Though it may be granted that the varve variation as to its dominating features all over the earth is a function of the sun radiation, at the same time it is still more or less influenced by local factors, such as the bottom topography at different localities together with changes in the direction of the melting rivers, the varying composition of the morainic material from which the clay is washed out, and other circumstances. By parallel measurements at different localities, many such deviations from the true solar curve will probably be eliminated, but meanwhile it is not advisable to transcribe the varve thicknesses in figures intended for smoothing calculations.

Yet a really convincing graphic connection already observed makes it possible for the first time to introduce in an exact way the time factor into a great number of geophysical investigations hitherto beyond our reach. Thus, to mention a few examples, the possibility of mapping and dating synchronous land ice borders over great areas in different regions of the earth enables us to take up, with respect to the physics of large ice bodies, a rational study of ice movement, of ice extension, and of its recession as a function of melting as well as of fracturing.

In the papers quoted, some hints are given concerning the use of time determinations for a closer geophysical study of other processes, of inorganic as well as of organic nature, such as the evolution of our actual climate and the erosion along our rivers as well as our lake and sea shores. In these papers was especially mentioned the magnificent example of Niagara Canyon, the age of which has now been geochronologically dated by means of good varve connections. Thanks to the excellent measurements by American and Canadian geologists, we have here a prime example of the amount of river erosion under certain conditions during a non-determined space of time.

Here may be mentioned furthermore the new possibilities of studying, step by step, how the ice recession was followed by the formation of soil and vegetable mould and the immigration of the whole flora and fauna within the former great ice deserts, which afford unique possibilities of supplying certain branches of geology with exact geophysic studies.

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THE NATIONAL ACADEMY OF SCIENCES

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The meliolineae: FRANK LINCOLN STEVENS. The Meliolineae are highly specialized biologically. This results in an isolation comparable in general to local geographic isolation. A species on a given host may remain limited to that host over long periods of time. During the lapse of time modification of the fungus occurs resulting in distinct varieties. Further changes lead to specific, even generic, differentiation. It thus happens that distinct but related forms are found on one host species. The evolution of these occurred during the tenancy of this phylum on this host. The occurrence of complexes of numerous related species on a given host family is very striking. No significant deductions from geographic distribution are evident; indeed, the most striking fact is the relative evenness in which the various genera and species are distributed over the Meliola world. Apparently evolutionary tendencies have operated in diverse areas in much or quite the same way. The course of evolution appears to have been from the non-hyphopodiate, 8-spored forms with persistent asci and spores of variable septation to hyphopodiate, 2–4-spored forms with evanescent asci and spores of definite septation, leading to the establishment of six genera within the group. It appears that these genera are of polyphyletic origin, each having arisen several, perhaps many times, from different ancestral stocks.

Some studies on the composition of vegetative and fruiting plants: E. J. KRAUS (introduced by John M. Coulter). Accumulating evidence on many types of plants shows that there is often a marked tendency for the gradual accumulation in the proportion of carbohydrates and carbohydrate-like compounds in excess of the nitrogenous constituents as the fruiting stage approaches. In some instances the differences in composition seem more specifically related to the relative solubility of the nitrogenous and carbohydrate constituents than to changes in actual proportions of these substances, the more fruitful plants containing a larger proportion of relatively insoluble substances. The general trend of the results is the same whatever the external environmental factors concerned in prolonging or shortening the vegetative period.

Progress with work on disease-resistant plants: L. R. JONES.

The dynamics of plant growth to soil conditions, with special reference to oxygen and carbon dioxide: BURTON E. LIVINGSTON (introduced by W. A. Noyes).

The quantum efficiency of the photochemical decomposition of anhydrous formic acid: WESLEY NORMAN HERR and W. ALBERT NOYES, JR. (introduced by Julius Stieglitz). The number of quanta required to decompose one molecule of anhydrous formic acid in the liquid state has been determined. The light intensities were measured by means of a thermocouple and the transmitted light subtracted from the incident light to obtain the amount of light absorbed. The source of light used was a quartz mercury arc lamp. The amount of decomposition is determined by gently boiling the liquid until the decomposition products are removed and then by measur-

ing the pressure increase in a constant volume. As pointed out by previous workers, the hydrogen formed during the reaction does not appear as a gas but probably reduces formic acid. As the average of several determinations it is found that 2.21 quanta are required on the average to decompose one molecule of formic acid. A possible effect of dust is indicated as the above figure became 1.57 when dust was present. When only wavelengths longer than 300 m. are used the number of quanta per molecule is 3.25. Similar measurements were made on formic acid vapor. To measure the decomposition products, the vapor was condensed with liquid air and the gaseous products swept into a McLeod gauge with a Toeppler pump. The process was repeated until no further pressure increase was noted. Addition of carefully purified hydrogen showed that hydrogen was used up in this case also. The number of quanta required to make one molecule decompose in this case was 1.48. Measurements with the solid were inaccurate due to difficulty in determining the amount of reflected light. It is found that there is no obvious relationship between the energy required to decompose one molecule of liquid, the energy required to decompose one molecule of vapor and the heat of vaporization. Possible effects of the light in the two cases will be discussed.

