is transcendental for him.”

Let us, for instance, see how that philosophical naturalist, Fechner, recently expressed himself in his *Zendavesta*. “God, as the totality of existence and action, has no external world—no being externally opposed to him; He is the only one and alone; all spirits move in the internal world of his spirit; He describes a cycle within himself, is not determined by anything from without; He determines himself, in himself, by containing all determinating causes of existence.” What rational man, from such phrases, can obtain a clear

notion of the meaning of the expounder? A God, in whose bodily and mental interior all spirits and bodies move, who describes a cycle within himself, and is not determined by anything from without! If all spirits move in the spirit, all bodies in the body of God, if He has no external world, how can He be a personal God?—personal God, as Fechner expressly calls Him in other passages. Is He not rather the compendium of all corporeal or spiritual existence, or the sum-total of the world itself, which the expounder presents in the shape of a person, whilst the world in its infinite multiplicity and variety is just the negative of every personification? The conception of a divinity spread and manifesting itself through the whole world, has been technically termed *pantheistic*, at a time when the present state of natural sciences was little dreamt of. But our modern philosophers delight in hashing up cold meat with new phrases, and dishing them up as the last invention of the philosophical kitchen.

CHAPTER XVII.

PERSONAL CONTINUANCE.

“The body and the soul have, from the moment of death, as little sensation as before birth.”

PLINY.

“ Thy best of rest is sleep,
And that thou oft provok’st ; yet grossly fear’st
Thy death, which is no more.”

THE DUKE, in *Measure for Measure*.

IN a preceding chapter, we have proved by facts the intimate and inseparable connection of spirit and body, of soul and brain, and the dependence of the soul in all its manifestations upon its material substratum ; we have also seen that it grows and decays with this substratum. Though we are unable to form a definite idea as to the *how* of this connection, we are still by these facts justified in asserting, that the mode of this connection renders it apparently impossible that they should continue to exist separately. *As little as thought can exist without a brain, so can there be no normally formed and nourished brain without thought*; and this law is merely a repetition of the fundamental principle in our philosophical investigation—“No matter without force, no force without matter.” “It

is as impossible," says Moleschott, "that a healthy brain should not think, as that thought should be connected with any organ but the brain."*

A spirit without body is as unimaginable, as electricity or magnetism without metallic or other substances on which these forces act. We have equally shown, that the animal soul does not come into the world with any innate intuitions, that it does not represent an *ens per se*, but is a product of external influences, without which it would never have been called into existence. In the face of all these facts, unprejudiced philosophy is compelled to reject the idea of an individual immortality, and of a personal continuance after death. With the decay and dissolution of its material substratum, through which alone it has acquired a conscious existence and become a person, and upon which it was dependent, the spirit must cease to exist. All knowledge which this being has acquired relates to earthly things; it has become conscious of itself in, with, and by these things; it has become a person by its being opposed against earthly, limited individualities. How can we

* Mr. Ringseis, it is true, tells us that apparitions, *i.e.* ghosts, "think without a brain." Why has Mr. Ringseis, to strengthen his argument, not added that men have been seen at night, carrying their heads under their arms? That neither a brain nor a nervous system has yet been detected in the infusoria, forms, for many reasons into which we cannot here enter, no valid objection against our principle.

imagine it to be possible that, torn away from these necessary conditions, this being should continue to exist with self-consciousness and as the same person? It is not reflection, but obstinacy; not science, but faith, which supports the idea of a personal continuance. "Physiology," says Vogt, "decides definitely and categorically against individual immortality, as against any special existence of the soul. The soul does not enter the fœtus like the evil spirit into persons possessed, but is a product of the development of the brain; just as muscular activity is a product of muscular development, and secretion a product of glandular development. So soon as the substances composing the brain are aggregated in a similar form, will they exhibit the same functions. We have seen that we can destroy mental activity by injuring the brain. By observing the development of the child, we also arrive at the conviction that the activity of the soul progresses in proportion as the brain is gradually developed. The fœtus manifests no mental activity, which only shows itself after birth when the brain acquires the necessary material condition. Mental activity changes with the periods of life, and ceases altogether at death."

Experience and daily observation teach us that the spirit perishes with its material substratum, that *man dies*. "The times have been," says Macbeth, "that when the brains were out the

man would die, and there an end." There never has been, and never will be, a real apparition, which could make us believe or assume that the soul of a deceased individual continues to exist: it is dead, never to return. "That the soul of a deceased person," says Burmeister, "does not reappear after death, is not contested by rational people. Spirits and ghosts are only seen by diseased or superstitious individuals."

Having thus premised our view in general, we must now discuss some of the chief arguments used in favour of an individual immortality, and we shall have occasion to consider this interesting and important question from some empirical points of view. There is something suspicious in the great zeal and the waste of arguments with which this question has at all times been defended, which yet, for obvious reasons, has rarely experienced serious scientific attacks. This zeal appears to show that the advocates of this theory are rather anxious about their own conscience, since plain reason and daily experience are but little in favour of an assumption which can only be supported on theoretical grounds. It may also appear singular, that at all times those individuals were the most zealous for a personal continuance after death, whose souls were scarcely worthy of such a careful preservation.

First of all, attempts were made to deduce from the immortality of matter, the immortality of the soul. There being, it was said, no abso-

lute annihilation, it is neither possible nor imaginable that the human soul, once existing, should be annihilated; which would be opposed to reason. Against this we must remark, that there is no analogy between the destructibility of matter and that of spirit. Whilst the visible and tangible matter sensually exhibits its indestructibility, the same cannot be asserted of spirit or soul, which is not matter, but merely an ideal product of a particular combination of force-endowed materials. With the dispersion of these materials, and their entrance into other combinations, the effect, which we call soul, must disappear. When we destroy a watch, it no longer indicates the time; and we thus destroy simultaneously the whole notion connected with such an instrument: we have no longer a timekeeper before us, but a mass of various materials which no longer present a whole. That this analogy is applicable, inasmuch as the organic world is not, as many suppose, obeying different laws, but is formed of the same materials, endowed with the same forces, as the inorganic world, will be shown in the chapter on "Vital Force." Experience teaches, in accordance with this view, that the personal soul was, in spite of its pretended indestructibility, annihilated; *i.e.*, it was non-existing during an eternity. Were the spirit indestructible, like matter, it must not only, like it, last for ever, but have ever existed. But where was the soul before the body to which it

belongs was formed? It was not: it gave not the least sign of an existence; and to assume an existence is an arbitrary hypothesis.

But that which never was, can also perish and be annihilated. It is in the very nature of things that all that arises should necessarily perish. Again, in deducing the immortality of spirit from the immortality of force, we should, although we are not justified in considering the notions of "force", "spirit", "soul" as identical, not confound a passing form or phenomenon of force with force itself. It is true that, in the eternal cycle of matter and force, nothing is destructible; but this only applies to the whole, while its parts undergo a constant change of birth and decay. There is a state, which might enable us to produce a direct and empirical argument in favour of the annihilation of the individual soul—the state of sleep. In consequence of corporeal changes, the function of the organ of thought is suspended, and the soul, in a certain sense, annihilated. The spiritual function is gone, and the body exists or vegetates without consciousness in a state similar to that of the animals in which Flourens had removed the hemispheres. On awakening, the soul is exactly in the state it was before sleep. The interval of time had no existence for the soul, which was spiritually dead. This peculiar condition is so striking, that sleep and death have been termed brothers. During the French revolution, the celebrated Chaumette

erected in the cemeteries, statues representing Sleep. The churchyard gates bore an inscription: "Death is an eternal sleep."* Andreaä, the author of an old "*Descriptio reipublicæ christianopolitanæ*" of the year 1619, says: "This one republic knows not death, and yet it is very familiar with it, but they call it sleep." The phenomena of dreaming have been used as arguments against the supposed annihilation of the soul during sleep, by their proving that the soul is also active in that state. This objection is founded upon error, it being well known that dreaming does not constitute the state properly called sleep, but that it is merely a transition between sleeping and waking. Perfectly healthy individuals know little of this transition, and dream rarely. Profound sleep knows of no dream; and a person suddenly shaken from such a state requires some time to collect his thoughts, so much so that in law he is not responsible for

* Chaumette, procurator of the commune of Paris during the revolution of 1789, and one of the chiefs of the Hebertist party, assumed the name of the Greek philosopher Anaxagoras. He enjoined morality, labour, patriotic virtue; he suppressed the publichouses, mendicity, and prostitution, established asylums for workmen, and closed the clubs for females who neglected their household duties to meddle with politics. He interdicted all kinds of worship except in the legalised churches; he abolished public funerals and the traffic in relics, and covered the churchyards with beautiful flowers pleasant to behold. Both he and his party were overthrown by Robespierre, and most of them executed March 24th, 1794.

any act he may have committed at that moment, on account of the suddenness of the transition from one state into another. A. Maury has published some observations made on himself, from which he concludes that dreaming is almost constantly the result of a change in some part of our organism reacting upon the brain. During dreaming, an individual resembles an insane person.

