Glucose solutions to which NaCN was added were found to give essentially the same results as did the molasses bait, but to a more pronounced degree. Further confirmation of the hypothesis respecting the origin of the ammonia is afforded by the results obtained with a mixture of cane-sugar solution (of the same specific gravity as that of the molasses used) and NaCN in the proportions of 1/4 ounce of the latter to 1 1/8 gallons of the former. When this mixture was used in cage experiments it was found that the HCN given off usually was sufficient to kill most of the flies without their having the opportunity to start feeding. Sucrose, having no free carbonyl group, would of course not undergo the cyanhydrin reaction.

In connection with the above, it is interesting to recall that Rasputin, the Russian monk who dominated the court of the late Czar, is reputed to have used glucose as a protection against sundry attempts upon his life by means of poison. Such results as have been described would suggest that this precautionary measure was well taken, in the case of NaCN at least. In addition, the findings of Heinekamp[1] respecting the resistance of various types of fowl to strychnine, furnish evidence that here also glucose, or its polymer glycogen, may have a rôle as antagonist in the case of the alkaloids as well as in that of the less complex poisons.

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GEOCHRONOLOGY AS BASED ON SOLAR RADIATION

IN this journal of 1920 was mentioned a part of my plan for an investigation of certain laminated clays in North America.

During a previous visit in this country in 1891, I had, at several places, observed laminated clays similar to analogous late glacial melting sediments in Sweden, which I had found, after long-continued investigations, to represent the annual deposition from the melting water along the border of the retreating ice-edge.

By help of a certain graphic method for the comparison of the sharply marked annual layers or *varves,* I had succeeded in identifying such varves from one point to another and ultimately worked out a systematic plan for the elaboration of a continuous time scale. This was in the main carried out in 1905–06 on the basis of field measurements made, for a considerable part, by a great number of able young assistants. During the following years this standard line was completed at many places. I thus succeeded, step by step, in tracing the recession of the ice border and the immediately following transgression of the clay-varves over one region after the other, until the whole line from southernmost Sweden to its central parts had been controlled.

As was to be expected, the lowest and oldest clay-varves were found to be deposited in the southernmost part of the land, while the great ice-sheet still covered the rest. By following the clay transgression step by step, the whole staircase-like series was gradually built up, forming a continuous and exact time scale for the last ice-recession across Sweden up to a certain year when a great ice-dammed lake in central north Sweden was drained off, and a thick annual varve was deposited, which has been chosen as representing the very end of the late Glacial Epoch proper.

For many years I tried in vain to find out any means of determining the length of this Postglacial Epoch, until one of my most successful assistants, R. Lidén, discovered, in the northern parts of Sweden, measurable annual varves which represent that epoch.

Of varves from this epoch, I measured in one section at the Indal River somewhat over 3,000, but it was along the Angerman River that Lidén quite independently succeeded in finding and working out practically the whole of the Postglacial varve succession by a careful and painstaking combination of a long series of sections, showing the total length of the Postglacial Epoch to be about 8,700 years.

What made his work especially important is that there seems to be no other place in the world, not even in Sweden, where there is any possibility of finding such a continuous varves series for the whole of the Postglacial Epoch.

By noting the position of the bottom varves, the ice-recession in Sweden has been determined in detail at certainly more than 1,500 different localities, while sections down to the very bottom varve elsewhere—excepting in Finland—have but rarely determined the front margin of the lowest varve.

Thus, along the Connecticut Valley, according to Antevs' exceedingly interesting and comprehensive varve measurements, the bottom of the clay layers was so seldom exposed that the bottom varve, which marks the stage of the ice-recession, could only be determined at one point along the whole of the southern four fifths of the measured line of ice-recession. Even the remaining fifth part of the line, which is north of a gap in the section not represented by clay deposits, the bottom varve was located at only five points.

[1] Heinekamp, W. J. R., "The Resistance of Fowls to Strychnine." *Jour. Lab. and Clin. Med.* 11: 209–214 (1925).

Though in this region it is not yet possible to know exactly the rate of ice-recession, the numerous measurements of long varve series have afforded valuable material for detailed teleconnections with the time scale in Sweden and a thorough and very satisfactory verification with respect to the thickness variation of the varves of some otherwise uncontrolled parts of the Swedish time scale.

