

The Open Court

A MONTHLY MAGAZINE

Devoted to the Science of Religion, the Religion of Science, and the
Extension of the Religious Parliament Idea

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The Open Court

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HUGO DE VRIES.

BY DANIEL TREMBLY MAC DOUGAL.

NEARLY half a century has elapsed since the formulation of Darwin's conception of natural selection, and the presentation of his conclusions as to the method of origin of species. The overwhelming number of facts brought together in his writings compelled the universal acceptance of the theory of descent. The wealth of detail described in his various books concerning organic evolution, together with the intricate theoretical explanations offered in connection with them, was so hopeless of duplication on the one hand, and so difficult of proof or disproof on the other, that the energy and attention of naturalists for half a century have been absorbed in discussions as to the interpretation and application of the broader generalisations, and in criticisms and counter-criticisms, while actual investigations of only minor importance were carried out, notwithstanding the period in question includes the time within which the biological sciences have had the greater part of their development.

That the establishment of organic evolution on a firm basis should be followed by a period barren of contributions to the subject is remarkable, but easily understood when the conditions are taken into consideration. Darwin's explanations of evolutionary movements supposed that the external changes constituting the apparent origin of types extended over many thousands of years, or over periods which could not be approximated. The methods proposed to account for the origin of species were extremely difficult of proof or disproof with any satisfactory degree of finality. The discussion of the value of evidence upon questions of such vague limits quite naturally became acutely controversial, and four-fifths of the literature upon this subject with which our libraries have been burdened during the last five decades might be discarded without injury to the subject.

sidered the forms of the evening-primrose which have arisen by saltation or mutation, and similar evidence is furnished by many other groups of plants and animals. In still further confirmation of this conclusion it is to be said that statistical measurements of the mutant forms of evening primroses show that they are clearly separable from the parental types from which they are derived, and present the curious anomaly of being more widely variant in their single characters than the parent.

The history of the studies upon which the mutation theory is chiefly based forms one of the most inspiring chapters in the history of natural science. Twenty years ago Professor DeVries began bringing under observation successive generations of several species of plants in order to determine whether all of the thousands of individuals included in the progeny of one parent-plant would inherit all of the parental characters. Over a hundred species were examined in this way. Finally one was found which showed seed-sports among its progeny—individuals which in some types lacked some of the parental qualities and hence constituted retrogressive forms, and others which bore characters not manifested by the parent. In this momentous discovery he had happened upon one species which was in its mutative period, which might occur in the history of a species once in a century, or once in a thousand centuries, and which might extend over one season or over a hundred. With this clue he set to work to ascertain the principles governing such forms of inheritance. Greenhouses and experimental grounds were prepared and cultures tended for two decades with the most painstaking and microscopic care. Every precaution was taken to exclude the interference of the wind, insects, birds and other agencies in pollination and fertilisation. Exact pedigree-cultures were carried through two decades with a degree of care not hitherto used in any culture of plants. It is impossible to set forth the enormous amount of detail to be kept in mind and organised in such experimental observations. It may only be cited as an illustration that in some seasons the packets of seeds, each representing a separate experiment, and requiring separate notes reached into the thousands. Furthermore the striking character of the results to be tested made it necessary that the experimenter himself should perform the commonest operations of gardening, in the way of weeding, watering, etc., in order that a line of descent might be traced through an unbroken series of years without a trace of doubt as to the purity of its lineage. The splendid results derived from a collation of these observations well justify the work spent in obtaining them, consti-

tuting as they do the most important contribution to organic evolution since the appearance of Darwin's *Origin of Species*.

It seems eminently fitting that results of this character should be obtained by Professor DeVries when his experience and attitude toward research are taken into consideration. As a young man he had come into contact with Sachs, Hofmeister and Bunsen, and developed an enthusiasm that has never failed through the tedious ordeal of two decades of patient, arduous plodding. During the course of his studies he has been a student, lecturer and professor in universities in both Germany and Holland, and he came to his self-appointed task with a broad knowledge of physiological science obtained at first hand, and with the mental strength and support that came from contact with the leaders in biological thought in his earlier days, and with the technical skill that is to be gained by experience in many laboratories.

A keen insight into the problems awaiting solution, a clear conception of the methods applicable, a trained imagination to bring into review all of the possibilities, then the steady, strong, unrelenting attack, these are the qualities that mark the investigator of the first rank, and which insure progress in thought and advancement of human knowledge.

Nor is the mutation theory the first expression of DeVries's speculative insight into the nature of organized matter. The idea of ultimate units of structure bearing the indivisible qualities of the body of which it formed a part formed an important theoretical basis for his work, and the present conception of the ions of the physical chemist may be traced to a development of this conception originated by DeVries. This generalization, which is essentially of a physiological character, even when applied to inorganic substances, gave the basis for the researches upon descent which have been carried out with such notable results.

Beyond the value of the principles established by Professor DeVries he has rendered a notable service to biological science by demonstrating anew that the principal problem in descent, the origin of new types, is capable of investigation by actual observation, and by methods so simple that they may be followed by naturalists with only elementary training. To rescue the subject of organic evolution from the wearisome tangle of polemics, and bring it again before the student and worker as a proper matter for experimental inquiry is in itself a triumph and constitutes a service to biological science not surpassed in importance by the actual discoveries already made.