● Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the U. S. Coast and Geodetic Survey resulted in the location of the following preliminary epicenters:

Friday, June 10, 3:15.2 a. m., Manila Time

Near Island of Buru, east of Celebes in Dutch East Indies. Latitude 4 degrees south, longitude 126 degrees east.

Friday, June 10, 6:54.3 p. m., Manila Time

Near Borodino Islands, between Philippines and Japan. Latitude 25 degrees north, longitude 132 degrees east.

For stations cooperating with Science Service in reporting earthquakes recorded on their seismographs see SNL May 21.

CHEMISTRY

American-Made Chemical Valuable to Spray Industry

BAD news for mosquitoes, flies, and other household insect pests comes from the du Point laboratories. Chemists have developed a synthetic compound that can replace a large part of the pyrethrum now imported from Asia and Europe for use in insect-killing sprays.

The new compound becomes of almost military importance, because economic and political disturbances in the lands whence pyrethrum is imported are interfering with both quantity and quality of the overseas supply.

The du Pont synthetic bears the chemical name isobutyl undecylenamide. It is a combination of derivatives of alcohol and of a vegetable oil. It is non-poisonous to human beings and other warm-blooded animals, and does not make stains.

For the manufacture of fly sprays, isobutyl undecylenamide is to be dissolved in a refined base oil at the rate of approximately half of one per cent. concentration. It will be used in combination with pyrethrum extract because such combinations are most efficient in both paralyzing power and ultimate killing power on insects.

So far as insect-killing power is concerned, the new compound is a complete replacement for pyrethrum extracts in fly sprays. However, its action is slow, and since the user of fly sprays is accustomed to seeing flies drop dead immediately upon being sprayed, it is necessary to add an agent that will give the desired quick paralyzing effect.

Only about 20 per cent. of the pyrethrin which would be necessary if used alone is required for an efficient fly spray containing the new compound.

Science News Letter, June 18, 1938

CHEMISTRY

Strong, Fireproof, Films Now Made From Bentonite Clay

Jelly Made From Colloidal Particles of the Clay Is Dried and Made Transparent Under Pressure

A NEW fireproof transparent film, which is potentially a rival for the familiar wrapping materials of cigarette packages and thousands of other articles, was described at the meeting of the Fifteenth Colloid Symposium at Massachusetts Institute of Technology.

The new entrant into the field of transparent wrapping films is made of a clay, known as Bentonite.

The new films, now made in the laboratory, are essentially fireproof and are indestructible up to temperatures producing red heat. They are not only very strong, tough and transparent, but they are highly resistant to water, acids, alkalis, and oils and have excellent properties of electrical resistance, it was indicated in the research report of Prof. Ernst A. Hauser of Massachusetts Institute of Technology and Miss D. S. le Beau, chemist of the Dewey and Almy Chemical Company.

Bentonite is one of the strangest materials known to man. When dry it is a powderlike material. When wet it swells to many times its original size. It is sometimes used in construction to stop leaks because it swells up when wet and plugs small holes. As the water flow is stopped the Bentonite dries out a bit, shrinks, allows more water to enter and then swells up again. This continuous, reversible swelling and shrinking provides an effective sealing mechanism in many instances.

Bentonite clays, said Prof. Hauser, contain large amounts of tiny particles of colloidal size. These can be separated from the larger particles by suspending them in water and letting the bigger particles settle out.

The tiny colloidal particles are then poured off with the water and the solution placed in an ultra-centrifuge. As it whirls around, the colloidal particles are separated into layers of uniform size.

When these collodial particles are concentrated they form strong jellies which liquefy on mechanical agitation.

Prof. Hauser and Miss le Beau make their amazing films by drying the Bentonite jelly and obtaining coherent, self-supporting, translucent films, without the use of any binder.

Under pressure these translucent films turn transparent and become very strong, yet flexible. It is possible to print on them, like paper, and their electrical resistance makes them comparable to mica.

They appear useful as wrappings for high electrical insulation and as anti-corrosive coatings. Whether they will invade the market for wrappings on cigarette packages and other articles cannot yet be predicted. A patent application has been filed on the films.

The new films not only have important applications in practical living but their scientific composition is offering an interesting study for research.

Prof. Hauser exhibited photographs showing that the tiny colloidal particles of clay form networks that interlace into chains and form large single crystals.

Oil Drops for Identification

The same phenomenon which makes colored oil films on the mud puddles in the gutter is now being used by scientists to identify specific proteins, of which many thousands of combinations can exist in nature.

