

APPENDIX  
TO  
FIRST PRINCIPLES,

*Int. Treatises 19<sup>A</sup>*

DEALING WITH CRITICISMS.



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NOTE.

Some of those who have copies of the earlier editions of *First Principles*, may feel an interest in this rejoinder to some of the criticisms passed upon that work. I have therefore decided to make it accessible to them by publishing it separately.

H. S.

July, 1880.



APPENDIX.



## APPENDIX,

### DEALING WITH CERTAIN CRITICISMS.

ONE way of estimating the validity of a critic's judgments, is that of studying his mental peculiarities as generally displayed. If he betrays idiosyncrasies of thought in his writings at large, it may be inferred that these idiosyncrasies possibly, if not probably, give a character to the verdicts he passes upon the productions of others. I am led to make this remark by considering the probable connexion between Professor Tait's habit of mind as otherwise shown, and as shown in the opinion he has tacitly expressed respecting the formula of Evolution.

Daily carrying on experimental researches, Professor Tait is profoundly impressed with the supreme value of the experimental method; and has reached the conviction that by it alone can any physical knowledge be gained. Though he calls the ultimate truths of physics "axioms," yet, not very consistently, he alleges that only by observation and experiment can these "axioms" be known as such. Passing over this inconsistency, however, we have here to note the implied proposition that where no observation or experiment is possible, no physical truth can be established; and, indeed, that in the absence of any possibility of experiment or observation there is no basis for any physical belief at all. Now *The Unseen Universe*, a work written by him in conjunction with Professor Balfour-Stewart, contains an elaborate argument concerning the relations between the Universe which is visible to us and an invisible Universe. This argument, carried on in pursuance of physical laws established by converse with the Universe we know, extends them to the Universe we do not know: the law of the Conservation of Energy, for example, being regarded as common to the two, and the principle of Continuity, which is traced among perceptible phenomena, being assumed to hold likewise of the imperceptible. On the strength of these reasonings, conclusions are drawn which are considered as at least probable: support is found for certain theological beliefs. Now, clearly, the relation between the seen and the unseen Universes cannot be the subject of any observation

or experiment; since, by the definition of it, one term of the relation is absent. If we have, then, no warrant for asserting a physical axiom save as a generalization of results of experiments—if, consequently, where no observation or experiment is possible, reasoning after physical methods can have no place; then there can be no basis for any conclusion respecting the physical relations of the seen and the unseen Universes. Not so, however, concludes Professor Tait. He thinks that while no validity can be claimed for our judgments respecting perceived forces, save as experimentally justified, some validity can be claimed for our judgments respecting unperceived forces, where no experimental justification is possible.

The peculiarity thus exhibited in Professor Tait's general thinking, is exhibited also in some of his thinking on those special topics with which he is directly concerned as a Professor of Physics. An instance was given by Professor Clerk-Maxwell when reviewing, in *Nature* for July 3, 1879, the new edition (1879) of Thomson and Tait's *Treatise on Natural Philosophy*. Professor Clerk-Maxwell writes:—

“Again at p. 222, the capacity of the student is called upon to accept the following statement:—

‘Matter has an innate power of resisting external influences, so that every body, as far as it can, remains at rest or moves uniformly in a straight line.’

Is it a fact that ‘matter’ has any power, either innate or acquired, of resisting external influences?”

And to Professor Clerk-Maxwell's question thus put, the answer of one not having a like mental peculiarity with Professor Tait, must surely be—No.

But the most remarkable example of Professor Tait's mode of thought, as exhibited in his own department, is contained in a lecture which he gave at Glasgow when the British Association last met there (see *Nature*, September 21, 1876)—a lecture given for the purpose of dispelling certain erroneous conceptions of force commonly entertained. Asking how the word force “is to be correctly used” he says:—

“Here we cannot but consult Newton. The sense in which he uses the word ‘force,’ and therefore the sense in which we must continue to use it if we desire to avoid intellectual confusion, will appear clearly from a brief consideration of his simple statement of the laws of motion. The first of these laws is: *Every body continues in its state of rest or of uniform motion in a straight line, except in so far as it is compelled by impressed forces to change that state.*”

Thus Professor Tait quotes, and fully approves, that conception of force which regards it as something which changes the state of a body. Later on in the course of his lecture, after variously setting forth his views of how force is rightly to be conceived, he

says "force is the rate at which an agent does work per unit of length." Now let us compare these two definitions of force. It is first, on the authority of Newton emphatically endorsed, said to be that which changes the state of a body. Then it is said to be the rate at which an agent does work (doing work being equivalent to changing a body's state). In the one case, therefore, force itself is the agent which does the work or changes the state; in the other case, force is the rate at which some other agent does the work or changes the state. How are these statements to be reconciled? Otherwise put the difficulty stands thus:—force is that which changes the state of a body; force is a rate, and a rate is a relation (as between time and distance, interest and capital); therefore a relation changes the state of a body. A relation is no longer a *nexus* among phenomena, but becomes a producer of phenomena. Whether Professor Tait succeeded in dispelling "the wide-spread ignorance as to some of the most important elementary principles of physics"—whether his audience went away with clear ideas of the "much abused and misunderstood term" force, the report does not tell us.

Let us pass now from these illustrations of Professor Tait's judgment as exhibited in his special department, to the consideration of his judgment on a wider question here before us—the formula of Evolution. In *Nature* for July 17, 1879, while reviewing Sir Edmund Beckett's *Origin of the Laws of Nature* and praising it, he says of the author:—

"He follows in fact, in his own way, the hint given by a great mathematician (Kirkman) who made the following exquisite translation of a well-known definition:—Evolution is a change from an indefinite, incoherent, homogeneity to a definite, coherent, heterogeneity, through continuous differentiations and integrations.\*

[*Translation into plain English.*] Evolution is a change from a no-howish, untalkaboutable, all-alikeness, to a somehowish and in-general-talkaboutable not-all-alikeness, by continuous somethingelseifications, and sticktogetherations."

