surpassing those of radio-activity—lie in the womb of time, they will not affect the contention that Spencer's synthesis of knowledge was the most comprehensive and complete—was final, not as foreclosing his scheme of the Universe against future advances of knowledge, but as the fullest and grandest generalization of the knowledge of his day. It was a *contribution* towards a settlement, not a closing of the account. In this sense, his permanent place is assured for all time. In the history of the progress of the human mind, the Synthetic Philosophy will be an enduring landmark. Men's ways of looking at things will never be what they would have been had he not written. Henceforth it will be "impossible thoroughly to pursue any kind of enquiry without being confronted by his ideas." "No man of the present time," said Rev. J. Minot Savage, of Boston, the Sunday after Spencer's death, "can discuss any one of the great problems of the world . . . without dealing with Herbert Spencer. He has got to agree with him or fight him: he cannot ignore him." What influence more permanent than this could any man have?[1]

In addition to his rare gifts for co-ordinating and systematizing the scientific conceptions of his day, Spencer possessed an unrivalled power of stimulating and directing others. To lead men to think for themselves—to suggest paths of inquiry at the end of which may lie a great truth—to direct a searchlight on the road to be traversed—surely these are attributes of the highest power. Sir Andrew Clark was wont to say that when feeling intellectually limp he was in the habit of turning to Spencer's writings, the bracing effect of which he seldom failed to experience. The suggestiveness of his ideas was freely acknowledged in his lifetime. From the American ranch, the Australian bush, and the South African veldt—from those who go down to the sea in ships—from countrymen and from foreigners—from men and women in humble walks of life as well as from those in exalted station—came to him grateful acknowledgments of stimulus and guidance received from his writings. And who can tell the number of those who unconsciously by his thoughts have had their

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[1] Compare Lord Courtney's address, chap. xxviii., p. 479.

own thoughts made broader and clearer, and their lives turned into the path of new endeavour ?

We are as yet too near him to form a true estimate of his greatness. This is partly due to the fact that the details of his personality obscure the grandeur of its outlines—that the superficial and immediate effects of his work prevent us from estimating its deep and remote effects. Partly, it is the result of the very success of his teaching, which, having permeated our thought and speech, gives the impression that many of his utterances are platitudes, truisms, common-places. His ideas and his ways of looking at things have become part of the intellectual atmosphere we breathe—have become embedded in the language we speak. The value of his teaching will be rightly appreciated only by future generations. What Professor Theodor Gomperz says of Plato, may be said of Spencer :—

> An intellect of the first order, having found and selected the elements of a world-theory, will combine and develop them in such manner as may best accord with its own powerful and strongly marked individuality, and, for this very reason, there will be small prospect of gaining the adherence, within a short interval, of any very extensive section of society. At the same time, such an intellect, out of the abundance of its wealth, will exert an influence upon many later generations, with which it will continually present new points of contact, and thus upon the intellectual life of mankind at large.[1]

To posterity Spencer's reputation as a thinker may with confidence be left.

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[1] Theodor Gomperz's *Greek Thinkers* (translated by G. G. Berry), ii., 245.

APPENDICES.

NOTE.—*The two following Appendices* [A and B] *being written in the first person, apparently belong to the* Autobiography, *and in a sense do so. The explanation of their appearance here is that the* Autobiography *was finished and stereotyped ten years before the first of them was written, and that now to incorporate them would involve a re-arrangement of the plates, which would be troublesome and costly. Hence I have thought it best to leave them to be used by my biographer. The use of the first person instead of the third will, after this explanation, cause no misapprehension.*

[*March, 1903.*] H. S.

APPENDIX A.

PHYSICAL TRAITS AND SOME SEQUENCES.[1]

YEARS ago I met with the remark that biographers do not adequately describe the physical traits of the men whose lives they write. Something is usually said about external appearance; but little or nothing is said about constitution. Both sets of characters should have their places, since both are factors in a man's career. Recognition of this truth has decided me to set down such memoranda concerning my physical nature as seem significant.

Already in the Autobiography I have named the fact that my ultimate height was 5 feet 10 inches: and I think I have remarked that during boyhood I was unusually long-legged. Probably my ability to outrun my school-fellows was due to this trait of structure. . . . On approaching manhood a much greater rate of growth, reaching three inches a year, was, I suppose, due to the more rapid development of the trunk. Eventually the proportions were not far from the normal, though I think the chest was not so large as was needed for a complete organic balance. Like my father and mother, and like all my grandparents, I was "spare," not to say thin. Indeed, the fact that throughout adult life my weight was usually a little over 10 stone implies this thinness, for the normal weight for a man of 5 feet 10 inches is something like a stone greater. I should add that my limbs when fully developed were somewhat slighter than usual, my hands especially being small —too small for a man.

A life's experience has proved my constitutional strength to have been good if not great. There have come round to me reports respecting my feebleness in infancy—feebleness said to have been such that it was doubtful whether I should be reared. I know no warrant for such reports. It is true that my father would not have my brain taxed by early lessons; but beyond this interdict I can remember no evidence. I was allowed to run wild and was freer from children's disorders than is usual.

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[1] Written in the autumn of 1902.

Something should be said respecting complexion. My hair was brown, leaning rather towards a darker than a lighter shade. A moderate amount of colour in the cheeks was characteristic. I had neither that parchment-complexion which goes along with the strongest constitutions (contrary to common notions) nor that high colour which is popularly thought a sign of abounding health. And here seems the fittest place to remark that during middle and later life I changed very little. In advanced years the usual remark was that I looked ten years younger than I actually was. There were, I think, three causes for this. It was said of me, after the publication of *Social Statics*, that my forehead did not bear any of those lines of thought which were to be expected. The absence of such lines has remained a trait down almost to the present time. As before explained, my thinking has not been forced but spontaneous ; and, as a consequence, the face has not been drawn into furrows expressing strenuous mental action. A second cause is, I believe, that as my strong eyes never shrank from any light however bright, there was not induced that wrinkling up of the corners of the eyes which reflex efforts to shut off part of the light cause ; and, consequently, there has not been so marked a production of "crow's feet." And then, in the third place, I have retained up to the present time all my teeth. Where the crowns have decayed the roots have been left, and there has not been produced the usual sinking in of the cheeks from lack of the support which the gums normally yield. This has enabled the face to retain its contour in a much greater degree than usual.

Until the time of my nervous breakdown, I had good health. My constitution appears to have been not strong in the sense of possessing overflowing vigour, but strong in the sense of having a good balance. All through life, in late days as in early days, my state of body and mind has been equable. There have never been any bursts of high spirits and times of depression ; but there has ever been a flow of energy moderate in amount, but sufficient for the purposes of life.

One consequence has been that I have preserved down to late life a love of amusements of all kinds. I never fell into that state of indifference which characterizes many. Concerts and theatres continued to be attractions until my broken health forbade attending them : a good drama being to the last, as at first, one of the greatest pleasures which life yields. Certain sports, too, as salmon and sea-trout fishing, retained their attraction until my strength failed. To friends who have lost liking for other pursuits than work, I have often insisted that it is a mistake, even from a business point of view, to give up amusements ; since, when disturbance of health has made a holiday imperative, there remains no means of passing the time with satisfaction. "Be a boy as long as you can," was the

maxim which I reiterated. Games, too, I played as long as physical powers allowed. Above all I continued to enjoy the country ; my sojourn in which every summer was looked forward to as the great gratification of the year. How fully I entered into its concomitant pleasures may be judged from the fact that I went picnicking when over eighty.

Being moderate in amount, my flow of energy was never such as prompted needless activities. There are men whose fulness of life necessitates some kind of action—purposeless action, if no other. This was never so with me. Contrariwise, I tended always to be an idler. Action resulted only under the prompting of a much-desired end, and even then it was with some reluctance that I worked at things needful for achieving the end.

I emphasize this trait since it is so utterly at variance with the trait commonly ascribed to me. On looking at the series of my books, and at the amount of material brought together in them, as well as the thinking shown, it appears to be a necessary implication that I have been a hard worker. The inference is quite wrong, however. In the first place, that which I have done has been done only under pressure of a great object : and even under that pressure it has been done with a very moderate activity. It is true that activity in thinking was constant ; and it was partly the pleasure of thinking (which in boyhood took the form of " castle-building," and in later life higher forms) which put a constant check upon action. Probably this trait did much towards shaping my career. Had I been energetic there would not have arisen those quiet contemplations, carried on irregularly and at first without definite aims, which led to the work I have done.

One of the traits of a constitution which, though not vigorous, was organically good, appears to have been a well-finished development of the structures which arise out of the dermal system. I was thirty-two before I had any sign of decay of teeth. I never had a tooth taken out or stopped. Of the eyes, which are also dermal structures, the like may be said. They have all through life remained strong. Down even to my present age (eighty-two) I read without spectacles ; sometimes putting on a pair, but finding the inconvenience such that, on the whole, I prefer to do without them. I may add that I have, until quite recently, rejoiced in a strong light. That dislike to a glare which many people betray, even in their early years, I have rarely if ever felt. The like holds with the ears. Those around me say that my hearing is perfect. Is there any significance in this perfection and long endurance of teeth, eyes, and ears, all of them developed from the dermal layer ? The implication seems to be that in the process of development there was no failure of nutrition at the periphery.

Part of my motive for setting down the foregoing facts has been that of introducing certain incidents and the effects they probably had on my constitution and career.

First of all there is the achievement in walking when thirteen, as narrated in my *Autobiography* [i., 95]. I have I think expressed the belief that, notwithstanding the passage through this constitutional strain without apparent damage, yet some damage was done. That such a long-continued exertion was possible at that age is strange ; and it was, I think, impossible that it could have been gone through without leaving certain imperfect developments of structure.

[After the visit to Switzerland] came the breakdown in health caused by writing the *Principles of Psychology*. If, as above inferred, the vascular system at large, and more especially its central organ, had been injured, it seems an implication that the collapse which occurred under this moderate stress of work would not otherwise have taken place. From that time onwards throughout the rest of my life I have never had a sound night. Always my sleep, very inadequate in quantity, has been a succession of bits : not the broken sleep resulting from an occasional turning over while half awake, but having frequent breaks with no sense of sleepiness, and long intervals with no sleep at all. Always I dropped off without preliminary sense that I was about to do so, and always when I woke I was broad awake. Only during recent years (say after seventy-five) have I approached the normal state, in so far as that is indicated by feeling sleepy before going to sleep and after waking.

I have said that for eighteen months I did nothing. Even reading a column of a newspaper brought on a sensation of fulness in the head ; and when, in the winter of 1856-7, I at length undertook to write the article on "Progress : its Law and Cause," the effort entailed was very trying. Still the result was beneficial, and from that time onwards, little by little, I resumed work.

It seems strange that with this nervous disability, accompanied by nights of three, four, or five hours sleep made up of many parts, I should have maintained what seemed to be good health. There was no failure of muscular strength. My usual practice was to run up three flights of stairs two steps at a time, and I remember noting that this habit remained easy to me on my sixtieth birthday. The essential cause was that my digestion remained good. Throughout preceding life I had never been to any extent troubled by dyspepsia, and this eupeptic state continued onwards after my break-down. The first indication of any lack of full digestive power was that, when forty, I found veal at a late dinner was no longer desirable. From that time onwards there has been no kind of food which I have avoided on the ground of indigestibility : my diet even down to this late

period including dishes which many people in middle life would shrink from. Of course the ability to obtain a good supply of blood has gone far towards compensating for the evils entailed by bad nights. Repair of the tissues goes on during waking hours as well as during sleep ; and sleep serves simply to give opportunity for making up *arrears* of repair and, especially, to give extra opportunity for repair to the heart. Hence it results that a comparatively small amount of sleep with good blood well circulated suffices—suffices better than a long sleep with a slow circulation and poor blood.

A partial ability to continue my work was the consequence. All through the period during which the *Synthetic Philosophy* was in hand, there was never any lack of power to think, and never any reluctance to think. Though my working time was so limited in duration (being checked by the rise of sensations in the head and a consciousness that mischief would result from perseverance) yet during this abridged period the process of dictating was in no degree restrained by a sense of effort or of disinclination ; and had I not known that disaster would follow I should have been ready to resume in the afternoon. The constitution had adjusted itself to the abnormal conditions, and the functions of all kinds went on within the prescribed bounds without apparent strain.

It is a question of some interest whether the state of things was injurious or otherwise to my work. Of course had I not lived beyond the usual age, part of it would have remained undone ; but having lived long enough to complete it (or all but a non-essential part of it), it seems possible that the slow rate of progress, giving opportunity for more quiet thinking than there would have been had I worked at the ordinary rate, was beneficial.

Thus far the accounts of my physical nature and of the incidents which profoundly affected it, have concerned the part of my life which extended to 1882. Then there came an incident, further illustrating the rashness I have described and leaving no benefit but only enormous evil. I refer to the initiation of the Anti-Aggression League, and the effects produced on my health.

Up to that time I had abided by my resolution not to enter into any public activity ; knowing that my state of brain was one which forbade any stress. But now the interest I felt in resisting our filibustering actions was such as to over-ride my resolution. Not that I thought of joining in a continued agitation. I thought that after the League had been set afloat I might retire, and assist only by name and money.

