The eccaleobion : a treatise on artificial incubation / by William Bucknell.

To the President of the College of Physicians
with the compliments of the
Author

THE

ECCALEOBION;

A TREATISE

ON

ARTIFICIAL INCUBATION.

IN TWO PARTS.

BY WILLIAM BUCKNELL.

Brought into being, and nurtured by other powers and agencies than those of Nature's providing, the Embryo of existence——lives!

" 'Tis God!
" Inspiring God!—Who, boundless spirit all,
" And unremitting energy, pervades,
" Adjusts, sustains, and agitates the whole.
" He, ceaseless works alone, and yet alone,
" Seems not to work; with such perfection framed,
" Is this complex, stupendous scene of things;"

LONDON:

PRINTED AND PUBLISHED FOR THE AUTHOR;

AND SOLD AT THE EXHIBITION, 121, PALL MALL; AND BY ALL BOOKSELLERS IN THE UNITED KINGDOM.

1839.

Price One Shilling.

G. Smallfield,
Printer,
69, Newgate-Street, London.

TERMS OF ADMISSION, &c.

TO THE

ECCALEOBION.

This most extraordinary and wonderful Exhibition of the production of Animal Life by Machinery, with all its accompanying interesting phenomena, is open to the Public, from Ten to Six o'Clock. Admittance, One Shilling.

The average number of birds capable of being brought into existence daily by this machine, exceeds 100, or about 40,000 per annum.

As the fresh, impregnated egg of any bird, from a wren to an eagle, can be elicited into life at the same temperature, persons bringing the eggs of canaries, goldfinches, poultry, or any bird, may place them in the Machine for hatching, marking the same with their initials, upon payment of one shilling each egg, and will receive a Free Admission Ticket for as many days as their respective number of eggs, whereby they will be enabled to watch the progress of the nascent birds to maturity.

Any persons desirous of seeing a bird in its nascent, or partly-formed state, at any period of incubation, will have an egg broken for them, upon payment of one shilling per egg.

Persons (particularly men of science) desirous of investigating the process of incubation, from the first microscopic speck of vital existence, to its full developement in a perfect and healthy being, may receive a Ticket of Admission for twenty-one days, with the privilege of breaking an egg each day—for One Guinea.

Parents and the guardians of youth, desirous that their charge shall behold this secret working of an Almighty Hand! will have an allowance made, according to the number of children admitted. Schools, also, will be admitted to view the whole process of incubation upon the same liberal terms.

(Note.—No Reduction of Charge, however, will be made for Children to the General Exhibition.)

During the last week of incubation, the birds are so far matured in the shells, that any visitor wishing to enjoy the gratification of hatching them at home, may do so without difficulty, by simply keeping them moderately warm; the warmth of the human body, or 98 degrees of Fahrenheit, being the standard.* The eggs are sold for this purpose at one shilling each.

Noblemen and Gentlemen, desirous that the interesting phenomena displayed in the developement of life by artificial means shall be witnessed by their families, without the inconveniences incidental to a public exhibition-room, can have the whole process, in a vital and uninjured state, brought to their own homes, by means of a portable Eccaleobion; and animal life in its most perfect, vigorous, and healthful state, made to burst into light and existence before their eyes, upon the tables of their Parlours and Drawing-rooms; furnishing the most splendid subject for an evening's "converzatione," of any within the range of science. Terms regulated according to distance and number of visits.

Eggs in any stage of incubation, and young birds, supplied for philosophical or anatomical purposes, in any quantity.

Having liberated themselves from the shells, and in the full enjoyment of health and strength, these beautiful, and from the extraordinary mode of their introduction into life, curious birds, are sold to visitors, as pleasing memorials of what science can achieve, at One Shilling each.—N. B. Warmth, dryness, proper food, and common care, are all that is necessary to a successful rearing.

* For further particulars, See pages 2 and 3, Chapter I.

ADVERTISEMENT.

The purport of the following pages is, to bring under the notice of an enlightened Public, an achievement hitherto unparalleled in the annals of science, and, in fact, from physical causes impossible to be done by any other means, in an European climate; Machinery, whereby is opened by its application to the production of Animal Life, and adaptation to innumerable processes in Science and the Arts, new fields of industry illimitable in their extent, and affording facilities for philosophical research, with an accuracy as regards that important condition, temperature—either of air or water, never before obtained.

In the latter part, the object is to place before the Public, in an attractive manner, the several subjects upon which it treats; subjects, extremely interesting in themselves, and respecting which the Public mind is not merely unfamiliar, but generally entirely ignorant. And it is hoped that through the instrumentality of a popular exhibition, a diffusion of information and an impulse to reflection will be given upon matters so full of the glorious evidences of Omnipotent Power and Infinite Wisdom, as cannot fail to be beneficial, raising thereby the thoughts of man from earth to Deity.

CONTENTS.

PART I.

CHAPTER I.

CHAPTER II.

CHAPTER III.

PART II.

Facts and Observations connected with, and illustrative of, the Phenomena of Life, Mind, and Instinct, more especially their developement by the Eccaleobion.

CHAPTER I.

CHAPTER II.

CHAPTER III.

CHAPTER IV.

THE ECCALEOBION.

PART I.

CHAPTER I.

EXHIBITION OF THE ECCALEOBION.

A Description of the Eccaleobion, as exhibiting at 121, PALL MALL, detailing the process of Incubation, as induced and developed thereby.

ECCALEŌBION, the name or title of this Machine, is derived from two Greek words, Εκκαλέω, "I bring forth, and Βιος, "life,"—forming the compound Eccaleobion, signifying, "I bring forth life."

The Eccaleobion, or Life-giving Machine, forms, to outward appearance, an oblong, square, wooden box, about nine feet in length, three feet in breadth, and three feet and a half in height, covered, excepting the doors, with cloth. It stands upon a table, and is entirely disconnected from the walls against which it is placed. Its efficient action and regulative power are inclosed within.

It is divided into eight compartments, or divisions, open to the sight (the doors being glazed) in which the eggs are deposited, spread promiscuously upon the floor of each division. The eggs lie uncovered, neither wrapped in flannel, nor immersed in sand, as has usually been done, in order that they might retain their warmth when exposed to cold, or resist the effects of too great heat.

The Eccaleobion is capable of containing upwards of two thousand eggs;—each egg has the power of generating heat, as the bird within it advances to maturity; consequently, a very successful issue, from a large number of eggs, can be expected only when such quantity is subjected to an uniform action of the ma-

chine, regulated, according to the degree of heat engendered by the birds. Or, in other words, the degree of temperature suited and administered to a thousand eggs, during the last week of incubation, would not elicit life in a thousand fresh eggs, submitted to the same influence; while the temperature, necessary to produce life in the latter, would destroy it in the former.

In consequence of this physical law, a great sacrifice of life is incurred in the endeavour to bring a large number of birds daily into existence; nevertheless, by using certain counteracting measures while eggs can be obtained plentifully and good, the average will exceed one hundred daily—or, about 40,000 per annum.

The spectacle of so many living beings, busily employed, liberating themselves from their imprisonment, and bursting into light and existence, through the agency of inert matter, set in operation by the human mind, presents a sight most beautiful and interesting! At this period, the assistance of the machine is not absolutely necessary; it may be done upon a table, while in your hand, or in a lady's bosom.

From the Eccaleobion the birds come forth, redolent in health, strength, and activity; and, soon after their liberation from the shell, are carefully fed, and tended for two or three days; after which, revelling in the luxury of their new existence, they are seen running about the floor of their apartment; and, proper means being used, neither require, nor feel, the loss of that maternal care, which, in all other instances, a natural parent only can successfully bestow.

Birds, in a healthy condition, require no assistance to effect their escape from the shell; which operation they perform in a remarkable and uniform manner, making a circular fracture of the shell with their bill, and bursting its integuments by strong muscular exertion. In cases of weakness in the bird, or defective hatching, assistance may be given, but such birds generally die in a few days, or, perhaps, hours. Darkness is also considered favourable to the process; probably, from too much light occasioning an unhealthy excitement in the nervous system of so exquisitely delicate a creature.

Few eggs, excepting those of rare or foreign birds, are worth the trial of hatching, if more than a month old;

their condition, however, is greatly influenced by the season, and the state of the weather; an egg retains its freshness longest in moderately cool weather; very hot weather destroys vitality in a few days. An egg having been frozen, is, of course, also worthless.

This machine does not, as is frequently the case with eggs sat upon by the parent bird, ever addle them. This evil is occasioned by the alternation of heat and cold, arising from the hen's unsteady sitting. The warmth imparted by the Eccaleobion is uniform and continued. A flush of fresh cool air passing over them each day, for a short time, is considered beneficial.

Failures, however, arise from the following causes, besides that already mentioned:—want of impregnation in the egg; age, commonly called staleness, whereby life has become extinct; weakness of the vital energy of the egg, produced by age, lowness of keep, or ill health of the parent; in these cases, the embryo partially developes itself, but dies before the full period of incubation.

Eggs may be brought to life; but if the process be not executed properly, the birds are weakly and ill-conditioned, and die in a short time afterwards. This has been the case with all former attempts at artificial incubation in this country. The process, however, by the Eccaleobion is so certain, and so completely under controul, that the birds produced by it come forth in the most perfect and healthy state, and live, flourish, and fatten, as well as any of their congenors, who owe their existence to a more natural and less extraordinary birth.

There is no difficulty in teaching the young of the various tribes of gallinaceous fowl to eat and to drink; they perform these operations spontaneously, or from observation, as appetite prompts them,* nor is food necessary until the expiration of twelve or twenty hours after leaving the shell. Sickly, and badly-hatched birds, seldom can be induced to eat, and die from inanition.

It is not necessary, in the Eccaleobion, to move or

* Are not the facts, of the extraordinary fecundity of these tribes of birds, their requiring no assistance in hatching, and their being self-instructed in the manner of taking their food, abundant evidence that an Allwise Providence ordained these peculiarities expressly for man's advantage; as in all those families of birds, not so fitted for his use, they do not exist; and, consequently, cannot be rendered, by artificial means, available for his benefit?

turn the eggs for the purpose of subjecting each to its fair proportion of warmth, as the machine acts uniformly, not only with the same power upon the whole surface of each egg, but upon all alike, however great their number. But, to prevent the yolk of weak eggs from settling by its specific gravity, and adhering to the shell, it is useful to pass the hand over them, so as to change their position once in twenty-four hours.

The egg of a strong, healthy bird, at the time of its protrusion from the body, is completely filled with yolk and albumen. If examined, a few days after, by holding it toward the light, a small bladder of air will be discoverable at the larger end, which increases with the age of the egg. This waste of its internal substance is occasioned by absorption by the atmosphere, through the pores of the shell of the more volatile part of its contents. When the bladder is large in any egg, it is unfit for incubation; nevertheless, in a good egg, as incubation proceeds, this bladder becomes considerable, probably produced both from evaporation by heat, and the vital action going on within the shell. It also serves an essential and important purpose in the economy of this mysterious process.

The germ, or embryo of the chick, contrary to the received opinion, is not in every egg placed precisely in the same situation, but varies considerably. Generally, it develcpes itself within the circumference of the broadest part of the egg; sometimes it is found higher, sometimes lower; and, when held before a strong light, has an appearance, when a few days old, somewhat resembling the meshes of a spider's web, with the spider in the centre. As it increases in size, the bulk of the contents of the egg decrease, as already stated, so that when the bird is completely matured, it has ample space to move, and to use its limbs with sufficient effect, to insure its liberation.

If chickens, about two months old and upwards, are turned in among a brood of younger birds, they will sometimes take to brooding, and tending them with the delight of natural parents. The gratification being quite mutual, the young chicks run after, and strive with each other for their favors with the most untiring perseverance. Although, probably, it is simply the pleasurable sensation derived from the genial warmth communicated

by the young birds nestling under them, which induces them to do it, it is, nevertheless, a striking, and highly-interesting picture, to witness these mimic mothers acting the part of foster parents with so much apparent satisfaction, yet with the awkwardness with which a girl, in similar circumstances, fondles her doll.

Beautiful as a brood of chickens always are, when presented to the eye under any circumstances, this interest is greatly increased, by an artificial system of production and rearing. Birds, but a few hours old, recognize the person who feeds them; and, in a few days, evince so many, and such pleasing traits of confidence in him as their protector and friend, following his steps, and clamorously repining at his absence, as must induce, in the most callous breast, a delightful sensation of regard for their welfare.

PROCESS OF INCUBATION.

The following progressive series of phenomena are daily observable, during the process of incubation, in the egg of the common fowl.

In an impregnated egg, previous to the commencement of incubation, a small spot is discernible upon the yolk, composed, apparently, of a membraneous sac, or bag, containing a fluid matter, in which swims the embryo of the future chick, and seemingly connected with other vesicles around it.

1st Day.—In a few hours after exposure to the proper temperature, the microscope discovers that a humid matter has formed within the lineaments of the embryo: and, at the expiration of twelve or fourteen hours, this matter evidently bears some resemblance to the shape of a little head; a number of new vesicles also successively appear, rudimentary of different parts of the future body of the chick; those first formed, and most easily distinguishable, may afterwards be recognized as assuming the shape of the vertebral bones of the back.

2d Day.—The eyes begin to make their appearance about the thirtieth hour, and additional vessels, closely joined together, indicate the situation of the navel. The brain and spinal marrow, some rudiments of the wings and principal muscles become observable. The formation of the heart is also evidently proceeding.

3d Day.—At the commencement of the third day, the beating of the heart is perceptible, although no blood is visible; a few hours, however, elapse, and two vesicles, containing blood, make their appearance,—one forming the left ventricle, the other the great artery. The auricle of the heart is next seen, and, in the whole of these, pulsation is evident.

4th Day.—The wings now assume a more defined shape, and the increased size of the head renders the globules, containing the brain, the beak, and the front and hind part of the head, distinctly visible.