Professor Tait, proceeding then to quote from Sir Edmund Beckett's book passages in which, as he thinks, there is a kindred tearing off of disguises from the expressions used by other authors, winds up by saying—"When the purposely vague statements of the materialists and agnostics are thus stripped of the tinsel of high-flown and unintelligible language, the eyes of the thought-

\* A conscientious critic usually consults the latest edition of the work he criticizes, so that the author may have the benefit of any corrections or alterations he has made. Apparently Mr. Kirkman does not think such a precaution needful. Publishing in 1876 his *Philosophy without Assumptions*, from which the above passage is taken, he quotes from the first edition of *First Principles* published in 1862; though in the edition of 1867, and all subsequent ones, the definition is, in expression, considerably modified—two of the leading words being no longer used.

the laws of molecular action are proved to hold true of them all, it requires considerable courage to assert that the modes of co-operation of the physical forces in these several regions of phenomena, present no traits in common. But unless they allege that there is one law for the redistribution of matter and motion in the heavens, and another law for the redistribution of matter and motion in the Earth's inorganic masses, and another law for its organic masses—unless they assert that the transformation everywhere in progress follows here one method and there another; they must admit that the proposition which expresses the general course of the transformation can do it only in terms remote in the extremest degree from words suggesting definite objects and actions.

After noting the unconsciousness thus betrayed by Mr. Kirkman and Professor Tait, that the expression of highly abstract truths necessitates highly abstract words, we may go on to note a scarcely less remarkable anomaly of thought shown by them. Mr. Kirkman appears to think, and Professor Tait apparently agrees with him in thinking, that when one of these abstract words coined from Greek or Latin roots, is transformed into an uncouth-looking combination of equivalents of Saxon, or rather old English, origin, what they regard as its misleading glamour is thereby dissipated and its meaninglessness made manifest. We may conveniently observe the nature of Mr. Kirkman's belief, by listening to an imaginary addition to that address before the Literary and Philosophical Society of Liverpool, in which he first set forth the leading ideas of his volume; and we may fitly, in this imaginary addition, adopt the manner in which he delights.

"Observe, gentlemen," we may suppose him saying, "I have here the yolk of an egg. The evolutionists, using their jargon, say that one of its characters is 'homogeneity;' and if you do not examine your thoughts, perhaps you may think that the word conveys some idea. But now if I translate it into plain English and say that one of the characters of this yolk is 'all-alikeness,' you at once perceive how nonsensical is their statement. You see that the substance of the yolk is not all-alike, and that therefore all-alikeness cannot be one of its attributes. Similarly with the other pretentious term 'heterogeneity,' which, according to them, describes the state things are brought to by what they call evolution. It is mere empty sound, as is manifest if I do but transform it, as I did the other, and say instead 'not-all-alikeness.' For on showing you this chick into which the yolk of the egg turns, you will see that 'not-all alikeness' is a character which cannot be claimed for it. How can any one say that the parts of the chick are not-all-alike? Again, in their blatant language we are told that evolution is carried on by continuous 'differentiations;'

and they would have us believe that this word expresses some fact. But if we put instead of it 'somethingelseifications' the delusion they try to practise on us becomes clear. How can they say that while the parts have been forming themselves, the heart has been becoming something else than the stomach, and the leg something else than the wing, and the head something else than the tail? The like manifestly happens when for 'integrations' we read 'sticktogetherations:' what sense the term might seem to have, becomes obvious nonsense when the substituted word is used. For nobody dares assert that the parts of the chick stick together any more than do the parts of the yolk. I need hardly show you that now when I take a portion of the yolk between my fingers and pull, and now when I take any part of the chick, as the leg, and pull, the first resists just as much as the last—the last does not stick together any more than the first; so that there has been no progress in 'stick-togetherations.' And thus, gentlemen, you perceive that these big words which, to the disgrace of the Royal Society, appear even in papers published by it, are mere empty bladders which these would-be philosophers use to buoy up their ridiculous doctrines."

There is a further curious mental trait exhibited by Mr. Kirkman and which Professor Tait appears to have in common with him. Very truly it has been remarked that there is a great difference between disclosing the absurdities contained in a thing and piling absurdities upon it; and a remark to be added is that some minds appear incapable of distinguishing between intrinsic absurdity and extrinsic absurdity. The case before us illustrates this remark; and at the same time shows us how analytical faculties of one kind may be constantly exercised without strengthening analytical faculties of another kind—how mathematical analysis may be daily practised without any skill in psychological analysis being acquired. For if these gentlemen had analyzed their own thoughts to any purpose, they would have known that incongruous juxtapositions may, by association of ideas, suggest characters that do not at all belong to the things juxtaposed. Did Mr. Kirkman ever observe the result of putting a bonnet on a nude statue? If he ever did, and if he then reasoned after the manner exemplified above, he doubtless concluded that the obscene effect belonged intrinsically to the statue, and only required the addition of the bonnet to make it conspicuous. The alternative conclusion, however, which perhaps most will draw, is that not in the statue itself was there anything of an obscene suggestion, but that this effect was purely adventitious: the bonnet, connected in daily experience with living women, calling up the thought of a living woman with the head dressed but otherwise



naked. Similarly though, by clothing an idea in words which excite a feeling of the ludicrous by their oddity, any one may associate this feeling of the ludicrous with the idea itself, yet he does not thereby make the idea ludicrous; and if he thinks he does, he shows that he has not practised introspection to much purpose.

By way of a lesson in mental discipline, it may be not unconstructive here to note a curious kinship of opinion between these two mathematicians and two litterateurs. At first sight it appears strange that men whose lives are passed in studies so absolutely scientific as those which Professor Tait and Mr. Kirkman pursue, should, in their judgments on the formula of Evolution, be at one with two men of exclusively literary culture—a North American Reviewer and Mr. Matthew Arnold. In the *North American Review*, vol. 120 page 202, a critic, after quoting the formula of Evolution, says:—"This may be all true, but it seems at best rather the blank form for a universe than anything corresponding to the actual world about us." On which the comment may be that one who had studied celestial mechanics as much as the reviewer has studied the general course of transformations, might similarly have remarked that the formula—"bodies attract one another directly as their masses and inversely as the squares of their distances," was at best but a blank form for solar systems and sidereal clusters. With this parenthetical comment I pass to the fact above hinted, that Mr. Matthew Arnold obviously coincides with the reviewer's estimate of the formula. In Chapter V. of his work *God and the Bible*, when preparing the way for a criticism on German theologians as losing themselves in words, he quotes a saying from Homer. This he introduces by remarking that it "is not at all a grand one. We are almost ashamed to quote it to readers who may have come fresh from the last number of the *North American Review*, and from the great sentence there quoted as summing up Mr. Herbert Spencer's theory of evolution:—"Evolution is &c." Homer's poor little saying comes not in such formidable shape. It is only this:—"Wide is the range of words! words may make this way or that way." And then he proceeds with his reflections upon German logomachies. All of which makes it manifest that, going out of his way, as he does, to quote this formula from the *North American Review*, he intends tacitly to indicate his agreement in the reviewer's estimate of it.