And now there began to be shown in more manifest ways the cardiac damage, and damage to the spinal cord, which had been left by my boyish exploit. I had to diminish my work, and year by year there came a diminution of the distance

which I could walk without damage. Every now and then, with my constitutional imprudence, I exceeded the limit of work or exercise, and thereafter made both of them smaller, until, in 1886, came the final break-down. Thereafter for some years I was obliged to desist from the *Synthetic Philosophy*. . . .

Having returned to a higher level of health I resumed writing the *Philosophy*, of which more than two volumes were still [in 1888] unwritten. Ensuing years witnessed the same general course of life—improvements for a time, relapses consequent on exceeding the amount of exertion bodily or mental which my state allowed, and then long periods during which very little or nothing could be done. The variations were great. From 1890 to 1896 there were times during which I was able to dictate a considerable amount each morning; to walk up and down-stairs; to sit at table to meals (except breakfast, which I had taken in bed since 1886); to drive to the Athenæum; and, when up to high water-mark, to play a game of billiards there. But always after a while some adverse incident—a little too much exertion, or a little too much talk, or a little too much work—brought me down again. And now, since the completion of the *Synthetic Philosophy*, the low level has become settled.

During these later years, when capable of any work, my dictation (according to Mr. Troughton) has amounted sometimes to two periods of ten minutes each during the morning, and sometimes to three. Reading for more than a few minutes at a time is mischievous, and listening to reading has to be restricted to fragments. It has been so even with music. Even so simple a thing as looking at illustrations in monthly magazines is too much for me unless taken in portions. Sometimes things have considerably improved, as at Bepton, in 1900, when I could walk about the garden a little; while at other times, as in the spring of 1901 and again during the present autumn (1902) I have been mainly confined to bed, even the extra effort entailed by reclining on a sofa being too much. To all appearance this state of things will become more pronounced, and infirmities of other kinds, which have during these last years added to my troubles, will make such part of my life as remains still more to be dreaded.

APPENDIX B.

NOTE.—When there occurred to me the thought of writing a brief intellectual history of myself I hesitated for some time: doubting whether it would be of any service. Now that it has been completed, however, I am glad that I undertook it. Placing the facts in order of genesis has had the effect of revealing to me some significant connexions of ideas I was previously unconscious of; and I infer that, if to me the narrative has yielded information, it is likely to yield still more to others. As elucidating the natural evolution of a theory, such information may not be without its use.

At the same time some aid may be given to those who have not yet made acquaintance with my books. I would suggest that for such the best course will be to read first a number of the *Essays*, beginning with the more popular; then to read the little book on *Education;* then *The Study of Sociology;* and then the pages which here follow. A sketch plan of an unexplored region is always convenient for guidance, and this "Filiation of Ideas" may serve as a sketch plan of the Synthetic Philosophy.

February, 1899.

THE FILIATION OF IDEAS.[1]

A COMPLETE biography should give an account not only of a man's career and conduct but also of his mental development, emotional and intellectual, and of the products of that development. Something is not unfrequently done towards delineating the evolution of character, but not much is done towards intellectual history, explaining the genesis of ideas and the elaborations of them. Such a history cannot to much purpose be given by any one but the man himself, and it has not commonly happened that the man himself has thought of giving it.

I have already, in the Autobiography, indicated stages of thought, and shown the origins of certain leading ideas; but I have done this only in a fragmentary way, and much of the detail required to make the account coherent has been unmen-

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[1] The footnotes within square brackets have been inserted mainly to assist reference to the *Life and Letters*.

tioned. Then, beyond the fact that these indications do not form a continuous whole there is the fact that they are limited to the first half of my life. Hence the decision to narrate in full, so far as is possible, the successive steps, and also to describe the peculiarities of constitution, culture, and circumstance, which have been influential. One significant result will, I believe, be that of showing how large a part emotional nature plays in determining the intellectual activities, and how it enters as an important factor into the resulting convictions.

The events of childhood and boyhood, narrated elsewhere, indicate to how small an extent authority swayed me. The disobedience, so perpetually complained of, was the correlative of irreverence for governing agencies. This natural trait operated throughout life, tending to make me pay little attention to the established opinion on any matter which came up for judgment, and tending to leave me perfectly free to inquire without restraint.

The nature thus displayed was rather strengthened than otherwise by my father's habit of speculating about causes, and appealing to my judgment with the view of exercising my powers of thinking. By occasional questions of this kind he strengthened that self-asserting nature of which he had at other times reason to complain, but he did not apparently perceive this. Meanwhile he cultivated a consciousness of Cause—made the thought of Cause a familiar one. The discovery of cause is through analysis—the pulling to pieces phenomena for the purpose of ascertaining what are the essential connexions among them. Hence one who is in the habit of seeking causes is in the habit of analyzing. I have up to this time regarded my father as more synthetic than analytic : being led to do so by his perpetual occupation with synthetic geometry. But now, on reconsidering the facts, I see that he was in large measure analytic. He was a great adept at making solutions of puzzles, verbal or physical ; and this evidently implies analysis. Moreover, that analysis of articulations implied by his system of shorthand, exhibited the faculty.

No doubt this habit of mind, inherited from him and fostered by him, flourished the more in the absence of the ordinary appeals to supernatural causes. Though my father retained the leading religious convictions, yet he never appeared to regard any occurrences as other than natural. It should also be remarked that dogmatic teaching played small part in my education. Linguistic culture is based on authority, and as I rebelled against it, the acceptance of things simply on authority was not habitual. On the other hand, the study of Mathematics (conspicuously Geometry and Mechanics), with which my youth was mainly occupied, appeals, at each step in a demonstration,

to private judgment, and in a sense recognizes the right of private judgment. Many times, too, I assisted in experiments with the air-pump and the electrical machine ; so that ideas of physical causation were repeatedly impressed on me. Moreover such small knowledge of natural history as I gained by rearing insects, tended to familiarize me with natural genesis.

I have elsewhere named, as early established, the habit of castle-building, carried to a great extent ; and I have expressed the belief that this was a useful exercise of the imagination—not reminiscent imagination, but constructive imagination. Another trait, not thus far named, and which I inherited from my father, was a dominant ideality, showing itself in a love of perfection. In him this love was so strong that it became a hindrance. He could not let a thing alone as being finished. With me the desire to make work better, though pronounced, has not gone to that excess. Still, I have never been able to rest satisfied with anything incomplete. This has been shown in the repeated improvements of expression : correction, again correction, and yet again correction, has been the history of most of my books. The love of completeness has been curiously shown from the beginning by the habit of summarizing every chapter. I could not leave a thing with loose ends : the ends must be gathered together and tied up. This trait has been further manifested in the tendency not to rest content with induction, but to continue an inquiry until the generalization reached was reduced to a deduction. Leaving a truth in an inductive form is, in a sense, leaving its parts with loose ends ; and the bringing it to a deductive form is, in a sense, uniting its facts as all parts of one fact.

A general result of these natural traits and this kind of culture was an attitude of detachment. The absence of those studies, linguistic and historical, which form so large a part of the ordinary education, left me free from the bias given by the plexus of traditional ideas and sentiments. This detachment had the same kind of effect as the detachment from surrounding authorities. All influences thus conspired to make me entirely open to receive those impressions and ideas produced by direct converse with things. Elsewhere I have referred to the fact that when thirteen, spite of the high authorities against me, I denied the existence of inertia as a positive force ; and have instanced it as showing unusual independence of judgment, at the same time that it implied an unusual intuition of physical truths. These two traits, joined with a constructive imagination unusually active, and a great love of completeness, may be considered as forming my positive mental equipment at the outset ; to which there should be added the negative equipment, if it may be so called, of absence of culture in "the humanities."

But I must not forget another trait of nature—a relative liking for thought in contrast with a relative aversion to action. My physical constitution did not yield such overflow of energy as prompts some natures to spontaneous activity. In many directions action was entered upon rather reluctantly; while thinking was a pleasure. Obviously this predominant tendency to contemplation has been a factor in my career.

Letters written home when, at the age of seventeen, I commenced engineering in London, show an excursiveness characteristic of me. There are, I see, some ideas respecting the expansion of steam in relation to its heat, which, quite wrong in their preliminary assumptions, imply the absurd supposition that the question had not been fully worked out by those who were competent. I refer to these as showing both the self-confidence and the tendency to explore in the field of physics: the idea of natural causation being dominant. The daily professional culture in surveying and making drawings of machinery, of course conduced to exact thinking; ever impressing on me geometrical truths and the necessities of relation.

When, after nearly a year, I migrated to the Birmingham and Gloucester Railway, influences of the same class continued in operation. But I observe here coming out the trait above named—preference for thinking to acting. The first original thing I did was devising a new method of drawing the curves in skew arches; and the prompting motive was aversion from taking much trouble. Subsequent promptings to invention had the same origin. The Scale of Equivalents originated from my dislike to the labour of reducing a set of dimensions taken in inches and eighths into hundredths of a foot; and though I do not trace to that cause the invention I called a Velocimeter, which also is a means of dispensing with calculation, yet the consciousness of such labour, gone through by a coadjutor, directed my thoughts into the channel which led to it. Other devices, dating from that time, illustrated the same excursiveness, self-dependence, and constructive imagination. The latter part of my first engineering period brought me a good deal in contact with men and with business; and, being left in charge of some engineering work and allowed to carry out my own designs, there was a further familiarizing with mechanical truths and a further fostering of self-dependence. But here must be noted a significant fact. I became interested in geology, and bought Lyell's *Principles*, etc. The result of reading this was that, rejecting his adverse arguments, I adopted the hypothesis of development, which ever after influenced my thoughts. I was then twenty.

During this time at Worcester politics received no attention from me. But when, after the ending of my engagement on the Birmingham and Gloucester Railway, I returned to Derby,

a change took place in this respect; and in June, 1842, my thoughts on political matters resulted in the letters to *The Non-conformist* on "The Proper Sphere of Government"—a some-what strange subject for a young man of twenty-two to enter upon. The general tenor of these letters betrays the emotional leanings. Individuality was pronounced in all members of the family, and pronounced individuality is necessarily more or less at variance with authority. A self-dependent and self-asserting nature resists all such government as is not expressive of equit-able restraint. Our family was essentially a *dissenting* family; and dissent is an expression of antagonism to arbitrary control. Of course a wish to limit State-action is a natural concomitant; and this characterized the letters on "The Proper Sphere of Government." Beyond this constitutional tendency, here first illustrated, there was shown the tendency to regard social phenomena as subordinate to natural law: the two tendencies being, in an indirect way, correlatives. Already in those early days the culture I have described had fostered the belief that in society as in the world at large, there are uniformities of relation; and national life was vaguely thought of as a life having certain similarities to life at large. Though it had not yet taken shape, there was a dim idea of a social organism.

During the several subsequent years—years of miscellaneous and futile activities mainly spent over inventions, but partly in speculations, political, ethical, linguistic, showing as always the excursive tendency, and during which there was some art-culture—drawing, modelling, and music—there is little to be noted save accentuation of traits already shown. One matter, however, of some significance must be named. From the time when, at about the age of eleven, I heard a series of lectures on phrenology by Spurzheim, who was going through the country diffusing the doctrines of Gall, I had been a believer in phreno-logy. Though when twenty-one to twenty-four my scepticism had not risen to the height it eventually reached, yet, as might be anticipated, I entertained sundry phrenological heresies, and expressed them in articles published in a quarterly journal called *The Zoist*.[1] Two of these I need not name; the third had results. It appeared in January, 1844, under the title "A New View of the Functions of Imitation and Benevolence." The essential points in the argument were that the function of the organ called Imitation is to produce sympathy and that sympathy is the root of benevolence. Years afterwards I learned that the genesis of benevolence by sympathy had been expounded by Adam Smith; but in 1844 I knew his name only as the writer of *The Wealth of Nations*.

During the second engineering period not much specula-

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[1] [*Supra*, chap. iv., pp. 40, 45.]

tive activity went on. There were devices for diminishing monotonous labour and there was the ever-present thought of improvement. From the one cause resulted the little appliance for facilitating the plotting of sections; and from the other the improved levelling-staff and the proposed new type of level. Here, as always, instead of accepting the settled usages, as most do, the fact that they were settled usages had no influence with me.

Though there must have been filiations of the various mechanical ideas which prompted my activities between the time (1846) when my railway career ended and the time (1848) when my literary career began, yet I cannot recall them. There was a little invention, the binding pin, by which I made some money: there was the planing machinery by which I lost it; and there were sundry ideas which did not reach the experimental stage. But new ideas of some kind daily occupied me.

During all this second engineering period there had, I doubt not, been going on some development of the ideas set forth in the letters on "The Proper Sphere of Government." That governmental actions should be definitely restricted was a conclusion which in these letters stood without a satisfactory basis. What ultimate principle is it from which may be inferred the limits of State-action? Analysis was required. The excogitation of this principle and the perception that not only these limits, but also the requirements of equity at large could be deduced from it, prompted the writing of *Social Statics*. This was commenced five years after the letters on "The Proper Sphere of Government" had been written. Let me add that during the interval there had been going on that political activity entailed by membership of the Complete Suffrage Union and advocacy of the doctrine of equal political rights: a kind of activity and a kind of exercised sentiment which kept in mind the principle *Social Statics* elaborated.