Certain morbid conditions are still more calculated to prove the annihilation of our spirit. There are affections of the brain, *e. g.*, concussions, lesions, etc., which so much influence its functions, that consciousness is suspended. Such perfectly unconscious states may continue for months together. On recovery, it is found that the patients have no recollection whatever of the period which has passed, but connect their mental life with the period when consciousness ceased. This whole time was for them a deep sleep or a mental death; they in a sense died, and were born again. Should death take place during that period, it is perfectly immaterial to the individual who, considered as a spiritual being, was already dead at the moment when consciousness left him. Those who believe in a personal immortality, might find it somewhat difficult, or rather impossible to explain these processes, or to give some clue as to the whereabouts of the soul during these periods. In the eaves of our houses live infusoria which dry up and cease to live. This

apparent death lasts until a new rain awakens these animalcules to a new life. Does not the soul, in these instances, plainly show itself to be a vital process dependent upon the motion of matter?

We must also reject the theory which assumes the existence of an *universal spiritual matter*, an universal soul, from which individual souls emanate, and to which they again return on the destruction of their material substratum. Such theories are idle and unprofitable. The assumption of a "*spiritual matter*" involves, moreover, a contradiction, as in saying "a black bay horse", etc. "Imponderable matter," says Burmeister, "is a contradiction in itself." Light is not material, as was formerly believed, but is the result of the vibrations of the ultimate parts of matter already existing. Hence the notion of a "*spiritual matter*" or soul-substance is inconceivable—a logical and empirical nonentity. The theory of a personal immortality, moreover, would profit nothing by such an assumption. The return into an universal soul, involving the loss of personality and of any recollection, is equivalent to an annihilation; and it may be perfectly indifferent to the individual whether or not his so-called spiritual matter is again employed in the reconstruction of other souls.

Attempts have recently been made to infer personal continuance from the existence of this "*spiritual-matter*", or "*soul-substance*". Ru-

dolph Wagner speaks of an immaterial, individual psychical substance, which, connected for a time with the body, disperses after death, like light, into space, from which it possibly again returns to the earth. The absurdity of such a theory and such a comparison between the ether and the pretended psychical substance, rendered it easy for Carl Vogt to assign to this discovery, as regards personal continuance, a place among speculative fables. (See his work *Köhlerglaube und Wissenschaft*, 1855.)* The belief that the human soul, after death, will not be separated from matter, but will enter a more perfect body, is perfectly hypothetical, and is unsupported by physiological facts, which teach that the human body is composed of the most delicate and most perfect organs, and cannot be conceived to become still finer and more perfect.

The annihilation of a personal soul has also been protested against upon moral grounds. It was, in the first place, asserted, that the idea of an eternal annihilation is so revolting to the innermost feeling of man, that it must be untrue. Although an appeal to the feelings is not a scientific method of proceeding, it must certainly be admitted, that the thought of an *eternal life* is more terrifying than the idea of eternal

* We take this opportunity to state, that the above work reached us only while our first edition was in the press. The reader should therefore consider the similarity of certain passages as merely *accidental*.

annihilation. The latter is by no means repugnant to a philosophical thinker. Annihilation, non-existence, is perfect rest, painlessness, freedom from all tormenting impressions, and therefore not to be feared. There can be no pain in annihilation, as little as in profound sleep, but merely in the conception of annihilation. "The fear of death which is natural to all men, the most unfortunate as well as the wisest, is," as Montaigne justly observes, "not so much the fear of dying, as the thought of being dead, which the subject of death believes he retains after life, in some dark grave or elsewhere, looking upon the corpse as it were still himself, though it is no longer so." Fichte says very truly: "It is quite clear that he who does not exist feels no pain. Annihilation, if it exists, is therefore no evil." The idea of an eternal life—of not being able to die, is, on the contrary, the most horrid that human fancy can invent, and its horrors have long been expressed in the legend of the never-dying Ahasverus.

The school philosophers, perceiving the loose ground upon which they stand in regard to this question, have, in their endeavours to reconcile philosophy and faith, tried to help themselves by very singular expedients. "The desire of our nature," says Carrière, "to solve so many problems requires immortality, and the many sorrows of this earth would be such a shocking dissonance in the world if it were not to find its

solution in a higher harmony, namely, in the purification and development of personal individuality. This and other considerations render immortality, from our point of view, a subjective certainty—a conviction of the heart.” Every one may, certainly, have *convictions of the heart*, but to mix them up with philosophical questions is unscientific. Either something accords with reason and experience—it is then true: or it does not accord—then it is untrue, and can find no place in philosophical systems. It may be that we are surrounded by many riddles; it may be that this is very inconvenient to our philosophers and the afflicted; it may be that it would be very fine if in heaven, as in the last act of a heart-stirring drama, everything would resolve in a touching harmony or in general joy; but science has nothing to do with what *may be*, but with what *is*; and is accordingly compelled to infer from experience the finiteness of human existence. Indeed, a perfect solution of the enigmas of the universe, as Carrière desires, must be considered as impossible for the human mind. The moment we arrive at this point we are creators, and capable of shaping matter according to pleasure. Such a knowledge would be equivalent to dissolution—annihilation, and there exists no being which can possess it. Where there is no striving there can be no life; perfect truth would be a sentence of death for him who has acquired it,

and he must perish in apathy and inactivity. Lessing associates with this idea such a notion of *ennui* that he was terrified at it. Nothing is gained by assuming a constant and more perfect striving in another world, as the limits would only be further removed; the second life would be merely an amended repetition of the first, labouring under the same fundamental defects, the same contradictions, and equally resultless. But, like the aspirant for a place, who prefers accepting an indefinite appointment from fear of obtaining none at all, so are there thousands and thousands, who, in their mental embarrassment, grasp at the uncertain prospect of a problematical eternal or temporal continuance.

Those philosophers, finally, who in this question do not hesitate to abandon philosophical reasoning—their constant boast—and appeal to an indefinite supersensualism, scarcely deserve to be noticed. Thus Fichte, the philosopher, decrees as follows: “An infinite continuance is not explicable by natural conditions: nor need it be so, as it extends beyond all nature. Though we cannot comprehend from an empirical point of view *how* an eternal continuance be possible, it still must be possible, as it lies in that which is above all nature.” Such decrees can only be valid for him who *believes*, or wishes to believe: all others will find it natural, that, in doubtful questions, we must apply human knowledge, and examine whether we can arrive at any solution

by experience, reason, and the aid of natural sciences. Examining it in this way, they will find that reason and experimental knowledge must be laid aside, to conceive the possibility of personal continuance.

Of no more value are the inventions of some naturalists who believe they can give scientific reasons for the doctrine of individual immortality. Thus Mr. Drossbach discovered that every body contains a limited number of *monads*, capable of self-consciousness, which gradually acquire self-consciousness, but which collapse at death. These monads aggregate again at future periods, or in other worlds, and form a new man, who recollects his former life! These problematical monads are too intangible for us to concern ourselves about them.

We may, however, take this opportunity of alluding to the unconquerable difficulties which must arise from the eternal congregation of innumerable swarms of souls which belonged to men who, in their sojourn upon the earth, have acquired so extremely different a degree of development. Eternal life is said to be a perfecting—a further development of earthly life, from which it would follow that every soul should have arrived at a certain degree of culture which is to be perfected. Let us think, now, of the souls of those who died in earliest childhood, of savage nations, of the lower classes of our population! Is this defective development or educa-

tion to be remedied beyond? "I am weary of sitting on school-benches," says Danton, in *Danton's Death*, by George Büchner. And what is to be done with the souls of animals? Man in his pride has in this affair only thought of self, and will not comprehend that the animal possesses the same right as himself. That there is no essential and natural distinction between man and animal, and that the human and animal soul are fundamentally the same will be shown in a subsequent chapter. It might, therefore, for the adherents to the theory of personal continuance, who do not believe in the immortality of the animal soul, be difficult, nay impossible, to point out the limit at which the indestructibility of the human soul commences. The latter is only distinguished from the former in quantity, not in quality, and a general law must be applicable to either. "If the soul of man be immortal, the animal soul must be equally so. Both have, by their fundamental qualities, the same claim upon continuance" (Burmeister). In applying this argument to the lowest animals, all moral grounds for individual mortality fail, and result in absurdities which overthrow the whole system.* We

* Moffat, the missionary, relates the following interesting anecdote. One of the tribe of the Bechuanas (in the interior of South Africa) asked him one day, pointing to his dog, "What difference is there between me and this creature? You maintain I am immortal; why is not my dog or my ox equally so? They die, and do you see anything of their souls? What, then, is the difference between man

may in this place remind the reader of the results indicated in the chapters treating of the construction of the heavens and the universality of the laws of nature, shewing, from a scientific stand-point, that there neither exists, nor can exist, any spot beyond the earth where the souls separated from their material substratum, could congregate.