That these two men of letters, like the two mathematicians, are unable to frame ideas answering to the words in which evolution at large is expressed, seems manifest. In all four the verbal symbols used call up either no images, or images of the vaguest kinds, which, grouped together, form but the most shadowy thoughts. If, now, we ask what is the common trait in the education and

pursuits of all four, we see it to be lack of familiarity with those complex processes of change which the concrete sciences bring before us. The men of letters, in their early days dieted on grammars and lexicons, and in their later days occupied with *belles lettres*, Biography, and a History made up mainly of personalities, are by their education and course of life left almost without scientific ideas of a definite kind. The universality of physical causation—the interpretation of all things in terms of a never-ceasing redistribution of matter and motion, is naturally to them an idea utterly alien. The mathematician, too, and the mathematical physicist, occupied exclusively with the phenomena of number, space, and time, or, in dealing with forces, dealing with them in the abstract, carry on their researches in such ways as may, and often do, leave them quite unconscious of the traits exhibited by the general transformations which things, individually and in their totality, undergo. In a chapter on “Discipline” in the *Study of Sociology*, I have commented upon the uses of the several groups of Sciences—Abstract, Abstract-Concrete, and Concrete—in cultivating different powers of mind; and have argued that while for complete preparation, the discipline of each group of sciences is indispensable, the discipline of any one group alone, or any two groups, leaves certain defects of judgment. Especially have I contrasted the analytical habit of thought which study of the Abstract and Abstract-Concrete Sciences produces, with the synthetical habit of thought, produced by study of the Concrete Sciences. And I have exemplified the defects of judgment to which the analytical habit unqualified by the synthetical habit, leads. Here we meet with a striking illustration. Scientific culture of the analytical kind, almost as much as absence of scientific culture, leaves the mind bare of those ideas with which the Concrete Sciences deal. Exclusive familiarity with the *forms* and *factors* of phenomena, no more fits men for dealing with the *products* in their totalities, than does mere literary study.

An objection made to the formula of evolution by a sympathetic critic, Mr. T. E. Cliffe Leslie, calls for notice. It is urged in a spirit widely different from that displayed by Mr. Kirkman and his applauder Professor Tait; and it has an apparent justification. Indeed many readers who before accepted the formula of Evolution in full, will, after reading Mr. Cliffe Leslie's comments, agree with him in thinking that it is to be taken with the qualifications he points out. We shall find, however, that a clearer apprehension of the meanings of the words used, and a clearer apprehension of the formula in its totality, excludes the criticisms Mr. Leslie makes.

In the first place he dissociates from one another those traits of Evolution which I have associated, and which I have alleged

to be true only when associated. He quotes me as saying that a change from the homogeneous to the heterogeneous characterizes all evolution; and he puts this at the outset of his criticism as though I made this change the primary characteristic. But if he will refer to *First Principles*, Part II. chap. 14 (in the second and subsequent editions) he will find it shown that under its *primary* aspect, Evolution "is a change from a less coherent form to a more coherent form, consequent on the dissipation of motion and integration of matter." The next chapter contains proofs that the change from homogeneity to heterogeneity is a *secondary* change, which, when conditions allow, accompanies the change from the incoherent to the coherent. At the beginning of the chapter after that, come the sentences—"But now, does this generalization express the whole truth? Does it include everything essentially characterizing Evolution and exclude everything else? . . . A critical examination of the facts will show that it does neither." And the chapter then goes on to show that the change is from an *indefinite* incoherent homogeneity to a *definite* coherent heterogeneity. Further qualifications contained in a succeeding chapter, bring the formula to this final form—"Evolution is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation."

Now if these various traits of the process of Evolution are kept simultaneously in view, it will be seen that most of Mr. Cliffe Leslie's objections fail to apply. He says:—

"The movement of language, law, and political and civil union, is for the most part in an opposite direction. In a savage country like Africa, speech is in a perpetual flux, and new dialects spring up with every swarm from the parent hive. In the civilized world the unification of language is rapidly proceeding."

Here two different ideas are involved—the evolution of a language considered singly, and the evolution of languages considered as an aggregate. Nothing which he says implies that any one language becomes, during its evolution, less heterogeneous. The disappearance of dialects is not a progress towards the homogeneity of a language, but is the final triumph of one variety of a language over the other varieties, and the extinction of them: the conquering variety meanwhile becoming within itself more heterogeneous. This, too, is the process which Mr. Leslie refers to as likely to end in an extinction of the Celtic languages. Advance towards homogeneity would be shown if the various languages in Europe, having been previously unlike, were, while still existing, to become gradually more like. But the supplanting of one by another, or of some by others, no more implies any tendency of languages to become alike, than does the supplanting of species, genera, orders, and classes of

animals, one by another, during the evolution of life, imply the tendency of organisms to assimilate in their natures. Even if the most heterogeneous creature, Man, should overrun the Earth and extirpate the greater part of its other inhabitants, it would not imply any tendency towards homogeneity in the proper sense. It would remain true that organisms tend perpetually towards heterogeneity, individually and as an assemblage. Of course if all kinds but one were destroyed, they could no longer display this tendency. Display of it would be limited to the remaining kind, which would continue, as now, to show it in the formation of local varieties, becoming gradually more divergent; and the like is true of languages.

In the next case Mr. Leslie identifies progressing unification with advance towards homogeneity. His words are:—

“Already Europe has nearly consolidated itself into a Heptarchy, the number of states into which England itself was once divided; and the result of the American War exemplifies the prevalence of the forces tending to homogeneity over those tending to heterogeneity.”

To this the reply is that these cases exemplify, rather, the prevalence of the forces which change the incoherent into the coherent—which effect integration. That is, they exemplify Evolution under its primary aspect. In the *Principles of Sociology*, Part II. chap. 3, Mr. Leslie will find numerous kindred cases brought in illustration of this law of Evolution. To which add that such integrations bring after them greater heterogeneity, not greater homogeneity. The divisions of the Heptarchy were societies substantially like one another in their structures and activities; but the parts of the nation which correspond to them, have been differentiated into parts carrying on varieties of occupations with entailed unlikenesses of structures—here purely agricultural, there manufacturing; here predominantly given to coal mining and iron smelting, there to weaving; here distinguished by scattered villages, there by clusters of large towns.