Concerning *Social Statics* itself there are various noteworthy things to be said. There is no invoking of authorities. A few references, mostly dissentient, are made to ethical and political writers whose well-known doctrines I had gathered in the course of miscellaneous reading—not from their books; for I never could read books the cardinal principles of which I rejected. The course pursued in this case as in others was to go back to the facts as presented in human conduct and society, and draw inferences direct from them.

In fulfilment of the desire for ideal completeness there was, at the outset, a presentation of the entire field to be covered by a system of ethics. In pursuance of the ordinary conception theologically derived, ethics had been composed of interdicts of many desired actions and inculcations of actions not desired.

Ethical teaching had given little or no moral sanction to pleasurable activities. If not tacitly frowned upon, they were certainly not enjoined. But in the programme with which *Social Statics* begins—a programme corresponding with that ultimately adopted in *The Principles of Ethics*—there was a division recognizing the ethical sanction of those actions required for the fulfilment of the normal functions of life, and for the obtainment of those pleasures accompanying the normal functions. There was an assertion of the moral claims of the individual to natural satisfactions within specified limits.

And here, in going afresh over the facts, I observe something of which at the time I was not definitely conscious—that the first principle formulated was simply an abstract statement of the conditions under which might equitably be pursued by each that self-satisfaction just insisted upon as ethically warranted. It was an assertion of that liberty, within limits, to pursue the ends of life, which was implied in the assertion that enjoyment of the ends of life is moral. And this leads to a remark of some interest concerning the mode in which this principle was approached. For thirty years I supposed myself the first to enunciate this doctrine of the liberty of each limited only by the like liberties of all—the right of every man to do what he wills so long as he does not trench upon the similar rights of any other man. But after the lapse of that time I learned, from a reference in *Mind*, that Kant had enunciated this principle. After some trouble I found his enunciation ; and then it became manifest that Kant had reached the principle from the opposite side. He had specified the *limits* to the free action of the individual, leaving the free action as a thing not itself to be asserted but rather to be tacitly implied in the assertion of limits. I, contrariwise, had primarily asserted the claim of each to free action, and had secondarily asserted the limits arising from the presence of others having similar claim to free action. The two modes of reaching this conclusion are significant of the difference between the social states of Germany and England, and also significant of the individual difference. Kant, native of a country in which subordination to authority had been all along very marked, looked at this matter from the side of restraint—individual action was to be *restrained* within certain limits. And while the limits were made authoritative, there was no corresponding authoritativeness claimed for the right of free action. With me, the converse happened. Being one of a race much more habituated to individual freedom, the primary assertion was that of a claim to free action—not a recognition of subordinations, but the assertion of a *right* subject to certain subordinations. And while this opposite method of conceiving the matter was characteristic of a citizen of a relatively free country, it was more especially characteristic of one in whom the maintenance

of individuality had always been so dominant. I emphasize this contrast as clearly showing the extent to which the emotional nature influences the intellectual conclusions.

The next fact to be named is, that there was now displayed the tendency to pass from induction to deduction. The views I had expressed respecting the limitation of State action to certain spheres and exclusion of it from other spheres were lying all abroad : each standing on its own merits as an independent belief. Dissatisfaction with that condition of thought led to the search for an ultimate principle from which the limitations were deducible ; and this when found proved to be a principle from which were also deducible the various so-called rights. The whole ethical scheme, in so far as justice is concerned, had been reduced to a completely deductive, and consequently quite coherent, form satisfying the love of ideal completeness.

Another significant fact is, that throughout the whole argument there is tacitly assumed the process of Evolution, in so far as human nature is concerned. There is a perpetual assumption of the moral modifiability of Man, and the progressive adaptation of his character to the social state. It is alleged that his moral evolution depends on the development of sympathy, which is held to be the root of both justice and beneficence. This change of mental nature is ascribed to the exercise of the sympathetic emotions consequent upon a peaceful social life, and, therefore, tacitly implies the inheritance of functionally-produced changes of structure. There is also a passing recognition of Survival of the Fittest. The beneficence of the process by which, among animals and men, the inferior disappear and leave the superior to continue the race, is asserted ; but there is no recognition of the consequences seen by Mr. Darwin.

In the last chapter, entitled "General Considerations," the evolutionary conception is distinctly brought out in many ways. Civilization is described as a continuous moulding of human beings to the social state, and of the social state to the human beings as they become moulded : the two acting and reacting. Along with this there is recognized the analogy between a society formed of individuals and an animal formed of living cells or units ; though at that time (1850) the hypothesis that an animal is thus formed was, when here and there hinted, regarded as an absurdity. Along with the conception of this analogy of ultimate components between the social organism and the individual organism, there went another which proved of far greater significance. How I came by the idea that a low type of animal consists of numerous like parts performing like functions, while a high type of animal consists of relatively few unlike parts performing unlike functions, I do not remember. It may have been from Professor Rymer Jones's

Animal Kingdom ; for some of the facts cited are, I think, from that work. But wherever this general truth came from, I immediately recognized the parallelism between it and the truth presented by low and high types of societies. This was the earliest foreshadowing of the general doctrine of Evolution.

For the perception that there is a progress from a uniform to a multiform structure, and that this progress is the same in an individual organism and in a social organism, was a recognition of the progress from the homogeneous to the heterogeneous, though no such words were used. I had at that time no thought of any extension of the idea ; but evidently there was the germ which was presently to develop. I should add that the acquaintance which I accidently made with Coleridge's essay on the Idea of Life, in which he set forth, as though it were his own, the notion of Schelling, that Life is the tendency to individuation, had a considerable effect. In this same chapter it is referred to as illustrated alike in the individuation of a living organism, and also in the individuation of a society as it progresses.

Shortly before, or immediately after, the publication of *Social Statics*, I made the acquaintance of Mr. G. H. Lewes at one of Chapman's *soirées.* We became mutually interested, and walked towards our homes together. I remember the incident because conversation during the walk having turned upon the Development Question, I surprised Mr. Lewes by rejecting the view set forth in the *Vestiges of the Natural History of Creation*, which he supposed to be the only view, and asserting the view that functional adaptation is the sole cause of development. I name the fact as showing what my belief was at the close of 1850 or beginning of 1851.

Nothing noteworthy in the development of ideas occurred during that period of mental inertia which followed the publication of *Social Statics.* I think it probable, however, that further materials for thought were afforded by the lectures of Professor Owen on Comparative Osteology, given at the College of Surgeons, which I attended. Along with a mass of details, there were presented to me certain general facts which were suggestive. An hypothesis sets up a process of organization in thoughts previously lying unorganized. The effect is analogous to that which results when a sperm-cell is added to a germ-cell. In the facts as exhibited throughout Professor Owen's lectures, there were many illustrations of the truth that the skeletons of low types of animals are relatively uniform in their structures—showing what he then and at other times used to call " vegetative repetition." I could not accept his Platonic notion of an ideal vertebra, of which he considered each actual vertebra an embodiment ; but his facts illustrated progress from the uniform to the multiform in the course of osteological organization. I do not remember that I thought anything to that effect, but

here were materials for further development of the conception illustrated at the close of *Social Statics*.

The acquaintance made with Mr. G. H. Lewes was followed by two country excursions which we made together in the autumn of 1851—the first up the Thames Valley from Maidenhead as far as Abingdon, and the other in Kent, in the neighbourhood of Maidstone. They were accompanied by a great deal of philosophic talk. One effect, as indicated in *George Eliot's Life*, was to give him an active scientific interest. Another effect was that a leaf I gathered suggested to me certain facts of plant-structure: recognition of the Law of Organic Symmetry being the ultimate consequence.[1] During the second excursion I made acquaintance with a little book just published by Milne-Edwards, which we looked into on board the steamer carrying us to Gravesend. It set forth the luminous idea of "the physiological division of labour." Though the conception was not new to me, for it was illustrated at the close of *Social Statics*, yet this phrase, expressing an analogy between individual organizations and social organizations in so vivid a manner, gave greater distinctness to pre-existing thoughts. The reading of Lewes's *Biographical History of Philosophy*, which resulted from my acquaintance with him, did not, so far as I remember, give origin to any special ideas; but it gave me an interest in philosophical and pyschological inquiries greater than had before existed. Presentation of the doctrines of various schools throughout the past served, not so much as a means of acquiring their thoughts as a means of stimulating my own thoughts, and this effect began presently to show itself.

During the first months of 1852 the essay on the "Theory of Population" occupied me. Chapman, then proprietor of the *Westminster Review*, to whom I had on some occasion expressed my view respecting the decrease of fertility which goes along with higher development, had been anxious to have an article on the subject. I at first declined for the assigned reason that I proposed to write a book about the matter. Subsequently circumstances decided me to accede to Chapman's proposal, and the article was written for the April number. Here again was illustrated the truth that a germinal idea thrown among unorganized materials sets up organization. The notion had been present with me, certainly from 1846-7, and how much earlier I do not know.[2] But now the working hypothesis soon caused such knowledge as I had to take shape, and gave the power of rapidly assimilating other knowledge. Support was found in the doctrine of individuation above named; for a thesis running throughout the essay is that individuation and reproduction are antagonistic—a formula

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[1] [*Supra*, chap. vi., p. 63.]

[2] [*Supra*, chap. vi., p. 64.]

which, expressed in physical terms, as I should in later days have expressed it, is equivalent to—Integration and Disintegration are antagonistic. A collateral effect of the reading of Coleridge's essay on the Idea of Life was that of making me seek a better definition of Life than "the tendency to Individuation." Hence resulted the definition given in that essay—the coordination of actions. Though a better one, this formula was incomplete because it limited the conception to actions going on within the organism, without reference to those external actions which they are adjusted to.

As narrated elsewhere, this essay on "The Theory of Population" led to my friendship with Huxley.[1] I name the fact here because within a few weeks of its commencement there was an incident which fixes the date of one of my beliefs. I had suggested an introduction to Lewes, and had taken Huxley to Bedford Place, Kensington, where Lewes then resided. On our way back the discussion turned on the Development question, and he ridiculed the notion of a *chain* of beings. I said that I no more accepted that symbol than he did, and that a tree was the true symbol. How long I had thought this I do not know ; but the incident shows that before that time there had arisen a belief which we shall presently see pervaded other speculations. It is observable that this conception of divergent and redivergent branches implies the conception of increasing multiformity or heterogeneity—one thing giving origin to many things : the thoughts are manifestly akin.

Persuaded by Lewes, who was at that time literary editor of the *Leader* (a paper which died a few years afterwards), I wrote for it a series of short essays under the title of "The Haythorne Papers"—a name given as a bracket holding them together. They show the usual excursiveness, and a tendency everywhere to analyze and to generalize. The second of them, entitled "The Development Hypothesis," was of fundamental significance.[2] It shows that in 1852 the belief in organic evolution had taken deep root, and had drawn to itself a large amount of evidence—evidence not derived from numerous special instances but derived from the general aspects of organic nature, and from the necessity of accepting the hypothesis of Evolution when the hypothesis of Special Creation has been rejected. The Special Creation belief had dropped out of my mind many years before, and I could not remain in a suspended state : acceptance of the only conceivable alternative was peremptory. This distinct and public enunciation of the belief was but a giving definite form to thoughts which had been gradually growing, as was shown in *Social Statics*.

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[1] [*Supra*, chap. vi., p. 65.]

[2] [*Supra*, chap. vi., p. 65.]

From this time onwards the evolutionary interpretation of things in general became habitual, and manifested itself in curious ways. One would not have expected to find it in an essay on "The Philosophy of Style"; but at the close of that essay, written in 1852, the truth that progress in style is from uniformity to multiformity—from a more homogeneous to a more heterogeneous form—finds expression: showing that in mental products, too, the distinctive nature of high structure was beginning to be recognized. The progress of thought in another direction was shown in an essay on "The Universal Postulate."[1] I had been reading Mill's *Logic*. In it occur his strictures on Whewell; and while agreeing as to the unsoundness of Whewell's doctrine, I did not agree in the reason for rejecting it. Hence the essay. This involved the first expression of metaphysical convictions; for the outcome of the argument was a defence of realism and an assertion of the impossibility of establishing any belief at variance with it. Up to this time, thinking with me had been mainly concrete in character, but now it assumed an abstract character; and thereafter the abstract and the concrete went hand in hand, as the inductive and the deductive were already doing. This essay on "The Universal Postulate" ended in a controversy with Mill, which, taking its first shape in the next edition of his *Logic*, went on at intervals in an amicable manner for some years and eventually led to our friendship.

In an essay on "Manners and Fashion" developmental ideas again displayed themselves. The origin of institutions by a process of evolution was taken for granted; and there was delineated the rise of the different kinds of government by divergence from one original kind, which united the ceremonial, the political, and the ecclesiastical. There was also this same idea running throughout the account of the genesis of the different forms of manners from simple original forms—a mulplication of kinds from one kind.

A like trend of thought was shown in "The Art of Education," published in the *North British Review* (since deceased), and now embodied in my little book on *Education*. Various evolutionary corollaries were drawn from the proposition that the unfolding of a child's mind repeats the unfolding of the mind in the human race. It was urged that education must proceed "from the simple to the complex," since the mind, "like all things that develop, progresses from the homogeneous to the heterogeneous." It was contended that the development of mind "is an advance from the indefinite to the definite," and that teaching must follow that course. A further corollary was that as "humanity had progressed solely by self-

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[1] [*Supra*, chap. vi., pp. 67, 69, 73.]

instruction," "self-development should be encouraged to the uttermost in the child."

