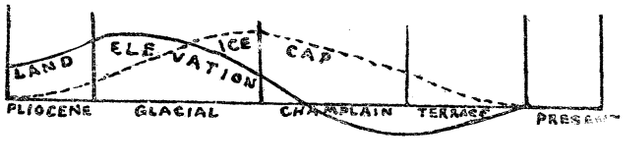
sustain — whether of Darwin, or of Archbishop Ussher — he seeks only to know the truth, whatever may be the consequences. Perhaps the points mentioned in this paper further along have not had sufficient attention hitherto. "Come, let us reason together."

The first extract above sets the close of the "Ice Age" entirely too far back. One of the objects of this paper is to make good this assertion. From the facts set forth below, it is reasonable to conclude that even on Croll's theory alone the close was not over 40,000 years ago, and possibly not over 35,000. If the views of Professor LeConte, given in his paper of January, 1891, have the weight and influence which their importance demands, it seems to me that there need no longer be any contest between gacialists who reject the astronomical theory, by reason of the remoteness of the time, and those who refer the ice age to terrestrial causes alone. Professor LeConte's theory is so clearly and tersely set forth that it is best to quote it entire, as given by Professor Wright on pp. 618–9, including the figure used in illustration:—



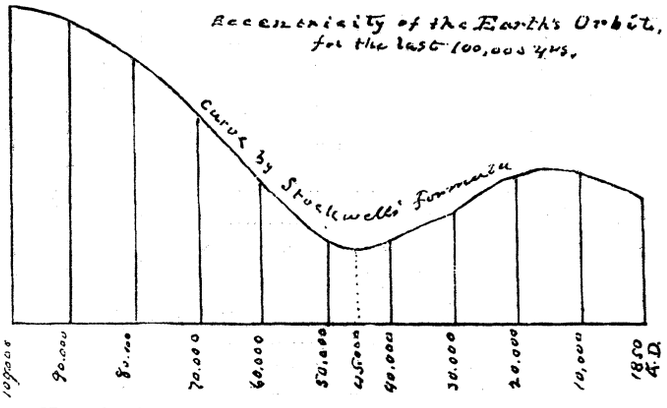
"1. That the continental elevation which commenced in the Pliocene culminated in the early Quaternary, and was, at least, one of the causes of the cold, and therefore of the ice accumulation.

"2. That the increasing load of ice was the main cause of the subsidence below the present level.

"3. That the removal of the ice-load by melting was the cause of the re-elevation to the present condition.

"4. That all these effects lagged far behind their causes.

"This lagging of effects behind their causes is seen in all cases where effects are cumulative. For example, the sun's heating power is greatest at midday, but the temperature of the earth and air is greatest two or three hours later; the summer solstice is in June, but the hottest month is July; and in some cases the lagging is much greater. The cause of sea-breezes,— i.e., the heating power of the sun, — culminates at midday, but the effects in producing air-currents culminate late in the afternoon and continue far into the night, long after the reverse cause, i.e., the more rapid cooling of the land, has commenced.



"Now, in the case under consideration, it is probable that the lagging would be enormous in consequence of the reluctant yielding of the crust and the capacity of ice to produce the conditions of its own accumulation. Although the elevation produced the cold, and therefore the ice accumulation, yet the latter culminated long after the former had ceased, and even after a contrary movement had commenced."

So far LeConte.

The close of the glacial epoch as above given — 70,000 years — is wholly arbitrary, and is evidently very far from the truth, as will be shown. At that time the eccentricity of the earth's orbit was nearly twice as great as it is now, and the consequent excess of the sun's time on one side of the equator above that on the other side (depending on the longitude of the perihelion) was about fourteen days. It had decreased from thirty-five, when the difference was greatest. But this difference of fourteen days would work in the direction of great difference of climate between the hemispheres, and would so continue to work as long as there was any difference at all. And not only so, but the effect would continue and accumulate according to the universal law of nature in the cases above cited, long after the smallest eccentricity had been reached. And that smallest eccentricity occurred less than 45,000 years ago, whether the computation be made by the formula of LeVerrier or by that of Stockwell.

The last sentence of the extract from LeConte is significant: "Yet the latter culminated long after the former had ceased and even after a contrary movement had commenced." In this latitude the usual temperature for the first week in December is not very different from that of the first week in March. Yet the sun in the first case is more than twenty-two degrees south of the equator, and at the latter date is scarcely five degrees. In like manner, and in accordance with the law above named, suppose the intense cold resulting from the wide glaciation of the northern parts of this continent, to have continued long after the eccentricity had reached its minimum, then it is not only possible, but even probable, that the close of the ice age was not more than 35,000 years ago, even if 30,000 would not be a more accurate designation. In which event, the objection to the astronomical theory, by reason of the long time elapsed since the days of high eccentricity, is wholly removed. And Professor Wright himself, although long favoring the short period of 10,000 years, has lately seen cause to doubt whether this is not too small. In a letter to the New York *Nation*, under date of Sept. 15, 1892, in view of his recent investigation of the old northern outlet of the great lakes into the Ottawa River, he says the facts "will . . . considerably lengthen our computation."