5th Day.—On the fifth day the liver makes its appearance, and both auricles, now plainly seen, approach nearer the heart than they were before. That beautiful phenomenon, the circulation of the blood, is evident.

6th Day.—The lungs and stomach are distinguishable, and the full gush of blood from the heart distinctly apparent.

7th Day.—During this day, the intestines, veins, and upper mandible, become visible; and the brain begins to assume a consistent form.

8th Day.—The beak, for the first time, opens, and the formation of flesh commences upon the breast.

9th Day.—The deposition of matter, forming the ribs, takes place, and the gall-bladder is perceptible.

10th Day.—The bile is now formed, or, at least, distinguishable by its green colour; and the first voluntary motion of the body of the chick is seen, if separated from its integuments.

11th Day.—The matter forming the skull now becomes cartilaginous, and the protrusion of feathers evident.

12th Day.—The orbits of sight are now apparent, and the ribs are perfected.

13th Day.—The spleen gradually approaches to its proper position in the stomach.

14th Day.—The lungs become inclosed within the breast.

15th, 16th, and 17th Days.—During these days, the infinity of phenomena in this wonderful piece of vital mechanism elaborate it into more perfect form, and it presents an appearance closely approaching the mature state. The yolk of the egg, however, from which it derives its nourishment, is still outside the body.

18th Day.—On the eighteenth day, the outward and audible sign of developed life is apparent, by the faint piping of the chick being, for the first time, heard.

19th, 20th, and 21st Days.—Continually increasing in size and strength, the remainder of the yolk gradually becomes inclosed within its body; then, with uncommon power, for so small and frail a being, it liberates itself from its prison in a peculiar and curious manner, by repeated efforts made with its bill, seconded by muscular exertion with its limbs, and emerges into a new existence.

The position of the chicken in the shell, is such as to occupy the least possible space. The head, which is large and heavy in proportion to the rest of the body, is placed in front of the belly with its beak under the right wing; the feet are gathered up like a bird trussed for the spit, yet, in this singular manner, and apparently uncomfortable position, it is by no means cramped or confined, but performs all the necessary motions and efforts required for its liberation, with the most perfect ease, and that consummate skill which instinct renders almost infallible.

The chicken, at the time it breaks the shell, is heavier than the whole egg was at first.

An egg will not hatch in vacuo.

Such is the Exhibition of the Eccaleobion, such the interesting nature of the phenomena displayed by its agency! Phenomena, so magnificent and astounding, so pregnant with wonders, as to fill with admiration and astonishment, alike the mind of the profoundest philosopher, and the least contemplative of the human race. Nor is it possible, that the most unintelligent Christian can survey them with indifference, or his reflections thereon not lead him

"Through Nature, up to Nature's God!"

CHAPTER II.

ARTIFICIAL INCUBATION,

As practised by the Egyptians, and the attempts made in Europe, particularly by the French Academy, to establish it in France, shewing the causes of their failure, and the successful issue of the Eccaleobinic system.

Domestic Poultry, particularly the Gallinaceous kinds, have not only ever been regarded valuable as food, from their highly nutritive qualities, but in this country, in its most populous districts, as luxuries, which, from their dearness, seldom grace the table of the poorer and middling classes. It would be, therefore, no small achievement to bring an article, at present, so restricted in its consumption, within the reach of the public generally, which, however, can never be accomplished until some means of multiplying their numbers beyond those heretofore in existence shall have been provided.

There is a charm about these tribes of birds, which prepossesses every one in their favor, particularly of the common cock and hen. Their dauntless courage, especially of the male bird, his noble bearing and defying notes, his attention to his wives; their affection for their young, their fearlessness of man, and their ample repayment of his care of them in the shape of eggs and food; render them, not only an ornament at the door of the cottager, but the pride of the "gude wife," who well knows the value of an egg in the nest, when provision is scant in the cupboard. No cottage, where there is room for a run, without trespassing upon a neighbour's property, is what it ought to be, if not possessing these interesting appendages.

Most gallinaceous fowls, in great part, find their own food, and are fattened at little cost. Why should England, therefore, import from foreign countries often as much as twenty tons of poultry per week, and seventy millions of eggs per year from France, paying a duty of

£24,000, when both might be had cheaper and better at our own door? Ireland also supplies a much larger amount.

Why should the flesh of poultry, whose food mostly consists of what otherwise would be lost, be generally double or treble that of the ox or the sheep, weight for weight, whose food is costly and of the best description, and which animals require the constant attendance of man to their wants?—The reason of all this, is the difficulty, or rather impossibility, hitherto experienced, of obtaining them congregated in sufficient numbers, so as to make the breeding and rearing of them exclusively a matter of business; and this will be the case until capital, machinery, and labour, become united for its accomplishment, as they are in other branches of industry and commercial enterprise.

That France is much better situated in this respect than England, owing to the superiority of its climate, cannot be denied; it, however, is not so with Ireland, from which country we derive our greatest supply of eggs, whilst that any physical obstacle of any moment exists in England, is disproved by the fact, that the poultry of this country is greatly superior in every quality of flavour, weight, tenderness, and nutrition, to those of any other, and consequently obtains a higher price.

There have not, however, hitherto existed the means whereby this desirable increase of our domestic birds could be effected. The Oriental mode of artificial incubation being unsuited to an European climate, if this difficulty could have been surmounted, there would still have remained that of rearing, hitherto also equally impracticable, upon a scale sufficiently extended to render it profitable.

These obstacles, however, are now overcome, the rapid advance of science having furnished the means of surmounting those difficulties which physical causes would have rendered otherwise impossible. Nor is it improbable that, at no very distant day, eggs, instead of being sold at twenty-four for a shilling, when, half wasted, and through long keep rendered most unwholesome food, will be converted, at a cheap rate, into the richest flesh and blood; constituting, above all other animals, the most nutricious and savoury of human food.

In Egypt, the great parent of the sciences and the

arts, artificial incubation has been practised from the remotest ages, long before any extant historical records chronicled the fact. Their method, as primitive as can well be conceived, is a copy of what nature herself presents to their notice. The ostrich, an inhabitant of their deserts, lays her eggs upon the ground, covering them over with sand; this preserves them, alike from the scorching power of the meridian sun, and the chilly coldness of midnight, and, in such a climate, this is all that is necessary to develope life in the egg. Nor can there be a doubt, that the egg of any other bird similarly circumstanced would hatch also, allowance being made for the large size of an ostrich's egg, and the thickness of its shell, which prevent slight atmospheric changes from injuriously affecting it, and unquestionably contribute materially to a successful result.

The Egyptians imitate the ostrich; they arrange eggs in *Mammals*, or ovens, built in such manner as to give to the eggs the necessary protection from the slight atmospheric changes of their almost unvarying climate; and a small fire, running lengthways through the different compartments, maintained for the first eight or ten days, is sufficient to promote incubation; the loss of heat from radiation during the remaining days of the process, owing to the genial nature of the clime, being so trifling as not to destroy the vitality of the egg.

Under circumstances so peculiarly favourable, it is nevertheless a task of no ordinary difficulty, and which, requiring the most minute care and attention on the part of the operator, is practised only by a few individuals; these inhabit a particular village, named Bermé, situated in the Delta of the Nile, about sixty miles from Grand Cairo, and by teaching the secret to their children, these Bermeans perpetuate the practice of their art. It is, however, only during the serene autumnal months, that they will venture upon the performance of this curious business, at which time, scattering themselves over the whole land of Egypt, they bring into existence, under the supervision of the government, the enormous and almost incredible number of above ninety-two millions of various kinds of poultry. The ovens being limited to three hundred and eighty-six, and the business monopolized by the government, we may conclude this estimate a near approximation to the truth.

De Reaumur, in his well-known work upon this subject, utters a sentiment, to the justness of which, every philanthropist will cordially assent,—That Egypt ought to be more proud of her *Mammals* than of her towering pyramids. And, it was in the spirit of so beautiful a truth, that the members of the French Academy determined to make experiments in their own country of this Egyptian practice.

These experiments were placed by the Academy under the direction of the celebrated M. De Reaumur, and, under the patronage of the Royal Family, most strenuous exertions were made to plant this novel mode of increasing illimitably the quantity of human food upon the soil of France. It was a subject calculated to excite popular enthusiasm; the nobility, clergy, and gentry, vied with each other in its encouragement, and titled dames and ladies, high in honour, proved at once their patriotism and their patience, by becoming the mothers of canaries and goldfinches, by hatching them in their bosoms.

It required not, however, the philosophers of the French Academy to institute experiments, to prove that eggs could be hatched in France as well as in Egypt, by adopting the same means—precautions being taken to guard against the injurious effects of a less favourable climate; or that, being hatched, it was possible the birds might be reared. The question to be solved was, were such means so easily practicable, that, being carried into operation, the produce would repay the cost, trouble, and labour incurred iu their establishment; and their utility proved by a large increase of this description of human food, with a profitable remuneration to the adventurers?

As might have been predicted, those means, so admirably adapted to the steady unchanging climate of Egypt, suited not the varying temperature of France; and, after the most persevering endeavours, not only in France, but in the rigorous climate of Poland, and the more genial one of Italy, it was after a few years abandoned, as a project, however beautiful in theory, absolutely impossible in practice.

In England, similar experiments, but not upon so extensive a scale, have been made. The only attempts of any notoriety were those of Mr. Mowbray, the author

of an excellent treatise upon domestic animals; and another, an exhibition of which took place at the Egyptian Hall some few years since.

Mr. Mowbray practised the Oriental method, immediately by fire. That at the Egyptian Hall was mediately by steam. In both cases, they were but the toys or play-things of an investigating philosophical mind, the success of which depended upon the minute and constant attention paid to each individual egg, which, wrapped in flannel, or immersed in sand, required unremitting observation incompatible with large numbers; while no provision, for a successful rearing of the birds, was in any way provided.

Such being the state of the case, it might have been considered hopeless again to endeavour to attain an object, apparently suited only to the blandness of an Eastern clime—did not every day's experience prove, that in the present age nothing is beyond the power of genius to overcome; that physical difficulties vanish before the light of mind, and the frost of winter and the heat of summer are either turned away, or rendered innoxious in their influences, by science commanding the elements of nature to obey her direction, or mould themselves to her bidding. Her magic wand annihilates time and space, the lightning of heaven is in her hand, and the wind and the wave obey her behest.

It is evident, from the foregoing detail, that to revive the Egyptian practice would be utterly useless. The principle, therefore, upon which the Eccaleobion machinery, in Pall Mall, is constructed, is entirely different from any thing yet attempted in this or any other country.

Rationally, to hope for success, it became necessary to be in possession of a power completely to controul temperature, independent of climate, season, or changes in the atmosphere; and also uninfluenced by them. These invaluable properties the Eccaleobion possesses; a perfect and absolute command over temperature, from 300 degrees of Fahrenheit to that of cold water: so that any substance, submitted to its influence, shall uniformly be acted upon over its whole surface at any required intermediate degree within the above range, and such heat maintained unaltered, without trouble or difficulty, for any length of time.

By means, then, of this absolute and complete command over temperature, obtained by this machine, the impregnated egg of any bird, not stale, placed within its influence at the proper degree of warmth, is, at the expiration of its natural time, elicited into life, without the possibility of failure; which is sometimes the case with eggs subjected to the caprice of their natural parent.

It must have struck even the most superficial observer, that the extraordinary fecundity of gallinaceous fowls is a wise and most benevolent dispensation of nature, to provide, the more abundantly, food for man; as, in those tribes of birds not suited for his table, the female lays no more eggs than she can incubate.*—With respect, therefore, to domestic poultry, the most nutricious of all human food, this rich provision of a bounteous Providence is for the first time available to Europe.

The hitherto insurmountable difficulties of giving existence being thus overcome, the next step for consideration is the rearing, and in this matter, as in the former, the coldness and variability of the climate of Europe, at least in its central and northern parts, have presented obstacles of a description insuperable.

To a successful rearing of a considerable number of birds artificially, the essentials required are, suitable buildings on a dry soil, sufficient warmth, proper food, and careful attention to cleanliness and their usual wants.

The buildings, of course, must be adapted to the habits of the particular species of bird intended to be reared, whether turkeys, geese, ducks, chickens, pheasants, or partridges, and each species separated from the others. Nor are any erections already standing likely to be well suited for these purposes, so as to combine shelter, economy of artificial warmth, and sufficient space, open and enclosed, for healthful exercise; without an union of these essential conditions, any attempt would most assuredly fail. By far the best plan, and the cheapest in the end, would be to build expressly for the purpose; any dry, well-drained situation would do. The chalk hills of Surrey or Kent offer a soil peculiarly favourable to the constitution of all gallinaceous fowl.

It is with respect to warmth, where all attempts have hitherto failed,—the means of furnishing the young

* See also the Note at page 3.

broods with that genial warmth imparted by their natural parents, and necessary to their existence, not having been attainable. Heated apartments will not do; accustomed to a warm floor and dry atmosphere, when old enough to be turned out of doors, they die from cold and cramp. De Reaumur's artificial mothers, where large numbers are concerned, are utterly useless. As is also his idea of capons being taught to take them under their care, and discharge the duties of a mother. (*Quere*, How many would be required in Egypt to brood ninety-two millions of young birds?)

Steam, or hot-water pipes, might possibly be so arranged as not to be entirely useless, but their unavoidable irregularity of temperature would occasion the destruction of vast numbers, although every remedial precaution which prudence might suggest were used. It is only by the application of the principle of the Eccaleobion machinery to rearing, as well as to hatching, which will ensure to the birds, at all times, the exact degree of warmth imparted by the parent bird, that will preserve them in health; and which is as easy of accomplishment to any number, as its efficacy is proved by experience to be incontrovertible.

So far as food is concerned, every farmer's wife throughout the kingdom knows what is proper. One great danger arises from their voracity of appetite inducing them to eat too much of food too nutricious for their delicate digestive organs, whereby they become sickly, or what is commonly called crop-bound; simple as the remedy for this evil may appear, it is somewhat difficult to put in practice where large numbers are fed together.

