'flatheads' are more particularly found in the pine-wood regions, where game is obliged to subsist solely upon heather forage (sweet broom), and where food is to be found only in occasional places.

"As transitory forms, there are also in such districts, in addition to the few flatheads found at all times, deer having one 'scurr' or stunted horn, while the other horn is well developed, bearing perhaps ten to twelve branches, and the majority of the rest of the deer have only small, smooth antlers of light color, some curiously bent or spirally twisted. Deer which instead of antlers bear a long, straight, spear-like horn on one side were formerly called 'provincial murderers,' as they were considered a very dangerous enemy of other deer during the rutting season, and on which account their destruction was sought.

"In the main, these so-called deformities, and even the total absence of antlers on the flatheads, can in no way be considered an indication of the lack of procreative power, nor can they be classed with the abnormal forms or the total loss of antlers, which results from injuries, and which reappear in their young. The flathead deer are seldom unequal in strength or weight to the others of the same age and the same district, but occasionally excel the latter in these respects. They also early enter the rutting season, and show themselves equally ready for the conflict. Their art and manner of fighting are singular enough; like the female, they rise up high on their hind feet, and with their fore-feet they, from above, mercilessly strike their antagonist. It is remarkable how the antler-bearing antagonist intuitively enters such conflict by rising on his hind feet, making no use of his terrible weapons. On such occasions the flathead, having developed superior skill in his movements, almost always puts to flight in a few rounds much larger deer with immense forked horns. Also at other seasons the contests may be observed in regions where the flatheads are found, and where at times a troop of such game is run together into a narrow space, as is the case occasionally during the preparations of a suspended hunt; yet those encounters are less fierce and soon ended, as they are brought on by the momentary invitations and accidental meeting of the deer in the press."

Have there been any cases of deer, bisons, etc., with 'flat' or hornless heads noticed in America? A.

SOME ANALOGIES BETWEEN MOLECULES AND CRYSTALS.

BY JOHN W. CALDWELL.

CHEMISTRY and crystallography are closely related branches; they are, indeed, but parts of one great whole. The special design of chemical laws is to present the methods and conditions of the re-arrangement of atoms, which re-arrangements we generally denominate chemical reactions. The laws of crystallography, on the other hand, primarily relate to the element of form. While the first series of laws concerns the arrangements of atoms, the second takes cognizance of the arrangements of molecules: while the one considers the influence of the chemical force of affinity, the other is concerned with the physical force of crystallization.

A consideration and comparison of the most important laws of the two series will develop, I think, a most interesting parallelism and correspondence. Thus, the first great law of chemistry is that of definite proportions, in which is stated the principle of the fixed and unchanging composition of every compound. It finds its satisfactory analogue in the crystallographic law of the constancy of the interfacial angles, first propounded by Steno in 1669, and re-enunciated by Romé de l'Isle in 1783. It affirms that for a certain crystal species, under conditions of absolute identity of chemical constitution and equality of temperature, the corresponding interfacial angles in different individuals will be found always to be equal and constant; and this holds in imperfect as well as perfect crystals. It is evident then, that what the law of definite proportions is, in regard to chemical constitution, the law of constancy of the interfacial angles is, in respect to crystalline form.

Another equally perfect and beautiful correspondency obtains between the law of multiple proportions and that of the rationality of the indices. The former emphasizes the simple multiple ratio of one element as it unites with some other element to form two or more compounds; whereas the latter, an important crystallographic law, attributed to Haüy, articulates the remarkable fact that the modifications of specific crystalline form always take place by a multiplication of one or more of the index values (or the reciprocals of these, the parameter values), by small and simple numbers or fractions, by rational and not by irrational quantities. The analogy here existing is easily appreciated: in the one case we have presented the method (namely, by simple multiple ratio) of the formation by weight of chemical compounds containing the same elements; in the other, the method, also by simple multiple ratio, by which is determined the modification of fundamental form of a crystalline species.

