

molecule is nowhere defined (in a note on p. 57 a casual statement is made as to the meaning of the term); "Avogadro's law," which lies at the basis of the whole modern edifice of chemistry, is conspicuous by its absence; certain statements as to gaseous combination and to "volume weights" are made, it is true (p. 35), but these are incomplete and misleading.

When a theory of valency is raised on so slender and shifting a molecular foundation as is here laid, no wonder that the edifice should be a strange one; the definition of "atomicity" on pp. 54-55 is incomplete, and cannot be upheld by facts; the statement on p. 58, "it is then a law to which there are no real exceptions, that though the equivalence of an element may vary, it does so always by the addition or subtraction of an even number," is simply untrue. As an "important conclusion" from certain "facts" (? fancies) "on equivalence," it is stated that (p. 59) "a formula which possesses an uneven number of bonds or units of chemical affinity cannot possibly represent a molecule"; without minutely criticising the expression "bond or unit of chemical affinity," suffice it to say that such a formula as, according to Dr. Kemshead, cannot possibly represent a molecule, unfortunately does represent a molecule. The existence of the molecule NO is a case in point: *à propos* of this compound, there is a charming example of the author's method of treating chemical science as a collection of opinions of various authorities to be found in a footnote on p. 169.

Notes on the Crania of New England Indians. By Lucien Carr. From the Anniversary Memoirs of the Boston Society of Natural History, 1880.

THIS is one of the numerous contributions now being made towards our knowledge of the fast-disappearing race of North American Indians. The author, Mr. Lucien Carr, holds the office of Assistant Curator to the valuable Museum of American Archæology and Ethnology at Cambridge, Mass., an institution owing its foundation to the liberality of Mr. Peabody, so well known in England by his benefactions to the London poor, and its scientific excellence to the zeal and organising power of its first curator, the late Dr. Jeffries Wyman, and of his successors.

The object of the present memoir is to collect together such information as is still to be obtained regarding the cranial characters of the native Indians of the New England States, the celebrated "five nations" of the early historians of America, who in consequence of their geographical position were among the first of the race to succumb to the inroads of European immigration. Measurements are given of 67 crania, of which 38 are assigned to males and 29 to females. The averages of these measurements give the following results:—A medium cranial capacity, *i.e.* 1436 cubic centimetres for the males and 1319 for the females. A latitudinal index of 759, showing mesaticephalism verging upon dolichocephalism. The altitudinal index exactly the same. The principal facial indices show orthognathism, with a strong tendency to mesognathism, a mesorhine nose (index 50), and slightly megaseme orbits (index 88 in the males, and 91 in the females). Although these are the average characters of the whole collection, very few, if any, of the individual crania are to be found presenting them. There is indeed no such uniformity among these skulls as may be seen in certain races, such as Eskimos, Bushmen, Fijians, Andamanese, or even Australians. Perhaps it could scarcely be expected in inhabitants of a large continent, presenting great diversities of climatic and other conditions, and with no natural barriers to free migration and intercourse. The examination of these skulls therefore confirms what has been often remarked before, that although in a broad sense the American Indians present a certain community of type, there is

great diversity in detail among them, the result probably of a long series of repetitions of the process of breaking up into distinct groups or tribes and reuniting in various combinations.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Conservation of Electricity

IN a recent communication to NATURE (vol. xxiv, p. 78) Prof. Silvanus P. Thompson very kindly mentions my latest memoir on "The Conservation of Electricity," and, as I am glad to find, confirms my views on this subject by stating that he has independently arrived at the same conclusions with myself.

As regards however the question of priority moved by Prof. Thompson, I think I ought to add that an earlier paper of mine, published five years ago, must have escaped Prof. Thompson's attention. This was printed as an abstract in the *Comptes rendus* of the Paris Academy of Sciences for June 19, 1876, under the title, "Extension du principe de Carnot à la théorie des phénomènes électriques. Equations différentielles générales de l'équilibre et du mouvement d'un système électrique réversible quelconque." I there enunciated the law of the Conservation of Electricity in the same terms as now, and also gave the same analytical method for applying it. I beg leave to quote as a proof the following explicit passage from this extract:—"L'équation $\int dm = 0$ a une autre signification plus simple; elle signifie que de l'électricité peut se déplacer, mais ne peut jamais varier en quantité. Ce principe de la conservation de la quantité d'électricité a été admis par les physiciens dans tous les cas connus jusqu'ici, influence, frottement, etc. . . . Pour que $\int dm = 0$ pour tout cycle fermé, il faut que dm soit une différentielle parfaite." This method I had already applied in 1875 to the phenomena presented by mercury electrodes (*vide Annales de Chim. Phys.* 1875). In fact my latest memoir is merely a renewed attempt to draw, by means of new applications, the attention of physicists to a fact which I cannot help considering as important for the future, viz. that the principle of the Conservation of Electricity is, as far as analytical applications are concerned, the exact analogue to Carnot's Principle for Heat.

Paris, Faculté des Sciences, June 5

G. LIPPMANN

Apparent Decomposition of Sunlight by Intermittent Reflecting Surfaces

IT occurred to me that light might be decomposed by interrupting, with a reflecting surface, a ray of light in such a manner that the interruptions may be proportional to the wave-length period of any particular ray forming a part of a composite ray. The experiment is effected in the following way:—

A wheel having bright spokes (the large wheel of a bicycle answers well) is caused to revolve between an observer and the sun, so that a ray of light is reflected to the observer by a bright spoke; then, when 120 spokes pass before the observer per second, violet light shines out vividly; when 65 pass, red appears, and different rates of revolution give different colours. There seems to be a marked relationship existing between the number of spokes which pass by and the wave-length of the two colours mentioned, that of the violet being $\frac{1}{80000}$ inch, and that of the red $\frac{1}{64000}$ inch.

I am now investigating this apparent relationship between spoke-interruption and wave-length for the other colours of the spectrum of white light, and I hope to be able to make known the results shortly.

FREDERICK J. SMITH

Taunton, June 4

Symbolical Logic

I AM sorry that Mr. MacColl should have thought that there was any intention on my part to suggest a doubt as to his having