As regards attention to cleanliness, and their other common wants, such as regularity of feeding, and an abundant supply of pure water, nothing need be said; they can scarcely live, certainly not flourish, without these necessary requirements being strictly attended to.

By a judicious system of management, suitable buildings being provided, and other proper means adopted, one thousand birds might be kept in the best possible condition, with less trouble and attendance than a brood of a dozen chickens that may have, by accident, lost their mother, would require, without such measures being taken to rear them.

Under, however, the best management, and the greatest precautions used against their various ailments, many will perish; but the average will be much less than in the farm-yard, from being in the latter, usually, entirely left to shift for themselves, under any circumstances of weather, wet or dry, cold or stormy. It is a truth, however, that almost all the diseases of poultry arise from atmospheric causes.

With respect to medical treatment, applied to the diseases of poultry, but little regarding its efficacy is known. The nostrums and mode of treatment adopted throughout the country, together with the greater part of what has been written upon the subject, is a farrago of nonsense and absurdity. If shelter, warmth, food and cleanliness, congenial to their habits, will not preserve them in health, but little reliance can be placed upon medicine.* Most good wives, however, possess an insatiable itching to be considered skilful doctors. From among some thousand birds that have come under my observation, I never could discover that common and universal disease called the "pip." Yet show any farmer's wife a sickly chicken, and she immediately opens its mouth and, with her needle tears off the cartilage from the under part of the bird's tongue, to show it is afflicted with it. When will the light of knowledge banish these absurdities?

The next question that suggests itself is,—Is it desirable, by such means, thus to increase the quantity of human sustenance?—The answer must be, that although a considerable quantity is reared in this country, and we can, and do, obtain immense quantities of poultry and eggs from France, Belgium, Holland, Ireland, and Scotland; yet, no man would object to have two turkeys upon his table instead of one, any more than a starving applicant for our benevolence would object to receive two loaves instead of the smaller number.

* I wish this to be understood, however, only as the result of my own experience. My highly valued friend, Mr. Rees, Surgeon, of Stratford, whose scientific attainments entitle his opinion to some weight, assures me, "that from a course of experiments, entered into for the purpose of ascertaining the comparative effects of medicine and regimen upon various animals and the human frame, in diseases apparently arising from similar causes; the results, he considers, to be in favour of medicine."—Nor is it improbable, that the numerous failures in this respect arise from the incompetency of the parties properly to administer remedial agents.

We call the Egyptians barbarous; the procuring, however, by art and industry, an abundant supply of that necessary of life, good animal food, is no evidence of barbarism.—If the population of the United Kingdom, which, as respects Egypt, is as twenty-four to two, were as well supplied with this artificial production as Egypt, it would require,—not ninety-two millions, but one thousand one hundred and four millions of poultry annually, for them to be as well fed, in this respect, as the uncivilized natives of Egypt. But, how stands the account in this matter,—full one-third of our population subsist almost entirely, or rather starve, upon potatoes alone. Another third have, in addition to this edible, oaten or inferior wheaten bread, with one or two meals of fat pork, or the refuse of the shambles, per week; while a considerable majority of the remaining third seldom are able to procure an ample daily supply of good butcher's meat, or obtain the luxury of poultry from year to year.

On the continent of Europe, the population is still in a worse condition:—fish, soups made from herbs, a stuff called bread, made from every variety of grain, black, brown, hard, and sour, such as no Englishman could eat; olives, chestnuts, the pulpy saccharine fruits, roots, stalks and leaves, and not unfrequently the bark of trees; saw-dust, blubber, train-oil, with frogs and snails, make up and constitute a good part of the food of the greater portion of the inhabitants of Europe.—There is no other cause for this than the excessive ignorance of its population.

We now come to the last consideration connected with this subject, which is—Are the profits likely to be realized, such as to warrant an endeavour to establish this artificial system of obtaining an additional quantity of human food?

Mr. Mowbray, in his standard work already mentioned, gives the consumption of food by birds in the highest state of condition, as follows:—"By an experiment made in July, 1806, a measured peck of good barley, kept, in a high style of condition, the following stock, confined, and having no other provision: one cock, three hens, three March chickens, six April and six May ditto, during eight clear days, and one feed left." Here then are nineteen birds, varying in age from two months to their full size, consuming one peck of corn in eight days, which, at one shilling per peck,

gives a cost of one half-penny and an eighth per head, which, however, is considerably above the cost of chickens for the first eight weeks of their existence. But, taking it at this high average, it gives an expense for each bird of nine pence, all but a fraction, for fourteen weeks' keep, at which age they are in the greatest perfection, "being the most delicate and easy to digest of all other animal food." Where they can enjoy the advantage of a good run, the expense would still be lessened, perhaps one-third.

Now, what is the price at a poulterer's, or in the London markets, of a fine fat chicken fourteen weeks old, or nearly its full size?—Never less than two shillings, and for six months in the year, or during the dear season, four and five shillings. Which, adding to ninepence an additional three pence for the value of the egg and extras, gives the enormous profit of from one hundred to five hundred per cent., divided between the breeder, the middle-man, and the retailer.

It need not be wondered at, that such is the case, nor can it be otherwise, while the present system continues. A poulterer whose sale is not more than ten dozen per week, must keep a man and a horse and cart, and attend the different markets for his purchases. All these things, with incidental expenses, will amount, at least, to two guineas per week—which two guineas must be spread over his ten dozen birds, before he derives any profit for himself. Upon any artificial system, these expenses would be saved, and the two guineas thus thrown away would keep a thousand birds, averaging all ages, a whole week.

Buildings and machinery, and other necessary apparatus being provided, no objection exists as to the expense of hatching. An Eccaleobion machine might be constructed, only requiring regulation once in twenty-four hours, capable of hatching, throughout the year, ten thousand eggs per month, (a week being allowed for removal and refilling), while the cost for hatching, during the month, would, probably, be half a chaldron of coke, which, at one pound per chaldron, would be but the twentieth part of a farthing per bird. The expense for artificial warmth, during the time the birds might require it, would be somewhat more—perhaps, one farthing per bird.

Of course, the expenses would be greatest in the winter season, but remuneration would be corresponding. No intensity of frost, under the Eccaleobinic system, need prevent the business proceeding, provided the eggs have not been frozen, though the spring and summer months are, undoubtedly, the most favourable. To ensure good eggs, laying stocks of all descriptions should be kept.

All circumstances considered, it would be found that a considerable capital would be required, and to be judiciously expended, before artificial incubation and rearing could be placed upon a basis sufficiently extensive to render it profitable; and which can only be done upon the principle of producing quantity, so that the necessary expenses shall be divided over a large number. This accomplished, the reward would be highly lucrative.

Since the above was written, the Sixth Part of Dr. Ure's excellent work, "A Dictionary of Arts, Manufactures, and Mines," has fallen into my hands, in which is described M. Bonnemain's method of artificial incubation, by hot-water circulation; more practicable than De Reaumur's plan, it still is not sufficiently so for general application, and consequently ceased with the attempt of its ingenious and pains-taking inventor.—With respect to "Artificial Incubation by means of Hot Mineral Waters," noticed also in Dr. Ure's work, I need only say, that, whoever wrote the sentence, "There is no other trouble required in breeding chickens, by means of hot-baths, than to break the eggs at the proper time," could have known but little about incubation, either artificial or natural, for these simple reasons, that if the chicken is not strong enough to liberate itself it is worthless; and, to break the egg, however carefully, is generally fatal to the bird.

CHAPTER III.

ECCALEOBION MACHINERY.

Remarks on the peculiar properties of the Eccaleobion Machinery, and the adaptation of its principle to many important purposes connected with the sciences, the arts, and the economy of domestic life.

The Eccaleobion Machine gives the power of a perfect and absolute controul over temperature, from three hundred degrees Fahrenheit, downwards, to that of cold water. Any intermediate degree within this range, that may be required, is obtained with perfect accuracy, and maintainable, unaltered, for any length of time.*

There does not exist, in the whole arcana of science, any means (save by this machine) of obtaining a fixed, determinate heat, and maintaining it, without deviation, for months, or for years, if required; and, when we reflect that the whole phenomena of animal and vegetable life originate in, and are dependant upon, temperature; when we consider, also, its effects upon inorganic matter upon the surface of the earth, may we not conclude, that it has a like important influence in the production of the various substances found within its bowels, and that metals, minerals, salts, crystals, &c., &c., may owe their formation to a long-continued action upon the elements of which they are severally composed, of that fixed, undeviating heat, which the earth is known to possess, at different depths?

Here, then, is opened a new field for philosophical investigation, extensive as nature herself, and numberless as her works. The Eccaleobion presents an opportunity for new discoveries, in a manner more perfect than was ever yet placed in the hands of science, combining, with the greatest simplicity of structure and management, properties which make it irresistible in its effect, and infallible in its action.

* The machine exhibited is, for greater convenience, denuded of its outward governing-apparatus, by which no variation of temperature can possibly occur: as it is, the variation is about two degrees in ten hours, the apartment being at summer-heat.

In chemistry and the other arts, how innumerable are the processes which depend, for their success, upon the application of a steady heat, below three hundred degrees! The spirituous extracts and compounds, made from valuable drugs, herbs, &c., must not be allowed too great a heat in the process, or the spirituous and aromatic qualities are volatilized, and also their acrid and earthy particles dissolved in the liquid; the difficulty and uncertainty, as well as the attention required, is, consequently, very great. In a machine constructed upon the principle of the Eccaleobion, a thousand gallons of as many different compounds, either solid or fluid, might be placed, for any length of time, with the certainty of their continuing at the required degree of heat; they would neither burn nor get cold. Nor is any variation produced by difference in quantity, a tea-cup full and a vessel containing a hundred gallons will be both precisely of the same temperature.

The value of this important discovery is not only apparent, but its capability proved, by what it has already been applied to—the production of animal life; which, although but one, and, perhaps the least, of the purposes for which it is adapted, is as severe a test of its efficiency for common processes, requiring a command over temperature, as it could well be subjected to. By its means, two thousand birds have already been brought into existence, and by keeping the machine in continued action, the number which may be produced is, of course, illimitable.

In most of the means made use of, for obtaining high temperatures, the heat is applied at the bottom, and sometimes circulates round the sides; whereby, the sediment in the vessel is frequently burned to a hard cake, without the liquid above acquiring its proper temperature. In the Eccaleobion, the distribution of heat is alike, over the whole surface of whatever is submitted to its action, being no greater at the bottom than at the sides or top; and, when the whole mass has become heated throughout, it remains steadily at that point.

It is adapted, then, for any process in science or the arts, wherein temperature is required to be under command. For extracts, infusions, decoctions, spirits, spirituous compounds, the precipitation of crystalline salts,

or any liquid, the obtaining of which requires regulation of temperature, this principle is unfailing.

For vinous or spirituous fermentation of any description, where the same is induced, accelerated, or maintained, by the application of a regulated heat.

For all purposes of evaporation, drying of drugs, or any operation in air, which requires an uniform temperature in the process.

In domestic economy, confectionary and pastry need never be burned; and the manufacture of jellies, conserves, and preserves rendered less troublesome.

In the ripening of wines it is invaluable. The wine-merchant, by means of an Eccaleobion, may place in his cellar 100,000 bottles of wine, and give to the whole any temperature he pleases for any length of time; nor shall two bottles be found among the whole 100,000, varying a single degree of heat from each other.

The sulphur in gunpowder sublimates in drying, at a certain point; the process is, consequently, one of care and tediousness. The Eccaleobion, applied to this national manufacture, would give the maximum of heat, without danger of deterioration.

The Eccaleobion may be constructed of any size or form. The chemist or artizan may place it in a cupboard, upon a table, under his counter, in the chimney corner, or in the garret, wheresoever convenience may dictate, and the fire in the kitchen or the cellar.

The manufacturer, the brewer, the distiller, and the vinegar-maker, may alike make it subserve their purposes, upon a scale of any magnitude.

It needs but little attention; according to the accuracy required, would regulation be necessary—say, once in eight, sixteen, or twenty-four hours.

After regulation, the degree of temperature would not increase, if the fire be continued ever so great. Neither would it decrease beyond a known point, according to determinating circumstances, say, $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{1}{8}$ of a degree, although the fire should go out.

Such are the principle, power, and effects, of the Eccaleobion.

END OF PART I.

THE ECCALEOBION.

PART II.

FACTS and OBSERVATIONS connected with, and illustrative of, the PHÆNOMENA of LIFE, MIND, and INSTINCT, more especially their developement by the ECCALEOBION.

CHAPTER I.

LIFE.

The Eccaleobion does not bestow life,—to bestow, or to give life to matter, is an attribute of Deity alone. It developes it, so as to render its existence in an organized being evident; which, without such means having been employed, its vitality would not be recognizable by our senses.

It developes it, also, so as to give to such being the power of existing to the full term or length of life natural to the particular species of animal to which it belongs, and which existence it could not have enjoyed without such developement; as life, though present in the embryo, must, without this application, have inevitably perished. In this sense, the Eccaleobion gives existence to an organized being!

Although we cannot perceive that life exists in an embryo, yet we infer that it does, from the facts, that the embryo is the offspring of living parents, and requires but the presence of certain favourable circumstances, external and from itself, to elicit an organized and perfect being.

This, of course, refers only to the germs of oviparous animals, the only orders of the living creation upon which the Eccaleobion can exercise a vital influence. The embryos of viviparous animals being developed in the bodies of their parents, their state during the progress of developement cannot so easily be determined;

though many of its conditions which are known assimilate to those of ova, naturally or artificially acted upon, so as to produce organized life.

Life is a power, a property, possessed by an infinite number of beings, animal and vegetable. The lowest orders in the animal and vegetable kingdoms, as well as the highest, and the innumerable intervening links, which together form these endless chains of existences, are alike endowed with it.