Furthermore, though it has not been possible, even to such an admirable varve tracer as Dr. Antevs, to find a continuous varve series through the late glacial part of the time scale in Canada, this is, happily enough, of less importance since the extended teleconnections with the already minutely controlled Swedish time scale afford an equally good but much more convenient and time-saving method.

Thus it is neither necessary nor advisable to use uncertain estimates or perhaps quite erroneous assumptions for filling out gaps between actually measured varve series, if the whole sum really is to be trustworthy.

Furthermore, considering that the initiative, the organization and method of the investigation are totally of Swedish origin, and, as it seems, it is only in Sweden that the time scale can be continued all the way up to our own age, it may be fully justified to name this chronologic standard line the *Swedish Time scale,* even where it is identified and completed by parallel measurements in other countries.

The main purpose of an exact international chronology must be the reference of different kinds of events everywhere to one and the same time standard.

The necessary condition for the introduction of such a time scale was, of course, the possibility of identification, even at great distances, of synchronous varve variations. This condition seems now to be realized.

Thus, almost all of the varve series measured in 1920 by the little Swedish expedition to North America have been with certainty identified with corresponding series of the time scale in Sweden, as illustrated by some examples representing a few thousands of years, published in the *Geografiska Annaler,* Stockholm, 1926.[1] Quite lately the author has also succeeded in identifying a series of nearly 600 varves, carefully measured in Argentina by one of my former pupils, Dr. Carl Caldenius.[2] Also a description of E. Norin's varve measurements in northwestern Himalaya, carried out and identified by him in 1925 and 1926, will soon appear in the same journal.

Considering that the distances between Sweden and the other regions are no less than 6,000–14,000 km., the similarity of more than 80 per cent. of the whole varve number between the identified varve series is very astonishing but quite convincing with respect to the long and uniform succession of characteristic varve variations, which, naturally enough, have not been possible to connect in more than one single way. It is especially noteworthy that this similarity continues century after century, thus, as it seems, putting it beyond every doubt that only a real identity is able to explain such a considerable sum of similarities.

Here it must also be emphasized that it was first after many totally vain attempts that the striking correspondence was discovered, and then was at once found to be continuous over practically the whole of the varve series.

A close study already made of the published diagrams will soon show that a mere accident here must be totally shut out. This remarkable coincidence of such rapid variations at such considerable distances, caused by simultaneous ice-melting, seems not to be explicable in any other way than by variations in the amount of heat from the sun. Thus in reality, we have to do with nothing less than a gigantic, self-registering thermograph, showing the variations in the radiation from the sun.

With respect to the physics of the sun, it is of interest that there exists an observed biennial variation as well as the annual one, this latter being indicated by the connection of the varve variation of the two hemispheres, so that the north and south summers, with their closely corresponding varves, point to a natural *thermal year.* Still it is undetermined whether that year begins with the one hemisphere or the other.

It may be of interest for the elucidation of this question to include also the southern part of the Cordilleran observations which are analogous to the renowned measurement of the solar radiation which, for two decades, have been executed on the sunny heights in the far West of the United States.

Whatever may be the astronomic cause of the annual solar variation, it seems likely that its beginning and end probably are to be found somewhere between the north and south summer, or not far from the equinoxes. When this has been fully stated, our annual means of temperature ought to be calculated for the natural thermal year, which ought to give much more characteristic results than the means of the arbitrary fiscal year.

[1] G. De Geer, "On the Solar Curve, as Dating the Ice Age, the New York Moraine and Niagara Falls through the Swedish Time Scale." Data, 9. *Geogr. Ann.,* Stockholm, Vol. 8 (1926), pp. 253–284, Pls. 1–3 (varve diagrams and map).

[2] G. De Geer, "Late Glacial Clay Varves in Argentina, measured by Dr. Carl Caldenius, dated by Means of the Solar Curve through the Swedish Time Scale." Data, 1. *Ibidem,* Vol. 9 (1927), pp. 1–8, Pl. 1 (varve diagrams).

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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(Continued from page 434)

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-