Several cultures of the nematode have been grown on artificial media for five and one half months, transfers being made every ten days to two weeks. At the end of six months the worms failed to reproduce and the majority died.

During the cultivation of these strains, the nematodes were repeatedly shown to be capable of producing fatal infection in beetle larvae. A culture after six months on media, and which had seemingly lost its ability to grow, was still capable of infecting beetle larvae. The forms obtained from these again produced good cultures.

It is believed that this is the first time that the entire life cycle of a parasitic nematode has been obtained on an artificial medium. The cultivation of this form enables us to obtain worms in large numbers, and may give us a method for the control of Japanese beetle infestation. This possibility is now being investigated in cooperation with the New Jersey State Department of Agriculture.

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THE POTATO RUGOSE MOSAIC COMPLEX

IN recent years the identity of the virus or viruses causing rugose mosaic of potato has been questioned. Although it has often been suspected and even claimed that this disease is not due to a single virus, this fact has not been definitely demonstrated or clearly explained.

Working in Johnson's laboratory at the University of Wisconsin and using his viruses, the writer has found that the rugose mosaic disease of potato, which is identical with "spot-necrosis" of tobacco, is caused by a combination of two distinct viruses. The "mottle" virus, which is normally present in apparently healthy potatoes of most if not all standard American varieties, is one of the viruses in the combination causing this disease. This virus is readily transmitted by plant extract but not by aphids. The other virus in this complex is readily transmitted by aphids as well as by plant extract. The symptoms of the aphid-transmitted virus on young Havana tobacco plants are often faint; usually only a clearing of the veins and a general flattening of the plant are apparent.

The aphid-transmitted virus may be separated from the rugose mosaic or "spot-necrosis" complex by means of the aphids *Myzus persicae* or *Macrosiphum solanifolii*. The "mottle" virus may be separated from the complex by various means but may also be readily obtained, free of the aphid-transmitted virus, from apparently healthy potatoes. When these two viruses are combined the result is typical "spot-necrosis" on tobacco or rugose mosaic on potato.[1] When only the insect-transmitted virus is inoculated to the American Bliss Triumph potato, for instance, the result is typical rugose mosaic, since the "mottle" virus is already present. On the other hand, if this virus is transmitted to tobacco it will not produce "spot-necrosis," unless the "mottle" virus is artificially introduced. If the "mottle" virus is not present, as is apparently the case in certain foreign varieties of potato, aphid transmission will naturally fail to produce the typical rugose mosaic disease, although artificial inoculation will succeed. This may explain the contradictory results secured with different varieties of potatoes in foreign countries.

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MICHELSON AND ROWLAND

DR. MILLIKAN'S excellent obituary of Michelson, published in SCIENCE May 22, contains one statement to which exception may be taken, for it seems to do injustice to another man. This statement is that Michelson in 1880 "became the best known American physicist by virtue of his new speed-of-light measurement."

In the decade ending with 1880 Rowland had published his research on the relation between magnetic induction and magneto-motive force in ferromagnetic metals, had during a short stay in Berlin proved experimentally the magnetic effect of electric convection, an achievement which Helmholtz had attempted in vain, had improved upon the British Association determination of the ohm, and had remeasured the mechanical equivalent of heat, thus displacing the value found by Joule. In the year 1880, I believe, and certainly not later than 1881, he had begun the construction of that dividing engine which was soon to make the Rowland concave diffraction gratings universally and permanently famous. These gratings and the measurements he made with them won for him the Draper Medal of the National Academy of Sciences in 1890, many years before the same award was made to Michelson.

EDWIN H. HALL

CAMBRIDGE, MAY 25, 1931

CONSULTANT SERVICE AT THE LIBRARY OF CONGRESS

THE letter published in SCIENCE of January 2 in regard to the new consultant service at the Library of Congress has elicited correspondence, some of which indicates the need of further information as to certain details of the service offered by the library.

[1] After submitting this manuscript for publication, the writer received Kentucky Agricultural Experiment Station *Res. Bull.* No. 309, in which Valleau and Johnson report having reached similar conclusions.