It has been further maintained, that the idea of immortality is, like that of God, innate in the spiritual nature of man, and cannot be controverted by any reasoning; upon which ground there exists no religion which did not consider individual immortality as a fundamental principle. We have already expressed our views in relation to innate ideas; and, as regards religions, there are many which know nothing of an immortality. The chief religious sects of the Jews knew nothing of personal continuance. According to Richter (*Lectures on Personal Continuance*), most of our theologians agree that, in the books of the Old Testament, written before the Babylonian exile, there cannot be found any certain indications of a belief in personal continuance. The Mosaic doctrine never points to a reward in heaven after death. The original religion of Confucius says nothing of a heavenly hereafter. Buddhism, which counts two hundred millions of disciples, knows nothing of immortality, and
and animal? None! only that man is a greater rogue.”
(See *Ausland*, 1856, No. 33.)

preaches *non-existence* as the highest object of deliverance.* The Greeks, who excelled us in

* This remarkable atheistic and materialistic religion, founded 600 B.C. by the son of an Indian king (Gautama or Buddha)—who, rejecting castes, taught the equality of all men, and abolished sacrifices—spread in a short time among a third of then existing humanity, until it was exterminated in India, 800 A.C., by the reaction of the priests or Brahmins, after the most bloody wars. According to this doctrine, the original matter, or *prakriti*, is the only thing existing divine *per se*. In this matter there are immanent two forces, which produce two different conditions—quiescence and activity. In one state it remains quiescent with consciousness in an absolute inactive vacuity; and this is the state of bliss of the original nothing (*çunja*). In another state the matter steps out of itself by its activity. It becomes then active, and is shaped into limited forms. In doing so it loses its consciousness. It acquires it again in becoming man; and there is in this manner an *original* and a *born* consciousness. The aim of man is to reproduce the original consciousness. On arriving at it, he learns that there is nothing real beside the original matter, and that nothing else exists; his spirit then becomes identical with the original conscious nothing, and he becomes a Buddha, *i.e.* a knowing one, a god-man, etc. From this Buddha doctrine sprung the Vaiçeschika doctrine, which remarkably agrees with the results of modern natural science. Its founder was called Kanada, or the atom-giver. The original matter has, according to him, no consciousness. It is merely matter, without possessing the highest spiritual principle, *self-consciousness, which exists only in man. The combination of atoms produces the series of existing developments. The world is eternal and existing by itself, but it only acquires consciousness in man. Sensual perception is the cause of consciousness. The soul is only a form, determined by the modification of forces, resulting from the aggregation of atoms. With the dispersion of the atoms the soul ceases to exist; there is no personal immortality.* The chief schools of this doc-

many respects, knew only of departed shades; and, among the Romans, the belief in immortality was very faint indeed. Travellers relate that among a great number of primitive nations, the belief in a personal continuance is either not existing, or is combined with such notions as neutralise the idea (see Meiner's *Kritische Geschichte der Religionen*, 1806-7). Thus Dr. G. Helfer reports of the Seelongs, in India, that they believe in good and evil spirits, which govern the

trine are the Tscharvakas and Lokajatikas. In those countries in which Buddhism continued to prevail, it degenerated in different directions. These principles, nevertheless are, according to Dr. Helfer's report on the provinces of Tenasserim, still prevalent. The Buddhists inhabiting these parts are not proselyting like other religious sects, and are very tolerant. They do not pretend that their religion is the best, but that it suits them. Those who consider the dogma of personal continuance necessary for the preservation of public morality, may be surprised by a notice contained in the *Système de la Nature* (vol. i, p. 280, note 78), and taken from the *Argument du Dialogue de Phédon de la Traduction de Dacier*. It runs thus: "When the dogma concerning the immortality of the soul spread from the school of Plato through Greece, it caused the greatest confusion, and induced a number of individuals dissatisfied with their lot, to commit suicide. Ptolemæus Philadelphus, King of Egypt, on seeing the effects which this theory produced upon his subjects, forbade its teaching on pain of death." An analogous event occurred in our days. At the beginning of this century a theistical sect arose in Birman, where Buddhism prevails, which assumed an almighty and omnipotent spirit which created the world, and which also taught a species of immortality. The king burned fourteen of these heretics at the stake, and exterminated the sect. (See *Ausland*, 1858, No. 19.)

motions of natural things, but have no idea of an eternal life, and always reply to such questions, "We do not think of them."

Among the enlightened of all nations and times, the dogma of the immortality of the soul has had ever but few partisans, though they made no efforts obstinately to support their opinion like their opponents. Mirabeau said on his deathbed, "I shall now enter into nothingness;" and the celebrated Danton, being interrogated before the revolutionary tribunal as to his residence, said, "My residence will soon be in nothingness." Frederic the Great, one of the greatest geniuses Germany has produced, candidly confessed his disbelief in the immortality of the soul. He who has opportunities of observing people in the domestic circle, and in various critical situations, is able to judge how much the ideas of the enlightened classes differ from the dogmas of the church in general, and particularly as regards the immortality of the soul. He will frequently hear observations proving that the belief in existence after death has taken but a feeble root in the mind. The whole tendency of our time, all social efforts, are scarcely in harmony with this doctrine. "No one," says Feuerbach, "who has eyes to see can fail to remark, that the belief in the immortality of the soul has long been effaced from ordinary life, and that it only exists in the subjective imagination of individuals, still very numerous." Nor can we otherwise explain the

fear of death, despite all the consolation religion affords, if death were not considered as putting an end to all the pleasures of the world.

Finally, let us listen to what Pomponatius, an Italian philosopher of the sixteenth century, says on this subject: "In assuming the continuance of the individual, we must first show how the soul can live without requiring the body as the subject and object of its activity. We are incapable of thought without intuitions, but these depend upon the body and its organs. Thought in itself is eternal and immaterial; but human thought is connected with the senses, and perceptions succeed each other. Our soul is, therefore, mortal, as neither consciousness nor recollection remains." And again: "That virtue is much purer which is practised for itself, without hope of reward. Still those politicians must not be blamed, who, for sake of the public good, have the immortality of the soul preached, in order that the weak and bad may, from fear and hope, choose the road which noble minds select from inclination. *For it is certainly false that only despicable scholars have denied immortality, and that all estimable sages have adopted it. Homer, Pliny, Simonides, and Seneca were, though wanting this hope, not bad men: they were only free from expecting the wages of a slave.*"

CHAPTER XVIII.

VITAL FORCE.

“If we could seriously believe that the natural laws can arbitrarily be disobeyed by life, all natural and psychological science would be useless.”

ULE.

AMONG those mystical notions which bring confusion into the investigations of natural science, and which are now rejected by exact observation, must be particularly mentioned the notion of what is called *vital force*. There is scarcely any assumption which has done so much harm to science as that of a particular organic force which was said to resist inorganic forces (gravity, affinity, light, electricity, magnetism), thus constituting exceptional laws—a separate code—a state in the state. If science were forced to accept this theory, our axiom of the universality of natural laws, and of the immutability of the mechanical order in the universe, would lose its value, and we should be obliged to admit that an extraneous power interferes and creates exceptions which cannot be estimated. A gap would then exist in the constitution of the world, science would despair, and, as Ule justly observes, natural and psychological science would cease to

exist. Science, fortunately, instead of yielding in this question to dynamical theorists, has carried off the victory by the accumulation of a mass of striking facts; so that the notion of a vital force is reduced to a walking shadow, and exists only in the brains of such individuals as have lagged behind in science. All those who have specially studied any branch of natural science touching the organic world agree now in regard to vital force, and the term itself has become so obnoxious that it is rarely used. It could not be otherwise, there being no doubt that life obeys no exceptional laws, that it does not resist inorganic forces, but that, on the contrary, life itself is nothing but the product of the conjoined action of these forces.