Electrochemical theory of oxidation and neutralization reactions: W. H. RODEBUSH. The electromotive series of the metals can be extended to include most of the elements and groups of inorganic and organic chemistry. The groups at one end of this series will be recognized as both strongly oxidizing and strongly acid forming. This is not a coincidence. These groups have a deficiency of negative electricity. This deficiency may be satisfied in three ways: (a) A hydrogen ion may be lost; (b) an electron may be acquired; (c) a neutral atom itself deficient in electrons may be given up. (a) is a typical neutralization reaction and (b) and (c) are characteristic oxidation reactions. Numerous examples can be cited.

Progress in the concentration of illinium: B. S. HOPKINS. Illinium was detected in portions of rare earth material that had been derived from monazite sand, the separation being accomplished by fractional crystallization mainly as double magnesium nitrates and as the bromates. The concentration obtained by these means, while adequate for identification, probably did not exceed one per cent. of illinium. Efforts are now being directed to increase the amount of illinium in various ways. (1) Fractionation as double magnesium nitrate and bromate is being applied to a large quantity of monazite residues. (2) Other methods of fractional crystallization are being used, such as the perchlorates, ferricyanides and dimethyl phosphates. (3) Determination of the relative basicity of illinium as by the fractional precipitation with NH_4OH and $NaNO_2$. (4) Separation of illinium from its neighbors by means of the varying ionic velocities. (5) Other minerals, especially those rich in neodymium and samarium, are being examined for illinium. The results so far obtained indicate that the best method of concentration is by means of the fractionation as double magnesium nitrate and as bromate, although the fractionation as dimethyl phosphate looks promising. The ionic migration method has possibilities which are attractive, although the results so far obtained are not conclusive. It seems probable that the basicity of illinium will place it between neodymium and samarium, although work on this phase of the problem is especially tedious. One quantity of American samarskite was tested for illinium with negative results, but the present indications are that fergusonite contains a larger proportion of illinium than monazite. Other ores such as cerite, allanite, gadolinite and tscheffkinite are now under investigation as possible sources of illinium.

The critical stage of the earth's megadiastrophism: T. C. CHAMBERLIN.

Factors governing the low temperature carbonization of high oxygen coals: S. W. PARR (introduced by W. A. Noyes).

Hydrazoic acid; an ammono nitric acid, a nitrous acid hydrazide and an ammono hyponitrous acid: E. C. FRANKLIN.

Isolation of the alpha form of methyl alpha glucoheptoglucoside and its acetate: C. S. HUDSON.

Glacier motion as a type of rock deformation: ROLLIN T. CHAMBERLIN. In an endeavor to decide between viscous flow and crystalline yielding, measurements of the internal shearing in various glaciers were made with a self-recording clockwork apparatus. The results show that slipping takes place along definite shearing planes, at times gradually and at other times by distinct jumps. The capacity to withstand a certain amount of growing stress before yielding is indicated. Four manifestations of glacier movement are recognized: (1) Solid flow by idiomolecular exchange between ice crystals, (2) solid shearing of aggregates of granules, (3) intermittent slip along well-developed thrust fault planes, and (4) sliding of the whole body of ice over the rock beneath. Here is a rock of simplest sort actually undergoing deformation before our eyes. It gives concrete illustration of many of the phases of earth deformation which have been interpreted chiefly from results remaining from the past.

Concerning the metal in meteorites: GEO. P. MERRILL (with lantern slides). The paper gives a brief résumé of opinions relative to the metallic constituent of stony meteorites, and dwells mainly upon its physical properties as compared with artificial material. It is shown to partake of the nature of artificial so-called wrought iron and undergoing decided changes on fusion under ordinary conditions. Particular attention is, however, called to the position of the metal relative to the silicate constituents and the conclusions to be drawn therefrom.

The influence of oscillating sea-level on the development of the continental shelf: FRANCIS P. SHEPARD (introduced by David White).

Lake Illinois and the problem of its duration: M. M. LEIGHTON (introduced by T. C. Chamberlin).

