

declared. He recommends immunizing or raising the resistance of the general population, in countries where dysentery is a problem, by vaccination.

Here again, the scientists are checked in their efforts to wipe out the disease. A vaccine has been prepared against dysentery, and has been given by mouth to hundreds of thousands of people in Japan during the last ten years. Though the results are claimed to be favorable according to the statistics, Dr. Shiga said that "a careful consideration" is still needed before accepting this method of vaccination.

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## PHYSICS

### Prof. Arthur H. Compton— Electric Not Light

**C**OSMIC RAYS are made up of electrical particles (electrons and possibly protons) and not of light particles (photons), Prof. Arthur H. Compton, University of Chicago Nobelist, told the Harvard Tercentenary Conference. He presented a carefully marshalled array of fact and argument in support of his thesis.

Physicists agree quite generally that electrical particles are actually detected at the earth's surface with specially constructed instruments. But it is also generally agreed that most of these particles are secondaries, that is, they have been kicked into activity by the impact of a primary source of energy arriving at great speed from outer space very much as a marble or a billiard ball is knocked spinning by the impact of the "taw" or the cue ball.

The disputed question has been whether the primary cosmic rays are light particles or electrical particles.

In support of his claim that primaries as well as secondaries are electrical particles, Prof. Compton cited the obedience of the cosmic rays to the pull of the earth's magnetic field. Electrical particles can be attracted by magnetism. Light particles can not. Again at great depths under earth and water, the cosmic rays lose energy and are absorbed in a manner characteristic of electrical particles rather than photons.

A few instrumental results have shown undoubted light effects. The supporters of the light particle theory have claimed these were due to photons from outer space that got clear through to earth without colliding with any particles and turning them into secondaries. Prof. Compton in rebuttal suggested that these light bursts were themselves

secondaries given off by electrical particles rather than the other way around.

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## ARCHAEOLOGY

### Prof. Eduard Norden— Roman Crop Insurance

**C**ROP insurance, now much to the fore as a politico-economic topic, interested farmers in the very earliest Roman days, too. It took the form of prayer for freedom from plant pestilences and other destruction in the fields—somewhat reminiscent of modern prayers for rain and against grasshoppers.

The earliest of these prayers, which is also the oldest known Latin hymn, was described in a new translation by Prof. Eduard Norden of the University of Berlin. It was chanted at field-edges by the Arval Brethren, a sort of pagan religious order, whose special job it was to pray for the welfare of the crops.

The hymn is addressed to Mars—who was oddly enough the god of agriculture as well as of war. It is not in the stately classic Latin of Cicero and Vergil, but in a rude early language very difficult to translate at all. In addition to its endeavor to placate "wild Mars," it also calls upon the lesser local divinities, the Lares and the Semones, and ends in a five-fold alleluja chorus of "Triumph! Triumph! Triumph! Triumph! Triumph!"

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## GENETICS

### Prof. Filippo Silvestri Polyembryony

**Q**UINTUPLETS are nothing to get excited about in the insect world. To some species of small winged creatures, indeed, a mere five offspring at a time would seem rather close to outright race suicide.

The strange biology of multiple birth among insects was discussed before the Harvard Tercentenary Conference by Prof. Filippo Silvestri of the Royal College of Agriculture, Portici, Italy.

In this mode of "super-quintupling," most familiar to scientists in certain parasitic members of the wasp family, the number of individuals eventually resulting from the hatching of a single egg ranges from ten or fifteen to hundreds and even thousands, depending on the species concerned. Scientists call the phenomenon polyembryony, or the condition of many embryos.

When the insect's egg begins to

divide, it first forms a mass of cells, such as constitutes an early stage in the development of any individual. But this cell mass does not proceed to organize and differentiate into the various body parts, in the ordinary fashion. Instead, it breaks apart into separate cells, or small groups of cells; these re-multiply into considerable cell-clumps, and then proceed to turn into larvae, which eventually change into the fully developed insects.

What causes this breaking apart of the original cell mass is still a point of dispute among biologists. Prof. Silvestri is inclined to the opinion that since these insects are all parasites, developing from eggs laid in the eggs of larger insects by their mothers, the presence of abundant fluid, rich in nourishment, may make the first cells more independent of each other than are the cells in comparable early stages of development in other animal forms.

Certainly polyembryony is an advantage to the species that practice it. It results in more rapid multiplication, and hence increases the chances of survival and spread for the species, in a world where its peculiarly selective habits of egg-laying impose pretty heavy handicaps.

To man, also, the process offers certain benefits. The insects described by Prof. Silvestri belong to the large class of tiny, gnat-size wasps that lay their eggs in the eggs of other insects, particularly caterpillars. Their larvae feed on the tissues of these involuntary hosts, eventually killing them and cutting short their careers of crop destruction. When a single egg releases from a dozen to a thousand of these tiny borers from within, the caterpillar's career is so much the shorter, and its possibilities of harm correspondingly the less.

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## GEOLOGY

### Prof. Arthur Holmes— Billions of Summers

**G**EOLOGICAL evidence that for nearly 2,000,000,000 years there have been no astronomically significant changes in the heat and dynamical relations between the earth and sun was presented by Prof. Arthur Holmes. Layers of clay laid down in the earliest known sediments so closely resemble the layers of the most recent deposits that Prof. Holmes is convinced that they were formed under seasonal variations as marked as those of today.

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