Again, it is alleged that an increasing homogeneity is shown in fashion. “Once every rank, profession, and district had a distinctive garb; now all such distinctions, save with the priest and the soldier, have almost disappeared among men.” But while for a reason to be presently pointed out, there has occurred a change which has abolished one order of differences, differences of another order, far more multitudinous, have arisen. Nothing is more striking than the extreme heterogeneity of dress at the present day. As Mr. Leslie alleges, the dresses of those forming each class were once all alike; now no two dresses are alike. Within the vague limits of the current fashion, the degree of variety in women’s costumes is infinite; and even men’s costumes, though having average resemblances, diverge from one another in colours, materials, and detailed forms in innumerable ways.

Other instances given by Mr. Leslie concern the organizations for carrying on production and distribution. He argues that—

“In the industrial world a generation ago a constant movement towards a differentiation of employments and functions appeared; now some marked tendencies to their amalgamation have begun to disclose themselves. Joint Stock Companies have almost effaced all real division of labour in the wide region of trade within their operation.”

Here, as before, Mr. Leslie represents amalgamation as equivalent to increase of homogeneity; whereas amalgamation is but another name for integration, which is the primary process in Evolution, and which may, and does, go along with increasing heterogeneity in the amalgamated things. It cannot be said that a Joint Stock Banking Company, with its proprietary and directors in addition to its officers, contains fewer unlike parts than does a private Banking establishment: the contrary must be said. A Railway Company has far more numerous functionaries with different duties, than had the one, or the many, coaching establishments it replaced. And then, apart from the fact that the larger aggregate of co-operators who, as a Company, carry on, say a process of manufacture, is more complex as well as more extensive; there is the fact, here chiefly to be noted, that the entire assemblage of industrial structures is, by the addition of these new structures, made more heterogeneous than before. Had all the smaller manufacturing establishments, carried on by individuals or firms, been destroyed, the contrary might have been alleged; but as it is, we see that in addition to all the old forms there have come these new forms, making the totality of them more multiform than before. Mr. Leslie further illustrates his interpretation by saying:—

“Many of the things for sale in a village huckster's shop were formerly the subjects of distinct branches of business in a large town; now the wares in which scores of different retailers dealt, are all to be had in great establishments in New York, Paris, and London, which sometimes buy direct from the producers, thus also eliminating the wholesale dealer.”

Replies akin to the preceding ones are readily made. The first is that wholesale dealers have not been at present eliminated; and cannot be so long as the ordinary shopkeepers survive, as they will certainly do. In the smaller places, forming the great majority of places, these vast establishments cannot exist; and in them, shopkeepers carrying on business as at present, will continue to necessitate wholesale dealers. Even in large places the same thing will hold. It is only people of a certain class, able to pay ready money and willing to go great distances to purchase, who frequent these large establishments. Those who live from hand to mouth, and those who prefer to buy at adjacent places, will maintain a certain proportion of shops, and the wholesale distributing organization needed for them. Again, we have to note that one of these great stores, such as Whiteley's or Shoolbred's, does not within itself display any advance

towards homogeneity or de-specialization; for it is made up of many separate departments, with their separate heads, carrying on businesses substantially separate—all superintended by one owner. It is nothing but an aggregate of shops under one roof instead of under the many roofs covering the side of a street; and exhibits just as much heterogeneity as the shops do when arranged in line instead of massed together. That which it really illustrates is a new form of integration, which is the primary evolutionary process. And then, lastly, comes the fact that the distributing organization of the country, considered as a whole, is by the addition of these establishments made more heterogeneous than before. All the old types of trading concerns continue to exist; and here are new types added, making the entire assemblage of them more varied.

From these objections made by Mr. Leslie which I have endeavoured to show result from misapprehensions, I pass to two others which are to be met by taking account of certain complicating facts liable to be overlooked. Mr. Leslie remarks that:—

“In the early stages of social progress, again, a differentiation takes place, as Mr. Spencer has observed, between political and industrial functions, which fall to distinct classes; now a man is a merchant in the morning and a legislator at night; in mercantile business one year, and the next perhaps head of the Navy, like Mr. Goschen or Mr. W. H. Smith.”

Nothing contained in this volume explains the seeming anomaly here exemplified; but any one who turns to a chapter in the second part of the *Principles of Sociology*, entitled “Social Types and Metamorphoses,” will there find a clue to the explanation of it; and will see that it is a phenomenon consequent on the progressing dissolution of one type and evolution of another. The doctrine of Evolution, currently regarded as referring only to the development of species, is erroneously supposed to imply some intrinsic proclivity in every species towards a higher form; and, similarly, a majority of readers make the erroneous assumption that the transformation which constitutes Evolution in its wider sense, implies an intrinsic tendency to go through those changes which the formula of Evolution expresses. But all who have fully grasped the argument of this work, will see that the process of Evolution is not necessary, but depends on conditions; and that the prevalence of it in the Universe around, is consequent on the prevalence of these conditions: the frequent occurrence of Dissolution showing us that where the conditions are not maintained, the reverse process is quite as readily gone through. Bearing in mind this truth, we shall be prepared to find that the progress of a social organism towards more heterogeneous and more definite structures of a certain type, continues only as long as the actions which produce these effects continue in play. We shall expect that if these actions

cease, the progressing transformation will cease. We shall infer that the particular structures which have been formed by the activities carried on, will not grow more heterogeneous and more definite; and that if other orders of activities, implying other sets of forces, commence, answering structures of another kind will begin to make their appearance, to grow more heterogeneous and definite, and to replace the first. And it will be manifest that while the transition is going on—while the first structures are dissolving and the second evolving—there must be a mixture of structures causing apparent confusion of traits. Just as during the metamorphoses of an animal which, having during its earlier existence led one kind of life, has to develop structures fitting it for another kind of life, there must occur a blurring of the old organization while the new organization is becoming distinct, leading to transitory anomalies of structure; so, during the metamorphoses undergone by a society in which the militant activities and structures are dwindling while the industrial are growing, the old and new arrangements must be mingled in a perplexing way. On reading the chapter in the *Principles of Sociology* which I have named, Mr. Leslie will see that the above facts referred to by him, are interpretable as consequent on the transition from that type of regulative organization proper to militant life, to that type of regulative organization proper to industrial life; and that so long as these two modes of life, utterly alien in their natures, have to be jointly carried on, there will continue this jumbling of the regulative systems they respectively require.