Evolution of the odd-numbered elements: W. V. HOWARD (introduced by H. S. Washington). When the isotopes of the elements which have been determined by Aston and others are plotted on coordinate paper with the atomic numbers as abscissae and the mass numbers as ordinates they are found to have certain definite relationships to one another. These may be expressed as follows: (1) The isotopes of the even-numbered elements between carbon and polonium form two groups of series, of which one group conforms to the equation $M = 2N + 4X$ and the other to the equation $M = 2N + 4X + 2$, where M is the mass number, N the atomic number and X a whole number between 0 and 11. (2) Each series corresponding to any given value of X in one or other of the two groups is terminated by an element which has an isotope with an odd mass number, and in some cases two such isotopes. (3) The odd isotopes of the even-numbered elements may lie immediately above the lowest and second lowest even-numbered isotopes or above either of these, but never occupy a higher place in the list of isotopes of any element. (4) The elements whose lower isotopes terminate one or more series have higher isotopes which begin one or two others. (5) No element has more than five even isotopes (xenon excepted). (6) The above rules do not hold in their entirety for the two series in which $X = 0$. (7) No odd-numbered element has more than two isotopes. (8) No odd-numbered element has an isotope with an even mass number. (9) No odd-numbered element has an isotope whose mass number is the same as that of any isotope of any other element, odd or even. (10) If an odd-numbered element has two isotopes, the following even-numbered element can not have more than one odd isotope. (11) The isotopes of all odd-numbered elements have a mass number which is less by one than one or other or both of the two lowest isotopes of the even-numbered element immediately following. These rules do not hold for nitrogen, the elements below carbon in the periodic table or the radioactive elements. By means of these rules the isotopes of those elements which have not yet been successfully attacked may be predicted with results which agree very closely with those of Russell. These relationships together with certain experimental results and the occurrence of the different elements in the earth's crust suggest that the odd-numbered elements were formed from the lowest isotopes of the even-numbered elements by the loss of a proton and an electron which combined to form atomic hydrogen. If it be assumed that this change has taken place, it is possible to account for the amount of water in the ocean and the great quantity of juvenile water which is being constantly added to the earth's crust. The process of magmation becomes one whereby disintegration of the odd-numbered elements at a comparatively shallow depth below the earth's crust raises the temperature of the rocks and at the same time provides water, which results in the lowering of the melting-point of those rocks so that a magma may be formed. The theory of the radioactive control of mountain building becomes one of mountain building caused by non-radioactive disintegration of the elements. All the heat involved in mountain building, the formation and rise of magmas, and the heat radiated from earth's crust may be supplied from this one cause alone.

Evolution of the odd-numbered elements: W. V. HOWARD (introduced by H. S. Washington).

The ordovician section of northwestern Illinois: E. O. ULRICH.

Some factors in rock metamorphism: DAVID WHITE.

The Shinarump conglomerate and its associated vertebrate fauna: E. C. CASE (introduced by F. G. Novy).

Influence of oscillating sea-level on the development of the continental shelf: F. P. SHEPARD. Evidences of changing relations of land and sea are found on almost every coast. Little has been done to determine whether such changes are dominantly a result of crustal warping or of the shifting of the sea-level. The problem has been discussed chiefly in connection with coral reefs. Since these reefs occur mostly in very unstable regions, the results can not be said to be very satisfactory. There is a terrace-like submarine platform around the various continents, which is covered by rarely exceeding water, 600 feet. It is terminated by a fairly steep slope which leads down to the deep ocean basins. This is known as the continental shelf. A study of this feature should throw light on the question of sea-level changes. Previously only small parts of the shelf have been considered with any care. The present study took in all parts of the shelf. The results of the study lend much support to the idea of shifting sea-levels. Hills, valleys, delta flats, terraces, are found in abundance along all parts of the continental shelf. In connection with coral reefs studies it has been proposed previously that the sea was lowered by glaciation about 200 or 300 feet. Such lowering does not appear to be adequate to explain the features mentioned above, which are indicative of sub-aerial or of littoral erosion and deposition. It seems probable that during much of the Tertiary period the sea-level was from 400 to 800 feet lower than at present. In testing the validity of this hypothesis all varieties of coasts were considered, such as arid, humid, mountainous, low and so forth. The characteristics of the shelf adjacent to each type of coast were compared with predictions based on the various hypotheses for the origin of the shelf. In each case the actual conditions appeared to fit the newly suggested hypothesis much better than the others. If such considerable changes of sea-level have occurred, many coastal features formerly ascribed to diastrophism can be explained without it.