About this time, 1854, Miss Martineau's abridged translation of Comte's works was published. I had already gathered a notion of his system from Lewes, who was a disciple and had written in the *Leader* some papers giving an abstract of it; and a more specific knowledge of Comte's cardinal ideas had been gained in 1852, from reading the introduction at the instigation of George Eliot, and with her aid. She, too, was anxious that I should accept Posivitist doctrines. But the reading of the Introduction, while it left me undecided respecting the doctrine of the Three Stages, was followed by immediate rejection of the Classification of the Sciences. Now that the translation was published, I looked further into the Positive Philosophy, with the result that I engaged to write a review of it for the *British Quarterly*. Being an impatient reader, especially when reading views from which I dissent, I did not go far. But the part I read, and which prompted me to write a criticism, had a very important effect. I have said elsewhere that I owe much to Comte—not in the sense assumed by his disciples, but in an opposite sense. I owe to him the benefits of an antagonism which cleared and developed my own views, while assigning reasons for dissenting from his. Rejection of his ideas concerning the development of the sciences, led to those ideas of my own which are set forth in "The Genesis of Science"; and these had significant relations to the psychological ideas soon afterwards elaborated. The rise of certain fundamental perceptions and fundamental acts of reasoning was ascribed to gradual organization of experiences. There was a development of the idea of likeness, and out of this the idea of equality and inequality. From the likenesses and unlikenesses of things, a transition to the likenesses and unlikenesses of relations, was alleged; and this, leading to recognition of the equality of relations, was represented as the basis of reasoning. Then it was shown that throughout this development divergence and re-divergence go on, causing multiplication and heterogeneity of sciences: the symbol of a tree being here again used. And it was further pointed out that along with differentiation of the sciences there goes increasing interdependence, that is to say, integration. Thus, while there were several traits foreshadowing a psychological theory, there were other traits foreshadowing a general evolutionary conception, in so far as it concerns intelligence and its products.[1]

In what year I decided to write a book on the *Principles of Psychology* I do not remember.[2] But in 1853, there was reached

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[1] [*Supra*, chap. vii., pp. 72, 74.]

[2] [*Supra*, chap. vi., p. 67.]

one of its leading views, consequent on the perception that the definition of life as "the co-ordination of actions," required to be supplemented by recognition of the relations borne by such co-ordinated actions to connected actions in the environment. There at once followed the idea that the growth of a correspondence between inner and outer actions had to be traced up from the beginning; so as to show the way in which Mind gradually evolves out of Life. This was, I think, the thought which originated the book and gave its most distinctive character; but evidently, the tendency to regard all things as evolved, which had been growing more pronounced, gave another special interest to the undertaking. The evolutional view of human nature had been assumed all through *Social Statics*, and in the essay on "The Development Hypothesis" belief in evolution had been distinctly avowed as holding of the organic creation. The progress of organisms and of societies from the uniform to the multiform had been recognized, and the thought of increasing mutual dependence of parts had been accentuated by meeting with Milne-Edwards's phrase "the physiological division of labour." Then came the congruous formula of Von Baer—of development from the homogeneous to the heterogeneous. At the same time had arisen the correlative conception of divergence and redivergence, and consequent increasing multiformity, as occurring in organisms, in governmental organizations, and in the genesis of the sciences. Advance from the indefinite to the definite, as displayed in the individual mind and in the mind of humanity, had also been recognized. Thus various ideas, forming components of a theory of evolution, were lying ready for organization. And after publication of the essay on "The Genesis of Science," in which the evolutional view of mental progress was so pronounced and coherent, the *Principles of Psychology*, which for a year or more previously had been taking shape, was commenced."[1]

Under the promptings above described, the part entitled "General Synthesis" was the one to which I first devoted myself; and it was the writing of this that led to a wider and more coherent conception of evolution. Among the component chapters are some entitled "The Correspondence as direct and Homogeneous," "The Correspondence as direct but Heterogeneous," "The Integration of Correspondences." Here, then, in another sphere had arisen the recognition of progress from the homogeneous to the heterogenous; and it was the joining of this with the various previous recognitions which led to the question—Is not change from homogeneity to heterogeneity universal? The question needed only to be asked to be

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[1] [*Supra*, chap. vii., pp. 72, 74.]

answered affirmatively. In pursuance of that tendency which I have before described as characteristic, there forthwith arose a desire to find for this induction a deductive interpretation. This universal proclivity must have a universal cause. What is that cause? And the answer soon reached was that it is the multiplication of effects. It was at Tréport in August, 1854, that this generalization, inductive and deductive, was reached;[1] and I immediately decided that as soon as the *Principles of Psychology* was completed I would write an essay under the title "The Cause of all Progress." Whether I then wrote to Chapman proposing such an article for the *Westminster Review*, or whether I made the proposal when I saw him in London later in the year, I cannot remember. I think the last is the more probable. Certainly, however, before the close of the year an agreement was made for such an article: the title, however, being negatived by Chapman as appearing too ambitious, and "Progress: its Law and Cause" being substituted.

Of course the evolution of mind thus traced up throughout the Animal Kingdom as a part of the progressive correspondence between inner and outer actions, could be made clear only by various sequent interpretations. Hence resulted the chapters on "The Nature of Intelligence" and "The Law of Intelligence." After these more abstract conceptions came the more concrete conceptions of Reflex Action, Instinct and Reason as conforming to the general view. Finally, on rising up to human faculties, regarded as organized results of this intercourse between the organism and the environment, there was reached the conclusion that the so-called forms of thought are the outcome of the process of perpetually adjusting inner relations to outer relations; fixed relations in the environment producing fixed relations in the mind. And so came a reconciliation of the *a priori* view with the experiential view. The whole theory of mental development as thus presented, assumed that the correspondence between inner and outer came to be gradually established because the effects registered in the nervous systems of one generation were more or less transmitted as modifications of the nervous systems in the next generation. Though, nowadays, I see that the natural selection of variations in the nervous system has been a factor, and, *in the earliest stages*, perhaps the most important factor, yet I still hold, as I then held, that the inheritance of functionally-wrought modifications is the chief and almost exclusive factor in the genesis of all the more complex instincts and all the higher mental powers. But the evolutionary view of mind, though manifested throughout the whole argument of these

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[1] [Supra, chap. vii., p. 75.]

chapters, was not put into the foreground ; partly, I suppose, because the evolutionary view of Life in general was at that time almost universally rejected and mostly ridiculed.

The thesis elaborated in the division entitled "Special Analysis" was suggested by the conclusions reached in the essay on "The Genesis of Science," respecting the development of the ideas of equality of things and equality of relations. It needs but to read that essay to see that this conception of growing intellectual perceptions arose in the course of a search for the initial ideas of science ; and, on comparison, it will be manifest that the successive chapters of this "Special Analysis" are but an elaboration of that initial thought. Here the remarkable fact to be noted is that there has, unintentionally as I believe, resulted a complete correspondence between the General Synthesis and the Special Analysis—between the putting together and the taking to pieces ; for the adjustment of inner relations to outer relations, posited in the one case, is, in the other case, the root down to which the mental structure is traced. Concerning the conclusions which make up the "Special Analysis" one only calls for separate mention—the paradoxical one that Logic, hitherto regarded as a subjective science, is in reality an objective science. Authority and long usage may give such strength to a belief that no disproof changes it. I have furnished a triple demonstration of the objective nature of Logic, but the old idea persists without even a sign of change.

As stated in the preface to the volume when published in July, 1855, there was omitted a final part which would have been called, as in after years it was called, "Physical Synthesis." In this I had intended to show the way in which these evolutionary mental processes are to be interpreted as resulting from the passage of nervous discharges along lines of least resistance, which became lines of less and less resistance in proportion as they were oftener and more strongly traversed.

Concerning the ideas of this work it remains only to add that in the "General Analysis" was set forth the logical justification of that Realism without which the evolutionary view, in common with scientific views at large, becomes inconceivable. It was an elaboration of the Universal Postulate and its corollaries : the general thesis being that Idealism takes for granted at every step of its argument the validity of that test-proof which it ends by tacitly denying.

After the interval of incapacity for work extending from July, 1855 to January, 1857 ; I at length prepared the long-contemplated essay on "Progress : its Law and Cause."[1] This was published in April, 1857 ; and in it the general conception which

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[1] [*Supra*, chap. vii., p. 83.]

had been reached in August, 1854, was set forth in detail. Here may fitly be remarked a disproof of the statement not uncommonly made that my thinking has been *a priori*. Besides many other evidences, the genesis of this essay is a clear demonstration to the contrary. Progress from homogeneity to heterogeneity was observed now in one class of phenomena and now in another, until the instances had become many and varied. Only then came the generalization that this transformation is universal ; and only then did there commence a search for the ultimate truth from which the induction might be deduced. But in some men—and especially so was it in Huxley—the hatred of deductive reasoning is such that the mere fact that an induction can be interpreted deductively arouses doubt. The rhythm of action and reaction necessarily carries opinion to extremes ; and the reaction against *a priori* reasoning in Biology and Geology, had gone to the extreme of repudiating all reasoning but the *a posteriori*.

The origin of the next step I cannot remember. Whether it was that on contemplating the multiplication of effects there arose the question—How does there arise the first effect ?—I do not know. But a short time after the publication of the above-named essay, came perception of the truth that a state of homogenity is an unstable state. In an article originally called by me "Transcendental Physiology," but entitled by the editor "The Ultimate Laws of Physiology," a statement of this general truth was published in the *National Review* for October, 1857.[1] This generalization was not like the other inductively reached, but was, I think, deductive from the outset : resulted from the prosecution of analysis. But though not forced upon me by observation it was, in the essay named, exemplified by facts of various orders : the deduction was here verified by induction. At the same time was set forth the process of integration as part of the process of evolution, both organic and social. But, as in the *Principles of Psychology* so here, it made its appearance as a subordinate or secondary process—was not recognized as a primary process. The development of thought in this direction was delayed until some seven years had passed.

During the same summer, while rambling in Scotland, there was written another essay, evolutionary in substance though not professedly forming a part of the doctrine—the essay on "The Origin and Function of Music." How there had arisen the belief that music results from development and idealization of those cadences of the voice which indicate emotion, I cannot remember. But it shows again the ever-present belief in natural genesis—the growth of the complex out of the simple. There had probably suggested itself the question—Where does

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[1] [*Supra*, chap. vii., p. 83.]

music come from? and in default of the theory of supernatural endowment, the origin set forth seemed the only possible one.

The drift of thought thus so variously displayed, was now made still more decided by re-reading my essays while preparing them for publication in a volume: and thereupon followed the final result.[1] During a walk one fine Sunday morning (or perhaps it may have been New Year's Day) in the Christmas of 1857-8 I happened to stand by the side of a pool along which a gentle breeze was bringing small waves to the shore at my feet. While watching these undulations I was led to think of other undulations—other rhythms; and probably, as my manner was, remembered extreme cases—the undulations of the ether, and the rises and falls in the prices of money, shares, and commodities. In the course of the walk arose the inquiry—Is not the rhythm of motion universal? and the answer soon reached was—Yes. Presently—either forthwith or in the course of the next few days—came a much more important result. This generalization concerning the rhythm of motion recalled the generalization which was to have been set forth in the unwritten part of the *Principles of Psychology*—the generalization that motion universally takes place along the line of least resistance. Moreover there had become familiar to me the doctrine of the Conservation of Force, as it was then called—in those days a novelty; and with this was joined in my mind Sir William Groves's doctrine of the correlation of the physical forces. Of course these universal principles ranged themselves alongside the two universal principles I had been recently illustrating—the instability of the homogeneous and the multiplication of effects. As, during the preceding year, I had been showing how throughout all orders of phenomena, from nebular genesis to the genesis of language, science, art, there ever goes on a change of the simple into the complex, of the uniform into the multiform, there naturally arose the thought—these various universal truths are manifestly aspects of one universal transformation. Surely, then, the proper course is thus to exhibit them—to treat astronomy, geology, biology, psychology, sociology and social products, in successive order from the evolution point of view. Evidently these universal laws of force to which conforms this unceasing redistribution of matter and motion, constitute the *nexus* of these concrete sciences—express a community of nature which binds them together as parts of a whole. And then came the idea of trying thus to present them. Some such thoughts they were which gave rise to my project, and which, a few days later, led to the writing out

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[1] [*Supra*, chap. viii., p. 85.]

of the original programme, still extant. This I sent to my father on the 9th January, 1858.[1]

During the subsequent two years, partly occupied with vain endeavours to find some way of executing my project, there appears to have taken place some elaboration of this programme; but, so far as I remember, no important addition was made to its leading ideas; unless it be the conclusion that these laws of transformation, and the ultimate physical laws whence they result, are all corollaries from the Persistence of Force. This may, however, have been a later conclusion, but, whenever arrived at, it implied the analytic habit; since it gave an answer to the questions—Why is the homogeneous unstable? Why do effects multiply? Why is motion rhythmical? There was no rest till there was reached this final truth not to be transcended—a truth equivalent to the truth that existence can neither arise out of nothing nor lapse into nothing.