The second of the objections above noted as needing to be otherwise dealt with than by further explanation of the formula of Evolution, concerns the increase of likeness among developing systems of Civil Law; in proof of which increase of likeness Mr. Leslie quotes Sir Henry Maine to the effect that 'all laws, however dissimilar in their infancy, tend to resemble each other in their maturity:' the implication to which Mr. Leslie draws attention, being that in respect of their laws societies become not more heterogeneous but more homogeneous. Now though in their details, systems of Law will, I think, be found to acquire as they evolve, an increasing number of differences from one another; yet in their cardinal traits it is probably true that they usually approximate. How far this militates against the formula of Evolution, we shall best see by first considering the analogy furnished by animal organisms. Low down in the animal kingdom there are simple molluscs with but rudimentary nervous systems—a ganglion or two and a few fibres. Diverging from this low type we have the great sub-kingdom constituted by the higher Mollusca and the still greater sub-kingdom constituted by the Vertebrata. As these two types evolve, their nervous systems develop; and though in

the highest members of the two they remain otherwise unlike, yet they approximate in so far that each acquires great nervous centres: the large cephalopods have clustered ganglia which simulate brains. Compare, again, the Mollusca and the Articulata in respect of their vascular systems. Fundamentally unlike as these are originally, and remaining unlike as they do throughout many successive stages of ascent in these two sub-kingdoms, they nevertheless are made similar in the highest forms of both by each having a central propelling organ—a heart. Now in these and in some cases which the external organs furnish, such as the remarkable resemblance Evolution has produced between the eyes of the highest Mollusca and those of the Vertebrata, it may be said that there is implied a change towards homogeneity. No zoologist, however, would admit that these facts really conflict with the general law of Organic Evolution. As already explained, the tendency to progress from homogeneity to heterogeneity is not intrinsic but extrinsic. Structures become unlike in consequence of unlike exposures to incident forces. This is so with organisms as wholes, which, as they multiply and spread, are ever falling into new sets of conditions; and it is so with the parts of each organism. These pass from primitive likeness into unlikeness, as fast as the mode of life places them in different relations to actions—primarily external and secondarily internal; and with each successive change in mode of life new unlikenesses are superposed. One of the implications is that if in organisms otherwise different, there arise like sets of conditions to which certain parts are subject, such parts will tend towards likeness; and this is what happens with their nervous and vascular systems. Duly to co-ordinate the actions of all parts of an active organism, there requires a controlling apparatus; and the conditions to be fulfilled for perfect co-ordination, are conditions common to all active organisms. Hence, in proportion as fulfilment approaches completeness in the highest organisms, however otherwise unlike their types are, this apparatus acquires in all of them certain common characters—especially extreme centralization. Similarly with the apparatus for distributing nutriment. The relatively high activity accompanying superior organization, implies great waste; great waste implies active circulation of blood; active circulation of blood implies efficient propulsion; so that a heart becomes a common need for highly evolved creatures, however otherwise unlike their structures may be. Thus is it, too, with societies. As they evolve there arise certain conditions to be fulfilled for the maintenance of social life; and in proportion as the social life becomes high, these conditions need to be more effectually fulfilled. A legal code expresses one set of these conditions. It formulates certain regulative principles to which the conduct of citizens must conform that social activities may be harmoniously carried on. And these



regulative principles being in essentials the same everywhere, it results that systems of Law acquire certain general similarities as the most developed social life is approached.

These special replies to Mr. Leslie's objections are, however, but introductory to the general reply; which would be, I think, adequate even in their absence. Mr. Leslie's method is that of taking detached groups of social phenomena, as those of language, of fashion, of trade, and arguing (though as I have sought to show, not effectually) that their later transformations do not harmonize with the alleged general law of Evolution. But the real question is, not whether we find advance to a more definite coherent heterogeneity in these taken separately, but whether we find this advance in the structures and actions of the entire society. Even were it true that the law does not hold in certain orders of social processes and products, it would not follow that it does not hold of social processes and products in their totality. The law is a law of the transformation of aggregates; and must be tested by the entire assemblages of phenomena which the aggregates present. Omitting societies in states of decay and dissolution, which exhibit the converse change, and contemplating only societies which are growing, Mr. Leslie will, I think, scarcely allege of any one of them that its structures and functions do not, taken altogether, exhibit increasing heterogeneity. And if, instead of taking each society as an aggregate, he takes the entire aggregate of societies which the Earth supports, from primitive hordes up to highly civilized nations, he will scarcely deny that this entire aggregate has been becoming more various in the forms of societies it includes, and is still becoming more various.

Criticism would be greatly diminished in bulk if there were excluded from it all that part devoted to disproving statements which have not been made; and were this course pursued, the work *On Mr. Spencer's Formula of Evolution*, by Malcolm Guthrie, would disappear bodily. It is little else than a mis-statement of certain fundamental views of mine, and then an elaborate refutation of the views as mis-stated.

Let me first show by brief extracts from *First Principles* what these views are. In a chapter on "Ultimate Scientific Ideas," after showing how the hypothesis that matter consists of solid atoms commits us to alternative impossibilities of thought, I have shown how the hypothesis of Boscovich, that matter consists of centres of force without extension, is unthinkable. In the course of the argument I have pointed out that though Boscovich's hypothesis cannot be realized in thought, yet, on the other hand, the hypothesis of extended atoms itself implies an imaginary separableness of each atom into parts, and again of these into parts, and so on without

limit until unextended centres of force are reached: the consciousness of force being that which alone perpetually emerges. And I have ended by saying that "Matter then, in its ultimate nature, is as absolutely incomprehensible as Space and Time." In the second part of the work, in chapters treating of "The Indestructibility of Matter," "The Continuity of Motion," and "The Persistence of Force," I have at some length elaborated the view that Force is the ultimate component of thought into which our conceptions of external existences are resolvable. Summing up the first of these chapters I have said—"thus, then, by the indestructibility of matter, we really mean the indestructibility of the *force* with which matter affects us." At the close of the second of these chapters I have argued that "the continuity of motion, as well as the indestructibility of matter, is really known to us in terms of *force*" . . . "that which defies suppression in thought, is really the force which the motion indicates." And then in the third chapter, having shown how the truths that matter is indestructible and motion continuous, can be known to us only as corollaries from the truth that force is persistent—that force is that "out of which our conceptions of Matter and Motion are built"—I have gone on to say that "by the Persistence of Force, we really mean the persistence of some Power which transcends our knowledge and conception." Throughout all which arguments the implication is that I hold Matter and Motion to be conditioned manifestations of this unknown Power. Being aware of the perversity of critics, I have, in the "Summary and Conclusion," again endeavoured to bar out misinterpretations. Here is one of the sentences it contains:—

"Over and over again it has been shown in various ways, that the deepest truths we can reach, are simply statements of the widest uniformities in our experience of the relations of Matter, Motion, and Force; and that Matter, Motion, and Force are but symbols of the Unknown Reality. A Power of which the nature remains for ever inconceivable, and to which no limits in Time or Space can be imagined, works in us certain effects. These effects have certain likenesses of kind, the most general of which we class together under the names of Matter, Motion, and Force."