Aided by our most perfect and powerful instruments, no trace of organization is discoverable in the embryo while in a fluid state. It is just possible, that still more improved instruments may render apparent, to our imperfect vision, organization in this fluid; but the probability seems so remote, that, at present, without any evidence of the fact, we are justified in concluding, that life exists in a fluid, as well as in an organized body. Life, therefore, is not the result of organization, but a power to which organization is subservient. Its existence in a fluid, previous to the process of organization commencing, proves that organization cannot be the cause of life, but is effected by it; and, when produced, becomes an instrument, or means, the only means that we know of, whereby life can be propagated.

Life, as a property actually existent, is apparent to our senses, only as a function of organized matter,* and it is an essential condition, with respect to certain classes of organs, termed vital, that they be present and perfect in their kind, whether animal or vegetable; a man could not live without a heart, lungs, liver, &c., nor could a vegetable without the spongioles of its roots, and those other vessels, by and through which it imbibes and elaborates nourishment.

There are other conditions, also, essential to the existence of life, independent of perfect organization. We know of no life, but what can exist only in a certain

* Some physiologists affirm, that the blood and the chyle are alive;—they may be so—it is more than probable that they are—why not also, air, light, the electric fluid, and other assumed forms of matter, without which, there could be no life? But, assumption is not proof of fact; and, if they be, their life is not cognizable by our senses. The best evidence adduced of the blood being alive, is, its assuming a vascular structure, while coagulating after its effusion from the veins: but this presumed effort to organize may equally be accounted for by the contemporaneous disengagement of carbonic acid gas; and, moreover, the vascular mass, for any purposes of life, is itself dead.

medium or fluid, suited to its peculiar nature, and which it inhales—has the power of decomposing—and from which it partly derives sustenance. Take the most perfectly-organized animal, whose medium is the common atmosphere, and plunge it into air deprived of its oxygen, and life is instantly extinguished ; although, at the moment of the change, and even after death, the organization of such animal body continues perfect. It is the same with fish, whose element is a fluid denser than that of the atmosphere. Nor can the plants of alpine regions, where the air is more rarefied, long continue in health in a lower altitude.

Not only is a perfect organization peculiar to each kind of animal and vegetable existence, and a circumambient fluid, especially suited to the nature of each, in which to live, move, and breathe, essential to such individual life; but, without any change of the elements which constitute such fluid, an alteration of temperature, frequently very slight, may be destructive of vitality. In the Eccaleobion, an increase of but a few degrees of heat, scarcely perceptible by our senses, will destroy life in the egg. Even the human subject cannot long endure the usual changes occurring in its own proper atmosphere, without suffering or death ensuing, unless counteracting measures be provided. Nor can the animals and vegetables of the torrid zone live in the higher latitudes of the temperate and frigid. Light, also, exercises a powerful influence over the healthful functions of organic life.

No organization, then, of matter, however perfect, can bestow, or preserve life, in consequence of its own inherent perfectness of structure. All that we know upon the subject, is, that it is a power, or property, existing in an infinite number of organized systems, which, under peculiar and certain conditions, enjoy or possess those attributes, which, under the denomination of what we call life, it alone bestows—constituting the power of preserving each such body or system for a period of time incorruptible; and that when, from physical causes, this power, in and over such body or system, is weakened or extinguished, corruption ensues, and life becomes extinct.

Life is, distinct from Mind, inherited alike by a mushroom and a man, though no one will assert that the

former possesses mind. The words, both Life and Mind, however, simply express two facts, of which we are conscious, when they are connected with organized matter; and, independent or separated from such organized matter, it is utterly impossible for us, by the mere aid of our senses, to know any thing, or that life and mind have even an existence.*

The privilege of penetrating further into this mystery is denied to human faculties. When philosophy endeavours to explain what it calls, "the essential nature of life," by asserting it to be "a vital fluid," or, "an essence of matter," no advance whatever, towards an elucidation, is made, as any explanation of what this "vital fluid" is, or, of what this "essence of matter" consists, and how they obtain their powers and properties, are equally as inexplicable as what life is.

Equally unsatisfactory is it, to call mind, by way of illustration, "spirit," "spiritual substance," "soul," or "a ray of the Divinity;" the latter is almost blasphemy. Having no evidence of mind existing without body, and granting "spiritual substance," "soul," to be so many words signifying mind, it is still a power or property only cognizant by our senses, in the shape of volition, feelings, and desires, when exhibited by organized matter throughout one of the kingdoms of the material world, —an attribute of brutes, as well as of humanity!

* The existence of any thing, not palpable to our senses, cannot be demonstrated to exist—matter only is palpable—therefore only matter, and the properties of matter in a vital state, life and mind, can be demonstrated, the two latter only in connexion with a living, organized body. The dead, or simpler properties of matter, without which matter cannot be conceived to exist, viz. extension, impenetrability, mobility, and inertness, with others, not essential, as attraction and repulsion, need not be alluded to here.

CHAPTER II.

MIND.

MIND exists in no organized body, not possessing a brain, or some nervous system endowed with life. Evidence of the existence of mind, is the power which the brain possesses of giving to the animal, consciousness, thought, volition, desires, and feelings. All these faculties brutes possess as well as man; and, exactly corresponding and commensurate with the conformation and developement of the brain, or nervous system, in the various classes of animals, is the individual specific superiority or power of these faculties. Man, having relatively a superior organization both of the brain and every other part of his body,* is endowed with this

* The usual expression is,—" that man is the most perfectly-organized of all animals."—This is, however, an hypothesis utterly false. A frog, a serpent, a fish, a bird, a lion, and an ape, are each as perfect in form and organization as a man, and so of every animal. As well might a fish, or a bird, boast its superiority over man, because it can swim, or fly; which powers, if man possessed, would not only be utterly useless, but the inconvenience of the necessary members unendurable, and unsustainable by our bodily structure; as for man to boast a more perfect organization, because he possesses mental and bodily endowments, which enable him to do a number of things the lower animals cannot, and which would be as useless to them as swimming or flying would be to the human race. It is the same with respect to the senses of taste, smell, sight, hearing, and feeling; each class of animals have them exactly in the perfection necessary for the well-being of each, and suited to the place it occupies in the scale of organized existences. The sense of taste, perhaps, man possesses as fully as most animals, and greatly superior to some, or they, the inferior animals, could not relish that food which man rejects, and nature intended for their sustenance. In smell, man is generally inferior; had he the exquisite smell of the dog and the vulture, the effluvia which they so much delight in, and arising from every decomposing substance upon the earth's surface, would be insupportable. The powerful vision of the eagle, and the peculiar one of the cat and the owl, would alike be inconvenient and unnecessary to man, but is essential to the very existence of these animals. If our hearing and feeling were more exquisitely delicate, or less sensitive, what misery would it not occasion! the world would be full of noises and confusion, arising from sounds now unheard; and every touch of matter would be accompanied with pain, or we should be deaf and insensible to injuries inflicted upon our bodies; yet, other animals have these senses, both in a higher and lower degree of acuteness, and as such, administer to their comfort and necessities. Every animal, then, after its kind, is perfectly organized, as perfectly as man;—the difference to

mental property in the greatest perfection, developing, in consequence, numerous intellectual faculties, not exhibited by the less rational of the animal creation; such as a knowledge that he is a living being endowed with this power. The feelings of benevolence, and love of his species and other created things, though not confined exclusively to him, as an animal, is most fully displayed by him. His sense of the beautiful, the sublime, and the ridiculous, which faculties none of the brute creation possess;—his belief in a First Cause, the author of all things, and his religious feelings, consequent thereupon;—his capability of expanding his intellectual powers, and accumulating knowledge, until it assumes the character of science and art; all these circumstances, and many more, place him, to our conceptions, so inconceivably, and all but infinitely* above the nearest

be expressed between each, is, superior or inferior functional powers, physical or mental, arising from the peculiar organization of each; and which necessarily places each species higher, or lower, and precisely in its proper place in the chain of animated beings.

* I have said—"inconceivably, and all but infinitely"—because, although the word, *infinite*, is frequently, and, perhaps, properly used (as in page 23, line 4,) to denote a number, space, or quantity, beyond what our capacities are able to grasp; yet, when applied to express the power and wisdom of the Deity, it becomes a definitive term, which should have a certain, determinate, and understood meaning; and, further, because the fashionable jargon of the day is, the unintelligible stuff of an infinity of infinities in one infinity. This pseudo-philosophy asserts, that, from God to nothing, is infinity; and, that between every existing intermediate order of beings, as from brute to man, and from man to angel, the space is not only infinite, but capable of being filled up with an infinite number of orders of existences, each varying and rising superior to the other, and still each remaining infinitely distinct and distant from one another; and so on, through the innumerable chain of beings, upward to Deity, and downward to nothing; these terminations never ending, but still beginning—yet ever receding. Here is an infinity of infinities in one infinity, with a vengeance; the very acmè of nonsense, the quintessence of absurdity. I shall have occasion, presently, in the text, to show, that not only is there no room for an infinite number of orders of existences between any two links of this chain, but that no one single, additional intermediate order could possibly spring into being, without a violation of the present laws of nature. But to argue upon what we do not comprehend, is to multiply error; let us, therefore, see what meaning we attach to the words—finite and infinite.

By the term finite, is understood the powers of the human mind, contradistinct from infinite, which represents the powers and perfections of the Godhead, which can neither be comprehended nor understood by finite mind; yet, it nevertheless serves to carry our imagination to its utmost limit—let us see what that limit is.

We can easily imagine a line inconceivably lengthened beyond our powers of computation—one end terminating in Deity, the other in nothing. We can conceive such a line to exist, and call it infinite in extent; but we cannot

approach to him in the form of brutes, as to have induced the belief, that Mind, in other forms of matter in which it is also manifested, is not essentially the same—"the functional power of the living brain,"* as that brain is structured in every animal, producing a modification of mental power peculiar to each; the proper exercise of the function depending upon the health of the organ, disease injuring or destroying the function, though life may continue.†

conceive the existence of an interminable line terminating in Deity at one end, and this same interminable line terminating in nothing at the other. This may be the truest representation of infinity, or it may not; but be that as it may, we cannot comprehend it, and therefore, we cannot reason upon it; we must, therefore, resort to the nearest approach to it that we can comprehend, the line not interminable, but simply a line extending from Deity downwards to nothing. If we attach the idea of infinite to this line, we have just as full and correct a notion of infinity, as by the interminable never-ending, still beginning one, with this difference, however, that we understand the former, but cannot comprehend the latter. Now, we will suppose this simple line of infinity to represent, as upon a graduated scale, every order of created beings, known and unknown. The unknown, of which we know nothing, commencing the scale, as archangels, angels, spirits of the just made perfect, and man with every intermediate order of existence, down to the lowest organized being short of nothing. We can comprehend all this, as included in one line of infinity; but a part being less than a whole, I presume, in heaven as well as on earth, we cannot comprehend that the highest archangel is separated from Deity by another infinity. We can comprehend such distance to be immeasurably and inconceivably great—all but infinite; but, having given infinity to the whole line, the distance between any two points is not infinite. From archangel to man may be also immeasurably and inconceivably great, but still not infinite; and from man to the highest order of brutes, also immeasurably and inconceivably great, but certainly not infinite; and so on through all the intermediate orders of existences. To reason from any other premises than what our understanding does comprehend, is but the wisdom of folly. Nor is the glory, wisdom, and power of the Deity, deprived of a single ray, or the First Cause less Almighty, because an infinity of infinities does not exist in one infinity; on the contrary, we are the better enabled "to see him as he is."

Time denotes a portion of eternity—the space matter occupies a portion of infinity, speaking after the manner of men—could each portion be abstracted from their respective whole, by so much would each whole be lessened. This is the common-sense view of the case, and common-sense is good sense, alias truth, in the invisible as well as the visible world.

* This is the emphatic expression of Dr. Elliotson, in his work on Human Physiology, and to whom I offer my acknowledgments as being indebted for several facts, which in that work are rendered so clear and interesting, a work which will long place the name of Elliotson in the front rank among modern physiologists.

I presume it is quite as unnecessary to offer any evidence to prove, that mind is the functional power of the brain, as that we see with our eyes and hear with our ears, the one being as clearly established and universally acknowledged by physiologists as the others.

† If mind was not a power derived from the brain when healthily performing its functions, it would not be liable to receive any more injury from disease

There is no evidence, nor can there be any evidence brought forward to prove, that the power which gives thought, desires, memory, prudence, affection, and other qualities of mind, as exhibited by brutes, is different in its nature, from that which gives thought, desires, memory, prudence, and affection, when exhibited by the more rational being, man. They are essentially the same,* produced from the same functional cause, differing only from difference of organization, a difference only of degree, but not of kind; immeasurable, truly, though not infinite, between the highest order of brutes and the lowest human intellect. Originating from the same Deity, unchangeable in character and essence, either in the brute or human existence, and not to be mistaken for life, or the result of mere organized matter.

And why should this thing be?—Wherefore should other animals be so greatly inferior, and man be placed so eminently superior in mental endowment, to the next order of animated beings below him,—the highest order of the brute creation?—Wherefore?—but because it is absolutely necessary to the preservation of each.—A law, dictated by infinite wisdom, in mercy and benevolence to his creatures.—The great, life-conservative principle of the material world!

Man, as he exists, with all the advantages of his superior intelligence, and mental and physical powers, is only just capable of holding his dominion over the inferior orders of the creation. Had these been gifted with an organization of brain, more closely approaching the human, the horse would not have obeyed his rider, nor the bullock have given his shoulders to the yoke, nor the lion, or the tiger seek the shelter of the wilderness, and fly before the face of this more feeble lord of the

affecting that organ, than from others in the system. But no sooner does the brain become the subject of disease, than the mental faculties become deranged, and imbecility, madness, or total idiotcy, according to the character and intensity of the disease, the immediate consequence.

