and speed of growth determines which shall possess the limited number of females, the egg cells, waiting below and thus become parents to new plants.

Prof. Buchholz and his associates found that some of the pollen-tubes, the hereditary effects of which they especially wished to study, were sluggards in the race and arriving late found no unfertilized females and therefore had no opportunity to leave offspring to bear the particular hereditary qualities which they carried. The differences in growth rate of pollen-tubes defeated the purpose of the experiment.

Not to be outdone, the investigators next conceived the idea of cutting a piece out of the base of the style, decapitating the faster-growing tubes while leaving the slower-growing ones intact. The shortened style was then re-united and the pieces held in place with a splint consisting of a hollow grass straw. Arriving at the cut the slow-growing tubes crossed this barrier and proceeded on in the race without the handicap of having to run against faster competitors.

In practice the method should prove valuable to plant breeders, for its success has been proven by the heredity of plants thus produced. Other scientifically valuable seeds obtained by this method are available for planting during the present growing season.

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ENTOMOLOGY

Far Eastern Beetle Pest Discovered on Long Island

AN INSECT pest apparently new to this country has been discovered breeding in the stems of greenhouse grapes at Oyster Bay, on Long Island, and is reported by E. P. Felt, director of the Bartlett Tree Research Laboratories at Stamford, Conn.

The insect belongs to the group known as the ambrosia beetles, and was identified by an expert on beetles at the British Museum of Natural History, London, as a species known only from Korea, Japan and Formosa, where it occurs on several native shrubs. It was probably brought to America, half way round the world, in some plant introduced from one of those countries.

It is well to watch for minute holes, a twenty-fifth of an inch in diameter, and recent borings in sickly plants, since these are most likely to be attacked, Mr. Felt suggests.

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ASTROPHYSICS

Cosmic Rays Caused by Solar Activity, Says French Physicist

By DR. VICTOR COFMAN,
Science Service Correspondent

EXTREMELY fast electrons, coming from the sun with a speed practically identical with that of light, may be responsible for the production of the cosmic radiation, whose origin is still wrapped in mystery. Dr. Alexandre Dauvillier, of the Institut des Hautes Etudes of Paris, puts forward this view in a theory that links together several happenings of the sky.

"My theory," stated Dr. Dauvillier, "gives definite shape to a view which has also been suggested by Lord Rutherford, namely that very fast electrons accelerated in very weak cosmic electric fields may account for the formation of cosmic rays."

The source of the electrons, according to the new theory, is to be found in the bright spots ("faculae") which are seen on the sun's surface. They represent regions where the temperature reaches seven thousand degrees centigrade. The negatively charged electrons stream out of these hot regions with relatively slow velocity, but are enormously speeded up as they move through the positively charged "atmosphere" of the sun. This atmosphere consists mostly of hydrogen and calcium atoms, positively charged because the ultraviolet radiation from the sun knocks out some of their electrons. The electrical field surrounding the sun thus resembles that around the earth.

Deflected Into Arcs

The speeded-up electrons coming from the sun are deflected in the form of arcs by the earth's magnetic field as they approach our planet. They strike the upper atmosphere and produce secondary electrons, which are responsible for the luminous effects seen as auroral arcs—first observed by Nordenskjöld in 1878. From the curvature of these arcs one may calculate the velocity and the energy of the original fast electrons, whose course was bent by the earth's magnetism. The velocity is found to be only 30 centimeters per second less than that of light. Hence the electron needs only a few minutes to reach the earth, and arrive practically at the same time as the light itself. This may explain a few remarkable cases of bright flashes on the surface of the sun accompanied immediately by electro-magnetic disturbances upon the earth. The earth is so completely surrounded by traces of these swift electrons, that the cosmic radiation seems to be coming from all parts of the sky.

The energy of the fast moving electrons corresponds very closely to that of the cosmic rays, and Dr. Dauvillier believes that there is no need to look elsewhere for an explanation. He brings in support of his view another set of calculations, based upon the frequency of the auroras seen at different latitudes.

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EVOLUTION

Birds of Different Families Look Almost Like Twins

STRANGE tricks of "convergent evolution"; by which creatures only remotely related to each other come to look like twins, are being studied among birds by Dr. Herbert Friedmann, curator of birds in the Smithsonian Institution. There can be no question of so-called mimicry in most of these instances, for the members of these pairs of mutually resembling birds are usually found in widely separated regions.

The familiar yellow-breasted meadowlark, for example, has a "twin" in a North African pipit, belonging to an entirely different bird family. There is no discernible advantage to either bird in looking like the other. Dr. Friedmann inclines to the opinion that it is merely a case of a relatively limited number of feather patterns being possible, and these two birds having happened to hit on the same combination.

There is something of the same nature to be found in bird songs, too, he says, although it cannot be checked so exactly as in the case of colors. He cites the case of a South African cuckoo that has a call closely similar to that of the American whippoorwill.

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