A third analogy is found in the comparison of the law of valency or equivalence in the chemical domain, and the law of replacement or substitution in the crystallographic. The first of these, of course, refers to the relation by weight in which the various elements react; potassium being exchanged for sodium in the proportion of 39 of the former to 23 of the latter; and, in like manner, chlorine (35.5) for bromine (80). The chemical type or idea is continued in such reactions, although one of the original constituents may have been substituted by another element. Correspondingly, the law of replacement allows the crystallographic type or idea to be continued, though by altered agents. Thus, the recognized substitution-power of magnesium and calcium allows, in compounds of the latter, a greater or less substitution of the former, without change of crystalline form; calcite and dolomite are both rhombohedral in crystallization, the angles of the two differing slightly.

A fourth analogy is expressed in the allotropisms and isomerisms of chemistry, and the dimorphisms and polymorphisms of crystallography. The allotropism of elements is probably to be explained upon the basis of different atomicities of the elemental molecule; but, however explained, like atoms are able in many cases to build up structures sometimes as variant in physical characters as are the diamond and ordinary charcoal, having chemical dispositions as different as common phosphorus and red phosphorus. Similar suggestions apply to the subject of isomerism. Now, to this, crystallography presents an analogue in the dimorphism so often to be seen in minerals; one and the same substance showing itself in nature in two (sometimes more) crystalline forms, i.e., belonging to distinct crystalline systems; take, as illustration, calcite (rhombohedral) and arragonite (orthorhombic). Here again diversity of form is set over against diversity of physical and chemical characters.

A fifth analogy (the last that I shall venture) bases upon the hypothecation of actual molecular structural form — configuration, according to Wunderlich's proposed term to express stereo-chemical relations. The subject of molecular configuration is comparatively new; still we are becoming familiarized with diagrams and models intended to represent such relations. Many of us may have been at first indisposed to accept these views as anything more than visionary and fantastic; but the more we have pondered them, the more have we been impressed with their significance and beauty. Shape, form, and volume must be attributed to molecule as well as to mass; the only trouble has been in regard to the former, the apparent audacity and hopelessness of any attempt to penetrate matter to such depths. The new and most refined sense furnished to us by the use of polarized light, makes us aware of isomers identical in every respect, save their response to this delicate physical agent. Optical isomers have given rise, under the crucial investigations of such men as van t'Hoff, LeBel, Wunderlich, and V. Meyer, to the hypotheses of the asymmetric carbon atom, and the tetrahedral arrangement of the valence-bond, and the saturating atoms or radicals. The simple and symmetrical tetrahedron of methane must be accepted as the perfect analogue of a crystal of the same geometric form; and the optical isomers resulting from the different arrangements of the same atoms or residues around an asymmetric carbon atom, may, in like manner, be taken as the analogues of enantiomorphous crystals, as of quartz, right-handed and left-handed; the pairs in each case being perfectly equivalent, but not superposable.

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NOTES AND NEWS.

THE cause of the terrible disaster at St. Gervais is now being investigated by several men of science. There can be no doubt that it originated in the small glacier called the Tête Rousse, which is nearly 10,000 feet above sea-level. According to a correspondent of the London *Times*, who writes from Lucerne, Professor Duparc is of opinion that the habitual drainage of this glacier had for some reason or other became either totally blocked or obstructed; the water gradually accumulated in its natural concavity or bed; and the ever-increasing volume had exercised such an enormous pressure as to force a passage and carry away a portion of the face of the glacier with it. The mass of ice and water rushed down the rocks which dominate the glacier of Bionnassay, not in a single stream but in several, and then reunited into one enormous torrent at the foot of the Bionnassay glacier. A different theory is held by Professor Forel, of which the correspondent of the *Times* gives the following account: Professor Forel does not see how a quantity of water sufficient to force away so large a portion of the glacier could possibly accumulate in so small a body as the Tête Rousse, which has a total superficies of less than one hundred acres. It slopes freely on three sides; it is, in fact, one of the most abrupt of the whole chain of Mont Blanc; and, in a glacier of this description, with an altitude of nearly 10,000 feet, there are none of the conditions of a great accumulation of water. In his opinion, therefore, we must look for the main cause of the disaster in the natural movement and breaking up of the glacier. He estimates the volume of ice which fell at between one and two million cubic metres. The mass, first in falling and then rushing down the rapid slope, became transformed, for the most part, into what he calls a lava of ice and water. The ravine, he says, through which this avalanche rushed shows no traces of any great evacuation of water; in the upper portions of its transit there is no mud and no accumulation of sand, but, on the other hand, there are great blocks of glacier ice strewn everywhere, and at several points he found portions of powdered ice mixed with earth. Then, again, if this had been simply a torrent of water falling, it would have found its way down the more violent inclines, instead of, as in this case, passing straight over the frontal moraine at the foot of the glacier. In this higher region, therefore, all the evidence points to an avalanche of ice, which, starting at an altitude of nearly 10,000 feet, and descending at an incline of 70 per cent for 5,000 feet, was pulverized by its fall, a large portion of it being melted by the heat generated in its rapid passage and contact with matters relatively warm. It rushed into the ravine by the side of the glacier of Bionnassay and joined the waters of the torrent which issues therefrom, and, further aided by the stream of Bon Nant, it became sufficiently liquid to travel down the lower portions of the valley at the slighter incline of 10 per cent, and yet retained sufficient consistency to destroy everything in its passage. That this torrent was not composed merely of mud and water is proved, he says, by the fact that it did not always maintain the same height when confined to the narrower ravine, and that the remains on the sides of the rock show it to have been a viscous substance rather than fluid.