* "The spirit of a man that goeth upward, and the spirit of the beast that goeth downward," Eccl. ch. iii. v. 21, are arbitrary terms, beautifully expressive of the vast and immense difference between the mind of brutes and the mind of man; but are no more to be interpreted literally, than the words upward and downward; which if literally interpreted mean nothing. That which is upward and downward with us, being exactly the reverse to our antipodes; even to ourselves, every change from noon to night by the earth's revolution on its axis, reverses them. God's universe has no upward or downward, neither zenith, nor nadir.

creation. This immense difference, and consequent subordination of intelligence throughout the animal creation, is essential to the very existence of each; had the present distance between them been narrowed, or filled up, by innumerable other orders, each more closely approaching those actually existing in bodily and mental endowment, this beautifully-regulated world must have presented but one vast arena of slaughter and strife, for superiority and dominion. As it is at present, the differences are just sufficiently great to keep each class in its appropriate and appointed sphere and position.

But to satisfy the infinity of infinity theorists, a few simple illustrations will suffice. The brutes most closely approaching the human in organization and mind, are the various tribes of apes and monkeys, (Simia and Troglodytes in particular,) and the difference in volume of their brain and man, is, as five to one, giving, by its organization, that immeasurable superiority to the latter, which there evidently is between them. It is well known, that these creatures in their native woods assemble round the dying embers of the fires left by the natives, and are delighted with their warmth, and although possessing a physical conformation equal to the task, yet their mental faculties are not sufficient to teach them how to continue it, by throwing thereon a few sticks. We will now suppose for a moment an impossibility, that Infinite Wisdom could have committed so great a blunder, not, as to have created an infinite number of orders between them and man, but only one just so much their superior as to have possessed sufficient sense to keep the fires lighted; or, what would have amounted to the same thing, had this little superiority of intelligence been bestowed upon one of the existing tribes; what must have been the inevitable consequence?—Why that the animate world would long ere this, have been destroyed by conflagration, converted by this little superiority bestowed upon a monkey into a desert, and life utterly have become extinct.

Instead then of room for an infinite number of intermediate orders of beings, there is not room for one. How should there?—In God's Universe there is no void!—it is completely filled with his glorious works, and truly in infinite wisdom he hath made them all!

I do not for a moment believe, that the Almighty has

ceased to work, or that, omnipotent in power, he could not make complete systems of new orders of created beings, infinite in numbers, and differing in faculties, but not here. It may be on the farther bounds of the Universe, or in other worlds, or systems of worlds, but assuredly not to work harmoniously in this. This world of ours is, until he changes the laws which govern it, incapable of receiving any more orders of animated beings. Had there been room, most assuredly they would have been created at the first.*

But let us observe, how an order of intelligences superior to man, were Deity to create them and place them

* Immeasurably great as is the distance between our Solar System, and the Fixed Stars, I cannot conceive that another system of worlds, similar to our own, could be placed intermediate between our Solar System and the nearest Fixed Star, without so entirely disarranging the motions and periodical revolutions of other surrounding systems, as to be destructive of all vital existence in them, if such existence is affected by laws analogous to those that govern life in our world. It is true, the Almighty could make new laws remedial of such injurious changes, but this involves the creation of new forms of matter and new conditions of organization, and vital function.

A new continent is now in course of formation in the southern hemisphere —some thousands of years hence it will have emerged from its watery bed, and, unquestionably, as time proceeds, will be covered with animal and vegetable life. During this period, equally momentous changes will have occurred upon the old continents, portions of them, and whole islands, will from natural causes now in operation, become submerged beneath the ocean, or it may be, have disappeared and reappeared successively, and whole races of present animals may then be known to have existed only by their remains being imbedded in strata of recent deposition. But supposing the crust of the earth's surface to remain as it is, and the new continent to be peopled as Australasia now is in small degree, with a series of new animal forms, as extensive and powerful as the races which at present exist, differing from them in kind and degree mentally and physically, these would not be intermediate orders, but would form of themselves a distinct chain of existences, individually and collectively antagonist to those of the present era.

The infinite diffusion of the germs of life, and absolute filling up of every void, is beautifully exemplified in the vegetable kingdom, and is not confined to animal life. The solid rock, the sandy desert, the mountain top, the bottom of the ocean, as well as the richest soil, teem with it to exuberant profusion. While its apparent spontaneity is as wonderful as its wide-spread luxuriance. The great fire of London and the burning of American forests afford well-known illustrations.

Even vegetables, though not gifted with the powers of locomotion, or a capability of inflicting immediate destruction on other vegetables, do, nevertheless, within a prescribed limit, like animals, dispossess others of the soil if there be not room enough for the whole to exist together. Thus upon a large scale, the thistle of Europe, implanted from Spain, has in the immense central regions of South America destroyed and entirely supplanted the native vegetation over many thousand square miles of surface, keeping, with the exception of a few grasses, mosses, and lichens, exclusive possession of the soil. The graphic description of this phenomenon by Sir Francis Head, in his travels across the Pampas, from Buenos Ayres to Chili, will recur to every reader.

on this earth, would affect our condition upon it. Excelling us in powers of body and understanding, they would soon dispossess us of it. To suppose they might not require it, or its productions, would be to affirm that they were not inhabitants of the earth. We should contend with them then for its possession, and a destructive struggle for supremacy would be maintained, only to end in the slavery, or extermination of our race.*

To say that other orders of creatures have existed, as proved by their remains, shows most plainly that two orders, too closely approaching, or too far removed from each other, so that the weaker becomes the too easy prey of the stronger, cannot exist together. Why are those races of animals extinct? The original fiat given at the creation, "increase and multiply," has not been revoked for their destruction. But being pressed upon by superior orders, together with physical changes occurring upon the earth's surface injurious to their welfare, there became at length no room for them, and these races of beings have ceased to be its inhabitants.

It is the same with many races of animals, which are now fast diminishing in number, and receding from before the face of man, and of civilization, in various parts of the world; in like manner, as the wolf and other noxious quadrupeds have been exterminated in our own country.

The doctrine, that the young of every animal just brought into existence, possessing mind, is furnished with such mind, soul, or spirit, as a new and original endowment, and not the offspring of the parent, procreated in the same manner as life and its recipient body is propagated; is a doctrine so absurd, as scarcely to deserve refutation, were it not the belief of the greater part of even the thinking portion of mankind.

If Mind be, to every individual being, bestowed as an original endowment, how is it that mental infirmities

* The present families of man live not in harmony with each other; how inextinguishable then would be their hatred to a superior order, their oppressors! The nations of the Red Indian, the Carib, the Caffre, the Hottentot, and the Australian savage, are fast disappearing before the withering influences of the white man. To say they might be beings, pure, amiable, and a blessing, is nothing; does purity, goodness, and virtue, disarm malice, ambition, and revenge of their power to inflict misery?—If a colony of angels from heaven wished to take possession of a part of England, we should not grant it to them.

descend hereditarily through many generations?—Can the professors of this doctrine inform us where their emporium of souls is?—Do they deny to soul (mind) at any period of its existence, the property of consciousness?—if so, it cannot be soul. If consciousness is essential to soul, it must know where it came from, and how it passed its time before it entered the body. Or do they mean to assert that souls are begotten somehow and somewhere, but do not possess consciousness until a certain age, which age never arrives until they have been an inhabitant of some organized system a certain length of time; if so, who, and where, are the parent souls?—Are they conscious they are propagating little souls, and in consequence of this service are they, the parents, exempt from the penalty of inhabiting some animal body? Wheresoever they come from, how know they when an ovarian vesicle is impregnated? Do they take possession, and are waiting so to do at that precise moment, or at what after-period?—How get they into it, and not possessing consciousness, how find they it, and when found, the brain or whatever organs may be their proper residence?—Have they the power of choice, whether they shall animate the tabernacle of beasts, birds, fishes, or insects, or glorify themselves as lords of the creation in the form of human beings; or do they cast lots for the privilege of becoming a wise man, or a fool, the inheritor of the civilization and knowledge of the sage, or the degradation and ignorance of the savage?—All these and many more difficulties beset this most absurd of all conceivable absurdities.

"In the ordinary derivation of plants and animals," says Paley, "from one another, a *particle*, in many cases minuter than all assignable, all conceivable dimensions; an aura, an effluvium, an infinitesimal; determines the organization of a future body: does no less than fix, whether that which is about to be produced shall be a vegetable, a merely sentient, or a RATIONAL *being;* an oak, a frog, or a *philosopher;* makes all these differences; gives to the future body its qualities, and nature, and species. And this *particle*, from which *springs*, and by which is determined, a whole future nature, itself *proceeds* from, and owes its constitution to, a prior body," &c.*

* Natural Theology, conclusion, p. 591.

Life and Mind, then, were given to organized animal matter at its original creation, and are communicated from parent to offspring; each system of organized beings throughout the multitudinous chain of animal existences, propagating alone its peculiar powers and properties, unaltered by time and endurable throughout eternity; unless the same Almighty power that called them into existence shall choose to annihilate their prerogative.

Startling, as the announcement may appear, the Eccaleobion, "the work of man's hands," not only developes life, and gives existence to animal forms, but as a necessary consequence, mind being the functional power of the brain, it developes mind!—that power which thinks, feels, and wills!—that self-same spirit, which when enshrined in earth's highest order of created beings, claims kindred with its Maker, declares itself immortal, and views eternity as the means of advancing itself to Deity!

Astounding as this assertion must be to those who have never thought upon, or investigated the subject, it is as completely demonstrable, as that an organized being in which life is present, is produced by agency, which, if such agency had not been employed, such being could never have existed, nor its life have been developed.

That the inferior animals possess the faculties of mind, such as perception, thought, reflection, memory, &c., and are not insensible to joy, hope, sorrow, independent of mere animal gratification, which would make them to originate in instinct, the proofs are so innumerable, and abound in every work upon subjects of natural history, and are in the hands of almost every individual, as to render it unnecessary to be dwelt upon here. Any person only looking into the face, especially the eye of almost any animal, without regard to its voluntary actions and vocal sounds, must feel convinced that it possesses understanding and perceptions of a nature congenial with his own.*

* Although mind is generally allowed to exist to a certain extent in some of the higher orders of brutes, yet mankind will not readily acknowledge its presence in the more inferior races of animal life, as if mind, being the functional power of the nervous system, was not mind wheresoever that power was exercised, limiting Omnipotence, as if He could not have bestowed the mental faculties upon the most simple, as well as upon an organization the most complicate, and which latter, according to their ideas, must therefore be necessarily the most perfect. The following interesting facts being new to the public, I the more readily insert them:—

Fish, of all animals, are considered least to indicate emotions of the mind. I had a large globe, in which were several gold and silver ones; occasionally I

Mr. Locke says,—" All the difficulties that are raised against the thinking of matter, from our ignorance or narrow conceptions, stand not at all in the way of the

presented them with a fly or other insect, but this was but seldom; however, I often stood looking at and watching their motions, with no inconsiderable pleasure. After some time, I was much gratified by observing, that to the largest of them, a fine fellow nearly half a pound in weight, that this pleasure was reciprocal, he evincing by his increased hilarity of motion much delight at my presence. Usually, when I entered the room, be he at whatever part of the globe he might, he would instantly turn round and come to the side nearest to me, where he would remain, and with his head pointing at me and all but touching the glass, by rapidly moving his tail, and a corresponding motion of his body and fins, most unequivocally declare his gratification. Finding this disposition for an acquaintanceship, I endeavoured to induce him to allow of its becoming more intimate, by permitting me to handle him, but to no purpose; the only familiarity he would submit to, was my gently scratching his back with a black-lead pencil; this, however, by his impatience, he showed was a liberty by no means approved of. Upon four or five others that were prisoners with him I could make no favourable impression. Here was a mental sensation of joy and pleasure at the sight of a familiar acquaintance. Surely instinct without mind, would not teach fish to delight in the presence of man.