In which sentences it is distinctly stated that I have throughout regarded Matter under the form present to consciousness, as a *symbol*—a certain conditioned *effect* wrought in us by the Unknown Power; and I have gone on to say that "the interpretation of all phenomena in terms of Matter, Motion, and Force, is nothing more than the reduction of our complex symbols of thought, to the simplest symbols; and when the equation has been brought to its lowest terms the symbols remain symbols still."

It will scarcely be believed, and yet it is true, that notwithstanding all this, Mr. Guthrie ascribes to me the vulgar conceptions of Matter and Motion; argues as though I really think they are in

themselves what they seem to our consciousness; and proceeds to criticize my views on this assumption. He ignores the conspicuous fact that Matter and Motion are both regarded by me as modes of manifestation of Force, and that Force as we are conscious of it when by our own efforts we produce changes, is the correlative of that Universal Power which transcends consciousness. And then he ends the criticisms forming the second part of his work by saying "if this is not materialistic I do not know what is." He does not do this by inadvertence, though there would be little excuse even then; but he does it deliberately and with his eyes open. His next chapter begins:—

"It will have been observed that in the preceding part of this criticism I have employed the term 'matter in motion,' and have avoided the use of the word 'force,' although it appears so prominently in the pages of Mr. Spencer's work. This has not been accidental, but by design, indicating as it does one of my main criticisms of Mr. Spencer.

I can logically take up one of two positions. The first recognises matter, whose properties are merely those of extension, which are capable of being described in terms of geometry and arithmetic. I can also recognise as the sole active properties of matter its modes and rates of motion—the motion, that is to say, of ultimate units, atoms, molecules, or masses, also capable of measurement.

The second position recognises matter and its activity or activities—matter as endowed with force or forces."

Thus it will be observed that having avowedly dealt with Matter and Motion as modes of Force, I am "by design" criticized as though I had not so dealt with them. Having distinctly said what I mean by Matter and Motion, I am practically told that I shall not mean that, but shall mean what Mr. Guthrie means; and shall be dealt with accordingly. And then, further, it will be observed that of the two positions which Mr. Guthrie lays down as possible, and proceeds to argue upon as alternatives, one or other of which I must accept, both speak of Matter and units of Matter as though actually existing under the forms thought by us; and the last, speaking of "matter as endowed with force or forces," implies that whether in mass or in units, Matter is a space-occupying something which is in the one case inert and the other case made active by force with which it is "endowed"—force which is added to the inert something. Spite of all the pains I have taken to show that I regard Matter as *itself* a localized manifestation of Force—spite of all the evidence that our idea of a unit of Matter, or atom, is regarded by me simply as a symbol which the form of our thought obliges us to use, but which we cannot suppose answers to the reality without committing ourselves to alternative impossibilities of thought; I am debited with the belief that Matter actually consists "of space-occupying units, having shape and measurement." Though I have repeatedly made it clear that our ideas of Matter, Motion and Force are but the  $x$ ,  $y$ , and  $z$  with

which we work our equations, and formulate the various relations among phenomena in such way as to express their order in terms of  $x$ ,  $y$  and  $z$ —though I have shown that the realities for which  $x$ ,  $y$  and  $z$  stand, cannot be conceived by us as actually existing thus or thus without committing ourselves to alternative absurdities; yet questions are put implying that I must hold one or other hypothesis concerning these actual existences, and I am supposed to be involved in all the difficulties which arise.

Another work devoted to the refutation of my views, is that of Professor Birks,—*Modern Physical Fatalism and the Doctrine of Evolution, including an examination of Mr. H. Spencer's First Principles*. Having dealt with the work of Mr. Guthrie, I cannot pass by that of Prof. Birks without raising the suspicion that I find some difficulty in dealing with it. Indeed, I do find a difficulty,—a difficulty illustrated by that found in disentangling a skein of silk which has been pulled about by a child for half an hour. And just as the patience of a bystander would fail were he asked to look on until, by unravelling the tangled skein, its continuity was proved; so would the reader's attention be exhausted before I had rectified one-tenth part of the meshes and knots into which Prof. Birks has twisted my statements.

Abundant warrant for this assertion is furnished by the very first paragraph succeeding the one in which Prof. Birks announces that he is about to take *First Principles* as representative of the "fatalistic theory." In this paragraph he represents me as asserting that ultimate religious ideas are "incapable of being conceived." He further says that ultimate scientific ideas are by me "pronounced equally inconceivable." Now any clear-headed reader who accepted Prof. Birks' version of my views, would be led to debit me with the absurdity of saying that certain things which are put together in consciousness (ideas) cannot be put together in consciousness (conceived). To conceive is to frame in thought; and as every idea is framed in thought, it is nonsense to say of any idea that it cannot be conceived—nonsense which I have nowhere uttered. My statement is that "Ultimate Scientific Ideas, then, are all representative of realities that cannot be comprehended;" and the like is alleged of ultimate religious ideas. The things which I say cannot be comprehended or conceived, are not the *ideas*, but the *realities* beyond consciousness for which the ideas in consciousness stand. In Professor Birks' statement, however, inconceivableness of the realities is transformed into inconceivableness of the answering ideas! Further, at the end of this first paragraph which deals with me, I am represented as teaching that religion "is equivalent to Nescience or Ignorance alone." This statement is as far removed from the truth as the others. I have argued at considerable length, and in such

various ways that I thought it impossible to misunderstand me, that though the Power universally manifest to us through phenomena, alike in the surrounding world and in ourselves,—the Power “in which we live and move and have our being,”—is, and must ever remain, inscrutable; yet that the existence of this Inscrutable Power is the most certain of all truths. I have contended that while, to the intellectual consciousness, this Power, though unknowable in nature, must be ever present as existing, it must be, to the emotional consciousness, an object to the sentiment we call religious; since, in substance if not in form, it answers to the creating and sustaining Power towards which the religious sentiment is in other cases drawn out. Yet though in the most emphatic way I have represented this unknown and unknowable Power as the object-matter of religion, Prof. Birks represents me as saying that the unknowableness of it is the object-matter of religion! Though I hold that an Ultimate Being, known with absolute certainty as existing, but of whose nature we are in ignorance, is the sphere for religious feeling; he says I hold that the ignorance alone is the sphere for religious feeling!