— At a meeting of the London Chamber of Commerce on July 25, as we learn from *Nature*, Mr. J. Ferguson read a paper on "The Production and Consumption of Tea, Coffee, Cacao (Cocoa), Cinchona, Cocoa-Nuts and Oil, and Cinnamon, with reference to Tropical Agriculture in Ceylon." He referred to the position of Ceylon, its forcing climate, its command of free cheap labor, and its immunity from the hurricanes which periodically devastated Mauritius, from the cyclones of the Bay of Bengal, and from the volcanic disturbances affecting Java and the Eastern Archipelago. The plantations of Ceylon afforded, he said, the best training in the world for young men in the cultivation and preparation of tropical products, and in the management of free colored labor. The cultivation of cane-sugar, although tried at considerable outlay on several plantations forty and fifty years ago, proved a failure. More recently experiments by European planters with tobacco had not been a success, notwithstanding that the natives grew a good deal of a coarse quality for their own use. Although cotton growing had not been successful, the island had proved a most congenial home for many useful palms, more particularly the coconut (spelt without the *a* to distinguish it and its products from cocoa — the beans of the shrub Theobroma cacao) and palmyra, as also the areca and kitul or jaggery palms. Within the past few years Ceylon had come to the front as one of the great tea-producing countries in the world, India and China being the other two, with Java at a respectable distance. Mr. Ferguson said one of the chief objects of his paper was to demonstrate which of the products of the island it was safe to recommend for extended cultivation in new lands, and which were already in danger of being over-produced, and he had arrived at the conclusion that coffee, cacao, and rubber-yielding trees were the products to plant, while tea, cinnamon, cardamoms, cinchona bark, pepper, and even palms (for their oil) did not offer encouragement to extended cultivation. Statistics relating to the total production and consumption were given in an appendix.

— A third edition, largely rewritten, of "The Microscope and Histology," by Simon Henry Gage, associate professor of physiology in Cornell University, has been issued by Andrews & Church, Ithaca, N. Y. This volume contains much useful information, systematically arranged, and will, no doubt, be appreciated by those who are learning to use the microscope and desire to familiarize themselves with the most approved microscopical methods. Chapter I. relates to "The Microscope and its Parts;" Chapter II. to "The Interpretation of Appearances," which will be of special value to beginners; Chapter III. gives detailed information with reference to "Magnification, Micrometry, and Drawing;" Chapter IV. treats of "The Micro-Spectroscope and Micro-Polariscope;" Chapter V. of "Slides, Cover-glasses, Mounting, Labelling," etc.

— B. Westermann & Co. will publish in September the third volume of Conway and Crouse's translation of Karl Brugmann's "Comparative Grammar of the Indo-Germanic Languages." The fourth and concluding volume, with a full index, will be issued next year.