During a long illness, arising from inflammation of the lungs, it was my custom to sit up some hours daily in the bed supported by pillows. It was hot summer weather, and the window was generally open. One day I observed a wasp enter my chamber; there was a basin of sugar standing on the mantle-shelf, and he was not long before he discovered it. Instantly loading himself with the precious treasure he flew out of the window and disappeared; a short time afterward he re-appeared, and darting straight as an arrow to the sweets, again loaded himself and flew off, only, however, for a short time. This repetition of his visits induced me to time his absence, which occupied about fifteen minutes; regularly, at these intervals, during the whole of that day, the wasp came, and went away laden with booty. His motions were not that of one buzzing about uncertain where to fly, what to do, or where to pick up food, but those of one fully conscious of the importance of his discovery, and determined to avail himself to the utmost of its advantages,—rapid, straight to the mark, loaded himself, and off like lightning, to return as quickly. Although I dislike wasps, I would not take him prisoner, being determined to see if night, darkness, and sleep would deprive him of his memory. Before the window was opened on the following morning, his continued bouncing against it gave proof he did not easily forget. Previous to opening which, I took care to have the sugar removed, and when admitted he eagerly flew to the old spot. Nothing could exceed his anger at his disappointment, and every corner of the room was searched for the lost treasure, with a perseverance which would be highly praiseworthy in other beings besides wasps. As he seemed convinced it was still in the room, the room he would not leave, and although several times driven out, he immediately returned, until after trying his patience a sufficient length of time it was restored to him, when the same course of active business commenced, and was again continued throughout the day. On the following morning he again attempted to renew it, but having an aversion to wasps, and no more experiments to make, he was caught and killed. I learned a lesson however therefrom, and all Jehovah's works would teach one, if we would but study them aright,—that even this despised and noxious insect—thought, and reflected, and acted upon what these faculties suggested with promptitude and energy, showing that he was perfectly sensible of his good fortune in finding such a treasure.—Could man have done more?

power of God, if he pleases to ordain it so."—No man questions the power of God—but if it is matter that thinks in brutes—why then, it is matter that thinks in men. To allow that it is the brain in brutes, which gives them thought and reason, and that it is not the brain in man which does the same in him, but a something else, we know not what, called spirit, is about as wise as to assert that the flesh of brutes is matter, but that the flesh of men is not matter, but spirit. Locke further observes, what the faculties of brutes prove,—"either that God can and doth give to some parcels of matter a power of perception and thinking, or that all animals have immaterial, and consequently, immortal souls, as well as men; and to say, that fleas and mites, &c., have immortal souls as well as men, will possibly be looked upon as

Feeling always interested in the phænomena of the natural world, nothing was too insignificant to escape observation. Having picked up a caterpillar, of the kind vulgarly called "hairy tailors," I confined it in a tumbler with another of a different species, which in the course of the first night was devoured; resolving to try further its cannibal propensities, I furnished it occasionally with others nearly equal to it in size, which it likewise eat; its chief food, however, was the leaves of lettuce and spinach, the latter of which it was voraciously fond of. At first it was fearful, cross, and sulky, so that when I took off the cover it would leave off eating, its feet withdraw their hold, and if touched coil itself up, remain motionless, and appear as if dead. Gradually, however, we became better acquainted, so that if I peered into the glass it cared not, neither left off eating, nor, unless rather roughly handled, would it coil up; but such was not the case when strangers looked at it, for as soon as any other person only ventured a peep, it instantly became motionless, or coiled itself, as at first it did with me. It was also sensible that some secure substance intervened between itself and its visitors when the glass was not looked into from above, or its vision could not penetrate even the transparency of its prison, for it never indicated fear or sullenness, or a knowledge of our presence only when looked at from the top. After the expiration of some weeks, it left off eating, and prepared by a close examination, of several days' continuance, of its apartment, and of the materials at its command (the dead remains of stalks and leaves) to render itself secure from harm when lying defenceless in a chrysalis state. With these materials it raised a wall from the floor of its habitation upwards to the ceiling, thereby making itself a berth just sufficiently large for its purpose, combined with increased security, and no builder of the human race could have made a more judicious use of his means, or have adapted them so well to his situation, as it did. Even the hair of its body became deciduous, and spontaneously was thrown off, and was made use of, and so cleverly arranged and interwoven with its silken threads, as to present all around a chevaux-de-frise, impenetrable by most of those its enemies, who make the caterpillar tribes their prey. Another period elapsed, and the apparently inanimate body of the chrysalis became a wingless, female moth, which lived some time and laid a vast number of eggs, and thinking they were not fecundated, I threw them away. It would, however, have been worth while to have ascertained whether, as in some other of the insect tribes, the vital power of impregnation passed through several generations, but this did not occur to me.—Can any one doubt the existence of mind even in a caterpillar?

going a great way to serve an hypothesis."* This is unworthy the genius of the great and virtuous Locke!—We know not, nor can we know, whether all animals have immortal souls or not; but, if all animals are endowed with perception and thinking, they must be inheritors of the consequences of such endowment, be it immortality or any thing else—and why object to fleas and mites? Do these display so little of infinite wisdom, and are so insignificant as to deserve annihilation?—Man, in the fullest plenitude of his self-esteem, would not, perhaps, much object to the horse, the elephant, or the lion, having souls as well as himself, but fleas and mites, those abominable and noxious pests, oh, it is impossible! Reader, wherefore were they made? Doth a sparrow fall from the house-top without God's notice; or, are fleas and mites less the object of his care than the horse, the lion, or the sparrow?—To an eye that could take in the universe of God's creation, men would appear, clothed with their highest endowments, little more than fleas and mites.

But we are not to infer from this, that brutes are immortal as well as man. Was the mind (soul) of man in its own nature, of and in itself immortal, necessarily to exist throughout eternity, it must necessarily have existed through eternity—yet no man is conscious of having existed before he was born. Man's immortality is, therefore, a gift of Deity, conferred upon man, and upheld by God, of his own will and pleasure. Man can have no other claim to it; it is no otherwise an attribute of his nature, than that God willed to uphold it so at his creation; and he may, or he may not, have willed the same to brute natures as well as to man, but of this we can know nothing. Man, however, is the only animal endowed with sufficient intellectual moral power to distinguish, in his actions, right from wrong; and, consequently, is the only being that can be, in an after-state, responsible for these actions.

That man is placed at the head of the animal creation, and hath, in his relation thereto, dominion over some, cannot be denied: but if we view him merely as an inhabitant of earth, without regard to his high destiny hereafter, which a Divine Revelation unfolds, we find that neither in a civilized nor savage state, is his comfort,

* Locke's Second Reply to the Bishop of Worcester, p. 468, 8vo. edit.

welfare, or happiness, more cared or provided for, than that of fleas or mites, or any other link in the great chain of animated beings. With as much propriety might the lion boast that every animal of the forest was made for his diversion, and to gratify his appetite; or the elephant, that the whole vegetable creation was made for his pleasure and sustenance, as man to imagine that because he is highest in the scale, and has made subservient to his use and aggrandizement a few score of them, that the remaining thousands of beings he may be acquainted with, and the tens of thousands he knows nothing about, were made and are preserved in existence (and which will for ever hold and enjoy that existence undisturbed by him and unavailable to his wants) prospectively for his sole benefit, and with a view to his possession of the earth and its inhabitants.

If the present races of animals were made expressly with a prospective and ulterior view to man's good and advantage, for what purpose were the innumerable classes of animals and vegetables, which peopled and adorned the earth for millions of millions of years previous to man's being placed thereon created, the whole of which became extinct before he had an existence?—For what pupose, but for their own sakes, and for their own enjoyment of life, co-ordinately with, and promotive of, the welfare of all, and whose creation formed part of that stupendous design of Omnipotent and Omniscient Power, that embraced and blended into one vast system the uses and mutual relations of every atom, animate and inanimate, throughout the whole of created nature?

Man, "in his pride of place," however, declares the lower orders of creatures minute and insignificant—forgetful, that with respect to the powers and operations of Deity, nothing is small, nothing is large; and that for every single species of the higher animals, He has delighted to create a thousand lower ones, all revelling in beauty and happiness. If a mechanic, by combining a vast number of wheels and movements, was to produce the keeping of correct time in a watch, and another obtained exactly the same result by a few simple wheels and motions, which machine would most display wisdom and contrivance in the execution? Undoubtedly the latter—and who shall say, that a like amount of enjoyment is not bestowed by giving existence to an animalcule as a man? neither space, nor time, nor matter, nor

organs, being necessary with God, to the performance of his will.*

I have thus shewn, that the power which gives thought, desires, memory, prudence, affection, and other qualities of mind, as exhibited by brutes, is essentially the same in its nature with that which gives thought, desires, memory, prudence, and affection, when exhibited by man; and, as in common with other races of animals, birds possess thought, desires, memory, prudence, affection, and other qualities of mind, identical with human powers and sensations,—the Eccaleobion developes mind, as well as it developes life!—That property, power, soul, mind, spirit, or whatsoever name by which it is called, that philosophers have, exultingly, in the amiable spirit of benevolence loved to describe as an emanation of the Deity,† and divines in the religious fervour of faith, piety, and devotion, declared to be immortal,‡ is pro-

* "Ehrenberg has ascertained, that the Infusoria, which have heretofore been considered as scarcely organized, have an internal structure resembling that of the higher animals. He has discovered in them, muscles, intestines, teeth, different kinds of glands, eyes, nerves, and male and female organs of reproduction. He finds that some are born alive, others produced by eggs, and some multiplied by spontaneous divisions of their bodies, into two or more distinct animals. Their powers of reproduction are so great, that from one individual (Hydatina senta) a million were produced in ten days; on the eleventh day four millions, and on the twelfth sixteen millions. The most astonishing result of his observations is, that the size of the smallest coloured spots on the body of Monas Termo, (the diameter of which is only $\frac{1}{2000}$ of a line) is $\frac{1}{48000}$ of a line, and that the thickness of the skin of the stomach may be calculated at from $\frac{1}{48000000}$ to $\frac{1}{64000000}$ of a line. This skin must, also, have vessels of a still smaller size, the dimensions of which are too minute to be ascertained. Ehrenberg has described and figured more than five hundred species of these animalcules."—Dr. Buckland's Bridgewater Treatise, vol. I. p. 446.

† No philosopher in the present age would, I presume, profess this doctrine; the knowledge, adoration of, and belief in, the omnipotence, wisdom, and perfections of Deity, being so universal. Were the mind of man a ray, or an emanation, of the essence, however infinitely minute, of the Godhead, it could not but possess His eternal attributes of power, wisdom, and holiness, and be without a beginning, and without an end—attributes which, certainly, no mortal man will venture to lay claim to.

‡ Pure religion comes to us clothed with such fascinations, that few men would disallow its truths, were they not generally obscured, if not quite concealed, or its form rendered repulsive, by the dogmas, and crude fancies of imposing creeds,—so that it is not only difficult to disentangle truth from the error with which man has surrounded it, but weary or incapable of the task, the mind takes refuge in fanaticism or scepticism, willingly embracing the shadow for the substance. I can no more conceive a truly religious man, the most glorious of all God's works, rejecting a fact in the natural world, which must ever be beyond all the writings of men, however inspired, God's own revealed word, than I can conceive him to believe nature and its Maker at a difference. The sublime truths of nature, religion, and morals, are unity. Whenever they appear to differ, there is error somewhere on our

duced, or it otherwise would not exist, by the agency of inert matter set in motion by that very mind, as possessed by the highest order of created beings, of which we, at least, have any knowledge.*

Mind, then, is given to all organized animal matter; the differences of power and its developement in the various classes of animals, arise from difference of organization† necessarily varied and subordinate to each other, according to the impress of certain laws given at their creation, which, had not such been the case, the material world, throughout its whole chain of animal existences, would have perished; and that most glorious galaxy of Almighty Power, the power of mind, of intellect, of perceptions, of instincts, and of feelings, so wonderfully, variously, and sublimely displayed, through all the gradations of these innumerable families, extintinguished.

To guard the unthinking and inconsiderate from being led into error, from physical facts being so clearly proved, that assent cannot be denied to them, though such facts appear at variance with pre-conceived opinions, and religious sentiments, it may be well to state, that, in the investigation of nature's laws, we have nothing whatever to do with scripture or revelation. What revelation reveals is simply a matter of faith—a something which unassisted humanity could never have dis-

side only. Let us beware not to espouse the theories of men, in preference to the eternal truths of Deity, which his works unfold, and which cannot be at variance with himself.

* Revelation informs us that there are higher orders of intelligent beings, and no man who knows and feels any thing of the omnipotence of the Divinity can for a moment doubt it. But though a subject of belief, any thing regarding their powers, forms, faculties, essence, and place of residence, we know nothing. That such beings do exist, is all we know or can know respecting them. Nor can their existence, or non-existence, in any way interfere with the laws of the material world, or the truth of any fact which the investigation of them may discover.

† The organization of all animals is in exact conformity to the endowments of their minds, and *vice versa*. Had man, instead of hands, the paws of a bear, he could not exist, as he would be unable to procure for himself food, clothing, and shelter. Had a bear the mind of a human being instead of that peculiar to his species, he would be in the same helpless condition, as it would not confer upon him that faculty which we denominate his instinct. Further, had man, with all his boasted superior organization of body, a less endowed mind, he would be an idiot; and, consequently, in the same hapless state as under the other circumstances. There doubtless is superiority of mind among mankind, as regards its developement, vigour, and power, but it is one of degree and comparison only:—essentially they are all alike, the difference of developement and power being generally a consequence of better health and cultivation.

covered; it pretends to no elucidation of the mysteries of the material world, or of the laws which govern it; wherever introductorily (as the Mosaic account of the creation) or incidentally mentioned, it is subservient to the illustration of some moral or spiritual sentiment, and to that only. Truth is immutable and eternal as Deity, from whom it originates, and cannot be at variance with any thing he has revealed, wheresoever and under whatsoever conditions and circumstances it may be discovered. The world still moves, and the sun remains stationary, though scripture, seemingly, implies the contrary; and geology has made numerous discoveries, apparently as contradictory to the Mosaic account of the creation; and however irreconcilable they may appear to our understandings, knowing, as we do, "only in part," no good man will reject them upon that account, any more than he will reject the pure, undefiled religion of the Gospel, because it does not teach him geology. That man who will not boldly look into the Almighty's works, and search out his laws, and his perfections, as they are hidden or revealed in the innumerable wonders of the creation—fearlessly seek after truth, and view Omnipotence face to face, is unworthy of the name of man, and of the possession of those high endowments with which his Maker has gifted him, and for which especial purpose they were chiefly given.*

* It is truly farcical to listen to the whinings of some men, about the insufficiency of man's mental faculties, to behold, appreciate, or discover the wisdom, goodness, and glory of God, in this our present state of existence, and their morbid sighings after another, where, with enlarged powers, they expect to behold the Omnipotent Author of all things "as he is," without trouble or exertion on their part. Will these drones in wisdom deny, that the benevolent God has given to them perception, thought, memory, judgment, and every endowment suited and commensurate fully to work out all those higher attainments which he requires of them; or, have they so completely explored the every field of nature, which his goodness has spread before them—so intimately acquainted themselves with the wonders of his hands—and so filled their hearts with his glories, that universal nature is exhausted of her treasures, and nothing remains for them to do? Until this is the case, it is vain sighing for the higher glories of a brighter world. The truth is, these men do nothing, and disparage their God, and disgrace themselves, by supposing the Almighty has not bestowed upon man powers adequate to the duties of his station in the scale of vital existences. Nor can we hope, however higher in intelligence our position in a future state may be, that our second lesson in infinite wisdom will be more easy of attainment than our first in this world, the learning of which is thus declared to be so difficult—as though God had set us a task beyond our capacities, which mistake, if we will but patiently wait, he will remedy for us in the next.

CHAPTER III.

