

Natural History.

By Gerard Krefft.

Remarks on New Hypotheses.

According to promise, I bring before your readers some of the scientific news received by the mail, though it is necessary to begin the account with a rather lengthy introduction. All the journals bristle with "evolutionary" (or revolutionary) discussions, and we shall soon have to discard the term "biology," for living organisms such as animals and plants, if philosophers like Haeckel, the distinguished, uncompromising, and learned professor of Jena, succeed to tumble the whole creation into one. This gentleman, who has out-darwinised Mr. Darwin, aims at nothing less than to fill up the chasm between the organic and inorganic world, and to bring rocks and crystals,—in fact everything which exists, into the same category with living organisms. We are told by the able reviewer of Professor Haeckel's works in the instructive periodical called Nature, that had hypotheses are better than none at all, and that all we ought to insist on should be this:—"that a hypothesis be abandoned the moment it is found to contradict certain facts, or when the same facts are more satisfactorily explained by a new hypothesis."

Professor Max Müller is very angry with his famous countryman, Haeckel; he calls his theory "Evolutionary Materialism," though he believes "that the human mind stands in need occasionally of mental thunderstorms, because after passing through one of the decisive battles of the world of thought, our brains display greater vigour and freshness than ever."

Max Müller considers the question of "Evolution" in much too serious a light. He thinks that we are on the eve of a storm which will shake the oldest convictions of the world, and upset everything that is not firmly rooted. This shows how little Professor Max knows the world abroad, and if ever there was a season when people flock round those who interpret the faith in which they were brought up, it is the present time, in Australia at least.

After this digression, I shall try and explain what our men of science have done during the last twenty-five years, and for that purpose quote part of an eloquent address delivered by Professor Ferdinand Cohen, at Breslau, in Silesia, on the occasion of Professor Goppert's 25th anniversary as President of the Silesian Society for National Culture.

It is necessary that such a resumé should be given because almost every other book now published on Natural Sciences refers to some of the discoveries mentioned, and these discoveries, it is highly probable, have not penetrated to every place which the Sydney Mail makes bright once a week. Professor Cohen remarks:—"There are three discoveries which, during the last quarter of a century, have entirely changed the position of natural science—the mechanical equivalent of heat, spectrum analysis, and the Darwinian theories. Since, in the year 1842, an unknown physician in a Swabian country town, Dr. Mayer of Heilbronn, pointed out that a hammer 424 kilogrammes in weight, which falls from the height of a metre on an anvil, raises the heat of the latter by one degree centigrade, and that by this process of bringing a falling motion to a standstill, it is converted into a fixed quantity of heat, since then has science gained a new conception of the conditions of matter, and of the powers of nature. This new doctrine appears in the mechanical theory of heat announced by Joule, Maxwell and others in the doctrine of the conservation of energy of Helmholtz and Thomson, and by means of the brilliant writings of Tyndall it has become the common property of the educated world. Electricity, and magnetism, heat and light, muscular energy and chemical attraction, motion and mechanical work—all forces in the universe—are only different forms of one and the same power, which has dwelt from the first in matter in invariable quantity, neither increased nor diminished. Not the least trifle of it can be annihilated or created. Only the phenomenal forms of power are changeable; light can be converted into a chemical equivalent, this again into heat, heat into motion, and indeed a fixed quantity of one force always and only into an equivalent quantity of another in like manner also. The quantity of matter has remained unchanged from the beginning; not the least particle or molecule can be annihilated or created out of nothing, and only in the transformation of perishable bodies are the molecules formed into ever new combinations. What we distinguish as natural forces are only movements of molecules, for the least particles of matter out of which bodies are composed are not inseparably united to each other, but are loosely held together, and in continuous whirling and undulatory motion. According to the swiftness and width of undulation of the molecule will this motion of our nerves be regarded now as sound, now as heat, then as light or as colour. Moreover, the chemical union of the elements of matter, the attractive power of gravitation in all the bodies of the universe, are but varied forms of this universal motive force. The unity and permanency of substance, with its two attributes, matter and force, and their innumerable modifications, which go to form the bodies of the universe, were in the first instance enunciated by the great thinker, Spinoza. Now, it is established as a philosophic fact, by means of exact measure and weight." Alluding to the discovery of the spectroscope, the Professor remarks,—"The genius of these men compelled the rays of light imprisoned in the spectrum apparatus to make revelation of things in the world of stars which the curiosity of men had deemed for ever inaccessible."

