HISTORIC NOTES OF COSMIC PHYSIOLOGY.*

By Dr. T. Sterry Hunt.

[Abstract.]

The author began by insisting that general physiology, as the philosophy of material nature, is co-extensive with general physiography, in which sense it was employed by the best writers up to the first year of this century. In the abridgements of the Philosophical Transactions of the Royal Society up to 1700, and to 1720, the chief division is into Mathematical and Physiological subjects, the latter including the phenomena of the three kingdoms of nature. There is a physiology not only of animals and plants, but of the inorganic world, and from terrestrial physiology we rise to a conception of the physiology of the Cosmos or material universe; a subject which from the earliest times has attracted the attention of philosophers. One of the most evident of the problems thus presented is that of interstellar space, and its relations to our earth and its gaseous envelope. After noticing the views of the ancient Greeks, the author referred to the discovery by Alhazen of the refraction of light, from the phenomena of which the Arab philosopher attempted to fix the limit of the terrestial atmosphere. He then noticed the similar attempts of later observers, and adverted to the well-known hypothesis of Wollaston, who endeavored to assign thereto an absolute limit on grounds which are inadmissible. He adverted to various views as to the so-called ether of space, which Newton thought, must include exhalations from celestial bodies, and noticed the hypothesis of Grove that the medium for the transmission of radiant energy through space is but a more attenuated form of the matter which constitutes the gaseous envelopes of the earth and other celestial bodies, between which, through this medium, Grove supposed material interchanges might take place. The suggestion of Arago as to the possibility of determining the density of the rare matter of interstellar space was noticed, as well as that of Sir William Thomson, who has even attempted to fix the minimum density of the luminiferous medium, which he, like Grove, conceives may be a rarified extension of the terrestrial atmosphere. Mattieu Williams, adopting the hypothesis of the atmospheric nature of the interstellary matter, has attempted to show how the sun in its course through space may condense this matter with the evolution of heat and thus replenish the solar fires. From this ether also by a stoichiogenic process the various chemical species are perhaps generated.

The author had endeavored to approach the study of interstellary matter from a wholly different side. From a consideration of the chemical and geological changes of which we have evidence in the earth's crust since the beginning of life on the planet, it is clear that enormous volumes of carbonic dioxide have become fixed partly in the form of carbon, with evolution of oxygen, and partly as carbonates—equal in the aggregate to 200 atmospheres or more. This enormous volume, it is held, must have come from outer space to supply the gradual absorption of the gas from the atmosphere, while by a reverse process of diffusion the great amount of liberated oxygen may have been got rid of, and the equilibrium of the atmosphere in this way maintained. The consequences, both meteorological and geological of this process were discussed by the author in 1878, and more fully in 1880 in an essay on The Chemical and Geological Relations of the Atmosphere in the *American Journal of Science*. As a farther contribution to the history of these views, the author proceeded to show that Sir Isaac Newton not only held to the presence in interstellar space of exhalations from the sun, the fixed stars, and the tails of comets, which he supposed to become diffused in and to form part of the ether, but even suggested that this etherial matter is the solar fuel and essential to planetary life. From a consideration of the processes of vegetable growth and decay, Newton arrived at the conclusion that elements from interstellar space, brought by gravity within the terrestrial atmosphere, serve to nourish vegetation, and by its decay are converted into solid substances. In this way are, according to him, generated not only combustible (sulphureous) bodies, but calcareous and other stones, whereby the mass of the planet is augmented. These views put forward in Newton's famous Hypothesis concerning Light and Color in 1675, and in the Queries to the *Optics*, are more definitely enunciated in Propositions 41 and 42 of Book III of the *Principia*.

* Read before the A. A. A. S., Cincinnati, 1881.

ON THE UNIFICATION OF GEOLOGICAL NOMENCLATURE.

By Richard Owen.

With a view to proposing such Geological Terminology as would probably be acceptable to a large majority of the scientific representatives of those nations sending delegates to the International Congress for the Unification of Geological Nomenclature, it seems necessary to offer for discussion some principles, and to lay down some

SUGGESTIVE RULES:

1. To agree that all questions shall be decided by a plurality vote; or, if thought best, by a two-third majority.

2. To assign distinctive names for the headings of geological divisions and subdivisions, instead of calling, for instance the "Silurian," sometimes an "Age," at others a "Period, System, Era, Formation," or as by the French "Etage," which is translated by Surenne as meaning (when applied to Geology) stratum or layer. Further suggestions on this point will be given in the "Conspectus of Headings."

3. To arrange under these heads, when thus decided upon, such formations as are generally considered of nearly coördinate value, in lieu of giving the same apparent importance to a minor subdivision, say of Upper Silurian (such as Salina), or one of the Devonian (e. g. Chemung) that we assign to the whole Tertiary. The subjoined Tabular View offers a modified coördination.

4. To select, as far as practicable, for the geological formations thus arranged, geographical terms, indicating the areas where these formations prevail extensively, or have been studied very thoroughly. This would obviate any controversy on mooted points regarding the lithological or paleontological character of the formation. In order to illustrate the practical application of this rule, let us take for examination the nomenclature proposed by the illustrious Sir R. Marchison, in his great work of 1854, "Siluria," descriptive of the geological formation in the country inhabited by the ancient "Silures." His work of 1839 was entitled "The Silurian System," but his later publication showed a preference for the shorter and more expressive form as a noun. The adjective has, with slight modifications, been adopted in most modern languages; but by selecting the noun "Siluria," we unify for universal recognition. The same may be said for "Devonia." If it is not considered too great an innovation to alter terms already so well received, we might say "Silur-Britannia," "Devon-Caledonia," and proceed then to distribute the honors among different nationalities, as more fully exhibited in the Conspectus. The term Carboniferous is not correct when applied to Mountain Limestone or Millstone Grit, besides Coal Measures cannot be so rendered into other modern languages as to make a suitable subdivision, it is therefore suggested to name the system after the region having the greatest Coal area (the United States), and the Coal Measures after a European country in which coal is well developed. This would give us Appalachia or Carbon-Appalachia for the system, and Belgia for