When in the first sixteen lines specifically treating of my views, these three cases occur, it may be imagined what an intricate plexus of misrepresentations, misunderstandings, and perversions, fills the three hundred and odd pages forming the volume. Especially may it be anticipated that the metaphysical discussions, occupying five chapters, are so confused that it is next to impossible to deal with them. I must limit myself to giving a sample or two from this part of the work: one of them illustrating Prof. Birks' critical fairness, and the other his philosophic capacity.

In his chapter on “The Reality of Matter,” he says (page 111) “The sense of reality in things around us, Mr. Spencer has truly said, is one which no metaphysical criticisms can shake in the least;” and the rest of the paragraph is devoted to enlarging upon this proposition. The next paragraph begins—“‘Permanent possibilities of sensation’ is merely an ingenious phrase, to disguise and conceal a self-contradiction:” sundry antagonistic criticisms upon this phrase being appended. And then the opening words of the paragraph which succeeds are quoted from *First Principles*. Now since the refutation of my views is the aim of the work; and since both the preceding and succeeding passages specifically refer to my work; and since no other name is mentioned; every reader, not otherwise better instructed, will conclude that as a matter of course the phrase “permanent possibilities of sensation” is mine; and that the criticisms upon it tell against me. Even were there evidence that this phrase “permanent possibilities of sensation,” expressed, or harmonized with, a doctrine entertained by me; yet as the phrase is not mine, the quoting it as mine would have been a

literary misdemeanour. What then must be said of it when, instead of standing for any view of mine, it stands for an opposite view? Mr. Mill's expression, quoted by Prof. Birks as though it were my expression, belongs to a theory of knowledge entirely at variance with that set forth and everywhere implied in *First Principles*; and a theory which, where the occasion was fit, I have persistently combated (see *Principles of Psychology*, Part VII. "General Analysis"). And yet Prof. Birks tacitly makes me responsible for the incongruities which result from uniting this theory with the opposed theory.

From this sample of critical truthfulness let us pass now to a sample of critical acumen.

In arguing against Hamilton and Mansell in § 26, I have said "It is rigorously impossible to conceive that our knowledge is a knowledge of appearances only, without at the same time conceiving a Reality of which they are appearances; for appearance without reality is unthinkable." On page 121 of his work, Prof. Birks, quoting the last five words of this sentence, continues—"This is true, when once the conception of distance has been gained by actual experience." And he then proceeds to comment upon visual impressions, illusive and other. Again on page 135, when criticizing my argument concerning the indestructibility of matter, Prof. Birks says:—

"Matter, as knowable, is declared to be not the unseen reality, but the sensible appearances, or phenomenal matter alone. Phenomenal matter, it appears from daily and hourly experience, appears and disappears, perishes and is new-created continually. . . . The cloud vanishes, the star sets, or a mist blots it out, the drop evaporates, the ship melts into the yeast of waves, the candle is burnt away and comes to an end. The substance may last in another form, but the phenomenon or appearance is gone. . . . Thus, by the theory, of Matter, the Noumenon, we know nothing, and therefore cannot know that it is indestructible. Of Matter, the Phenomenon, we may know much. And one main thing we know of it, proved by hourly experience, is that it both may be and continually is destroyed. For an appearance is destroyed and perishes, when it ceases to appear."

In which sentences, as in all accompanying sentences covering several pages, the implication is that Prof. Birks identifies appearance in the philosophical sense with appearance in the popular sense! Everywhere his expressions and arguments make manifest the fact that Prof. Birks thinks the meaning of phenomenon in metaphysical discussion, is no wider than that implied by its derivation—something visible! Sounds, smells, tastes, are in his view not phenomena; nor are touches, pressures, tensions. And hence it results that since when a pound of salt is dissolved in water it ceases to be visible, its existence, phenomenally considered, ends: its continued power of affecting our senses by its weight, to the same extent as before the solution, not being considered as a phenomenal manifestation of its existence!

In § 46, when commenting on the mental confusion which metaphysical discussions often produce, I have ascribed this in part to the misleading connotations of the words "appearance" and "phenomenon;" and after illustrating this have said:—

"So that the implication of uncertainty has infected the very word *appearance*. Hence, Philosophy, by giving it an extended meaning, leads us to think of all our senses as deceiving us in the same way that the eyes do; and so makes us feel ourselves floating in a world of phantasms. Had *phenomenon* and *appearance* no such misleading associations, little, if any, of this mental confusion would result. Or did we in place of them use the term *effect*, which is equally applicable to all impressions produced on consciousness through any of the senses, and which carries with it in thought the necessary correlative *cause*, with which it is equally real, we should be in little danger of falling into the insanities of idealism."

This caution was intended for the general reader. That it might be needed by one who should undertake to deal with the work critically, never occurred to me. Not only, however, does it seem that Prof. Birks (who quotes the last three words of the paragraph) needs such a caution, but it further seems that the caution is thrown away upon him. For just those misinterpretations of the words above pointed out, are the misinterpretations he makes. After this I shall, I think, be absolved from examining further his metaphysical criticisms.

Of his criticisms upon various of the physical doctrines which this work contains, I will notice two only—the one because I wish to repudiate a view which, spite of abundant evidence to the contrary, he ascribes to me; and the other because, based as his statement is on a fact which he misinterprets, it is desirable to give the right interpretation of it. On page 188, Prof. Birks says:—

"The Essence of the doctrine held by Mr. Grove, Dr. Tyndall, and Mr. Spencer, and which the last has made the foundation of his whole theory of Physical Fatalism, is that there is, every moment, an unchanging total of Force, which never varies in amount, while it incessantly changes its form. The Force, then, which persists, must be a present existence. But Potential Energy is nothing of the kind. It is the sum of trillions of trillions of future possibilities of force, ranging through trillions of trillions of different future intervals of time."