Chemistry has established, beyond any doubt, that the fundamental elements are perfectly the same in the organic and inorganic world, and that life contains in its material substratum not a single element not to be found in activity in the inorganic world. Chemistry has also succeeded in separating organic structures into their elementary constituents, like inorganic bodies. That primitive mud (*Urschleim*) as it was called, from which, as was formerly assumed, all organic beings have originated, is a chemical chimera, and does not exist. This fact alone might have sufficed to banish the thought of a particular vital force. We have seen that forces are but qualities or motions of matter, and that every

atom is inseparably connected with such force. Hence every atom, in whatever position or connection it may happen to be, whether in organic or inorganic forms, can only display the same forces and produce the same effects. The qualities of the atoms are indestructible. As, then, experience has shown that all organisms consist of the same atoms as in the organic world, though differently grouped, it follows that there can be no particular organic force, no vital power. All organic life, says Mulder, is the result of molecular forces. It is a law that nothing can be imported into the world. Mulder compares the assumption of a vital force with the supposition of a single force in great battles in which thousands are engaged, through which guns are fired and wounds inflicted, etc., whilst this effect is not the result of a single force, "battle force," but merely the sum total of innumerable forces and combinations. Vital force is, therefore, not a principle, but a result. When an organic structure appropriates inorganic materials in its proximity, it effects this, not by a particular force but by a kind of infection by which it transfers to them its own molecular conditions, in the same manner as forces are transferred from matter to matter in the inorganic world. The origin of the organic world from one or several beginnings without any assistance from vital force may thus be explained. The possibility of such a beginning has already been treated of in the chapter on primeval generation.

Though upon general grounds it must appear impossible to assume exceptional laws existing in the organic world, it may be rendered more clear in concrete relations. Chemistry and physics have proved that inorganic forces act in the same manner in living and in dead nature; and the action of these forces has been investigated in the most delicate combinations of vegetable and animal organisms. It is now generally acknowledged that physiology, or the science of life, cannot subsist without chemistry and physics, and that no physiological process is possible without chemical and physical forces. "Chemistry," says Mialhe, "has undoubtedly, either as cause or as effect, had a share in creation in the growth and the existence of all living beings. The functions of respiration, digestion, assimilation, secretion, are chemical operations; chemistry alone is able to explain these important phenomena."

Oxygen, hydrogen, carbon, and nitrogen, enter in the body in various combinations; they separate, and act according to the same laws as out of the body. Compound bodies act in a similar manner. Water, the chief constituent of all organic bodies, without which neither animal nor vegetable life could exist, dissolves, evaporates, and flows within the organism in the same manner as out of the body. The inorganic materials which it carries along in a state of solution, are deposited in the bones of animals, or the tissues of plants,

as in inorganic nature. The oxygen of the air, combining in the lungs with venous blood, imparts to it that scarlet colour which it also acquires when exposed to the air out of the body. The carbon contained in the blood is, in this contact, consumed in the same manner as elsewhere. The animal stomach may correctly be called a chemical retort, in which materials are decomposed, or combined, according to the laws of chemical affinity, etc. A poisonous substance introduced in the stomach, can be neutralised in the same manner as out of the body; a morbid substance is neutralised and destroyed as in any other inorganic vessel. The chemical changes which food undergoes in the stomach and alimentary canal have been carefully examined, and the mode ascertained by which it enters the various tissues. It is also known, that their constituent elements emerge from the body in the same quantity as they entered, partly unchanged, and partly in different forms and combinations. Digestion is purely a chemical act. The action of medicines is equally so. All medicines not soluble in the fluids of the organism, and thus incapable of chemical action, are ineffective.

“These observations,” says Miahle, “show that all organic functions are effected by chemical processes, and that a living being may be considered as a chemical laboratory, in which actions are going on, which united, constitute life.”

Not less plain are the mechanical processes in the living organism. The circulation of the blood is clearly mechanical, and the anatomical apparatus by which it is effected, perfectly resembles that made by the hand of man. The heart has its valves, like a steam engine, and their closure produces audible sounds; the friction of the air against the walls of the bronchiæ produces the sound in ordinary breathing; the ascent of the blood from the inferior extremities to the heart is accomplished by mechanical arrangements. In a similar manner are the contents of the alimentary canal carried downwards by vermicular motion; and so is all muscular action in man and animals simply mechanical. The structure of the eye is founded upon the same laws as the construction of a camera obscura, and the ear receives the sound waves like any other cavity. "In science," observes Kraemer, "there prevails, at present, no doubt as to the impossibility of designating *any* natural quality, which is only to be found in the bodies of one kind. It is also known that organic processes cannot be called self-acting, as they, like the changes in the inorganic world, are only called into action by the external world and the physical forces connected therewith." Hence, as Schaller observes, physiology begins now to reject the theory of an essential difference between the organic and inorganic world.

If sometimes the effects of organic combina-

tions are surprising, inexplicable, and apparently unlike the usual effects of natural forces, this arises from the complexity of the material combinations in the organic world. Such complicated material conditions must, as previously shown, produce apparently wonderful effects. The labours of physiologists are now directed to the investigation of these combinations. Much that was formerly deemed impossible has already been effected. The time approaches, when, as Liebig believes, physiology will, with the assistance of organic chemistry, be enabled to find out the causes of certain phenomena not accessible to the eye. We must not, because most of these phenomena are as yet unexplained, infer the existence of an unknown dynamical power. We have, on the contrary, not merely the right but the duty, in accordance with the laws of induction, to infer the unknown from the known, and to maintain that a universal law which is true for a portion of organic phenomena is applicable to all. We must bear in mind that a number of phenomena now explained were formerly the chief supports of peculiar vital forces. It is not so very long that the chemistry of respiration and digestion has been known; or that the process of impregnation and generation has been ascertained to resemble the simple and mechanical processes in the inorganic world. The semen is no longer considered as a living and vivifying vapour; and what was formerly deemed the inexplicable effect

of that animating vapour, is proved to result from the immediate contact of the semen with the ovum, mechanically effected. Many processes in the animal body, such as the ascent of particles upon mucous membranes, apparently against the law of gravitation, seemed to justify the assumption of a vital power, until the discovery of ciliary motion proved it to be a mechanical process. This remarkable motion is perfectly independent of life, and continues long after death, and only ceases with the softening of the parts by putrefaction. The ciliary motion was observed to continue in a tortoise fifteen days after death. Since the discovery of the blood cells, and of the process of absorption and resorption; since the discovery of the laws of endosmosis and exosmosis, a new light has been thrown on the processes in the blood. The most wonderful, and apparently most inexplicable, action in the animal body—nervous activity, begins to receive a new light from physics, and it becomes daily more apparent what an important part an *inorganic* force—electricity—plays in these organic processes.

“Life,” says Virchow, “is a peculiar, and, indeed, the most complicated form of mechanical action, in which the usual mechanical laws act under the most unusual and most varied conditions, and in which the final results are separated from the original causes by such a number of intermediate links, that their connection is not easily established.”

It has been objected, in order to prove the necessity of the assumption of a vital force, that chemistry is unable to produce organic combinations; that is, such groupings of chemical elements in ternary or quaternary combinations always existing in living bodies, and so to produce in their retorts organic beings, or man. Chemists reply and prove that organic elements *can* be produced, such as grape-sugar, and several organic acids. They have created several organic bases, and produced urea, a peculiarly organic substance, which not long since was by physicians considered as a striking proof that chemistry could not imitate the products of the organism. We know not how far we may yet advance. "It is scarcely fifteen years," says Dr. Schiel, in a manuscript at this moment before us, "that the synthesis of organic substances, that is, their production from inorganic bodies in the laboratory of the chemist, was deemed impossible; yet to-day they make spirits of wine and costly perfumes from coals, candles from slate, prussian blue, urea, taurine, and many other substances, which, as was formerly believed, could only be produced by organic bodies from the inorganic materials furnished by nature. The distinction between organic and inorganic chemistry is at present merely a conventional term for classification, no longer corresponding to the phenomena, but only used for convenience."*

* It was in 1828 that Mr. Wöhler, by producing urea

the production of ternary and quaternary combinations can only be effected by vital force, it must be denied to those organisms which possess this force in the highest degree; it being known that animals have no power of producing organic combinations from inorganic matter, and are therefore for their existence entirely dependent upon the vegetable world, which alone is capable of transforming inorganic materials into organic.

No one who places any value upon facts, and knows the method of scientific induction, can hesitate to banish the notion of a particular force producing vital phenomena independent of natural laws, or can doubt that nature, with its materials and forces, is an indivisible whole, without limits or exceptions. And, further, that the strict distinction between "organic" and "inorganic" is forced; that the difference between them is not in essence, but in relation to external form and grouping of the atoms. "That the changes of organic bodies," says Krahmer, "correspond to the idea of class, genus, or species, whilst inorganic bodies are not in their changes artificially, upset the theory which sustained that organic combinations could only be obtained from organic bodies. In 1856 Berthelot produced formic acid from inorganic substances; namely, from carbonic oxide and water, by heating these substances with caustic potash, and without the cooperation of either vegetable or animal. Grease may be artificially produced from oleic acid and glycerine—two substances which are now obtained by merely chemical processes, a remarkable result of the progress of synthetic chemistry.

subject to a similar limitation, is true so far as any one likes to believe it. When a piece of sheet iron is manufactured into a nail, does not the idea correspond to the nail rather than to the sheet iron? When the larva becomes a butterfly, the process is of the same kind as when the sheet iron becomes a nail." The distinction between organic and inorganic forms arises from the first molecular arrangement, which contains the germs of these forms, being different. But the formation of crystals, shows that there are laws of form in the inorganic world which cannot be transgressed, and which approach those of the organic. "The appeal to a vital force," says Vogt, "is merely a periphrasis of ignorance. It constitutes one of those back doors—of which there are so many—in science, and which are the constant refuge of indolent minds who will not take the trouble to investigate what appears incomprehensible, but are satisfied with accepting the apparent miracle."