Already had Kirchhoff ascertained what terrestrial elements were present in the sun's atmosphere and what were not; quite recently has it been discovered that there is even present in the sun a substance (Helium) which hitherto has been unknown on the earth. Moreover, also the inner structure of the sun, the distribution of its incandescent liquid and gaseous parts, its luminous and coloured envelope, the nature of its spots and protuberances—all this is no longer a playground for fantastic imaginings, but the subject of exact research. Since the great eclipse of 1868 Lockyer and Janssen, Zollner Huggins, and Father Secchi have observed day after day, storms, whirlwinds, flame-aeolae, outbursts of burning hydrogen, to the height of 20,000 miles—thus has been developed an entirely new science—the meteorology of the sun. Moreover, on other obscure regions of the heavens, on the physical and chemical conditions, even on the laws of the movements of the fixed and double stars, on nebulae and milky ways, on planets and comets, on zodiacal and northern lights, has spectrum analysis thrown its enlightening rays.

Schiaparelli has solved the riddle of comets, and recognised the identity of their nature with that of the swarms of shooting stars whose remarkable brilliancy long ago made them universally known. During the last quarter of a century, the history of the formation of our earth has assumed a new aspect. When Humboldt's "Cosmos" appeared, the opinion prevailed that our globe, once a globe of liquid fire, became covered with a crust of congealed scoriae,

on which by-and-by the first animal and plant life made its appearance. After an almost infinite length of time, during which the Silurian, Devonian, Carboniferous and Permian strata were deposited, a terrible catastrophe, affecting simultaneously the whole earth, so completely destroyed the first Palaeozoic life, that not a single species survived the universal devastation. Upon the lifeless expanse it was supposed appeared their forming the secondary fauna and flora, entirely unconnected with, and different from, the extinguished one, until after frequent repetitions of the same process at longer or shorter intervals, man made his appearance, and along with him all existing plants and animals. With him begins the Historical Period, whose duration has not exceeded 6000 years. The causes of these world-wide revolutions, geology sought in the violent reaction of the molten interior against the once extremely slender crust. In opposition to these views the opinion peculiarly associated with the name of Lyell has made way, that no violent revolutions, returning at intervals, destroyed the external structure of the earth and all life is sustained; but that all changes even in the earliest times affected only the earth's surface, and that these could only be results of the same powers of nature which are actively at work on the earth at the present time; and that moreover the gradual but ever active powers of water, of air, and of chemical change have, perhaps, had a greater share in accomplishing these transformations than the fierce heat of subterranean masses of lava. The explorers of the buried remains of plants and animals show it to be impossible that all life in those geological formations could have been destroyed simultaneously, for many species are common at several stages; in particular many existing animals and plants reach far back into the primitive world.

Man himself could be shown to have been contemporary with many extinct species of plants and animals, and therefore his age on the earth must be extended back to an indefinite period. Man was witness to the inundation which buried the plains of the old and the new world under the waves of the sea of ice. Even in the immediately preceding period, when the subtropical element, rhinoceros, and hippopotamus disported themselves in the lignite woods of Middle Europe, have traces of mankind been found. Only in the most recent times has a foundation been laid for the prehistoric records of mankind, by means of which we may be able to obtain a knowledge of the state of civilization weapons, implements, and dwellings of that primitive race.

No book of recent times, Dr. Cohen thinks, has influenced to such an extent the aspects of modern natural science as Charles Darwin's work "On the Origin of Species," the first edition of which appeared in 1859 (the last or sixth edition in January, 1872); for even so late a period was the immutability of species believed in; so long was it accepted as indubitable that all characteristics which belong to any species of plants and animals were transmitted unaltered through all generations, and were under no circumstances changeable; so long did the appearance of a new fauna and flora remain one of the impenetrable mysteries of science.