Now the tacit implication here is, that I accept the doctrine of Potential Energy. The men of science named, with many others who might be added, hold that the total quantity of force remains constant. Against these it is urged that energy in becoming potential, ceases to exist; and that therefore the doctrine is untrue. And being represented as holding this doctrine in common with them, I am said to have based my general fabric of conclusions upon a fallacy. In the first place I have to ask on what authority Prof. Birks assumes that I hold the doctrine of Potential Energy in the way in which it is held by those named? And in the second place I have to ask how it happens that Prof. Birks, elaborately criticizing

my views step by step, deliberately ignores the passages in which I have repudiated this doctrine? In the chapter on "The Continuity of Motion," I have, at considerable length, given reasons for regarding the conception of Potential Energy as an illegitimate one; and have distinctly stated that I am at issue with scientific friends on the matter. Devoting, as Prof. Birks does, his chapter entitled "The Transformation of Force and Motion," to the incongruities which result when the doctrine of the Persistence of Force is joined with the doctrine of Potential Energy, as commonly received, it was doubtless convenient to assume, spite of the direct evidence to the contrary, that I accept this doctrine, and am implicated in all the consequences. But there can be but one opinion respecting the honesty of making the assumption. Let me add that my rejection of this doctrine is not without other warrant than my own. Since the issue of the last edition of this work, containing the passages I have referred to, Mr. James Croll, no mean authority as a mathematician and physicist, has published in the *Philosophical Magazine* for Oct., 1876, p. 241, a paper in which he shows, I think conclusively, that the commonly accepted view of Potential Energy cannot be sustained, but that energy invariably remains actual. I learn from him that he had in 1867 indicated briefly this same view.

The remaining case, above adverted to as calling for comment, concerns my motive for suppressing a certain passage in the chapter on "Ultimate Scientific Ideas," and substituting another passage. Before proceeding to state the reasons for this substitution, and to disprove the inferences which Prof. Birks draws from it, I may remark that it is usual in literary criticism to judge an author by the latest expression of his views. It is commonly thought nothing but fair that if he has made an error (I say this hypothetically, for in this case I have no error to acknowledge) he should be allowed the benefit of any correction he makes. Prof. Birks, however, apparently thinks that, moved by the high motive of "doing God service," he is warranted in taking the opposite course—perhaps thinks, indeed, that he would fail of his duty did any regard for generous dealing prevent him from making a point against an opponent of his creed.

But now, saying no more about the ethics of criticism, I pass to the substantial question. In the first place, I have to point out that in the passage suppressed I have not said that which Prof. Birks alleges. He represents me as asserting "that gravitation is a necessary result of the laws of space" (p. 227). I have asserted no such thing. He says "There can be no *à priori* necessity that every particle should act on every other at all at every distance" (p. 222). I have nowhere said, or even hinted, that there is any such *à priori* necessity. The notion "that gravitation results by a fatal necessity from the laws of space," which he ascribes to me (p. 229)



is one which I should repudiate as utterly absurd, and one which is not in the remotest way implied by anything I have said. What I have said is that "Light, Heat, Gravitation, and all central forces, vary inversely as the squares of the distances," and that "this law is not simply an empirical one, but one deducible mathematically from the relations of space." Now what is here said to be "deducible mathematically from the relations of space?" Not a thing, or a force, but a *law*. What is the law here said to be knowable *à priori*? The *law of variation* of any or every central force. And what is alone included in the assertion of this *à priori* law? Simply this, that *given* a central force and such is the law according to which it will vary. Nothing is alleged respecting the existence of any central force. Does Prof. Birks contend that if I say that light, proceeding from a centre, necessarily varies inversely as the square of the distance, I thereby say that the existence of light itself is known *à priori* as a result of space relations? When I assert that of the heat radiating in all directions from a point, the quantity falling on a given surface necessarily decreases as the square of the distance increases, do I thereby assert the necessary existence of the heat which conforms to this law? Why then do I, in asserting that the *law of variation* of gravity "results by a fatal necessity from the laws of space" simultaneously assert "that gravitation results by a fatal necessity from the laws of space?" Prof. Birks, however, because I assert the first says I assert the second. My proposition—Central forces vary inversely as the squares of the distances, he actually transforms into the proposition—There is a cosmical force which varies inversely as the squares of the distances. And debiting me with the last as identical with the first, proceeds, after his manner, to debit me with various resulting absurdities.

Having thus shown that the passage in question contains no such statement as that which Prof. Birks says it contains, I go on to show that I have not removed this passage because I have abandoned the belief it embodies. Clear proof is at hand. If Prof. Birks will turn to the "Replies to Criticisms," contained in the third volume of my *Essays: Scientific, Political and Speculative*, (pp. 334-337) he will find that I have there defended the above proposition against a previous attack; and assigning, as I have done, justification for it, I have shown no sign of relinquishing it. Why, then, Prof. Birks will ask, did I make the change in question? Had his mental attitude been other than it is, he might readily have divined the reason. Knowing, as he seemingly does, that this doctrine which he criticizes had been already criticized in a similar manner (for otherwise he would scarcely have discovered the change I have made), he might have seen clearly enough that the passage was suppressed simply to deprive opponents of the

opportunity of evading the general argument of the chapter by opening a side issue on a point not essential to its argument.

The chapter has for its subject, certain incapacities of the human mind—a subject, by the way, on which theologians are never tired of enlarging when it suits their own purpose, but on which an antagonist may not enlarge without exciting their anger. Various examples of these incapacities are given, to justify and enforce the conclusion drawn. Among these was originally included the example in question. Misrepresenting it as Prof. Birks misrepresents it, another writer had before him similarly based on his misrepresentation sundry animadversions. Though still regarding the statement I had actually made (not the one ascribed to me) as valid, I concluded that it would be best to remove the stumbling-block out of the way of future readers; and therefore decided to replace the illustration by another. The rest of the chapter remains exactly as it was, and its argument is not in the remotest degree affected by this substitution. Nevertheless, Prof. Birks, wrongly describing the nature of the illustration, and wrongly attributing the removal of the illustration to change in my belief, also wrongly conveys the impression that the doctrine which the illustration contained had some vital connection with the general argument of the chapter and with the doctrine of the work; and by conveying this impression calls forth exultation from religious periodicals.

Were I to deal with Prof. Birks' book page by page, a much larger book than his would be required to expose his mis-statements, perversions, confusions. The above examples must suffice. I will add only that in one belief of his I cordially agree with him. At the close of his preface he says—"I think that those who take the pains to read my strictures, and compare them with the statements of the work to which they are a reply, will find the effort repaid by a clearer apprehension of the topics in debate." And I venture to join with this the expression of my belief that if readers follow Prof. Birks' tacit suggestion, "a clearer apprehension of the topics in debate" will not result from acceptance of his criticisms.

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