The doctrine of vital power is now a lost affair. However much the mystics may endeavour to inspire new life into this shadow; however much the metaphysicians cry out against the presumption of physiological materialism in discussing philosophical subjects; however much some individuals may point to undiscovered and obscure physiological questions—all this cannot save vital force from a rapid and complete scientific death.

CHAPTER XIX.

THE SOUL OF BRUTES.

“The intelligence of the animal manifests itself entirely in the same manner as that of man. No essential difference, but only one in degree, can be proved to exist between instinct and reason.”

KRAHMER.

“The human body is a modified animal form; his soul an enlarged animal soul.”

BURMEISTER.

“The great gap which is supposed to exist between the intellect and instinct will be filled up, and the mind will readily submit to the jurisdiction of fixed physical laws.”

TUTTLE.

THE best authorities in physiology are now pretty much agreed in the view that the soul of animals does not differ in *quality*, but merely in *quantity*, from that of man. Carl Vogt has recently again discussed and decided this question in his own striking manner, so that little that is new can be added. Man has no absolute advantage above the animal; his mental superiority being merely relative. There is not one intellectual faculty which belongs to man *exclusively*; his superiority is merely the result of the greater intensity, and the proper combination, of his capacities. The enlarged human faculties are, as we have already seen, the natural and necessary result of the

higher and more perfect development of his material organ of thought. As the physical conformation of this substance presents an uninterrupted scale from the lowest creature up to man, so is there manifested a corresponding ascending series of mental qualifications. Neither in form nor chemically can any *essential* difference be proved between the animal and human brain; the differences are great, but only in *degree*. This fact alone, added to the expositions already given on the dependence of mental functions on the structure, size, and composition of the brain, might suffice to render the above proposition evident. *

Singularly over-estimating himself, man has been pleased to give the name of *instinct* to undoubted psychological manifestations in animals. But there exists no instinct in the sense in which the word is usually applied. It is not a necessity in-born in themselves and their mental organisation, nor a blind, involuntary impulse, which impels animals to action, but deliberation—the result of comparisons and conclusions. The mental process through which this is effected, is in its essence perfectly the same as in man, though the power of judgment is much weaker. No doubt this act of the will, and the process of mental deliberation which produces it, is so much determined by external and internal circumstances, that a free choice in such an act descends not unfrequently to zero, or is, at least,

confined within to the most narrow limits. But exactly the same may be said of the actions of man, whose free will, to the extent which he *believes* he possesses it, is a mere chimera.

By the same rule from which we deduce the actions of animals from instinct, we might also say that man obeys in actions merely instinctive impulses. But both assumptions are false. The animal considers, deliberates, acquires experience, recollects the past, cares for the future, feels—like man; and what hitherto had been considered as the consequence of a blind instinct, can easily be proved to be the result of conscious mental activity. “The opinion,” says Czolbe, “that animals possess neither conception, judgment, nor the power of forming conclusions, is refuted by experience.” “It is the height of folly,” says the *Système de la Nature*, “to deny to animals the possession of mental faculties; they feel, they think, they judge and compare, they choose and deliberate, they possess memory, they show love and hatred, and their senses are frequently more acute than ours.” It is not from mere instinct that the fox constructs two outlets in his cover, or that he robs the roost at a time when he knows that the farmer and his servants are absent or at dinner, but from deliberation. It is not instinct but experience which renders old animals more prudent than young ones. The examples proving the intelligence and judgment of animals are as numerous as they are

striking. Every person who has opportunities of observing the actions of dogs, has seen some remarkable cases of their calculating intelligence and cunning.

Professor Hinrichs* is of opinion that the animal possesses neither conception nor judgment, otherwise it would, for instance, take a walk by itself without its master, or visit a public house. Mr. Hinrichs must have had no opportunity of observing dogs. That they take walks on their own account, and visit hostelries known to them, are facts which may be observed daily. There is probably no philosophical question which so clearly exhibits the unfortunate position of philosophical theorists, than the question concerning the intellectual life of animals. All the facts, however striking, are discarded, while the accustomed philosophical categories are, with the self-sufficiency of a limited knowledge, applied to parts of the question. Nature happily knows nothing of the subjective speculations of these learned personages, and renders, almost in every individual fact, their theoretical constructions ridiculous. Read, for instance, the philosophical disquisitions, on the difference between man and animal which M. Julius Schaller—who, in the treatment of his subject, forms an honourable exception among the school philosophers—introduces in the second edition of his much praised work *Body and Soul* (1855). M. Schaller

* *Das Leben in der Natur*, etc., 1854.

considers the animal as an exemplar of its species, but distinguishes man as an individual, an *ego*. But what valid objection can be made if we reverse this idea, and maintain: the animal has its value only as a single individual; man, on the contrary, as a human being, or as a representative of his species? Read what Dujardin says of the intelligence of bees; what Burdach writes of crows; and what Vogt relates of dolphins, and of the remarkable training of a puppy by an old dog; remember the well-known anecdote of the swallow, which finding, on her return in spring, her nest occupied by a sparrow, revenged itself on the usurper by walling up the fly-hole. Why are animals, especially birds (crows, sparrows) not afraid of people who do not carry guns? Who knows not the wonderful economy of the beehive from Vogt's admirable description of it? And who has not read of the communities of dogs in the North American prairies? Hooker, an Englishman, writes of the elephant: "The docility of these animals has been known for ages, but loses so much by mere description, that their mildness, obedience, and intelligence appeared to me as surprising as if I never had heard of it. Our elephant was so docile, that, on demand, he picked up stones with his trunk, and reaching them to his master saved him, in his geological excursions, the trouble of alighting."

We must descend to the lower spheres of

human society, in order to comprehend that the intellectual scale from the brute to man is not interrupted. Leaving out of sight the most degraded human races, we often find, in our European population, individuals of whom it is questionable whether their mental disposition transcends the intellectual sphere of an intelligent brute. Does not the *crétin*, who is certainly a man, stand *below* the brute?

At what distance, finally, stands the Negro from the ape? The author saw, in the Zoological Gardens of Antwerp, an ape who had a complete bed in his cage, into which he placed himself at night, covering himself up like a man. He performed tricks with hoops and balls, turning all the while towards the spectators, as if he were anxious to show them his arts. He also followed with his finger the shadows which he cast on the wall. The exhibition produced a sad impression, as one could not divest oneself of the feeling that a kind of human, reflecting, and sensitive being was caged there. On the other hand, the Negro, according to the excellent description of Burmeister, forcibly reminds us of the ape, both in his physical and mental aspect. We find there the same impulse of imitation, the same cowardice, in short, all its characteristic peculiarities. Historically (as in Haiti) the Negro presents himself, to use the expression of a writer in the *Allgemeine Zeitung*, half ape, half tiger. Burmeister describes the Brazilian

aborigines as animals in their actions, wholly destitute of any intellectual tendencies. "In the wildernesses of Borneo and Sumatra, and the Polynesian islands," says Hope,* "there are hordes of savages, whose resemblance to the baboon is striking, and whose physical and mental superiority above the brute is scarcely perceptible. They possess little memory, and still less imagination. They appear incapable of reflecting on the past, or to provide for the future; nothing but hunger disturbs their apathy. No other mental capacity can be discovered in them, but that low, brutish cunning ascribed to the apes."