Professor Cohen does not doubt but that Darwin and his school may have over-estimated the reach of the explanations given by him to account for the transmutation of species, and especially the importance of natural and sexual selection, but the fundamental fact has been established, and will remain so for all future time.

The fact is that the collective life of the earth, from the beginning even until now, and from the fungus cell up to man, represents a single series which has never once been broken, whose members, through direct propagation, have proceeded out of each other, and in the course of a vast period have been developed into manifold and, on the whole, perfect forms.

Schleiden, in his "Principles of Scientific Botany" drew attention to the immutable law that all vegetable phenomena and all the various forms of plants proceed from the life and development of their cells. Schwann then discovered that animal bodies also were built up from an analogous cell. The most highly developed animal differs from the simplest plant only in the number and greater development of the matter composing the cell, and in the division of labour—the strict subordination of the separate cells to the collective life of the organism. Between the two extremes of the living world, the yeast-fungus and man, there is the same difference as there is between a group of individual men who do not know how to organise their strength, and a strictly disciplined well ordered army, suitably formed and well armed, and what by the strict subordination of the many wills to the central authority is always equal to the highest achievements.

Professor Cohen is evidently alluding to the last war, during which, regardless of praise and prayer on both sides, the "God of Battles" was with the best general, and the best disciplined if not always the biggest battalions.

After stating that all these researches into biology have left most important questions unsolved, the able lecturer confesses that the beginning of life is still wrapped in obscurity. I conclude with the following remarks of Dr. Cohen:—"But if anxious souls should fear that with the advance of a scientific knowledge of the universe among the people, would come a breaking-up of political and social order, let them be assured by the teaching of history. When we perceive the flash of an electric spark, we certainly do not take it for a bolt darted by the revengeful Jupiter; and as the vault of heaven is resolved into air and light, so also must the Olympus be shattered which was built thereon. But the idea of the true, the beautiful, and the good remain unshaken. They have been all the more firmly established; for they have been deduced from the order of the universe, and from the mind of man himself."

Before concluding, I would like to say a few words about education in Germany, because it is the opinion of the English reviewer that everything is so much better managed in the new Imperial country. He may be right as regards those classes who can pay for the higher kind of education; but as regards the lower orders, I take the following from a scholastic German periodical:—"The larger portion of the Berlin school boys have not the slightest idea about Nature. 2000 children, questioned by 84 teachers, gave proportionately the following result: Of 1000 children only 777 had an idea of the rainbow, only 632 had seen a potato field, only 602 knew what was meant by a butterfly, 538 had seen the glow of the sky at sunset, and only 462 actually observed the setting of the sun; 460 knew what a meadow is like, 406 had an idea of a wheat field, only 367 had ever seen a flock of sheep, 364 knew a forest, 264 knew what an oak

The Ceratodus is a striking example of this statement. I have found traces of man in the Breccia caves of Wellington. Part of the crown of a molar tooth in a fossil state like the surrounding remains of extinct mammals. The same block contained teeth of Tayassoo and Diprotodon—S. K. I had not seen these remarks when I wrote the last paper on "New Creations," in No. 679 of the Sydney Mail, and was not aware of the extent to which the transmutation of species had been accepted by scientific men everywhere. There is plenty of opportunity to acquire knowledge in New South Wales in this respect, and I hope that many young men and women will take advantage of the liberal offer of the Government, and come out to this colony.

tree was, 263 had some idea of ploughing, and only 176 had ever heard a lark sing." Considering that a large proportion of the poor of the new Imperial city have lived in tents, and packing cases, the result is not so bad, and will favourably compare with a similar number of youthful cockneys. Still there is room for improvement. Max Müller tells us that the world from workshop to palace is overrun with believers in all sorts of new notions, but with such a splendid crop of ignorance it matters little (as Professor Max says) what the religion or the dominant philosophy of a State is like, provided the morals of these children are good. If morality is deficient, then there is the drill-master and a strong police who will keep order, and should they break out, the rebels will be "dispatched" and have an opportunity to return to their original state of "jelly-fish," or "simple cell," abiding their time, like Micawber, till something better turns up during the next cycle.