This throwing back of the close of the ice age by the glacialist, and the preceding shortening of the period in accordance with a universal law of nature, may both serve to strengthen the hypothesis of LeConte, and commend it to all interested in these questions, as the explanation which best accounts for the admitted facts.

CURRENT NOTES ON CHEMISTRY.—I.

[Edited by Charles Platt, Ph.D., F.C.S.]

Properties of Diamonds.

THE experiments of M. Moissan in the production of artificial diamonds and other precious stones, his remarkable results in the reduction of the most refractory oxides and his whole line of work at high temperatures, are well known to readers of the scientific magazines. Some of the more recent investigations have been of the properties of the diamond when heated in oxygen, hydrogen, chlorine, etc. When the temperature is raised slowly the combustion is correspondingly slow and without production of light, being recognized solely by the action of the gas evolved on baryta solution. At 40°–50° above the point at which this slow combustion takes place the combustion becomes more rapid, producing a visible flame. Yellowish-brown carbonado burned with a flame at 690°; black carbonado with a flame at 710°–720°; transparent Brazilian diamond without a flame at 710°–720°; transparent crystallized Brazilian diamond without a flame at 760°–770°; cut diamond from the Cape without a flame at 780°–790°; Brazilian bort and Cape bort without a flame at 790°, and with a flame at 840°; very hard bort without a flame at 800°, and with a flame at 875°. As a rule, the harder the diamond the higher its point of ignition.

When heated to 1200° in hydrogen the Cape diamond loses nothing in weight, but becomes lighter in color and less transparent; dry chlorine and dry hydrogen fluoride have no action at 1100°–1200°. Sulphur attacks diamonds at 1000°, but with carbonado carbon bisulphide is readily produced at 900°. Sodium vapor has no action at 600°. Iron at its melting point attacks the diamond with the production of graphite on cooling; melted platinum also combines readily. Fused potassium hydrogen sulphate and alkali sulphates, potassium chlorate and nitrate are all without action on the diamond, but, according to Damour, attack

carbonado. The diamond is rapidly dissolved when heated to a high temperature with carbonates of the alkalies, carbonic acid being given off, but no hydrogen, and hence M. Moissan concludes that diamonds contain no hydrogen or hydrocarbons.

Treated with hydrofluoric acid, and then with aqua regia and finally washed, dried and burnt in oxygen, the diamonds yielded an ash consisting in all cases but one chiefly of ferric oxide. Cape bort contained also silica, calcium and magnesium, and Brazilian carbonado, silica and calcium, with a trace of magnesium. One specimen of green transparent bort from Brazil left a minute quantity of ash, which contained silica, but no iron.

Preparation of Pure Alumina.

The preparation of pure alumina from bauxite, which is always accompanied by more or less silica and oxide of iron, has commonly been carried out as follows: Taking advantage of that property of alumina, which enables it to act as either base or acid, according to its environment, the bauxite is fused with sodium carbonate, the resulting products being sodium aluminate and sodium silicate. The mass is then extracted with water and the sodium aluminate passed into solution. The silicate of soda, owing to a deficiency of base, is but little acted upon by the water and with the ferric oxide is left in the residue. From the solution of the sodium salt the alumina is precipitated by passing carbonic acid gas, carbonate of soda being regenerated at the same time.

This process has lately been improved by first precipitating a portion of the solution of aluminate by the gas in the cold, producing a small quantity of crystallized alumina hydrate of the same composition as Gibbsite, $Al_2O_3\ 3\ H_2O$. This, then, is added to the main bulk of solution, and a complete separation of the whole is secured, the soda being left in the caustic state. The reaction which takes place has been investigated by M. A. Ditte, and is explained as follows: A solution of sodium aluminate may be regarded as amorphous hydrated alumina dissolved in caustic soda. The form in which a body crystallizes from a solution is largely determined by the character of the crystal introduced to start crystallization. Hence in the process described above the tendency of the whole is to crystallize in the form of the several crystals first introduced, and as the crystalline form of alumina is less soluble than the amorphous in alkaline solutions, there is a gradual complete precipitation. Stirring facilitates the separation of the crystals by bringing those already formed into contact with fresh portions of solution. There is finally left only that proportion of alumina corresponding to the solubility of Gibbsite in caustic soda under the conditions existing.