It is often said that *language* is so characteristic a mark of distinction, as to leave no doubt about the deep chasm existing between man and the brute. Such objectors are certainly ignorant of the fact that brutes can also speak. Numbers of instances can be adduced, proving that animals possess the power of mutual communication even on concrete subjects. Dujardin placed a saucer with sugar in the niche of a wall at a considerable distance from a beehive. A single bee happening to discover this treasure, was seen repeatedly to fly about the margins of the niche, and to touch them with the head, in order to remember the locality. It then flew away, and returned shortly after accompanied by a number of friends, who quickly consumed the sugar. Had not these animals spoken to each other? Birds

* Essay on the Origin of Man, 1831.

especially, as is proved by many instances, freely communicate with each other, make appointments, etc. M. de Fravière* quotes some of the most remarkable and well authenticated facts in relation to the power of intercommunication possessed by bees. The mode in which the chamois place their watches, and inform each other of an approaching danger, equally proves this power of communication. And can instinct have imbued them with this foresight, inasmuch as the chamois are certainly older than the chamois-hunter? Many animals which live in communities choose a leader, and place themselves voluntarily under his guidance. Can this be effected without mutual communication? But man, because of his not understanding the language of animals, deems it easier to deny it altogether. Parkyns, an Englishman who in his travels through Abyssinia had opportunities of observing the conduct of monkey-tribes, remarks that "they possessed a language as intelligible to them as our own is to us."† "The apes," observes Parkyns, "have leaders, whom they obey better than men usually do theirs, and a regular system of depredation. When a tribe leaves the rocky clefts which it inhabits, and descends into the plain, in order to rob a corn field, it is accompanied by all its members, old and young, male and female. The elders of the

* Gartenlaube, iii, No. 47.

† Revue Britannique.

tribe, which are easily recognised by their hirsute appearance, are chosen as outposts. They carefully in descending examine every gulf, and climb up all the eminences to obtain a good view. Sentinels are also placed on the flanks and in the rear; indeed, their watchfulness is remarkable. From time to time they call and reply to each other, to announce whether any danger threatens, or whether all's right. Their cries are so sharply accentuated, so various, so distinct, that they may in time be understood. At the least cry of alarm the whole tribe halts at once, and hearkens until a second cry, differently intoned, bids them again to march."

An observer relates that he had recently assisted at a remarkable consultation of swallows. A couple had, in the spring, commenced building a nest under the roof of a house. One day a number of other swallows appeared on the roof, when there arose between them and the builders of the nest, a lengthened conversation, manifested by their loud cries and twittering. The consultation having lasted for some time, during which the nest was examined by some individual swallows, the meeting broke up. The result was that the nest was abandoned, and a better locality under the same roof selected!

Well, then, animals possess a language, but it is incapable of improvement. This, again, is an unfounded assertion. Notwithstanding that we can know next to nothing of the possible or real

improvement of the language of animals, since we do not understand it, there exists a number of facts, which leave no doubt that the vocal-and-sign language of animals is capable of a certain development—facts which are certainly unknown to him who concludes only from appearances or abstract premises.

Thus there has been observed an essential difference between the vocal expression of wild and that of tamed animals of the same species.* And in regard to man, we may ask of what improvement is the language of the negro or of those savage hordes capable, of whom travellers relate that they speak more by signs than by articulate sounds? The language of the savages, described by Hope, consists of a few hoarse grunting sounds. That of the Bushmen is, according to Reichenbach, so poor in words, that it consists mostly of harsh, throat sounds, and clicks, for which we have no representatives in our alphabet, so that they communicate with each other much by signs. We know, moreover, that the mental capacities of animals are as capable of being developed as those of man. What remarkable actions do not trained animals perform! A trained hound is quite a different being from an untrained one. This training is not, as generally believed, a mere mechanical development, but it rests upon the possibility of imparting to the animal a conception of the object to be at-

* V. Fuchs, *das Seelen leben der Thiere*, etc., 1854.

tained by a certain action, without which it would be impossible to make a dog point at game.

That the education of animals proceeds but slowly and is attended with difficulties, does not so much depend on the limited faculties of the creature, but rather on the impossibility of direct communication. The same means must be employed—and they are so in fact—which are required in the troublesome education of the deaf and dumb. But even without any particular training, it is well known that domesticated and tamed animals improve in mental capacity through their continual intercourse with mankind.

Another assertion that the capacity for rational improvement is innate in man, whilst the intelligence of animals would ever remain stationary unless improved by man, is neither perfectly correct, nor calculated to establish an essential difference between man and brute. That the lowest human races in their reasoning faculties are deficient in this internal impulse for improvement, and consequently possess no history, is well known; while, as has already been mentioned, the human race, considered as a whole, required an immensely long period to feel that impulse for improvement.

Hence the gradual transition which through innumerable steps, both physical and intellectual, leads from the brute up to man, can only be denied by those who delight in placing their individual opinions above the actual facts. All the

known marks of distinction, which are quoted as arguments to establish a strict boundary line, are in their nature merely relative, and not absolute. How could it be otherwise? The infinitely diversified reciprocal action between matter and force in living nature must result in an infinite variety of results which admit of no boundary, but spread in every direction and in an uninterrupted connexion. Nature knows of no limits, which are imagined by the systematising intellect of man. Man has, therefore, no right to place himself proudly above the organised world, and to consider himself as a being of a different and higher nature; he should, on the contrary, acknowledge the firm and infrangible link which chains him to nature, and that he shares with every thing that lives and flourishes the same origin and end.

“That which has not a little contributed,” says the author of *Menschen und Dinge*,* “to veil from us for so long a time the intellectual aspect of the animal world, is the antiquated opinion that man alone is gifted with intellect and spirit, and that there exists an insurmountable barrier between him and the brute. This error once removed, and the view adopted that the animal world is not merely in its physical, but also in its intellectual and moral nature, a *disjointed*

* Mittheilungen aus dem Tagebuche eines reisenden Naturforschers, 1855, (Men and Things; Communications from the Diary of a Travelling Naturalist.)

man (ein auseinandergelegter Mensch), we shall see a comparative psychology arise, just as we possess a comparative anatomy.

Professor B. Cotta relates a remarkable case, first observed by Darwin, of certain crabs inhabiting the Keeling Islands, which open the cocoa-nuts with their claws to get at the kernel. This circumstance has been quoted as a proof of a peculiar instinct, and the narrator seems even inclined to view it as a striking proof of the wisdom of the Creator, who has for this purpose created a peculiarly constructed animal! It is difficult to conceive how a naturalist can form such an idea. It can scarcely be doubted that the creature has performed some special experiments upon the nuts, before it came upon the idea of using its claws in a suitable manner. To view it in any other light, or to assume that a peculiar apparatus has been given to it on account of the cocoa-nuts, is little short of presumption. By the same rule, we might say man has been created to travel on railroads; that he has constructed locomotive engines by instinct; and that he has been endowed with legs to step into the carriages.

CHAPTER XX.

FREE WILL.

“Man is free like the bird in a cage; he can move within certain limits.”

LAVATER.

“A free will, an act of the will, which should be independent of the sum of influences which determine man at every moment and set limits to the most powerful, does not exist.”

MOLESCHOTT.

MAN is a product of nature in body and mind. Hence not merely what he is, but also what he does, wills, feels, and thinks, depends upon the same natural necessity as the whole structure of the world. Only a superficial observation of human existence could lead to the conclusion, that the actions of nations and of individuals were the result of a perfectly free will. A closer inquiry teaches us, on the contrary, that the connection of nature is so essential and necessary, that free will, if it exist, can only have a very limited range; it teaches us to recognise in all these phenomena fixed laws which hitherto were considered as the results of free choice. “Human liberty, of which all boast,” says Spinoza, “consists solely in this, that man is conscious of his will, and unconscious of the causes by which it is determined.”

That this view is no longer theoretical, but sufficiently established by facts, is chiefly owing to that interesting new science Statistics, which exhibits fixed laws in a mass of phenomena, that until now were considered to be arbitrary and accidental. The data for this truth are frequently lost in investigating individual phenomena, but taken collectively they exhibit a strict order, inexorably ruling men and humanity. It may, without exaggeration, be stated, that at present most physicians and practical psychologists incline to the view in relation to free will, that human actions are, in the last instance, dependent upon a fixed necessity, so that in every individual case free choice has only an extremely limited, if any, sphere of action.

It is impossible for us to prove this truth by exhaustive facts, as it would require us to call in the aid of the whole province of human knowledge. This proof is, however, too intimately connected with our view of nature to be passed over. We shall, therefore, endeavour to furnish the reader with some data from the following intelligible facts.

The conduct and actions of every individual are dependent upon the character, manners, and modes of thought of the nation to which he belongs. These again are, to a certain extent, the necessary product of external circumstances under which they live and have grown up.

Galton* says: "The difference of the moral

* London Journal of the Royal Geog. Society, v, 22.

and physical character of the various tribes of South Africa depends on the form, the soil, and the vegetation of the parts they inhabit. The dry inland plateaux, which are merely covered with thick jungles and short shrubs, are inhabited by the dwarfish and sinewy Bushmen; in the open, undulating pasture lands dwell the Dammares, a tribe of independent shepherds, where every father of a family reigns supreme in his household; while, in the rich crown lands of the north, we find the Crampos, the most civilised of these tribes. Charles Müller remarks that the desert has changed its inhabitant, the Bedouin, into a cat. According to Desor, the history, customs, and manners of the American Indians, whom he distinguishes as prairie and forest Indians, may be traced to the difference of soil which they inhabit. "It is about two hundred and thirty years," says Desor, "since the first colonists, in every respect true Englishmen, came to New England. In this short time they have undergone considerable changes; a peculiar American type has been developed, chiefly, it appears, by the influence of the climate. An American is distinguished by his long neck, his spare figure, and by something irritable and feverish in his character. The scanty development of the glandular system, which gives to American women a certain ethereal expression of the figure, and the lank, dry hair, may be connected with the dryness of the atmosphere.