THE QUARTER'S REVENUE.

RECEIPTS AND PAYMENTS. Statement showing the Consolidated Revenue Fund, the Loans Account; the Loan Fund, 35 Victoria, No. 5; the Loan Fund 26 Victoria, No. 2; the Loan Fund, Funded Stock Act; the Superannuation Repeal Fund; the Trust Fund Accounts of the Government of New South Wales, the Receipts and Payments during the quarter ended 30th June, 1873, as per accompanying statements:—

Table with columns: ACCOUNTS, Receipts during the quarter ended 30th June, 1873, Payments during the quarter ended 30th June, 1873. Rows include Consolidated Revenue Fund, Loans Account, Civil Service Superannuation Fund, etc.

TOTALS ... £1,465,813 8 1 ... £964,317 11 9

DISTRIBUTION OF THE BALANCE OF 30TH JUNE, 1873. Bank of New South Wales; London Account; Public Account, Sydney; The Loan Fund, under 35 Vic., No. 5; etc.

Table with columns: Revenue or Receipt, Quarter ended 30th June, 1872, Quarter ended 30th June, 1873. Rows include Customs, Spirits, Wine, Ale and Beer, Tobacco and Cigars, etc.

COMPARATIVE STATEMENT OF REVENUE AND RECEIPTS ON ACCOUNT OF THE CONSOLIDATED REVENUE FUND, THE LOANS ACCOUNT, THE LOAN FUND, FUNDED STOCK ACT, THE SUPERANNUATION REPEAL FUND, AND THE TRUST FUND, DURING THE QUARTERS ENDED 30TH JUNE, 1872, AND 30TH JUNE, 1873, RESPECTIVELY.

Table with columns: Revenue or Receipt, Quarter ended 30th June, 1872, Quarter ended 30th June, 1873. Rows include THE LOAN FUND, FUNDED STOCK ACT, SUPERANNUATION REPEAL FUND, TRUST FUND, etc.

Table with columns: Revenue or Receipt, Quarter ended 30th June, 1872, Quarter ended 30th June, 1873. Rows include Contributions under Diseases in Sheep Act of 1866, Fees under Registration of Brands Act, Postage, Commission on Money Orders, etc.

Table with columns: Revenue or Receipt, Quarter ended 30th June, 1872, Quarter ended 30th June, 1873. Rows include Licenses: To Wholesale Spirit Dealers, To Auctioneers, To Retail Fermented and Spirituous Liquors, etc.

Table with columns: Revenue or Receipt, Quarter ended 30th June, 1872, Quarter ended 30th June, 1873. Rows include Rents—Exclusive of Land: Tolls and Ferries, Wharves, Government Buildings, etc.

OTHER RECEIPTS. Advances Repaid: Advances to Public Officers and others from the Treasurer's Advance Account of 1872, recovered; Advances to Public Officers and others from the Treasurer's Advance Account of 1873, recovered.

Table with columns: Revenue or Receipt, Quarter ended 30th June, 1872, Quarter ended 30th June, 1873. Rows include MISCELLANEOUS RECEIPTS: Sale of Government Property, For the support of Patients in the Lunatic Asylums, Collections by the Government, etc.

It is a matter of notoriety (observes the Bombo Times) that the improvement clause of the Land Act is evaded in every possible manner; the selector has simply to make a statute copy declaration that he has made improvements on the land to the value of £1 per acre, and this he frequently does altogether irrespective of the truth; the land agent then certifies that, to the best of his belief, the facts set out in the declaration are true, and of this the said land agent knows about as much as that celebrated luminary "the Man in the Moon." This being done, the selector is entitled to a grant of the land conditionally purchased, but, in all probability, a scrutiny of the improvements declared to be of the statutory value would reveal the startling fact that not one-fourth had been placed upon the ground.