The evolutionary belief implied interest in all orders of phenomena throughout which, according to its thesis, it should be displayed. Hence physical astronomy became interesting. During many preceding years the Nebular Hypothesis had been apparently discredited by the revelations of Lord Rosse's telescope: the resolution of various apparent nebulæ into clusters of stars, was supposed to have given the *Coup de grâce* to the theories of Kant and Laplace; or, at any rate, it was concluded that all such support as appeared to be furnished by the present existence of nebulous matter was dissipated. It was supposed that these luminous patches which powerful telescopes proved to consist of enormous numbers of stars, were remote sidereal systems similar to our own. Of course under these circumstances I was prompted to look into the evidence, and was soon convinced that the reasoning assigned for this conclusion was vicious. This led to the essay on "Recent Astronomy and the Nebular Hypothesis," published in the *Westminster Review* for July, 1858. It contained proofs that the current conclusion was untrue, and that these clusters of stars form parts of our own sidereal system. This has since become an accepted doctrine. The invalidity of the reason for rejecting the nebular hypothesis at large having been shown, there

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[1] [In reply to questions from Professor A. S. Packard, of Brown University, Providence, Spencer wrote (15 August, 1902): "I believe you are right in crediting me with the introduction of the word 'evolution.' I did not, however, introduce it in the place of 'epigenesis,' or any word of specially biological application, but as a word fit for expressing the process of evolution throughout its entire range, inorganic and organic.

"I believe the introduction of it was between 1857, when 'Progress: its Law and Cause' (was issued), and the time when the scheme for the Synthetic Philosophy was drawn up; and the adoption of it arose from the perception that 'progress' has an anthropocentric meaning, and that there needed a word free from that."]

followed an exposition of the reasons for believing in the nebular genesis of the solar system. Additional reasons of significance were assigned. One of them was that according to the ratio between centrifugal force and gravity in each planet is the greater or smaller number of satellites it possesses. Another was that to variations in this ratio, unlike in each planet, are ascribable the different specific gravities of the planets. With acceptance of the hypothesis of Olbers respecting the missing planet, went the conclusion that the celestial bodies are neither solid nor liquid all through ; but that the interior of each consists of gases reduced by pressure to the density of liquids. It had been shown that gases may be compressed to that degree of density without liquefying ; and since then the experiments of Prof. Andrews, proving that there is a critical temperature above which no pressure, producing however great a density, will cause liquefaction, has made this view more tenable than it at first appeared. In recent years it has been enunciated afresh in Germany by Dr. August Ritter in 1882. Of course the conclusion that from the bursting of a planet thus constituted, resulted the asteriods, has gained an ever-increasing support from the ever-increasing number of them discovered ; for it is manifest that of the multitudinous fragments the larger would be relatively few, and that with successive decreases of size would go increases of numbers : an inference corresponding with the facts. An explanation of comets and meteor-showers was also afforded. It should be added that I ventured to dissent from the theory of the Sun held by Sir John Herschel, that the photosphere incloses a dark body, rendered visible through breaches in the photosphere known as spots. In pursuance of the view that the Sun is the product of a still-concentrating nebula, the temperature of which is too high to permit solidification, it was contended that the photosphere consists of metallic vapours ever rising and precipitating : a view soon afterwards verified by the discoveries of Kirchhoff and Bunsen. An extreme illustration of that disregard for authority characterizing me was thus shown ; for the then current view respecting the nebulæ, and the view respecting the constitutiou of the Sun, had the highest warrant. I must however, in candour, add that the essay contained some serious mistakes—one especially concerning the distribution of comets from which I thought evidence was derivable.[1]

The ever-present interest in the idea of evolution as extending to all orders of phenomena, prompted other audacities displayed at this time. One of them was a criticism upon Prof. Owen's *Archetype and Homologies of the Vertebrate Skeleton.* It was published in the *British and Foreign Medico-Chirurgical*

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[1] [*Supra*, chap. xxvi., pp. 424-45.]

Review for October, 1858, and afterwards appended to the second volume of the *Biology*.[1] Of course his theory, which was a modern application of the Platonic theory of Ideas, conflicted with the evolutionary view of the organic world. The purpose of the essay was two-fold—to show the inconsistencies of his reasoning, and to show how, by mechanical actions and reactions between organism and environment, the segmentation of the vertebral column might be produced.

In the same manner was to be accounted for, and I may add excused, the audacity shown in an article written in 1858 on "Illogical Geology," in which certain views of Lyell, Murchison, and Hugh Miller were adversely criticized.[2] The pushing of evolutionary inquiries in all directions necessarily brought me face to face with geological facts, and theories, and with the palæontological evidence accompanying them. The notion, still at that time generally accepted among geologists, that during past eras there had occasionally occurred a sweeping away of the old organic types and the creation of a new set, was of course utterly repugnant to me, and it became needful to examine the reasonings which led to such a conception. It was shown that geological evidence does not warrant it.

This same period (1858-60) gave birth to several other essays pervaded by the same general thoughts. One of them, on "The Law of Organic Symmetry," was published in the *Medico-Chirurgical Review* for January, 1859.[3] As already said, this arose from an observation I made during my excursion with Lewes in 1851. I do not remember that the general formula of Evolution was referred to (I have not got the essay at hand), but the interpretation was evolutionary. The transitions from spherical and radial symmetry to bilateral symmetry, and in some cases to asymmetry, were shown to illustrate the general proposition that the forms of parts are determined by their relations to surrounding actions: growths being equal where the incident forces are equal and unequal where the incident forces are unequal. I should remark, however, that the interpretation was incomplete in so far that it recognized inorganic forces only—heat, light, gravitation, etc.—and did not recognize any organic agency, such as the influence of insects in developing the forms of flowers.

A criticism of Prof. Bain's work on *The Emotions and the Will* was written at this time, and naturally from the evolution point of view. Especially is this seen in a proposed classification of mental states, which is said to be justified "whether

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[1] [*Supra*, chap. viii., p. 87.]
[2] [*Supra*, chap. viii., p. 95; chap. xxvi., pp. 424-45.]
[3] [*Supra*, chap. viii., p. 87.]

we trace mental progression through the grades of the animal kingdom, through the grades of mankind, or through the stages of individual growth."[1]

Then came the essay on "The Social Organism,"[2] in which is observable the growth between 1850 and 1860: the first being the date at which, in *Social Statics*, there had occurred the primary recognition of the analogy between an individual organism and a social organism. In this essay, as in its germ ten years before, the fundamental parallelism recognized is in that mutual dependence of parts which both display; and all the phenomena of organization, individual or social, are regarded as having this as their cause. Any one who refers to *Social Statics* (pp. 452—456, original edition; pp. 264—267, revised edition) will see that this was the root-idea and that this dominates the developed idea. He will also see how entirely without kinship it is to the fanciful notions of Plato and of Hobbes. But in the essay on "The Social Organism" the general conception indicated in *Social Statics*, while developed in detail, has also become affiliated on the general doctrine of Evolution. In the first place, the mutual dependence of parts is shown to involve an increasing integration, and in the second place, numerous illustrations which society furnishes are summed up by the statement that "not only is all progress from the homogeneous to the heterogeneous, but, at the same time, it is from the indefinite to the definite."

And now came the actual start.[3] Ideas which had become fairly definite and coherent were now to be made quite definite while being elaborated in *First Principles*.

As shown by the original programme, I had from the outset seen the need for specifying my position in respect to metaphysico-theological beliefs. If all things were to be interpreted in terms of the redistribution of matter and motion, I must guard myself against ascription of the materialism apparently implied. Along with such an interpretation must go the admission, or rather the assertion, that our ideas of matter and motion are but symbols of that which transcends the possibilities of knowledge: and that hence, any explanation of the *order* of the changes which the Cosmos exhibits, still leaves unexplained the *nature* and *origin* of them.

Hence came to be thought out and written the preliminary division of *First Principles*—"The Unknowable." An absurd misconception resulted. While this was simply an introduction intended to exclude misinterpretations, it was, by the few who paid any attention to the book, regarded as its substance. Having inspected the portico, they turned their backs on the building! The general doctrine of a universal transformation,

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[1] [*Supra*, chap. viii., p. 96.] [2] [*Supra*, chap. viii., p. 96.]
[3] [*Supra*, chap. ix., p. 100.]

conforming everywhere to the same laws, was passed by as not calling for exposition or comment; or, if recognized at all, was supposed to be a sequence of Darwin's doctrine of "natural selection"! The thought of the muddle-headed public seems to have been:—Both are evolutionary; one was published later than the other; therefore the second is a development of the first.[1]

The second division of *First Principles*, constituting its essential part, is mainly, as above implied, an elaboration of the ideas already specified. It contains, however, three further ideas of cardinal importance. One is the process of "Segregation" which, though indirectly implied in some of the essays, had not before taken shape as a necessary part of Evolution. A second concerned the final stage. I have a dim recollection that, referring to the general process of transformation set forth in "Progress: its Law and Cause," which had been the topic of conversation (during an afternoon call at Huxley's), Tyndall put to me the question—"But how does it all end?" or some question to that effect.[2] I cannot now remember whether the answer was given forthwith or whether it came only after reflection; but my impression is that up to that time I had not considered what was the outcome of this unceasing change to a state ever more heterogeneous and ever more definite. It needed only to ask the question, however, to bring the inevitable answer, and the chapter on "Equilibration" was the result. And then, in pursuance of the same line of thought, embodying itself in the question—"What happens after equilibration is completed?" there came the reply, "Dissolution." This was at once recognized as complementary to Evolution, and similarly universal.

I may add that the expositions contained in the successive chapters of the second division of *First Principles*, were easier to write than at first appears. Having in each case got hold of the clue, it was not difficult to follow it out among all orders of phenomena. Bearing the generalization in mind, it needed only to turn from this side to that side, and from one class of facts to another, to find everywhere exemplifications.

In the first paragraph of the *Principles of Biology* may be perceived the effect of bringing a general view to the study of a special subject. The characterization of organic matter is obviously determined by the doctrine contained in *First Principles*. It is pointed out that its elements present two marked contrasts—carbon extremely fixed, hydrogen very volatile; oxygen extremely active, nitrogen very inactive. That is, the components are specially heterogeneous; and the heterogeneity of the compound is increased by the presence of phosphorus

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[1] [*Supra*, chaps. xv., p. 201; xviii., p. 252; xxviii., p. 464; xxx., p. 518.]
[2] [*Supra*, chap. ix., p. 103.]

and sulphur. To this peculiar composition is ascribed that great instability which fits organic matter for those easy and perpetual changes implied by life ; while in the fact that three of its chief components, being gaseous, severally contain in their combined state immense amounts of molecular motion, is seen that constitution which makes it a source of visible activities. It is clear that, in the absence of the leading truths set forth in *First Principles*, organic matter would not have been thus conceived.

There is also exemplified, before the close of the chapter, the effect of bringing together the leading conceptions of different sciences. Complete knowledge of one science is by many urged as an educational ideal, rather than a general knowledge of several. But in each science progress depends on ideas which the other sciences furnish. Prof. Graham's all-important investigations respecting the colloid and crystalloid forms of matter, well exemplified the need for transcending the limits of pure chemistry for the further advance of chemistry. The contrasts he draws between colloids and crystalloids —between the instability of the one and the stability of the other, between the consequent *energia* of the former and the quiescence of the latter, have important implications of many kinds, especially biological. But, not being guided by the relevant biological ideas, there is a corollary which he did not reach. Had he looked at the vital changes from the physiological point of view, and observed that while the wasted tissues are continually being rebuilt the waste-matters have continually to be carried away ; he would have seen that it is because the tissues are formed of colloids while the waste-matters are crystalloids that the vital processes are possible. From the small molecular mobility of the large colloid molecules and the great molecular mobility of the small crystalloid molecules, it results that these last can rapidly diffuse through the first and escape into the channels which carry them out of the body.

Concerning interpretations contained in the immediately following chapters, it will suffice to say that they are dominated by the thought of interpreting vital activities in terms of latent motion taken in and visible motion given out—molecular motion in food and molar motion expended through muscles. And here came recognition of the part played by nitrogen. From the feebleness of its affinities for other elements it results that, easily liberated from its combinations with them, it becomes a constant cause of molecular disturbance and vital motions. This interpretation was suggested by remembrance of the various cases in which nitrogenous substances, both inorganic and organic, are made to serve artificially as agents initiating changes—explosions, fermentations, etc.

The succeeding division of the work, "The Inductions of

Biology," of course consists mainly of expositions of those general truths currently accepted at the time the work was written. Presentation of these in a relatively-coherent form was the natural result of an endeavour to affiliate them on the general principle of Evolution. In each chapter there are indicated the relations borne to first principles by the truths set forth. There may be noted, however, sundry special inferences reached through the systematic mode of contemplating the facts. Everywhere arose the inquiry—What are the physical terms involved? with the result that conclusions —true or untrue as it may turn out—were set down which would not have been reached had not this question been asked.