It has been observed that, during the prevalence of easterly winds the irritability of the Americans is considerably increased. The rapidity of the American State development, which surprises us, may thus, to a considerable extent, be ascribed to the climate." As in America, so have the English given rise to a new type in Australia, specially in New South Wales. The males are tall, thin, but muscular; the females of great but transitory beauty. The whole character of the Englishman is an expression of his foggy sky and his heavy atmosphere. The Italian is the reflex of his ever bright sky and of his sunny climate. The imaginative world of the oriental is connected with the copiousness of the nature by which he is surrounded. In the inhospitable north the shrubs are scanty, the trees dwarfish, and so is the race which inhabits it. The extreme south admits as little of a high development of the human race. It is only where climate, soil, and other circumstances of the surface harmonise and are in equilibrium, that man acquires that degree of mental culture which gives him the superiority above his fellow creatures.

If the nations are thus in the aggregate, in regard to character and history, dependent upon external circumstances, the individual is no less the product of external and internal natural actions, not merely in relation to his physical and moral nature, but in his actions. These actions depend necessarily, in the first instance,

upon his intellectual individuality. But what is this intellectual individuality which determines man, and prescribes to him, in every individual case, his mode of action with such force, that there remains for him but a minute space for free choice; what else is it but the necessary product of congenital physical and mental dispositions in connection with education, example, rank, property, sex, nationality, climate, soil, and other circumstances? Man is subject to the same laws as plants and animals. As the plant is for its existence, size, shape, and beauty dependent upon the soil in which it has taken root; as the animal is small or large, tame or wild, beautiful or ugly, according to the circumstances under which it became developed; as an entozoon changes its form, accordingly as it inhabits the interior of any other animal; so is man physically and mentally the product of such external influences, and becomes, in this manner—certainly not that morally independent, free-willing creature as he is represented by moralists. One individual possesses a remarkable propensity for benevolence; everything he does exhibits this peculiarity: he is charitable, tolerant, beloved by all, and it is his enjoyment to indulge in these inclinations. Another inclines to conscientiousness: he is just in all his transactions, and may put a term to his existence if deprived of the possibility of fulfilling his obligations. The thoughtless man, on the contrary, is, by his

mental disposition, induced to commit acts approaching to wickedness. Some individual, again, possesses a violent character bent on destruction, which can only be restrained by the greatest efforts. A fifth has a particular love for children, and is a model husband; whilst a sixth dislikes children and domestic life. Vanity or love of approbation may be the cause of the most perverse actions or the greatest crimes, while firmness may enable a person with limited faculties to achieve the greatest results. All these natural dispositions, developed by education, example, etc., are so powerful in human nature, that neither deliberation nor religion can effectually neutralise them, and it is constantly observed that man rather follows his inclinations. "The actions of man," says Auerbach, "are independent of their belief in God, etc.; they act according to their impulses and habits." How frequently does it occur that a man, knowing his intellectual character and the error of his ways, is yet unable to struggle successfully against his inclinations. The many contradictions in the moral nature of man (piety and love for children without actual benevolence, feelings sometimes exhibited by the most hardened criminals), can be explained in no other way than by considering them as the result of natural impulses.

Not merely, however, the intellectual nature of man, but every individual action, if not a necessary emanation from his character, is still deter-

mined by natural influences which limit the exercise of his freedom of choice. It is well known that climate, and even changes of the weather, influence our mental disposition. Our resolutions change with the state of the barometer; and a number of actions, which we believe to have resulted from free choice, were perhaps merely the products of such accidental circumstances. Our corporeal conditions equally exercise an almost irresistible influence over our mental disposition and resolutions. "A young man," says Kraher, "has different ideas from an old man; a person in a recumbent position thinks in a different manner than when erect; the famished and the comfortable argue differently from the satiated and uncomfortable." The great influence which diseases of the various organs of the body exercise upon thought and action are too well known, and have already been indicated. The most dreadful crimes have, independently of the will of the agent, been committed under the influence of such abnormal corporeal conditions. It was reserved for modern science closely to examine such cases, and to establish disease as the cause of crimes which formerly were considered as the result of deliberate choice.

No one, therefore, who searches beneath the surface can deny that the assumption of a free will must, in theory and practice, be restricted within the narrowest compass. Man is free, but his hands are bound; he cannot cross the

limit placed by nature. "For, what is called free will," says Cotta, "is nothing but the result of the strongest motives." Most of the crimes committed against the state or society arise from passion or ignorance, the result of defective education or power of reflection, etc. An educated person finds means to obviate a disagreeable position without offending against the law; the ignorant seeks relief in committing a crime, and is thus the victim of circumstances. What does freedom of choice do for him who robs, steals, and murders from sheer necessity? What is the amount of responsibility attached to the man whose organ of destructiveness, and whose cruel propensities are large, and his intellectual faculties small? Deficiency of intellect, poverty, and want of education, are the chief causes of crime. Criminals are rather deserving of pity than of disgust. "Therefore," says Forster, "it were best to judge and to condemn nobody."

We now come to a point which we must not pass over, though by its practical bearing it appears foreign to our theoretical investigations. An unprejudiced study of nature and the world based upon innumerable facts, shows that the actions of individuals and of men in general, are determined by physical necessities which restrict free will within the narrowest limits. Hence it has been concluded that the partisans of this doctrine denied the discernment of crime, and that they desired the acquittal of every criminal, by

which the state and society would be thrown into a state of anarchy. We shall presently return to the last reproach which has, by the way, thousands of times been made to natural science; as to the first, it is too absurd to deserve any refutation. No scientific system has rendered the necessity of social and political order more evident than that to which natural science owes its progress, nor has any modern naturalist denied to the state the right of legitimate defence against attacks on the well-being of society. What is true is that the partisans of these modern ideas hold different opinions as regards crime, and would banish that cowardly and irreconcilable hatred, which the state and society have hitherto cherished with so much hypocrisy as regards the malefactor. Penetrated by such ideas, we cannot help a feeling of commiseration for the offender, whilst we not the less abhor every action calculated to disturb society; a humane sentiment, which gives the preference to preventive measures over punishment.

Since the general results of philosophy and of the natural sciences have become accessible to the people at large, the greatest dangers to society have been apprehended from their materialistic tendencies. They have even predicted the downfall of society and a *bellum omnium contra omnes*, if such tendencies should become prevalent. Only complete ignorance of the springs of society could fear such a catastrophe. The

like predictions and tirades have been heard at all times without having ever been realised. Society rests upon more solid foundations than these prophets imagine. It would be easy for us to show that naturalism does not ignore the value of moral ideas, so far as they form the foundation of human society, and that no attack is made on the real nature and existence of that society; but such a discussion would transgress the limits of our subject. Still we may shortly indicate the road which is to be followed by him who would more closely examine this subject.

Society rests upon the principles of necessity and reciprocity. The principle of necessity is identical with the restrictions to which free will is subject, and is by no means directly influenced by the diversity of the general opinions we entertain of the world, but only indirectly and very feebly. But when the principle of necessity is not in action, it is replaced by the relation of reciprocity.

This principle presents in its details as infinitely complicated a mechanism, as the relations of force and matter. To know, to explain, or to direct this mechanism according to any general principle is, in our opinion, impracticable. From our point of view we confidently assert, that these ideas of God and the world, or moral motives, in so much danger of being wrecked against naturalism, exercise but a very imperceptible influence on the ordinary march of human society. We are astonished that our society is so ticklish

as regards certain truths taught by science—a society whose social virtue is nothing but hypocrisy, covered by a veil of morality. Just cast a glance at this society, and tell us whether it acts from virtuous, divine, or even moral motives? Is it not, in fact, a *bellum omnium contra omnes*? Does it not resemble a race-course, where everyone does all he can to outrun or even to destroy the other? Are we not tempted to say of this society what Burmeister says of the Brazilians: “Everyone does what he believes he can do without incurring punishment. He cheats and abuses others as much as possible, being convinced that they would do the same to him. Anyone who acts differently is treated as an idiot”? Is it not the most refined egotism which is the spring of this social mechanism; and distinguished authors, who best know human society, do they not constantly depict in their narrations the cowardice, disloyalty, and hypocrisy of this European society?

A society which permits human beings to die of starvation on the steps of houses filled with victuals; a society whose force is directed to oppress the weak by the strong, has no right to complain that the natural sciences subvert the foundations of its morality.