INSTINCT.

Instinct has always been considered, by most men, to be a power distinct from mind, bestowed upon all the lower animals (sometimes said, in lieu of mind) for the preservation and multiplication of their species. The beaver erects his habitation, the bird builds her nest, the salmon ascends a river and deposits its spawn, and the honey-bee constructs its cellular comb, precisely in the same manner as they did five thousand years ago, mostly without any improvement derived from their own previous practice, or the experience of ages.

Generally their young, also, so soon as they arrive at mature age, are, in these particulars, and without any previous teaching, equally as expert as their parents; and, as in all these their proceedings, performances, and modes of operation, they immeasurably distance any teaching which man, with all his superiority of intellect, his science, and his art, could effect; while, in other things, they present but little understanding, being altogether his inferior,—Man has, in all ages, considered them to possess a power or endowment, as distinct from mind, as mind is distinct from life; and this power is called instinct.

In all these operations of animals, however, there may be discovered abundant evidence of the adaptation of means and materials to circumstances, and such alterations of circumstances, as take place unforeseen, and which could not be remedied without possessing this power of adaptation, combining, frequently, every faculty of mind in its highest developement, as perception, thought, design, memory, skill, contrivance, and anticipation of probable consequences.* Here, then, the

* Most animals adapt themselves to circumstances, and materials to circumstances. The beaver chooses the materials for his habitation, of a strength proportioned to the violence of the current of the river in which he builds; and, if liable to inundation, provides against floods. Birds, under novel circumstances, make use of a thousand ingenious expedients, to secure to themselves, their nests, and their young, protection, safety, and provision. Fish

rational power, Mind, is fully exercised, so that, if instinct and mind are distinct powers, it is utterly impossible to disentangle their numerous impingements.

Every animal having an organization of brain, or nervous system, peculiar to its species, and knowing that mind is the functional power of the brain, or nervous system, and being incapable of separating the faculties of mind from the supposed faculties of instinct, may we not rationally conclude, that it is this peculiar organization which gives to each race that particular power, called Instinct, and which power is a modification of mind, consequent upon such peculiar organization, necessarily exactly suited to each animal's situation in the scale of being, and which, from the non-possession of other mental faculties, are absolutely essential to its existence ?*

make annual migrations to find suitable places for multiplying their species, and evince many curious contrivances to obtain their prey; and were we better able to explore the wonders of the great deep, how vast would be the increase of our knowledge in these matters! While the innumerable tribes of insect-life present such extraordinary combinations of wisdom, contrivance, and skill, as to furnish lessons of instruction to the most accomplished intellect.

* Salmon deposit their spawn in fresh water, although their usual residence is the salt ocean. Many rivers have a variety of the species peculiarly their own, and each variety returns, with few exceptions, at the proper season, to its own particular river. The young of the first year, moreover, it is ascertained, go no farther out to sea than the mouth of their native river. This annual ascent of the salmon up its own particular or native river, although many more are open to it, which may present less obstructions, and more eligible banks and shallows, has been always adduced as an evidence of the wonderful and unerring power of instinct. To my mind, it proves quite the contrary; if instinct alone impelled salmon into fresh water, it would matter not what river they ascended; but, choosing to be guided by something like good sense upon the subject, they act very much like the man who wishes to catch them. Does the fisherman, who intends to take salmon, go to a river in which he does not know they exist, or to one in which he knows, from experience, they abound? So, in like manner, the salmon ascends that river, the impediments, banks, and shallows, and suitableness for its intended purpose, it is acquainted with, in preference to passing into strange waters, about the dangers and fitness of which it knows nothing—a specimen of wisdom, in a fish, much superior to what those persons exhibit, who deny that it understands at all what it is about.

When a traveller suddenly encounters a lion in an unfrequented wilderness, if safety can be obtained by retreat, he instantly flies, whilst the lion remains unmoved and unquailing. If instinct was herein brought into operation, the converse would be the case,—the lion would retreat from his omnipotent enemy, and the man, unshrinkingly, bid defiance to the kingly beast; he being, when well armed with good weapons (the results of his reason, without which he could not hold his dominion) more than a match for any savage of the forest, although he may not be desirous of the conflict. As it is, the man instantly perceives his danger, and flies, while the lion sees nothing but

The disorder termed Monomania, by physicians, proves, that a malformation, or disease of a nervous organ in a human being, impels, irresistibly, the individual afflicted with it, to the performance of certain actions, often always in the same manner; yet no one ever thought of referring these actions to instinct. Why should we then, when the whole organization of the body, as in the bee, is expressly adapted by the Almighty to perform certain acts, in a certain manner, and which it cannot possibly do in any other way, ascribe these acts of the animal to instinct? It would be about as rational to expect man, in erecting his houses, palaces, and temples, to imitate the architecture of the bee, the bird, or the beaver, as for animals to build their habitations in any other manner than as their faculties, mental and bodily, enable them to do. If, then, it is mind that rears the Corinthian column, or Gothic arch, then does it, also, the downy nest of the sparrow, and the hexagonal cell of the hive-bee.

The hybernation of some animals, as cold weather approaches, and the periodical migrations of others, may also be accounted for, by the effects of temperature, and other physical causes, operating upon their animal systems, and impelling them to these courses, assisted by that mind which it has pleased God to gift them with, for their own security, comfort, sustenance, multiplication of their species, and other acts conducive to the welfare of the whole creation.

Addison observes, "that God is the soul of brutes"—without, however, subscribing to the full purport of this

an animal, which, judging from its size, he is accustomed to conquer, and therefore remains unmoved, acting precisely as man himself would, before a less powerful enemy. These actions arise from the operations of reason (mind) in the simplest combinations of its faculties.

In a newly-discovered, and uninhabited country, the beasts and birds are found tame, unregardful, and fearless of man. It, however, no sooner becomes colonized, than its animal population become quickly acquainted with the superior power of their new enemy, and retreat before him to distant and more secure fastnesses; many, however, always remain, who, by putting into operation an infinite number of stratagems and devices, defeat his vigilance, and elude his wiles—stratagems and devices never before required, and called into practice only by the emergency of the occasion. Some, even, as the crow and the sparrow, know the distance he can reach with his offensive weapons, and are also aware whether he is armed with them or not; and, if so, keep beyond their range. Even the whales of the ocean have learned the policy of avoiding those seas, once their own domain, and migrating to more distant and inaccessible regions.

expression, it is He who upholds all things by His omniscient wisdom and infinite power, and that as mind is a consequence of the developement of life and organization, we may conclude, that in cases where intellect, united with peculiar organization, appears insufficient to account for some feelings and actions of animals, such as the intense affection for their offspring, sometimes long enduring, in others only lasting for a short period, and then ceasing altogether,—as also the impulse which induces the young the first time to draw milk from the breast:—these, and numerous other instances, apparently unconnected with mind, may arise from that great principle, Life, working so mysteriously, and in such an infinite diversity of ways upon organized matter, and not to any third power distinct both from life and mind.

Mind, then, as it exists in the animal creation below man, in consequence of varied and peculiar organizations, possesses faculties, not existent in the human family; or, if existent, are less perfect and manifest, because less necessary. This peculiar power of mind in the lower animals enables them, in whatsoever regards their welfare and preservation in their natural state, intuitively to see at once their position and requirements; and furnishes them with instantaneous impressions and perceptions, as inducements or motives for action in exigencies, and under circumstances where a long process of the reasoning faculties could not assist them.

This power is essential to their preservation, and beautifully does it shew the perfectness of the Almighty's works. It gives to the performances of the lower animals a perfection which no art could teach, no science improve, equally necessary to the young as to the old; and, their performances being perfect, no experience of years, or of ages, can possibly improve them—an arrangement of the laws which govern the animate world, without which they must perish. The word Instinct, should therefore be blotted from the vocabulary of the naturalist,—or should be understood to mean—that modification of mind which each race of animals possesses, the consequence of peculiar organization, fitting each to occupy a certain determinate position or place in the material world, and essential to the welfare and preservation, individually and collectively, of the whole.

I have shewn, that the Eccaleobion developes mind

as certainly as it produces an organized animal existence; let us examine, however, the truth of this fact, as shewn by the artificial position in which the birds are placed.

Little as we are, or can become, acquainted with the habits, pursuits, uses, and degrees of intelligence possessed by the innumerable orders of created beings endowed with animal life; yet the domestication of some has furnished an opportunity for this investigation,—and in every instance mind is discoverable, although many centuries of domestication in many of them (particularly the more important animals) having entirely changed their natural habits, and dulled their mental power from its being so seldom required to be exercised, render its existence both less necessary and less apparent. A cow, or a horse, having all its wants fully supplied, has neither cause nor opportunity to evince the possession of it; and scarcely do they, in much brightness, unless the administration of some of their usual comforts is neglected, or ill-treatment induces them to spurn the curb of man's dominion. When the possession of mind is spontaneously exhibited without any such causes operating to produce it, generally it may be accounted for, from an exuberance of health and animal spirits.

To those who know any thing of the phenomena of the human mind, the exhibition of its powers is precisely under the subjugation of the same causes. Little mental energy is shewn by any man, until some stimuli from outward circumstances render it a pleasure or a necessity. Could we, as brutes, philosophize on the attributes of brutes, and publish the results of our investigations, as arising from such an advantage, though we should, undoubtedly, discover the secrets of many, perhaps, now to us inscrutible mysteries, yet this fact, of the similar conditions of the two minds, needs not such assistance to render it apparent.

Birds, brought into existence by the Eccaleobion, are under the influence of these stimuli; and, from being in an unnatural position, exhibit traits of mental endowment, which, under the usual circumstances of nature, would not be so prominently brought forward; or, if shewn in their common condition, would, perhaps, remain unnoticed, or classed by men under that convenient term, Instinct,—they being perfectly satisfied, that to suppose a chicken endowed with mind, were equiva-

lent to suppose it a rational being, and immortal—an evidence of such perfect insanity in the supposer, as to qualify him for Bedlam, a blasphemy against God, a denial of revelation, and a traducer of the intellect of man.

But sounder opinions, and ideas more consistent with the wisdom and power of Deity, are taking the place of the vain conceits of foolish men; and mind, under whatsoever form it appears, is about being acknowledged to be mind,*—the most astonishing thing is, that man, boasting the possession of it in the highest degree, has never, in the mass, acknowledged or perceived it to be true.

As yet, experiments by the Eccaleobion,† for obvious

* The improvableness of the human, and the non-improvableness of the brute natures, has ever been a favourite argument used in support of an essential difference of mind. It is one, however, most fallacious, both being improvable, and both being limited in the extent of their capacity for improvement. The usefulness to man of the ox, horse, elephant, camel, ass, dog, and other animals, depends entirely upon the improvability of their mental faculties, and is consequent upon artificial teaching and culture; as are also, though not of any importance, the words, tricks, and unnatural songs taught the parrot, goldfinch, canary, bullfinch, and other birds; and, even the taming of the more ferocious beasts, is a sequence of the same improvable disposition. Limited, however, as their capacities for improvement are, man has nothing to boast of in this respect, being alike circumscribed within definable limits, beyond which he cannot pass. The reputed 5,600th year of the world produces human beings of no more expanded intellect, no greater genius, or more superior mental powers, than did its 1, 2, or 4,000th year;—the philosophers, poets, painters, sculptors, legislators, mathematicians, and historians of ancient times, display the highest powers of mind, in as great vigour, developement, and lustre, as any of the present age—there is no improvement, there is a gulph, beyond which we cannot pass. It is true, society—mankind in the mass, is progressing; but this is purely the effect of mechanical agency—certainly originating from mind;—the printing-press, ships, steam-enginery, and innumerable other works and arts, prevent the knowledge of past ages, not only from being lost, but render it of easy attainment to all; so that labourers in the field being multiplied, each has but to add to increase the general stock. Society is, therefore, progressively improving, whilst individual mind, though possessed of increased knowledge, remains as to intellectual powers, at least, whilst in a human frame—"the same yesterday, to-day, and for ever."

† Hitherto the experiments have been to develope life in large masses, and the eggs of the common fowl were the only ones that could be obtained in sufficient quantity, and the difference of time required to complete incubation in different kind of eggs was another obstacle. Such eggs of other birds, therefore, as have been experimented upon, were placed in the machine more as a matter of curiosity, than for purposes of philosophical investigation; and, in most instances, when life had been produced, no trouble was taken to rear them, it interfering too much with the more regular business. Now, that the machinery is perfected, and the principles whereby life is obtained in its most healthy and vigorous state discovered, no opportunity will be neglected to prosecute, in other forms of animal existence, so interesting an inquiry.

reasons, have mostly been confined to the eggs of the common fowl, and the first act of volition in the nascent bird appears about the eighth day, by the voluntary opening of its bill; on the eighteenth, it first makes known a sense of its existence by a faint piping voice, increasing in strength until it breaks its shell.

Beyond what the actions, voice, and countenance of infants indicate, mind cannot be discovered to exist in them until a considerable period after birth, yet no person ever failed to make the discovery long before they give evidence of their perceptions, thoughts, desires, and feelings, by words.* Mind, in the young of other animals, is discoverable in the same manner, and generally, is much sooner developed, inasmuch as the period for arriving at the adult state is considerably shorter in all the inferior tribes of animals.

No one who witnesses the irruption of a large brood of chickens from their shells, by means of the Eccaleobion, but must feel convinced, that they sensibly feel the peculiarity of their situation, and a few hours' additional strength renders this increasingly obvious.

We can easily believe, that a chicken hatched in the usual manner, understanding the cluck of its parent, and having the advantage of her nursing, so exactly suited by nature to its wants and condition, that they are no sooner produced, than satisfied without effort or possibility of error, can scarcely express emotions of the mind. The case, however, is different when produced by the Eccaleobion; without any parent to soothe or administer to their wants, or to awaken or enter into the sympathies of their nature, they betray surprise at their situation, and, like a child just awoke out of sleep, evidently wonder where they are, and how they came there.