The chapter on "Growth" furnishes a good example, and furnishes, too, another illustration of the way in which, to interpret the truths of a special science the truths of more general sciences have to be brought in aid. The amounts and limits of growth exhibited by the different classes of organisms, plant and animal, are inexplicable by one who limits himself to biology alone. Mathematics and physics have to be invoked—certain relations between masses and surfaces, certain relations between proportional sizes and proportional strains, certain relations between the genesis of energy and the tenacity of the parts which expend energy. And here let me exemplify the way in which an interest in scientific inquiries at large, may bring in, from a remote subject, the solutions of certain problems. Some time between the issue of the first edition in 1864 and the recent edition in 1898, I met with a report of Mr. Froude's experiments made to determine the resistance to vessels moving through the water. The surprising result was that the chief resistance is not due to continued displacement but to "skin friction." When revising the chapter on "Growth" a significant corollary hence resulted. It became clear that by growth an aquatic animal gains in relative speed: since the increase of energy going along with increase of mass is not met by a proportionate increase of resistance: the skin-friction increases at a slower rate than the increase of energy. Hence great aquatic animals can come into existence. The catching of more prey needful for larger growth would not be possible in the absence of this relation between energy and resistance.

The aid which one science furnishes towards solution of the problems presented by another, is again exemplified in the chapter on "Adaptation." The processes of modification constituting adaptation of organic structures, are rendered quite comprehensible by reference to the analogous social processes.

The cardinal idea which runs through the chapters on "Genesis," "Heredity," and "Variation," is, as shown in § 66, an example of reasoning *a priori*—an exceptional example; for, as I have shown, *a posteriori* conclusions have habitually pre-

ceded the *a priori* verifications. The argument is that the specific traits of organisms cannot be conveyed by the morphological units or cells, nor can they be conveyed by the molecules of protein substances into which these are chemically resolvable: these being common to all organisms. There appears therefore no alternative but to assume some intermediate units conveying the specific characters—physiological units as I called them, or, as I would now call them, constitutional units. That the structure of each organism results from the organic polarities of these seems implied by the facts that a scale from a Begonia leaf, or a fragment of a Polyp's body, begins to assume the typical structure of the species; and yet it seems inconceivable that the complex structures of organisms of advanced types can be thus produced. A more feasible conception was suggested in the final edition of the work; and here again sociological facts aided interpretation of biological facts. For evidence was given that beyond the tendency of a whole aggregate of units of a particular kind to assume the structure peculiar to that kind, whether a society or an animal, there is an ability of the units in each locality to form themselves into a structure appropriate to that locality, quite independently of the influence of the whole aggregate. Recent experimental evidence (1896-7) here came in verification.

Passing over minor ideas in Part III., the first to be named is, that the process of natural selection becomes incapable of producing specific adaptations as fast as there arise complex animals in which many organs co-operate to achieve a single end. The great Irish elk with its enormous horns is instanced; and the argument is that growth of such horns is useless for offence and defence without an accompanying adjustment of numerous bones and muscles concerned in wielding them; that appropriate variations cannot be assumed to take place simultaneously in all the co-operating parts; and that without simultaneous variations in them, increase in the size of the horns must be injurious. After this, the thing of chief importance in this division is the interpretation of the two essential factors of organic evolution—Adaptation and Natural Selection—in physical terms. And here I come upon a fact which obliges me to qualify the description of my method of thinking, namely, allowing some germ of thought accidently occurring, to grow by accretions until it became a fully-developed hypothesis. I was now met by a problem which demanded solution. Adaptation is not a process known to physical science; and the hypothesis of Natural Selection is in both of its terms foreign to that class of ideas which physics formulates. How, then, are adaptation and natural selection to be conceived as caused by that universal play of forces which universal evolution postulates? At first the interpretation seemed hopeless; but when the life of an organism was regarded as a combination of functions forming

a moving equilibrium in presence of outer actions, an interpretation presented itself. All the phenomena fell into place as attendant on the maintenance of moving equilibria and the overthrow of them. It was in thus studying the facts that the expression "survival of the fittest" emerged; for this is, as the context shows, as direct a statement as ordinary language permits of the physical actions and reactions concerned. Here again general truths served as interpreters of special ones.

Some months before completion of the first volume of the *Principles of Biology*, there occurred a digression which had important results. More than once after writing the "Genesis of Science," in which M. Comte's classification of the sciences was rejected, I had endeavoured to make a valid classification, and had failed. Only now, early in 1864, did I hit upon the right mode of regarding the facts: recognizing that the primary basis of a classification is a division into Abstract, Abstract-Concrete, and Concrete, dealing respectively with the forms, the factors, and the products.[1] The conclusions arrived at seemed important enough to justify suspension of other work for the purpose of publishing a brochure setting them forth in detail. Incidentally there came a result of greater importance. While trying to arrange the concrete sciences, and asking what most general truth there is which must take precedence of all those truths presented by astronomy, geology, biology, etc., I saw that it must be a truth concerning the unceasing redistribution of matter and motion which all concrete things exhibit. This truth was that integration of matter and dissipation of contained motion are concomitant changes, and that the converse concomitant changes are increase of contained motion and dissipation of matter: the first resulting in Evolution and the last in Dissolution. In this way I was suddenly made aware that in setting forth the process of Evolution in *First Principles*, I had followed a wrong order; since I had represented the increase of heterogenity as the primary process, and integration as a secondary process. Forthwith I decided to reorganize *First Principles* as soon as the *Principles of Biology* was completed. And here I note the second case in which the writings of M. Comte had an all-important influence; but, as in the preceding case, an influence opposite in kind to that supposed. Had I not made acquaintance with his views concerning the development of the sciences; had I not been thus led to reject his classification; had I not been, consequently, prompted to seek another classification; I should probably never have reached the above conception, and the doctrine set forth in *First Principles* would have retained that very imperfect form originally given to it.

For completion of the narrative, I must add that about this time was written an essay on "The Constitution of the Sun,"

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[1] [*Supra*, chap. x., p. 112.]

containing, among other things, the hypothesis that solar spots result from the condensation of metallic vapours in the rarefied interiors of cyclones ; and must add that about the same time was written an essay under the title "What is Electricity ?" I name these merely to show the excursiveness still displayed.[1]

Returning to the *Principles of Biology*, the first remark to be made is that the interpretation of the special by the aid of the general, is shown throughout Vol. II. in a conspicuous manner ; for in this there begins the deductive explanation of biological phenomena at large in terms of the formula of Evolution.

"Morphological Development" sets out by regarding the facts plants and animals display as primarily phenomena of integration. There is growth by simple accumulation of primary aggregates (cells or protoplasts) ; there is growth by union of groups of these into secondary aggregates ; and then again by union of groups of groups into tertiary aggregates. The rise of the two largest divisions of the plant world is dealt with from this point of view. From the needs of the interpretation there resulted a speculation respecting the origin of Endogens and Exogens (Monocotyledons and Dicotyledons). For in tracing out the origin of plant aggregates of the third order, produced by integration of those of the second order (each in its separate form a thallus or frond), there arose the question—By what different methods of integration did there arise these two different types of vegetal organization ? The interpretation implies a rejection of Schleiden's doctrine, which regards the shoot or axial organ as primary, and the leaf or foliar organ as secondary ; for it implies that the foliar organ is the homologue of a primitive separate frond or thallus, which of course came first in order of evolution. I may add that though in most cases the materials for my arguments were ready to hand in works on Biology, it was in some cases otherwise ; and here is an instance. Observations pursued for some years brought abundant support to the inference that axial organs may, under conditions of excessive nutrition, develop out of foliar organs. "The Morphological Composition of Animals" was dealt with in like manner. Cells, aggregates of cells, and unions of these aggregates into still higher ones, were the stages : the various types of *Protozoa* falling within the first group, *Porifera* and simple Coelenterates coming within the second group, and the compound coelenterate animals, fixed and moving, as well as *Tunicata*, coming within the third group. How far this compounding of groups proceeds in the animal kingdom was a question which arose. The conclusion drawn was that while the *Vertebrata* are aggregates of the second order, annulose creatures (Arthropods and Annelids) are aggregates of the third order : each segment being the

[1] [*Supra*, chap. x., p. 117 ; chap. xxvi., pp. 427-31.]

homologue of what was originally an independent organism. This speculation was, I supposed, peculiar to myself ; but I recently found that it had two years earlier been propounded by M. Lacaze Duthiers. There are many reasons for and against it, but true or untrue, it is manifestly a sequence of the mode of regarding organic progress as exhibiting integration.

In conformity with the general order of evolution, as set forth in *First Principles*, there came next the production of structural differences : advance in integration being accompanied by advance in heterogenity. And here arose the occasion for carrying out in new directions the speculation initiated in 1851, and subsequently set forth in "The Law of Organic Symmetry." The general thesis that the parts of an organism become unlike in form in proportion to their exposure to unlike conditions, was illustrated throughout : first in the shapes of plants as wholes, then in the shapes of branches, then in the shapes of leaves, then in the shapes of flowers, and finally in the shapes of vegetal cells. There followed a like series of interpretations of animal forms—general, and then more and more special. In this exposition was incorporated that theory of vertebrate structure indicated in 1858, as an alternative to the theory of Professor Owen—the theory, namely, that vertebræ have arisen from the mechanical actions and reactions to which the original undivided axis was exposed by lateral undulations ; these becoming as the vertebrate animal developed, more and more energetic, at the same time that the axis became by its reactions more and more indurated at the points of muscular insertion ; segmentation being a necessary compromise between flexibility and stability.

In the next division, "Physiological Development," there is again shown the way in which the interpretations in general and in detail are dominated by the general formula of Evolution : more markedly shown, because, while Morphology had been studied from the evolution point of view, Physiology had been scarcely at all thus studied. As currently understood, Physiology was concerned only with the single and combined functions of organs, and scarcely at all considered the question how functions have arisen. Thus a new field had to be explored, and the exploration was guided by the conceptions set forth in *First Principles*. The general question was "how heterogeneities of action have progressed along with heterogeneities of structure" ; and it was held that to the various problems presented the "answers must be given in terms of incident forces."

Here the hypothesis of Evolution raised a new set of questions, and the raising of them almost of itself prompted the answers. "Intercourse between each part and the particular conditions to which it is exposed" was shown "to be the

origin of physiological development." Throughout successive chapters, proof was given that physiological differentiations exemplify "the inevitable lapse of the more homogeneous into the less homogeneous"; and evidence that the changes result from "the necessary exposure of their component parts to actions unlike in kind or quantity" was furnished by the order in which the differences appear. It was contended, further, that "physiological development has all along been aided by the multiplication of effects": the differentiated parts acting and reacting on one another with increasing complexity. Then came the inquiry—How does there arise that mutual dependence of parts which is the necessary concomitant of the physiological division of labour? Physiological integration accompanies physiological differentiation, and the question was—"What causes the integration to advance *pari passu* with the differentiation?" a question to the solution of which the analogy between the individual organism and the social organism was once more brought in aid. Then, lastly, came to be treated the phenomena of physiological equilibration, as it establishes itself more and more completely in proportion as organic evolution becomes higher: the result of the play of organic forces being such as continually to re-establish a disturbed balance between outer and inner actions, and to establish a new balance where outer actions of a permanent kind arise.

I indicate these chief heads of the argument simply to show how the filiation of ideas was here determined by the need for presenting the facts of physiological development in terms of evolution at large. General truths again served as keys to the more special truths, and caused these to fall into coherent order.

Something must be said respecting an inquiry which arose while writing this division. The genesis of the circulation in plants was one of the topics to be dealt with; and I found very little information ready to my hand. Either I must treat the topic in a cursory manner or must investigate it for myself, and this last alternative I chose. In pursuance of the idea dominant throughout, that the differentiations of parts are due to differences in the incident forces, I inferred that, initiated by slight differences of pressure in certain directions, the produced currents themselves gradually formed channels and so prepared the way for the differentiated structures. The current doctrine was that circulation is through the wood; but there seemed to have been ignored the question—What happens in plants having no woody tissue, and in those young plants and young parts of plants in which woody tissue has not yet been formed? Examination proved that in such places the spiral, fenestrated, or annular vessels are the sap-carriers, and that these fall out of use as fast as the woody tissue arises. The investigation led to the discovery of absorbent organs in certain leaves and roots,

which had not been seen because the sections of the leaves had not been made in such a manner as to disclose them. By compulsion I was in this case led into experimental research; and I do not remember any other case in which an experimental research was undertaken.[1]

The remaining part of the *Principles of Biology*, entitled "Laws of Multiplication," need not detain us. It is an amplified and elaborated statement of the hypothesis which was set forth pretty fully in "The Theory of Population deduced from the General Law of Animal Fertility," published in 1852. In this Part VI. of the *Biology* many additional illustrations, sundry developments, and various qualifications, are set forth. These supplementary ideas it is needless here to specify.

I am often astonished at the large results which grow from small causes. When drawing up the programme of the "System of Philosophy," as it was at first called, and laying out the plan of each work, it occurred to me that, before beginning deductive interpretations in pursuance of the doctrine of Evolution, it would be needful to set down the truths which had been, or which might be, reached by simple induction. And then it occurred to me that, before this statement of inductions, it would be needful in each case to specify the data. This conception determined in large part the arrangement followed. In each science the first and second divisions set forth respectively the data and the inductions, on which the evolutionary interpretations might stand.