Yes, those who know how to appreciate the ideas we defend, and which are so vehemently attacked by the whole clique of pharisees, hypocrites, mystics, Jesuits, and pietists, may be able

to imagine that at some future period there may be a more ideal social edifice, which will have for its foundations human dignity and human equality. Does not antiquity furnish us with examples of such a partial transformation ?

Whatever may be our ideas of the government of the world and of immortality, whether or not they undergo a change, society will not perish. And even if our ideas were false, if the enlightened part of the community cannot be deprived of its prejudices without doing some damage to society at large, science and empirical philosophy can only say : truth is above things divine and human ; there exist no reasons strong enough to cause us to abandon it.

“La vérité,” says Voltaire, “a des droits imprescriptibles ; comme il est toujours temps de la découvrir, il n’est jamais hors de saison de la défendre.”

CHAPTER XXI.

CONCLUDING OBSERVATIONS.

“Les hommes se tromperont toujours, quand ils abandonneront l'expérience pour des systèmes enfantés par l'imagination. L'homme est l'ouvrage de la nature, il existe dans la nature, il est soumis à ses lois, il ne peut s'en affranchir, *il ne peut même par la pensée en sortir*; c'est en vain que son esprit veut s'élaner au-delà des bornes du monde visible, il est toujours forcé d'y rentrer.”

Système de la Nature.

“It is now nearly twenty years,” says Göthe, in his posthumous works, “since all the Germans have become transcendentalists. They will wonder at themselves should they ever become aware of it.” That time seems to approach. The pompous speculative systems are fast expiring, chiefly by the influence of an exact investigation of nature. The result is the more important, as the natural sciences had hitherto only exercised an *indirect* influence on the march of philosophical disquisitions. Exact science inculcates modesty; and it is perhaps for this reason, that our modern naturalists have hitherto neglected to apply the standard of exact science to philosophy, and from the treasury of facts to forge arms for the overthrow of transcendental speculations. Now and then there issued from the workshops of these industrious

labourers a ray of light which, reaching the noisy philosophers, did not fail to heighten the existing confusion. These single rays were, however, sufficient to cause in the camp of speculative philosophy a feverish excitement, and gave rise to sallies in anticipation of a threatened attack. There was something ludicrous in it to see these philosophers so desperately defend themselves before they were seriously attacked. It certainly will not be long before the battle becomes general.* Is the victory doubtful? The struggle is unequal; the opponents cannot stand against the trenchant arm of physical and physiological materialism, which fights with facts that everyone can comprehend, while the opponents fight with suppositions and presumptions. But an hypothesis can never be the foundation of a scientific system. Hypothesis, used to such an extent as in philosophical speculation, abandons sensual perception, the only source of human knowledge, and ascends into regions inaccessible to our intelligence. In its erratic movements, it can never arrive at a resting-place; for all imaginable things *may* exist behind that which is concealed from us. All that transcends the sensual world and the deductions resulting from

* Since these remarks were first expressed by the author, his expectations have been partly fulfilled. The scientific agitation in regard to the questions discussed is daily spreading, and becoming, without exaggeration, a sign of the present time.

the comparison of sensual objects, is hypothesis, and may be sufficient for him who is satisfied with it. "The naturalist can never be satisfied with it, he knows only bodies and their qualities; what is beyond, he terms transcendental, and he considers transcendentalism as an aberration of the human mind." (Virchow.)

Whosoever rejects experience, rejects human conception, and has yet to learn that human knowledge and thought without real objects is a nonentity. Thinking and being are as inseparable as force and substance, spirit and matter; an immaterial spirit is an arbitrary assumption without any real basis. Were the human mind in possession of any metaphysical knowledge not determined by the real world, we should expect the same conformity in the views of metaphysicians as we find among physiologists in regard to the function of certain muscles, or the law of gravitation, etc.; instead of which we find nothing but obscurity and contradictions.

"If," says Virchow, "philosophy is the science of what is actual, it can only proceed by the road of natural science, and search in experience for its objects of investigation. It becomes, then, not merely in essence but in method natural science, from which it only differs in its aim; inasmuch as all philosophical systems have a transcendental object, viz. the investigation of the plan of the universe, or the fathoming of the Absolute, while true natural science considers the knowledge of

individual existences as its chief task ; for the example of all times has shewn how fruitless and hopeless the way is to the Absolute."

We hear a general talk of the boundaries of natural sciences ; but the talkers are usually ignorant of the meaning of their words, and follow merely an instinctive impulse of sudden fear lest their theories be suddenly overthrown by these sciences. A science knows of no boundaries but of such as are inherent in its nature. As far as it extends, it has to say its say, to use a common expression ; and no science has a greater right to do so than natural science, which may perhaps be the only science that will remain. According to our view, an exposition of transcendental things which cannot be made to harmonise with the results of natural science, is a convolution of words without sense. When speculative philosophy, powerless against the facts brought to bear against it, tries to save itself by ascending to inaccessible metaphysical heights, it resembles an animal which tries to escape a danger by concealing its head. An armed opponent has never yet been conquered by haughty contempt.

We consider it mere prudery on the part of some naturalists, who declare that the empirical material is insufficient to return definite answers to transcendental questions. It certainly is incapable of answering these questions *positively*, and for that purpose it will never suf-

fice; but it is more than sufficient to answer them *negatively*, and to put an end to the reign of philosophical transcendentalism, which rejects experience. Whosoever combats hypothesis in science, must also combat it in philosophy. Hypothesis may maintain that being and thought existed once separately; empiricism knows only that they are inseparable.

The materialistic tendency of the natural sciences has recently been, to the surprise of the German scientific world, vehemently attacked by a distinguished naturalist. The attack seemed an act of despair; for this philosopher, possessing sufficient positive knowledge to estimate the impotence of idealism in science, avows that all resistance to the approaching enemy would be vain. And yet it is not by facts that he endeavoured to combat his invisible enemy, as he knew well the facts would be against him. He therefore went roundabout, and appealed to the moral consequences of truths established by science. This mode of discussion is so little consistent with science, that it is surprising that a professor should have committed such a blunder before an assembly of *savans*. The merited reward for such conduct was not long withheld; according to published reports, the assembly received his remarks with great indignation.

“The morality,” exclaimed Professor Rudolph Wagner, at the meeting of German physicians and naturalists at Göttingen—“the morality

which flows from scientific materialism, may be comprehended within these few words: 'Let us eat and drink, for to-morrow we die.' All noble thoughts are but vain dreams, the effusions of automata with two arms, running about on two legs, which, being finally decomposed into chemical atoms, combine themselves anew, resembling the dance of lunatics in a madhouse."

The fundamental idea of this burst of anger has been already refuted in preceding chapters. To attack an established principle because fools draw from it false inferences, is a mode of tactics long used up. "If," says Reclam,* "he were to lay down such a general principle, he ought to forbid the sale of matches, as they have caused fires, or the use of locomotives, since people have been killed by them; and no houses with several stories ought to be built, to prevent persons from throwing themselves out of the window."

To pretend that the materialism of science changes all great and noble ideas into vain dreams, that materialism has no future and no morality, is such a gratuitous assertion that it deserves no refutation. There have at all times been great philosophers holding such or similar opinions, who nevertheless were neither fools, robbers, assassins, nor desperadoes. At this time our most laborious scientific workers, our most indefatigable physicians, profess materialistic opinions, without one of them having

* German Museum.

justified Professor Wagner's assertion. The constant zeal to enrich their minds, the search after truth, and the conviction of the necessity of social and moral order, are for them sufficient compensation for what passes by the name of religion. Even if these ideas should become general, and increase in man the thirst for enjoyment, which has, by the way, been observed at all times, and which is now greater than ever, it would not much matter. The difference in this respect between former and present times lies only in the sincerity of the avowal. Some may assume a devout appearance, but their actions belie their words. In antiquity, words and actions were in classical harmony. We put on an hypocritical garment, to appear different from what we really are. "The hypocrisy of self-deception," says Feuerbach, "is the main vice of our times."

We must finally be permitted to leave all questions about morality and utility out of sight. The chief, and indeed the sole object which concerned us in these researches, is truth. Nature exists neither for religion, for morality, nor for human beings; but it exists for itself. What else can we do but take it as it is? Would it not be ridiculous in us to cry like little children, because our bread is not sufficiently buttered?

To those who may, by some of the results of our investigations, have felt shaken in their philosophical or religious convictions, we recommend

the following passage of Cotta as a fit conclusion of this chapter, and of the whole work.

“Empirical natural science has no other object than to find out the truth, be it, according to human notions, consolatory or the reverse, beautiful or ugly, logical or illogical, rational or absurd, necessary or contingent.”

THE END.

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