oppositely directed along the line AB. This is all that the laws of motion imply. They do not imply that the acceleration of A due to B is the same when a third particle C is present as when it is absent, although this implication is often read into them.

The supposition that the mutual action between two particles A and B may depend in part upon the influence of a third particle C has been called the hypothesis of modified action. Pearson,[1] while emphasizing the possibility that such a hypothesis may represent the truth for molecular or ethereal actions if not for actions between particles of gross matter, states that 'one of Newton's laws of motion distinctly excludes this hypothesis.' To thus interpret Newton's laws seems, however, a mistake. The essence of these laws may be summed up in the principles of the constancy of linear and of angular momentum for any isolated system. These principles do not exclude the hypothesis of modified action.

The second principle of Dr. James also goes too far in asserting that the acceleration of a particle in a field of force is 'independent of the particle' (*i. e.*, of its mass). That this is true in a particular case such as that of gravitational fields is a consequence not simply of the laws of motion but of the law of gravitation, and the possibility of cases in which it is not true may be admitted without thereby questioning the universal validity of the Newtonian laws.

The foregoing comments have been made because of the intrinsic interest of the questions raised, rather than from any desire to criticize adversely the presentation of Dr. James, which in the main is admirably clear and logical. The remainder of the book is devoted mainly to a discussion of the direct and inverse problems of the mechanics of a particle—*i. e.*, the determination of the law of force when the motion is known, and the determination of the motion when the law of force and the initial conditions are known. These problems are treated for both the case of fixed axes and that of moving axes. In particular considerable space is given to motion relative to the earth.

[1] 'Grammar of Science,' second edition, p. 319.

On the whole, the book is one that is well worthy the attention of any one who is interested in the rigorous treatment of the fundamental principles and problems of mechanics.

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The Other Side of Evolution.[1]

Books are rare which, in their last sentence 'look hopefully to God for that only which will deliver the church from this [evolution] and all other pestilent evils, theoretical and practical,' and I owe, perhaps, an apology to the readers of Science for not sooner calling their attention to 'The Other Side of Evolution.'

The scope of the book is given in the preface:

> It will be shown that evolution is not accepted by all scientists and scholars; that it is rejected by some of the greatest of these; that it is admittedly an unproven theory; that it has never been verified and can not be; that not a single case of evolution has ever been presented, and that there is no known cause by which it could take place. Its arguments will be considered one by one and their fallacy shown. It will be shown to be, by its own principles, unscientific and unphilosophical, and simply a revamping of the old doctrine of chance clothed in scientific terms. Finally, it will be shown that it is violently opposed to the narrative and doctrines of the Bible and destructive of all christian faith; that it originated in heathenism and ends in atheism.

A sharp distinction is not always drawn in this volume between evolution in general and organic evolution, but in the 'Foreword' we are told (p. 2): "The theory of evolution asserts that from a nebulous mass of primeval substance, whose origin it never attempts to account for, there came by natural processes, as a flower from a bud, and fruit from flower, all that we see and know in the heavens above and the earth beneath"; and on page 4: "The theistic and the atheistic evolution, however,

[1] 'The Other Side of Evolution, an Examination of its Evidences,' by Rev. Alexander Patterson, author of, etc., with an introduction by George Frederick Wright, D.D., LL.D., F.G.S.A. The Winona Publishing Co., Chicago, Ills. Winona Lake, Ind.

agree in saying that man was descended from the brute. * * * This doctrine as to man is the vital part of the whole theory and in this all evolutionists are practically agreed." This leaves no doubt as to where the shoe pinches.

However, we are further informed (p. 60) that

The central point in the whole theory is the descent of man from the brute. It is this which, as stated, gives it importance to the christian. But for this, the hypothesis would be but a curious scientific theory. It is a matter of comparative minor interest how the universe or the various species came.

Chapter I. deals with evolution [organic] as an unproven, unaccepted theory and the Uncertainty of Scientific Theories in General.

Chapter II. deals with: (1) The Origin of Matter; (2) The Origin of Force; (3) The Formation and Orderly Arrangement of the Universe; (4) The Origin of Life.

Both chapters I. and II. are mere skirmish lines; the real attack begins in chapter III., which deals with The Evolution of Species. 'Not a Single Instance of Evolution is Known,' under which caption we have:

The world has been ransacked for evidence, the museums are full of specimens, the secrets of nature have been explored in every land, the minutest creatures discovered and analyzed. We have the remains of animals and plants of many kinds thousands of years old, such as the mummied remains from Egypt, and yet not a single instance of the change evolution asserts has ever been known!

Other items in this chapter are: 'No Cause of Evolution Known,' 'How Evolution Originated Species.' Under the last head are 'abbreviated, and rendered into untechnical language, the thoughts of evolutionary writers' as follows:

Eyes originated from some animal having pigment spots or freckles on the sides of its head, which, turned to the sun, agreeably affected the animal so that it acquired the habit of turning that side of the head to the sun, and its posterity inherited the same habit and passed it on to still other generations. The pigment spot acquired sensitiveness by use and in time a nerve developed which was the beginning of the eye.