This method of procedure had the effect of drawing my attention to truths, some already current and some not current, which would have been passed over unspecified or unrecognized, had it not been for the necessity of filling up these divisions of the skeleton plan. Especially was this cause influential in giving to the *Principles of Psychology* an extended development. What were the data? What were the inductions? were questions to be answered; and search for answers led to some significant results.

The science of Life at large had to supply the data to the science of Mental Life. Setting out from the biological view, it was needful to regard the nervous system as the initiator of motion, and to trace up its development in relation to the quantity of the motion and the heterogeneity of the motion. It was also needful to formulate such truths of structure as are common to all types of nervous systems. Beginning with the simplest structure, in which there is seen nothing more than an afferent nerve, a ganglion, and an efferent nerve, it was contended that the nervous arc formed by the fibre carrying a

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[1] [*Supra*, chap. x., pp. 123, 124.]

stimulus, the ganglion corpuscles to which it went, and the fibre running to a part to be excited, constituted the unit of composition out of which nervous systems are built—a unit of composition with which, in developing types, there is joined a fibre passing from the primary simple ganglion to a higher and more complex one. The thesis was that, throughout their extremely varied types, nervous systems are formed by compounding and re-compounding this unit in multitudinous ways.

Not particularizing others of the Data set down, and passing at once to the Inductions, the first to be named concerns the substance of mind. After showing that of this in its ultimate nature we can know nothing, it was contended that of its proximate nature we may know something. Setting out from our knowledge of the sensation of sound, which is made up of minute nervous shocks rapidly recurring, there was ventured the hypothesis that sensations of all kinds, and by implication higher feelings of all kinds, result from the compounding and re-compounding in infinitely varied ways of minute nervous shocks, akin in their ultimate natures.[1] So that possibly there is an ultimate element of mind which, like some ultimate element of matter, is, by entering into more and more complex aggregates and unions of aggregates, capable of generating the multitudinous kinds of consciousness, as the supposed ultimate element of matter, by its endless ways and degrees of compounding, produces the various substances we know. There is thus hypothetically illustrated in another sphere the general doctrine of Evolution, since the supposed process implies increasing integration and increasing heterogeneity.

The question next to be dealt with was—What are the general truths respecting our mental states which admit of being set down as simple inductions, based upon introspection, and not involving any hypothesis respecting origin. Writers on Psychology have mostly had in view not structural traits but functional traits. We see this in the grouping by Aquinas into Memory, Reason, Conscience; by Reid into Memory, Conception, Judgment, Reasoning; by Dugald Stewart into Attention, Conception, Abstraction, Memory, Imagination, Reasoning. These various heads in the main connote kinds and degrees of action. It seemed to me that the first thing must be to contemplate the aggregate of mental states, and group them according to their characters and behaviours. Examination proved that there are marked structural distinctions in consciousness, and that these are related to structural distinctions in the nervous system. The broadest classification is into feelings and relations between feelings, of which the first are mental

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[1] The instalment of the *Principles of Psychology* containing this view was issued in Oct., 1868. M. Taine, in Vol. I. of *De l'Intelligence* propounded a like view in 1870.

states existing for appreciable times, while the last exist but momentarily; and it was inferred that while the feelings are correlated with changes in the nerve-cells, the relations are correlated with discharges along nerve-fibres. Examination proved that feelings themselves are first of all divisible into centrally-initiated or emotions, and peripherally-initiated or sensations. Among the peripherally-initiated, the broadest division is into those initiated on the outer surface and those initiated in the interior; and it was of course recognized that all these kinds have their vivid or original forms and their faint or revived forms. These groups of feelings differ greatly in definiteness—that is, in the distinctness with which they are mutually limited: the feelings derived from the highest senses being mutually limited in the sharpest way, and the mutual limitation becoming vague in proportion as the feelings are internally generated, and have not sense-organs divided into numerous sensitive elements. Sharpness of mutual limitation was discovered to be connected with ability to cohere—readiness to be associated: where there is vague mutual limitation there is incoherence. Another result reached was that feelings which are definitely limited by others and which, as a concomitant, readily cohere, are also feelings which can be called into consciousness with facility; while feelings of the lower kinds, as those initiated internally, can be revived with difficulty and, consequently, take but small parts in intellectual operations. Once more it was found that these truths which hold of feelings hold also of the relations among them. Here as elsewhere it was found that progress in mental organization, as in nervous organization, is presentable in terms of Evolution; for in rising to the higher types of mental states characterized by definiteness, coherence, and revivability, we progress in integration and heterogeneity.

Concerning the parts entitled "General Synthesis" and "Special Synthesis," it is unnecessary to say much here, since they repeat with small alterations, mainly verbal, the corresponding parts in the first edition. The only significant fact is that to § 189 I have added a note saying that "Had Mr. Darwin's *Origin of Species* been published before I wrote this paragraph, I should, no doubt, have so qualified my words as to recognize 'selection,' natural or artifical, as a factor." At the time the first edition was written the only factor I recognized was the inheritance of functionally-produced changes; but Mr. Darwin's work made it clear to me that there is another factor of importance in mental evolution as in bodily evolution. While holding that throughout all higher stages of mental development the supreme factor has been the effect of habit, I believe that in producing the lowest instincts natural selection has been the chief, if not the sole, factor. This modification of belief, however, affects but slightly the argument running through these two parts.

Part V. is the one referred to in the preface to the first edition as, for the time being, omitted. It sets forth and elaborates the idea, reached some time before the programme of the Synthetic Philosophy was drawn up, that the structures of nervous systems are to be interpreted as consequent upon the general law that motion follows the line of least resistance. The first chapter describes the genesis of nerves in pursuance of this hypothesis, and subsequent chapters carry it out in the description of simple and compound nervous systems.

Concerning the filiation of ideas exemplified in Parts VI. and VII. of the *Principles of Psychology*, there is not much to say here. The first of them reappears with no considerable change; and the second of them, though greatly developed, is chiefly an elaboration of the argument set forth in Part I. of the first edition—an elaboration which, though it contains many ideas not contained in the first, does not call for detailed notice.

In Part IX., "Corollaries," there is yielded another exception to what I supposed to be the uniform process with me—gradual development of a thought from a germ; for here I had forthwith to solve the questions put before me as best I might. After dealing with general psychology it became requisite to enter upon the special psychology of Man in preparation for Sociology. Certain traits of human nature are presupposed by the ability to live in the associated state, and there came the questions—What are these? and, How are they evolved? One only of the leading ideas in this part need here be named as illustrating the course of filiation. Before there can be social co-operation there must be established in Men a liking, such as we see in gregarious animals, for living more or less in presence of one another. And there must be developed in him, as in gregarious creatures, but in a far higher degree, the faculty of sympathy—the aptitude for participating in the feelings exhibited by others. Development of the required type of emotional nature was shown to be a part of the general process of mental evolution. The discipline of social life, beginning in feeble ways, itself little by little developed the capacities for carrying on social co-operation: there was gradual evolution here as everywhere else.

The filiation of ideas as exhibited in the *Principles of Sociology*, cannot be understood without knowledge of certain acts and incidents which occurred while the work on the *Principles of Psychology* was in course of execution. Recognizing how large an undertaking the *Principles of Sociology* would be, how vast the required assemblage of materials, and how impossible it would be for me to gather them, I decided as far back as 1867 to obtain help. I had to study the leading types of societies, from the savage to the most civilized; and I required something like a comprehensive account of the institu-

tions of each. The only course was that of engaging one or more assistants who should, under guidance, collect facts for me. My first step was to scheme an arrangement in which they should be so presented that while their relations of co-existence and succession were easily recognized, they should be so presented that those of each kind could be readily found when required. In the tables drawn up the primary division of social phenomena is into Structural and Functional, and the main divisions under these are Regulative and Operative. A glance will show that ranged under these main and subordinate groups, the heterogenous masses of facts societies exhibit, disorderly as they at first seem, are made intelligible, and the comparing and generalizing of them easy. Sundry modifications of beliefs at once resulted from thus facilitating induction.

The work on *The Study of Sociology* formed no part of the programme of the Synthetic Philosophy.[1] But, rather fortunately, it was written before the *Principles of Sociology* was commenced ; and, while serving to prepare the public, was also a good discipline for me. The cultured classes and their leaders—Carlyle, Froude, Kingsley, etc.—were in utter darkness about the matter. They alleged the impossibility of a "science of history," and were without any conception that there had been going on the evolution of social structures, not made or dreamed of by kings and statesmen, or recognized by historians. Two chapters "Is there a Social Science?" and "The Nature of the Social Science," explained that there is a distinction between history and the science of sociology like that between a man's biography and the structure of his body.

Evidence was given at this time of continued natural growth from a germ dating far back. In the comparison between a society and an organism, made in *Social Statics*, where the mutual dependence of parts common to both and the progress in both from a primitive state of no dependence to a state of great dependence, were pointed out, there was no recognition of any fundamental division in the classes of parts or classes of functions. But "The Social Organism," published ten years later, exhibited the analogy between the expending organs of the two and between the sustaining organs of the two. And now this conception had become more definite. In an essay on "Specialized Administration" published in December, 1871, it was shown that the militant structures and the industrial structures, while growing more distinguished as expending structures and sustaining structures, grow more distinguished also by the different forms of government proper to them : the one being under a despotic central control needful to produce

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[1] [*Supra*, chap. xiii., p. 159.]

efficient joint action, and the other being controlled by the mutual influences of the co-operating parts and not, in respect of their functions, subject to central direction. At the same time it was shown that individual organisms of high types furnish a parallel to this contrast in the contrast between the cerebro-spinal nervous system and the visceral nervous system. And here, more than before, was emphasized the truth that from the beginning war has been the cause of the development of centralized governmental structures, which become coercive in proportion as war is the dominant social activity ; while growth of that decentralized co-operation characterizing sustaining structures, becomes more marked as war ceases to be chronic : a corollary being that social types are essentially distinguished by the proportion between the militant structures and the industrial structures, and undergo metamorphoses according to the growth or decline of either order of activity.

One more essay, published in 1870, on "The Origin of Animal-Worship," must be named as containing another idea destined to undergo much development in the *Principles of Sociology*, the first instalment of which was issued in June, 1874. In the third paragraph (Essays, i. 309) it is said that "The rudimentary form of all religion is the propitiation of dead ancestors, who are supposed to be still existing, and to be capable of working good or evil to their descendants";[1] and that to prepare for "sociology, I have, for some years past, directed much attention to the modes of thought current in the simpler human societies."[2]

Growing complexity of subject-matter implies growing complexity of causation ; and with recognition of additional factors comes proof of the inadequacy of factors previously recognized. This is manifest when tracing the filiation of ideas throughout the *Principles of Sociology*. The modifications resulted from evidence contained in the *Descriptive Sociology* and added to from various other sources. Simple induction now played a leading part.

Already in *Social Statics* there were recognitions of the truth that the fitnesses of institutions are relative to the natures of citizens. More definitely the *Study of Sociology* again displayed

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[1] After the publication of the first volume of the *Principles of Sociology*, a controversy arose between Mr. (now Prof.) E. B. Tylor and myself concerning our respective views. Though his view, as set forth before 1870, was that animism is primary and the ghost-theory secondary, while my view was that the ghost-theory is primary and animism secondary, yet he had the impression that I had derived my view from him. In the course of the controversy, when referring back to things I had written, I overlooked these sentences just quoted, which (setting aside any difference of view between us) conclusively dispose of his supposition.

[2] [*Supra*, chaps. xii., p. 148; xiv., p. 190 xxvii., p. 451.]

this conviction. In youth my constitutional repugnance to coercion, and consequent hatred of despotic forms of rule, had involved a belief like that expressed in the American Declaration of Independence, and like that which swayed the French at the time of the Revolution—the belief that free forms of government would ensure social welfare. A concomitant was a great abhorrence of slavery, and a conviction that it has always been an unmitigated evil. Ecclesiasticism, too, excited in me profound aversion. Along with this went an unhesitating assumption that all superstitions are as mischievous as they are erroneous. These and allied pre-judgments were destroyed or greatly modified by contemplation of the facts. So that many ideas now set forth were not affiliated upon preceding ones, but generated *de novo :* some independent of, and some at variance with, preceding ones.

As in the works on Biology and on Psychology, fulfilment of the original programme, which in each case set out with Data and Inductions, was largely influential in producing certain of these changes. Especially did search for the data compel attention to those traits of human beings which are factors in social co-operation. Throughout many chapters the affiliation of every kind of superstition upon the universal belief in the doubles of the dead, was traced ; and it became manifest that all religious ceremonies originate from endeavours to please or pacify the ghost. The multitudinous facts showing this conspired also to show that belief in the continued, or rather the increased, power of the dead ruler came to supplement the power of the living ruler ; so that strengthening of natural control by supposed supernatural control became a means of maintaining social unions which could not else have been maintained. This was an all-important idea not affiliated upon preceding ideas. Nor could there be affiliated on preceding ideas the convictions produced by the logic of facts, that kingship and slavery are institutions naturally arising in the course of social evolution, and necessary to be passed through on the way to higher social forms. So, too, it had to be reluctantly admitted that war, everywhere and always hateful, has nevertheless been a factor in civilization, by bringing about the consolidation of groups—simple into compound, doubly-compound, and trebly-compound—until great nations are formed. As, throughout the organic world, evolution has been achieved by the merciless discipline of Nature, " red in tooth and claw " ; so, in the social world, a discipline scarcely less bloody has been the agency by which societies have been massed together and social structures developed : an admission which may go along with the belief that there is coming a stage in which survival of the fittest among societies, hitherto effected by sanguinary conflicts, will be effected by peaceful conflicts.