Silk from Wood.

At the Paris Exposition in 1889 M. de Chardonnet gave to the world his process for the manufacture of silk from wood and received the highest honors from the jury of award. Since that time the process has been further developed and has presumably attained a practical success; silk is being manufactured at Besançon from wood pulp such as is used in the fabrication of certin kinds of paper According to F. B. Loomis, U. S. Consul at St. Etienne, the following process is used: The pulp is carefully dried in an oven and plunged into a mixture of sulphuric and nitric acids, then washed in several water-baths and dried by alcohol. The product thus prepared is dissolved in ether and alcohol with the production of collodion similar to that used in photography. This collodion, which is sticky and viscous, is enclosed in a solid receptacle furnished with a filter in the lower end. An air-pump supplies air to the receptacle, and by its pressure forces the collodion through the filter, removing all impurities. The collodion flows into a horizontal tube armed with three hundred cocks having glass spouts pierced by a small hole of the diameter of the thread of a cocoon as it is spun by the silkworm. The spinner opens the cock and the collodion issues in a thread of extreme delicacy. This thread, however, is not yet fit to be rolled upon spools on account of its viscosity and softness, being still collodion and not "silk." To obtain the necessary consistency the thread as it issues is passed through water, by which means the ether and alcohol are washed out and the collodion solidified and transformed into an elastic thread as brilliant and resisting as ordinary silk. The dangerous inflammability of this substance, as prepared above (two centimetres per second), has been reduced, according to the inventor, by passing the spun thread through a solution of ammonia, thus rendering it as slow of combustion as any other like dress material.

Up to January of this year none of the more important silk manufacturers of St. Etienne or Lyons had invested heavily in this enterprise, but all express confidence in the process and believe it is destined to figure largely in the commercial world.

New Method for Melting Points.

A. Potilitzin is the author of a new method for the determination of the melting points for substances melting below 450°, this being the highest temperature which a nitrogen-filled mercury thermometer can indicate. One end of a hard-glass tube, 5 mm. bore and 500–600 mm. in length, is drawn out to capillary fineness and the other is bent at right angles. The capillary is dipped into the molten substance, the melting point of which is to be determined, so that on cooling the tube is closed by a solid plug of the substance 3–4 mm. long. The other end is connected with a manometer by means of which a pressure exceeding that of the atmosphere is maintained within the tube. The tube, along with the principal thermometer and also one for stem correction, is inserted into a wide test-tube, which is then immersed in a bath of fusible metal. When the melting-point is reached the plug softens and is expelled by the internal pressure, so that the sudden equalizing of the pressure in the manometer indicates the moment when the substance melts, the thermometers being then read off. Potassium nitrate was found by this method to melt at 336.57° (mean of eight experiments); by immersion of the thermometer direct into a large mass of the salt the melting point was found to be 336°.

Pigments Used in Some India-rubber Toys.

India-rubber has been generally, and correctly, accepted as a suitable material for children's toys; but investigation into the manufacture of the latter reveals the fact that many as placed upon the market contain harmful ingredients. A. Bulowsky has recently called attention to several dangerous ingredients as, for instance, in black dolls, which are often colored "in the mass" with lead pigments. Red articles are also most usually colored in mass, the pigment being antimony sulphide, which, however, being unattacked by the saliva may be considered innocuous. Grey rubber goods generally contain zinc oxide, and hence particularly when, as is sure to be the case, the toy is brought to the child's mouth, an element of danger is introduced. Superficial coloring is frequently accomplished by means of poisonous pigments. These remarks are applied in particular to foreign manufactures, and though, doubtless, the same coloring matters are used in this country, I have yet to learn of a case of poisoning from coloring in mass. Superficial pigments, from their disposition to flake and from the greater quantity brought into contact with the mouth, are certainly to be avoided. It is difficult, moreover, to estimate the amount of damage done by these toys owing to the many petty ills and derangements of infancy, the poison received by the child very likely is insufficient to develop well-defined symptoms or to direct suspicion, but at the same time may be the cause of an indisposition which itself brings on crying, wakefulness, and general wear on the little body struggling for existence.

NOTES AND NEWS.

PROFESSOR E. W. DORAN has been elected president of Buffalo Gap College, Buffalo Gap, Texas, and has resigned his position at College Park, Md.

— C. H. Turner has resigned his position at the University of Cincinnati and accepted the Chair of Natural History at Clark University, Atlanta, Ga.

— P. 21, line 9, from below: "regristation," read "registration;" p. 22, line 15, from below: "possible," read "impossible;" and p. 22, column 2, line 31, from above: "understood," read "understand."