In a time of drought some water animals, stranded by the receding waters, were obliged thenceforth to adopt land manners and methods of living. Although, strangely, the whale by the same cause was forced to the water, for it was once a land animal, but in a season of drought was obliged to seek the water's edge for the scant remaining herbage, and, finding the water agreeable, remained there and its posterity also, and finally, the teeth and legs no longer needed, became decadent and abortive as we see them now.

The same drought produced another and wonderful change, for it is to this that the giraffe owes his long legs and neck. The herbage on the lower branches withering up, he was obliged to stretch his neck and legs to reach the higher branches. This increased, as all such changes increased, in his posterity, and finally after many generations produced the present immense reaching powers of the giraffe. So that the same drought deprived the whale of his legs and conferred them upon the giraffe.

Still other items in this chapter are the Arguments from Geology, classification, distribution, morphology, embryology and 'Facts Opposing Evolution of Species.' Again, under 'The Argument from Embryology' we have:

Evolution derives it greatest arguments from the study of the embryo. It makes three claims. First, that the germ of everything, plant and animal, is the same, neither chemical analysis nor the microscope showing any difference.

This is indignantly refuted by:

Protoplasm, of which the germ is composed, differs and is not homogeneous material. That which builds the muscle is one kind and that which builds brain and nerves is entirely different. * * * Nor could the germs be alike, for the plant breathes carbon, the animal oxygen.

That ought to settle it.

Chapter IV. deals more particularly with the evolution of man. The argument from rudimentary organs is vigorously repudiated:

Shall we condemn the whole race to a bestial origin on the same evidence? All arguments founded on such facts are weak, puerile and unworthy of scientists. * * * Shall we suspend a philosophy of the universe upon a few long hairs? Shall we allow the guess as to the origin of the tip of the outer ear to revolutionize theology? Shall we risk our eternal destiny on the supposed uselessness of the so-called 'gill-slits' in premature puppies?

The Neanderthal skull "was claimed by the evolutionists as from two to three hundred thousand years old. Dr. Meyer, of Bonn, examined the evidence, and found it to be the skull of a Cossack killed in 1814."

Chapter V. shows Evolution Unscientific and Unphilosophical. Chapter VI. contrasts Evolution and the Bible, and the last chapter, VII., considers The Spiritual Effect of Evolution.

In this last chapter evolution is accused of many misdeeds:

It is, indeed, a fact that many young men have started with high purpose to prepare for the ministry and even for foreign missions, and have, after adopting modern theories, abandoned their purpose. * * * This apparent increase of faith [sometimes brought about by the adoption of evolution] simply prepares the way for its utter ruin. Instead of looking for a regeneration, a revolution of the inner state, the believer in evolution necessarily looks for a change from education or other form of development. It is, therefore, worse than unbelief.[2] It is antagonism. It is enmity! Once committed to this theory, there is no extreme the person may not reach. When openly advocated and taught, it is useless to seek revivals among those so taught.

As a consequence of all this we have the lamentable fact:

Education received in the United States over $200,000,000 in gifts during the last few years, to say nothing of the many-fold more received from incomes and public funds. * * * Whether this is the final form of unbelief is difficult to say. * * * It bears the marks of anti-christianity the apostle speaks of. * * * All satanic methods before this have been crude and coarse compared with this last invention. It is the most subtle and sweeping of all evil methods to ensnare the mind of man.

It certainly must be, for it has captured Patterson himself. He is evidently not conscious of the fact, and he would no doubt repudiate the accusation in appropriate English. We will, therefore, permit him to again speak for himself. The italics are mine. Patterson does not realize that the trend of evolution may be downward as well as upward and that specialization frequently goes with the reduction of parts.

(P. 47): Bearing in mind that this conclusion [the descent of Hippus from Eohippus] is pure assumption, and only inference at best, let us remark that it violates the primal law of evolution laid down by Spencer, that of evolution from the simple to the complex. It should have shown first the one-toed horse, then his development into a two-toed animal, and so on up to a horse having five toes. This would be evolution. As it is, we see the opposite of evolution, degradation, *which often occurs in nature* * * *.

This notion that degeneration is not evolution is also brought out in connection with the air-bladder of fishes, and Cope is quoted against evolution: 'The retrogradation in nature is as well or nearly as well established as evolution' and (p. 53):

The wild varieties of plants and animals are far inferior to the cultivated kinds. The older species are far superior to the present. The saber-toothed tiger is far superior to the present animal. * * * Progress is not seen to be upward in the flowers. So also parasitism is degeneration both in plants and animals. (P. 81): The late find of skeletons at Croatia, Austria, is heralded as the discovery of a connecting link. But these are skeletons of men and not of brutes. They are degraded men and *nothing is better known than the possibility of degeneracy in man.* (P. 89): We have seen that modern man has not developed in brain capacity above prehistoric man. It is also true that he has not developed physically. * * * *Indeed, we have degenerated in many respects. We have almost lost the sense of smell as compared with savage peoples or even animals. Our teeth are certainly not improving.* If we are

[2] For the benefit of the Rev. Patterson attention should probably be called to the fact that he is rather hard on St. Augustine and other church fathers who interpreted the story of creation in Genesis to mean the planting of the seed of creation, not the actual special creation of species, rejecting "Special Creation in favor of a doctrine which, without any violence to language, we may call a theory of evolution." Furthermore, that Patterson's method of interpreting the story of creation was introduced into the church by the Spanish Jesuit Saurez near the middle of the 16th century. Fortunately the followers of Suarez who "suspect the study of nature as if God were a hypocrite and did one thing in his work and said another in his Word" are growing fewer in number.

to find perfect specimens we do not look at the most advanced classes, but to the reverse. Those who live to extreme old age are generally in the lowly ranks. But why has physical development ceased at all? Why are there not some superior beings by this time? But alas, there are no marks or indications of wings or halos on either the great saints or scientists of the day.