In a report to the symposium, Dr. Vincent J. Schaefer of the General Electric Company's Research Laboratory described how the spreading of drops of indicator oils over thin, one-molecule

thick, films of various proteins produces characteristic patterns.

It is at the G. E. laboratories where Dr. Irving Langmuir and Dr. Katherine Blodgett have for several years been studying the methods of producing thin films on water surfaces, which have thicknesses of a few millionths of an inch.

When drops of the oil are applied to the center of such protein films the oil spreads into patterns having geometrical form, in many cases, like a star or circle. The exact shape can be used to identify the protein.

One protein used in the research was insulin, so important to persons having diabetes. When the monomolecular layer of insulin was spread on water the oil drop assumed one pattern. When certain salts were added to the water on which the insulin was resting, chemical reactions occurred with the insulin and the oil pattern changed its shape.

Soil Classification

A new way of classifying soil types—a fundamental problem of all scientific agriculture—was reported to the meeting.

Standard practice, but one not too satisfactory, is to run soils through sieves and determine sizes of the particles, said Prof. Richard Bradfield of Cornell University.

A more important characteristic of soils, however, is their ability to carry water and air to plant roots. Thus any real, exact classification of soils should include knowledge of the pore spaces in earth. Normal field soils, reported Prof. Bradfield, have from 40 to 60 per cent. of their total volume occupied by solid materials and the rest by pore spaces containing air and water in varying amounts.

It is not only important that the total volume of pore space be known, he added, but it is also necessary to have knowledge of the size of the pores, or channels, which carry down the vital air and water.

Studies reported by Prof. Bradfield describe a new way of answering this question. A sample block of soil is saturated with water and then an additional small hydrostatic head of water pressure is applied. This additional pressure forces out some of the water already in the soil. The flow is observed at different pressures and the resulting data can be plotted in the form of curves, which have characteristic shapes for different types of soils.

ECONOMICS

Unbalanced Budget is Sweden's Instrument Against Hard Times

With Reduced Taxation and Increased Expenditure, Bad Years Show Deficit; Good Years Have Surplus

A GOVERNMENTAL budget, normally out of balance, that provides a remedy for economic depression and a guarantee of sound finance—that is a prescription offered to Washington experts by Prof. Gunnar Myrdal, Swedish economist.

Swedish experience shows that it is possible to operate public finance in such a way as to allow a very radical under-balancing of the budget. The Swedish method, cited by Prof. Myrdal, prevents economic slumps and, in fact, guarantees sound finance in the long run.

Prof. Myrdal is a young man who can speak of unbalanced budgets and great depressions with a keen wit and flashing smile, yet he combines in himself all these impressive offices: Senator in the Swedish Parliament, deputy member of the board of directors of the Bank of Sweden, member, Swedish Royal Population Commission, the Housing Commission, and the Agricultural Commission, and professor of economics and finance at the University of Stockholm.

By a perpetually unbalanced budget, he did not mean one that would constantly be in the red. The red and black should alternate with the business cycle, he explained. Depressions, he said, should be planned for not as isolated years, but in their frame of the recurring good years. Budgets should be planned, not by the year any more than by the day; they should be planned for long-time periods, the books being closed annually with a deficit or a surplus.

In the bad years it is wise, they have decided in Sweden, to spend beyond your means, decrease taxation, and deliberately to run behind and have a deficit. But this deficit is made up by planning for a surplus during the following years of boom. The deficit from one bad year is split into five parts tacked on to the budgets of succeeding years.

In bad times, taxation is lowered, but expenditures for schools, for roads, and for all the works of government are kept up and even increased. This relieves public officials from the absurd position of having to scrimp on necessary public expenditures at the same time that they are proud of spending billions otherwise.

Public works in Sweden are put on an investment budget separate from the ordinary expenses. This budget must always be in balance, but this is really just a matter of bookkeeping. Only real investments on which a return is expected may be put on this budget on a rational sinking fund basis.

If a government building is to be erected, this would go on the investment budget. But the bureau occupying the building is charged a rental, year after year, and this item is part of the regular budget.

Such public works are part of the plan of enlarged spending during depression times, but by the rental or other such scheme, they are paid for during the good times that follow.

Sweden is now having a boom. Plans are now being made for a great public works program; approval is being secured from Parliament; everything is being put in readiness so that when the unemployment ranks begin to form the machinery can be instantly set in motion.

State control of railroads and waterfalls (that means power) and the tobacco and liquor businesses provide a large field for possible public investment. Coffee and oil are now being discussed as possibly to be brought under public control.

Railroads are now planning construc-