A brief library circular on "special facilities and regulations for research" covers such matters as the assignment of study rooms for the convenience of persons carrying on group or individual research or engaged in advanced work. A special collection of reference books is immediately available and other books are brought from the stacks on application. Access to the stacks is allowed, and to some extent books may be taken away for outside use. There is opportunity for incidental typewriting and clerical service.

A "System of Inter-Library Loans" is defined by a circular letter of July 1, 1930. Such loans rest on the theory of a special service to scholarship by the loan of unusual books not readily accessible elsewhere. Loans to colleges and universities are customarily limited to books required by members of the teaching force in their own investigations. The system is intended to complement the resources of the local library rather than to supply the major part of the material needed for extended research.

Photostat duplication may be arranged on the basis of an official memorandum dated December 10, 1930.

Library of Congress catalog cards may be purchased or ordered by libraries or individuals. These cards have been printed for accessions since January, 1901. The stock of cards now covers about 965,000 titles, is relatively complete not only for books copyrighted in the United States but for a large fraction of the more important foreign publications in the library, whose theoretic field is all literature required for research.

A small pamphlet, "L. C. printed cards: How to order and use them," contains detailed instructions in regard to the manner of ordering cards on any well-defined topic. It is also possible to subscribe for proof sheets, for example, in geography and anthropology, medicine, science, technology. The number of subscribers for cards has increased from about 200 in 1901 to more than 5,000 in 1930, the latter figure including some 600 individuals and firms.

Complete sets of cards are deposited in 51 libraries, a list of which is published in the librarian's annual reports. This, as well as the library classification and subject headings, may be consulted in the principal university libraries of the country.

H. W. TYLER,
Consultant in Science

KOPERNIK

IN SCIENCE for January 17, 1930, Dr. R. L. Sackett writes: "Copernicus was a German who studied in Vienna and Rome. He taught mathematics and for thirty or more years considered the Ptolemaic theory."

This passage is inexact. I hope that you will allow me to give some information concerning the great Polish astronomer.

Nicholas Kopernik, called after the Latin manner "Copernicus," was not a German but a Pole. He was born in 1473 in Toruń, a town situated in Polish Pomerania, taken in 1793, after the second partition of Poland, by Prussia, recovered by Poland in 1920 by virtue of the Treaty of Versailles. For many years this borderland of Poland was the scene of many combats between Polish subjects and the Teutonic order of knights known as the Order of the Cross. Both the father and mother of the astronomer were natives of Upper Silesia, an ancient province of the Polish kingdom. The name of the family is purely Slavonic, being derived from the name of a church village "Kopernik," where it had its origin. The father of Kopernik before settling in Toruń was living in Cracow, then the capital of Poland.

Kopernik, or Copernicus, was educated in Poland, at first in a school in Włocławek, a town on the Vistula, later in the University of Jagiellon, in Cracow. From 1491 to 1495 he studied there theology, mathematics and astronomy. He studied afterwards in Italy, as did many Polish scholars in the fifteenth and sixteenth centuries, ecclesiastical law in Bolonia and Rome, 1496–1501, and medical science in Padua and Ferrara, 1501–1504, but he did not study in Vienna. In the year 1501 he taught mathematics in the Roman Catholic University "Sapienza" in Rome.

After having returned to Poland in 1504, Kopernik was charged with a high ecclesiastical post as a canon of the Roman Catholic church in Frauenberg in the province of Varmia on the western border of Poland. He did not leave this post until his death in 1543. In Frauenberg he wrote his famous book, "De revolutionibus orbium caelestium," published, however, in Nuremberg, through the interest of his admirer and pupil, George Rhetic, professor in the University of Wittenberg.

In his political and social activity the great astronomer gave evidences of his patriotism. He was known as the author of a plan to amend the money circulating in the Polish western provinces. He also in the period of the Polish combats with the Knights of the Teutonic Order commanded in 1520 the defense of the fortress Olsztyn in the province of Varmia.

ST. MICHALSKI,
Editor of the *Nauka Polska*

ERRONEOUS CITATIONS

DR. C. A. SHULL'S article appearing in SCIENCE for April 3, 1931, entitled "Erroneous Citations and Titles of Scientific Papers" is very much to the point and has perhaps more force and timeliness than the