Alas, there are not!

CARL H. EIGENMANN.

SOCIETIES AND ACADEMIES.

THE WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS.

THE thirty-fifth annual meeting of the Wisconsin Academy of Sciences, Arts and Letters was held at Madison, February 8 and 9, 1906, the president of the academy, Dr. John J. Davis, presiding. On the evening of February 8 a dinner, complimentary to visiting members, was given, followed by an address by the president on 'The Academy—Its Past and Its Future.' During the four regular sessions the following program was presented:

RICHARD G. NORTON: 'An Investigation into the Cause of the Breaking of Watch Springs in Greater Numbers during the Warm Months of the Year.'

C. S. SLICHTER: 'The Limitations of a General Method of Approximation in Hydrodynamics.'

C. S. SLICHTER: 'A Fundamental Existence Theorem for Linear Homogenous Differential Equations.'

JAMES L. BARTLETT: 'The Climate of Madison.'

A. R. WHITSON: 'The Influence of Soil Temperature on the Occurrence of Frost.'

G. C. COMSTOCK: 'The Luminosity of the Brightest Stars.'

EDWARD T. OWEN: 'Hybrid Parts of Speech.'

NINA M. SHELDON: 'The Supernatural Elements in the English and Scottish Ballads.'

ARTHUR BEATTY: 'English Dramatic Origins—A Protological Study.'

F. C. SHARP: 'A Study of Moral Standards.'

REUBEN G. THWAITES: Memorial Address—'James Davie Butler.'

CHARLES E. BROWN: 'Wisconsin's Quartzite Implements.'

ARTHUR C. BOGGESS: 'The Period of Anarchy in Illinois, 1782–90.'

SOLON J. BUCK: 'The Occupation of Government Land in Oklahoma Territory.'

J. F. DILWORTH: 'Life in the Beguinages before the Reformation.'

E. K. J. H. VOSS: 'A Nuremberg City Ordinance of the Year 1562, Issued during the Time of the Black Death.'

D. L. PATTERSON: 'Alexander and the Council of Worms.'

D. C. MUNRO: 'The Children's Crusade.'

G. C. SELLERY: 'Suspension of *habeas corpus* in the Civil War.'

ULRICH B. PHILLIPS: 'Problems of Colonization as Illustrated in the Province of Georgia.'

C. R. FISH: 'Tables Illustrating the Progress of Rotation in Office.'

WM. V. POOLEY: 'Causes Affecting the Westward Movement of Settlement Prior to 1850.'

W. F. KOELKER: 'Note on the Nature of the Hydrocarbons Occurring in Wisconsin Oil Rock.'

LOUIS KAHLENBERG and ALONZO S. MCDANIEL: 'On the Differences of Potential between Manganese and Lead Peroxides and Various Aqueous and Non-aqueous Solutions.'

L. A. YOUTZ: 'Nitrogen from the Atmosphere and Its Use in the Annealing of Brass Wire.'

V. LENHER: 'Nitroselenic Acid.'

W. D. FROST, R. WHITMAN and R. E. MILTENBERGER: 'Effect of Desiccation on *Bacillus dysenteriæ* Shiga.'

GEORGE WAGNER: 'A Note on the Chemotaxis of Oxytricha aeruginosa.'

GEORGE WAGNER: 'Some Points in the Natural History of the Spoon-bill Catfish.'

G. A. TALBERT: 'Variations of the Brachial and Sciatic Plexus of the Frog.'

G. A. TALBERT: 'Cerebral Localization from a Clinical Study.'

C. B. HARDENBERG: 'Comparative Studies on the Trophi of *Scarabæidæ*.'

E. A. BIRGE and V. LENHER: 'The Gases of Wisconsin Lakes.'

E. C. CASE: 'Wave-rolled Snowballs.'

W. S. MILLER: 'The Mesothelium of the Pleural Cavity.'

S. WEIDMAN: 'An Additional Driftless Area in Wisconsin.'

J. J. DAVIS: 'Notes on a Few Parasitic Fungi of the Pacific Northwest.'

R. H. DENNISTON: '*Gasteromycetes* of Wisconsin.'

C. E. ALLEN: 'The Life History of *Coleochæte*.'

GEORGE M. REED: 'Infection Experiments with the Mildew on the Cucurbits.'

R. A. HARPER: 'The Nature of the Variation of the Spore Number in the Ascus.'