To these indications of the re-moulded conceptions per-

vading the *Principles of Sociology*, have now to be added the ideas characterizing the successive parts.

In "The Inductions of Sociology," the analogy between social organisms and individual organisms was elaborated: various minor ideas being brought to enforce the general idea. Here, as before, the assigned warrant for the comparison is the incontestable truth that in both there is co-operation of parts with consequent mutual dependence of parts; and that by these the life of the whole, individual or social, is constituted and maintained. Among further developments of the conception the first was a perception of the fact that whereas in individual organisms the co-operation is among parts which are in physical contact, in societies the co-operation is among parts which are in various degrees separated. At the same time it is shown that the co-operation, effected in living bodies by molecular waves propagated through the tissues, is, in societies, effected by "signs of feelings and thoughts conveyed from person to person." A concomitant difference is named. Whereas the animal organism has one sentient centre, for the benefit of which, in superior types, all other component parts exist, in the social organism there are as many sentient centres as there are persons; and, consequently, the units can no longer be regarded as existing for the benefit of the aggregate. Recognition of this essential difference explains the apparent anomaly that while societies highly organized for corporate action, and in that respect analogous to superior types of animals, are to be regarded as the highest *so long as militancy is great*, and the preservation of the society as a whole is the dominant end; under peaceful conditions, when corporate action is no longer needed for offence and defence, the highest types of society are those in which the coercive governmental organization has dwindled, and corporate action, with its correlative structures, gives place to individual action, having directive structures of a relatively non-coercive kind.[1]

The ideas contained in Part III., "Domestic Institutions," mostly show little evidence of descent from preceding ideas. The first significant one is contained in a chapter on "The

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[1] Some fifty years ago M. Milne-Edwards pointed out the analogy between the division of labour in a society and the physiological division of labour in an animal, and regarded the growing complexity of structure as a concomitant in the one case as in the other. If any one had thereafter asserted that he based the science of Biology on the science of Sociology, the assertion would have been regarded as extremely absurd. But the absurdity would have been no greater than is that fallen into by some American sociologists—Prof. Giddings and Mr. Lester Ward among them—who assert that I base Sociology upon Biology because I have exhibited this same analogy under its converse aspect; and who continue to do this though I have pointed out that the analogy does not in either

Diverse Interests of the Species, the Parents, and the Offspring"; in which it is shown that along with a certain community of interest there go certain antagonisms. In low types the sacrifices of individual life and well-being to the maintenance of the species, are great; and the sacrifices of parents to offspring and of offspring from inefficiency of parents, are also great; but as evolution progresses, all such sacrifices gradually become less. The next conclusion suggested by the evidence is that the sexual relations which arise, are, in a measure, appropriate to the respective social stages reached: polygamy having a natural relation to a chronic warfare which entails much male mortality. A further conclusion which the facts establish is that the *status* of women is low in proportion as militancy is high, and gradually improves (as does that of children also) in proportion as industrialism develops. Of chief importance, however, is the doctrine that a radical distinction must be maintained between the ethics of family life and the ethics of social life. The ethics of family life, as concerning offspring, are that benefits received must be great in proportion as merit is small; whereas, on passing into social life, the individual must become subject to the law that benefits shall be proportioned to merits. And it is contended that the effects are immediately fatal in the first case and remotely fatal in the last if a converse *régime* is in force.

The next division exemplifies not the filiation of ideas but the entire overturn of an earlier idea by a later. Dominant as political government is in the thoughts of all, it is naturally assumed to be the primary form of government; and this had been assumed by me, as by everybody. But the facts which the *Descriptive Sociology* put before me, proved that of the several kinds of control exercised over men the ceremonial control is the first. After recognition of this unexpected priority, the cardinal truth recognized was that ceremonies at large originate in the relation between conqueror and conquered: beginning with mutilations and trophies, and running out into all forms of propitiatory actions and speeches—obeisances, modes of address, presents, visits, titles, badges and costumes, etc. The

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case furnish a foundation, but merely yields mutual illumination. (See *Essays*, vol. ii., p. 467 *et seq.*) Those not biassed by the desire to make their own views appear unlike views previously enunciated, will see that if Sociology was by me based on Biology, biological interpretations would be manifest in all parts of the *Principles of Sociology* succeeding the part in which the above analogy is set forth. But they are not. The interpretations running through Parts III., IV., V., VI., VII., and VIII., though they are congruous with this analogy, are not guided by it, but have quite other guidance. They are based on the general law of Evolution, which is from time to time referred to as illustrated in the particular group of phenomena under consideration.

development of these exhibits very clearly the evolution from a simple germ to a complex aggregate, characterized by increasing heterogeneity and definiteness. A guiding truth finally emphasized was, that not only does ceremony begin with the behaviour of the conquered man to the conqueror, but that throughout all its developments it maintains its relation to militancy; being peremptory and definite in proportion as militancy is great, and diminishing in its authority and precision as industrialism qualifies militancy. This connexion, is one aspect of the truth that militancy implies the principle of *status*, which involves ceremonial observances, while industrialism, implying contract, does not involve ceremonial observances.

After premising that political institutions must be regarded as relative to the circumstances and natures of the peoples living under them, there is drawn a fundamental contrast between the two kinds of co-operation which societies exhibit. There is conscious co-operation in the actions of a society as a whole against other societies, and unconscious co-operation in the actions of citizens severally satisfying their own wants by subserving the wants of others, but who do this without concert: no arrangement for undertaking different kinds of production having been made or even thought of. Efforts for self-preservation by the aggregate originate the first form of organization; while efforts for self-preservation by the units originate the last form of organization; the first being coercive and the last non-coercive. Here, while setting down these leading truths, there is disclosed to me one which I had not observed—one which, like so many others, is seen in the analogy between individual organization and social organization. For the contrast between the conscious co-operation of the structures which carry on the external actions of a society, and the unconscious co-operation of the industrial structures which carry on sustentation, is paralleled by the contrast between the conscious co-operation of the senses, limbs, and cerebro-spinal nervous system of a vertebrate animal, and the unconscious co-operation of its visceral organs and the nervous system of organic life which controls them.

The general truth referred to before, and again implied in the statements just made, is that political organization is initiated by war and develops with the continuance of war. The primitive chief is the leading warrior. During long stages the military chief and the civil chief are the same, and even in the later stages in which the king becomes mainly the civil chief, he remains nominally the military chief. By implication the political organization is at first identical with the army organization. Chiefs and sub-chiefs, kings and feudal lords, are in peace central and local rulers; and the civil discipline among them and their subordinates is simply the military

discipline : the servile or non-fighting portion of the population being the commissariat.

One final truth—an all-important truth—has to be named and emphasized. This is that the fighting structures and the industrial structures, though in a sense co-operative, are in another sense antagonistic ; and that the type of the society is determined by the predominance of the one or the other. The militant type, in proportion as it is pronounced, entails compulsory co-operation, the *régime* of *status*, and the entire subjection of the individual ; while the industrial type is characterized by voluntary co-operation, the *régime* of contract, and the independence of the individual : all the habits, sentiments, and ideas which prevail being in either case accompaniments of the type.

In Part VII. it is shown that just as political institutions are initiated by the emergence of a leading warrior who, first chief in war, presently becomes chief in peace ; so ecclesiastical institutions have their beginning in the emergence of a special ancestor-worship from the pervading ancestor-worship carried on by all families. The propitiation of the deceased chief rises into predominance ; the son who rules in his place, and succeeding rulers, being the primitive priests. Thus arising, the cults of heroes, conquerors, kings, generate a polytheism with its various priesthoods ; and, by implication, a developed ecclesiastical system arises when victories produce composite societies and supreme rulers. Thus differentiated from political institutions, ecclesiastical institutions are partly co-operative and partly competitive : co-operative in so far that they join in enforcing the laws derived from the past, and competitive in so far that there grows up a struggle for supremacy : the ecclesiastical power, in virtue of its assumed divine authority, often becoming predominant. Differentiating as the ecclesiastical structure thus does from the political structure, it long participates in political functions. Its priests take part in war, and act as judges and local rulers during peace. But the differentiation becomes almost complete as social evolution progresses. And while ecclesiastical structures separate from political structures, there is shown within them progressing integration and progressing heterogeneity.

The futility of historical studies as ordinarily pursued, indicated already, is again shown on turning to the evolution of "Professional Institutions." Even before the collection and classification of the facts presented by inferior societies had gone far enough to make possible a complete tabulation, it became manifest that all the professions are differentiated from the priesthood. But so little recognized was this truth that the tabular representation, implying derivation of the one from the other, created surprise among highly educated critics.

Some significant evolutionary facts are exhibited in "Industrial Institutions." The division of labour displays unfamiliar

features when developmentally considered. Out of the primitive homogeneous stage there arise by degrees the three distinguishable processes, Production, Distribution, and Exchange; and it is pointed out that in each of these divisions there arises a secondary division into the essential and the auxiliary—the actual processes and the aiding processes. The increasing interdependence of all these processes is shown to constitute an industrial integration. On passing from the division of labour to the regulation of labour, we come upon the truth, inferable *a priori* and established *a posteriori*, that the regulation of labour has a common origin with political regulation, and gradually differentiates from it. The first stage succeeding that in which each male member of a tribe, while warrior and hunter, makes for himself all such things as women cannot make, is the stage in which conquered men are made slaves; and the directive power exercised over the slave is, like the political directive power, purely coercive. Social life and domestic life alike exhibit the relation of ruler and subject; since this form of regulation for slaves is also the form of regulation for children. As the paternal passes into the patriarchal, the control of industry continues to be similar in nature to governmental control. The like holds in large measure when communes arise; and though under gild-regulation there is independent industrial action, it is subject to the coercive, quasi-political action of the gild. Only by degrees does the industrial regulation, based on contract, separate itself from the original form of industrial regulation, based on *status*: the law of evolution is again illustrated. Passing over corollaries, it will suffice to name the generalization finally reached, that the essential differences in industrial regulation, as in political regulation, are implied by the question—To what extent does a man own himself, and to what extent is he owned by others? In actively militant states, like Sparta, he is the slave of the society, compelled to devote his activities and his life to its preservation: each is owned by the rest. But as fast as industrialism qualifies militancy, he acquires increasing possession of himself; until, in a society like our own, he is coerced scarcely more than is implied by paying taxes and, possibly, in case of war, going as a conscript. Still, however, he remains in considerable measure subject to the coercion of his industrial combinations—gilds or trade-unions. He is but partially master of himself, since he can use his abilities for self-maintenance only under such conditions as they prescribe. Complete possession of himself can be had by each citizen only in a perfectly peaceful state, and in the absence of all restraints on his power to make contracts.

In the *Principles of Ethics*, the title of the second chapter "The Evolution of Conduct," implies a point of view differing widely from the ordinary point of view. The idea that Ethics

is to be conceived as a certain aspect of evolving conduct, was utterly alien to current ethical ideas, at the same time that it was congruous with the ideas contained in the preceding works. The tap-root of the system goes back to *Social Statics*, in which some root-fibres went into Biology, Psychology, and, largely, into Sociology. These fibres had now developed into branch roots, as is shown by the titles of successive chapters—"The Physical View," "The Biological View," "The Psychological View," "The Sociological View." Ethics was thus conceived as treating of conduct in relation to physical activities, vital processes, and mental functions, as well as in relation to the wants and actions of surrounding men. Hence not only duty to others, but also duty to self, had to be recognized and emphasized.

After these and other Data came the question—What are the Inductions? Under this head had to be ranged the various kinds of conduct, and the various ideas of right and wrong, found in human societies of all kinds and in all stages of progress. The first general conclusion drawn from this Comparative Ethics was that there is, in each case, an adaptation between the ideas of right and wrong and the kind of life which inherited nature and environing conditions produce; and the second conclusion was that there exists no such thing as a moral sense common to all mankind, but that the moral sense in each society, and in each stage, adjusts itself to the conditions.

Part III. dealing with "The Ethics of Individual Life," recognized, in pursuance of the general conception, the moral sanction of all those individual activities implied in the healthful and pleasurable pursuit of personal ends, bodily and mental. The conclusions drawn, though checked by Biology and Psychology, were in the main empirical; for there are no adequate data on which to base a definite code of private conduct. Personal nature must largely determine the special activities and special limits to them, though vital laws must regulate these. But there is named, though not adequately emphasized, a general consideration furnishing much guidence; namely, that to achieve the fullest life and greatest happiness, a due proportion must be maintained among the activities of the various faculties: excess in one and deficiency in another being, by implication, negatived. Doubtless, in our social life the subdivision of occupations necessitates great disproportion; but consciousness of the normal proportion serves to restrain.

In "The Ethics of Social Life—Justice," there is at length a return to the topic with which the whole series of my writings commenced. In "The proper Sphere of Government," and then in *Social Statics*, endeavours were made to reach definite ideas concerning the just regulation of private conduct and the just relations of individuals to the social aggregate, represented by its government. And now, after all the explorations made