Before the chicken has liberated itself from its shell, it utters sounds in a tone and voice not to be misunderstood, challenging sympathy, and indicating disappointment at not being answered. When, during the night, a large number of birds have freed themselves from their calcareous shackles, (of course in complete darkness,)

† I have known instances of children having been born deaf and dumb, and even blind, and the parents not discovering it after many months,—such stupidity savors little of superior acuteness of intelligence above other animals, in the adult of the homo genus.

and the door of the machine is for the first time opened, and light bursts in, and the apparition of a human head appears before them, no infant ever displayed more astonishment in its countenance at strange sights, than is depicted in the eye and actions of these birds;—some will approach, as if to welcome that unknown something they feel they want, while others retire, in fear, to the darkest corners of the machine.

No parent answers to their joyous chirp, gives encouragement to their fears, or calls them to receive her protection; and the emotions they betray are precisely those we should expect in a rational being. As they are entirely removed from the circumstances nature herself would have placed them in—instinct, as distinct from mind, could not produce these emotions, as instinct would be a power given to them suited, and sufficient only, to their natural condition; for, can we for a moment suppose, that instinct would cause them to express surprise and astonishment, when, if in their natural state, no occasion or use for such emotions could possibly exist?

A few hours after, spontaneously, and without teaching, some of them, and these teach the more stupid, begin to eat,—this attempt appears to arise, in the first instance, simply from animal impulse; but shortly, the faculties of mind are brought into play, among which, that of observation is most prominent;—noting each other's actions, they learn from one another, not only how to eat, and more especially how to drink, but soon discover the quality of different kinds of food; and, before two days of their existence have passed, can distinguish them by sight, so that if one among them has a favourite morsel in its bill, it is a great chance if he be allowed to enjoy it without some of his companions participating in the luxury. If instinct taught and impelled them to gratify their animal wants, would it, without the possession of mind, give to them, in an eminent degree, the faculty of observation, and a capacity to appreciate the benefits to be derived from following certain courses they have observed others take, while similar ones, from which no advantage is to be derived, remain unnoticed, or, if noticed, unfollowed?

It appears so natural for chickens to follow the hen, to

come at her call, to contend with each other for the food she provides for them, and to seek warmth and protection under her wings—that we see nothing in all this, beyond what we express by the rather unmeaning expression, "that, it is what nature teaches them," (another term for instinct). Immediately, however, neither nature, nor the God of nature, teaches them any thing,* —the knowledge any animal possesses or can acquire is the consequence of a fixed law, determined by a peculiar organization of matter endowed with life, and whose properties and powers were bestowed at the creation, and have descended by propagation from parent to offspring perfect and unaltered, without the possibility of mutation, degeneration, or improvement, from the first pair through all ages unto the present time—and shall so continue while the world endures, a work perfect in its kind, without which qualities it would not be an evidence of that infinite wisdom and omnipotent power which in common with the whole of nature it displays, but a weak, imbecile, erring monstrocity, bearing within itself the seeds of the annihilation of its race.

The Eccaleobion, however, is no mother; it utters no voice, it provides no food, it affords no protection; yet are these beings not lost, but soon learn who is their protector and friend. It is contrary to Nature's laws, to instinct, unless we allow the faculties of mind to be

* "Immediately, neither nature, nor the God of nature, teaches them any thing."—This is equally true respecting human, and brute creatures. What perceptions have we that come to us otherwise than through the medium of our senses, or what knowledge do we acquire but by the exercise of our rational faculties?—If the Almighty teaches, what part of our knowledge has been acquired by the teaching of other men, what part by the exercise of our reason, and what part came immediately from the Deity?—If God instructs, whom does he instruct—the savage, or the sage? If the savage, it must be acknowledged, speaking with all reverence, that such instruction is neither the useful arts of life, morality, or religion. If the sage, which system of philosophy is the true one, varying, and founded as most of them are upon theory, and not upon facts? Or why should God, the father of all his creatures, condescend to instruct the sage, who least requires such assistance, and not the savage, to whom it would be most beneficial?—God fixed the laws which govern the material world at its creation; they are perfect, absolute in power, unerring in their effects, and unchangeable by man. Nor has the Almighty, who alone can do it, thought proper to alter his first arrangement.

It need hardly be added, that this is meant as regards the nature, properties, and effects of physical matter only' and not spiritual teaching. Let divines settle the truth of their multitudinous creeds, and reconcile the orthodoxy of to-day, with the heterodoxy of to-morrow.

brought into exercise, for the young of any animal to acknowledge man (generally its enemy) to be its protector and friend. Yet, in the case of life produced by the Eccaleobion, the birds soon have sagacity enough to know the hand that feeds them, and, with the full undoubting confidence of children in their parents, look to him for the fulfilment of their every want, delight in his presence, and clamorously bewail his absence. These evidences of consciousness, a perception of their (artificial) situation, a confidence that their wants and desires will be fulfilled, while the whole intercourse between the parties is most unnatural, cannot be the effect of instinct but of mind.

Birds do not masticate their food, but tear, break, or swallow it whole; the crop first receives it, from which, through a second cavity, it passes into the gizzard. In canivorous birds this is soft and smooth, suited to the fleshy aliment they consume. In granivorous birds it is a strong muscular receptacle lined with a thick membrane, by means of which the food is ground instead of having been masticated in the mouth—this process is, doubtless, greatly accelerated by the birds, when in a state of nature, swallowing with their food small pebbles and other hard substances. Whenever a granivorous bird, in a state of nature, is caught and killed, upon opening it, the crop and gizzard are found to contain a large quantity of these indigestible bodies; and, from their evident utility in the economy of the alimentary organs, man, without looking further into the matter, pronounces that instinct causes the bird to swallow them. Of about a thousand Eccaleobion birds that were reared in lofts and rooms, with bushels of fine gravel lying in heaps and scattered about, none would eat it, though several died in consequence of not doing so, by becoming crop-bound. If instinct is so effectual, why did not instinct teach these birds to swallow pebbles? but neither instinct, nor my own endeavours thereat, could induce them to do so. The reason is obvious. Like as children insensibly acquire, by receiving from their parents such food as they soon learn to relish, and by observation and habit find agreeable to their palates and stomachs, so birds learn to choose and mix their peculiar food— but as, without parents to direct, few children would eat the most wholesome, preferring to live upon sweets and food

injurious to them,* so these birds, as mothers they had none, and instinct was at fault, could not be persuaded to eat stones, a want of sense certainly, which some had reason to repent — nevertheless, the remainder owed not their salvation to wisdom-imparting instinct.

All these birds were, with but few exceptions, in the best possible health and condition, completely fat, and had been so from their earliest days. They were of all ages, varying from five to ten weeks, and were all turned out into a large yard, in the height of the fine weather of summer. This change, trivial as it may appear, was unfriendly to them, as many of them took cold, and some died. For food, they always had a full supply of the best corn, and occasionally a mess of scalded oatmeal;

* No children, and few adults, like at first such substances as mustard, pepper, and the other spices, spirits, tobacco, coffee, beer, or any high-seasoned food, but a relish for them is acquired by habit, and, when acquired, continued, although it may be pernicious. When Dr. Prout, a clever, sensible, and scientific physiologist, tells us, "that from the earliest times instinct has taught man to add oil or butter to farinaceous substances such as bread, and to fatten animals with the view of procuring the oleaginous in conjunction with the albuminous principle;" this accomplished and amiable man certainly must use it as synonymous with mind. Man's food in the first ages of his existence must have been chiefly vegetable—assisted by his taste and smell, and noticing the effects of what he had already eaten, he would soon learn to cull the most wholesome. Before he could obtain oil, butter, bread, and fat meat, a knowledge of agriculture, the domestication of wild animals, and many other arts, certainly not instinctive, would be necessary, and many ages, if not centuries, must have elapsed. Does instinct teach man to swallow bitter-aloes and other nauseous drugs, mercury, arsenic, and other poisons to cure the diseases to which he is liable? Unquestionably not. Then, if instinct, the conservative principle of our nature, teaches not this, neither does it the other, both teachings being essentially preservative. A knowledge of the qualities, uses, modes of obtaining, administering, and partaking these things, is a result consequent upon the exercise of our reasoning powers, and not an impulse of instinct.

Dr. Elliotson, in his work on Human Physiology, in which he so ably illustrates the constituents, properties, and uses, of the organs composing the human frame, makes no mention of instinct as a power of the brain. We, therefore, must infer, that this learned and scientific man considers it in no way distinct from mind, or else a power possessed only by brutes, and not developed in the human nature. Differing, as I have ventured to do, from both Dr. Prout and Dr. Elliotson, upon some points, it is due to those eminent individuals to bestow that meed of approbation upon their labours and researches into the secrets of nature, so highly calculated to advance the best interests and promote the welfare of our species, which is so eminently their due; labours by which truths, hitherto hidden, have been unfolded, and thoughts full of benevolence to mankind have originated, at once novel, useful, and interesting, so that no man can rise from the perusal of them without having acquired information, and more enlarged views of the wisdom and perfections of his Creator.

they, however, still for some time refused pebbles, but eat of every green thing they could obtain, as also insect and animal food; gradually, however, they learned the virtue there is in stones and other hard bodies, and swallowed them like others of their kind.

Most of them were very fine and beautiful birds, and not the least extraordinary circumstances attending them, are, that although the greater half were cocks, there was with slight exceptions neither fighting nor crowing among them, even when arrived at nearly their full size. It is usually asserted, that the high mettle and courage of the game-cock is natural to it, that is, instinctive, and that if two were to meet in a desert they would fight until one was killed. That they have in their natural state courage sufficient for the protection of themselves, from their numerous enemies, cannot be doubted, but all beyond, is the effects of diet and education. The birds not crowing, also, I cannot account for, otherwise than from their not being within hearing of the thrilling clarion of older birds.

As the birds advance to maturity, they soon shew they are perfectly aware the person who tends them is a stranger, and unallied to their species, by innumerable acts that will bear no other interpretation. They always, however, consider him as a particular friend, in an intercourse with whom they delight, more than with others of our genus. But long before they reach the adult state, the influence of an Eccaleobion origin ceases; and, as I am not writing a work on natural history, shall not pursue the subject farther, it being, when the birds are of adult age, as much open to the observation of others, as to the conductors of the Eccaleobion—merely observing, that at maturity not only are their actions and language perfectly understood among themselves, but there is no man acquainted with them who does not understand it also,—a presumptive proof, that mind answers to mind, through the various orders of the creation.

CHAPTER IV.

CONCLUSION.

The facts deducible from the foregoing relations, particulars, and observations, are the following :—

Life exists in a fluid matter without organization.

The organization of matter is a consequence or effect of life.

Organized matter only can propagate life.

The most perfectly-organized body cannot bestow, or preserve life, merely in consequence of perfectness of structure.

Life is a vital power, cognizant by our senses only, as it exists in an organized system.

Life is latent in a fluid, and not perceivable by our senses, but we know it to exist, from such fluid becoming an organized living being.

Life is propagated from parent to offspring, and not originating in, or with such offspring.

Life is a property or power, bestowed upon all organized animal and vegetable systems, subject to certain conditions peculiar to each system.

Life is that admirable power which preserves incorruptible all organized bodies endowed with it.

Mind is distinct from life, and exists only in animal beings.

Life is known to exist in a fluid previous to organization. Mind is not discoverable until sometime after an organized system is perfected.

Without a brain, or some nervous system, mind does not exist.

Mind does exist in all animals possessing a brain or nervous system, and is the functional power of such brain or nervous system,—most fully displayed when in a state of health, and injured or destroyed by disease.

The superior or inferior power of mind which distinguishes various classes of animals from each other, depends upon the peculiar organization of the brain or nervous

system as possessed by each. That of man is the most richly endowed with mental powers.

Each species of animals having an organization of brain or nervous system peculiarly its own, it gives to each race faculties, or a power of mind distinct, or at least differing, from others, and which power is essential to their existence.

Instinct is a term expressing this peculiar power, denoting those faculties of mind possessed by the lower animals, and which the human race have not in such great perfection.

Instinct is that form or modification which mind assumes under circumstances of peculiar nervous organization, co-ordinately related to the whole animal structure, and to that great principle Life as it so mysteriously affects organic matter.

The organization of every animal body as a whole, is in exact and suited conformity to the endowments of its mind, and (vice versa) the organization of its brain or nervous system, the functions of which develope such mind, is exactly suited to the requirements and peculiar conformation of the body.

Mind "is the functional power of the living brain," and, like life, is cognizant by our senses only as it exists in an organized system.

Mind, as a power of the brain, is essentially the same in its nature, whether existing in the brute or human form.

Mind, like Life, is propagated from parent to offspring, and not originating in, or with, such offspring.

Neither life, nor mind, can possibly be known to exist by our senses, separate from matter.

An organized animal being, possessing life, and, as a necessary consequence, endowed with mind, can be produced by other means than those which nature employs —the Eccaleobion is an instrument for such purpose.

As we are incapable of demonstrating to our mortal senses the existence of a First Cause, the creator and upholder of all things; yet, so infinite are the number of nature's works, so glorious their appearance, and so evident the infinite wisdom which originated them, that no rational man doubts the existence of a God. So, though we cannot demonstrate the existence of mind, called soul or spirit, separate from organized matter, yet

so extraordinary are the faculties, so rich the endowments, and so high the aspirations of the human mind, that in like manner we believe in our own immortality.

Revelation declares and confirms our belief in the existence of a Deity, and our own immortality. But with Revelation, when investigating physical facts and the laws of the natural world, we have nothing to do.

Whether mind, essentially the same in its nature under all its modifications, as existing so wondrously throughout the animal creation below man, is immortal, we can possibly know nothing; and any opinion or conjecture in a work of this kind, upon what we know nothing, is unworthy attention.

FINIS.

Printed by G. Smallfield, 69, Newgate-street, London.