that most fascinating of studies, inheritance of disease in man. The results have been that our practitioners know little about inheritance of normal characters, and less about inheritance of disease. They have even been scornful of such an idea, so that one practitioner not so many years ago indignantly demanded to be shown "a club-footed ovum," when inheritance of this defect was being discussed. They know in a vague way that certain conditions "tend to run in families," but how they run or how to investigate the history of such a family so that the record will be of value is unknown to them. There are, of course, many exceptions to this statement, but in the main it is true. Hence a meeting of biologists, statisticians and medical men should prove enlightening and stimulating to all.

Naturally, the attitude of the public on matters relating to disease is apt to be determined by their medical advisers. With the medical profession apathetic concerning the great field of preventive medicine that lies here, it is not to be wondered at that the public has little information on the subject. The average practitioner is apt to feel that the matter is outside his sphere, that the diseases showing heredity are rare, and only encountered occasionally by the specialist. The number of cases showing heredity of disease in any doctor's practice is apt to be in direct proportion to his knowledge of and interest in the subject. To the ophthalmologist, the importance must be constantly evident, yet many of them know little of inheritance. Cataract, glaucoma, optic atrophy, myopia, etc., are inherited in a great many instances, and are by no means uncommon. The neurologist has difficulty in naming ten diseases which come under his specialty without mentioning several that are inherited. The family doctor who is not a specialist encounters many cases of diabetes, gastric ulcer, anemias, hemorrhagic diseases, cancer, many of which have a background of inheritance. The numerous reports which are published showing pedigrees of these diseases do not represent the extent to which they are inherited; they merely indicate the occasional doctor who is interested in heredity. When we have educated our profession concerning the important part which inheritance plays in the production of disease; when we incorporate into their medical course a period of study embracing the fundamentals of genetics as applied to disease in man, then we may expect a more interested attitude after graduation, and a keener comprehension of the responsibility that is theirs in educating the public.

Because the whole subject is so closely bound up in the minds of the public with what we are pleased to term the "inalienable rights of man," the very attempts to study the problem calmly and sanely are thwarted by the reactionaries who insist upon placing emotion before fact. The problem must be met, and the first step toward it is the accumulation and sorting of facts which are known. How they are to be dealt with presents still another question. Dr. Lyon notes the huge sums expended by philanthropists and social organizations on the improvement of the environment, and contrasts it with the neglect shown to the study of heredity. There was an old story that in an insane asylum the patient was occasionally tested as to his ability to return to society as a normal or near normal citizen. The test consisted in the emptying of a trough of water with a bucket; into one end of the trough was pouring a stream of water through an open tap. When the patient turned this off, he was adjudged sufficiently sane to be dismissed. The increasing expenditures for our public institutions that care for the derelicts of society are beginning to pinch. Many of these unfortunates will still be with us even after we have done our utmost from both the environmental and hereditary standpoints; but in the meantime how long will society continue to expend thousands upon improvement of the trough and upon larger and more efficient buckets? When will it become sane enough to turn off the tap?

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THE CULTIVATION OF A NEMATODE PARASITE OF AN INSECT

THE nematode parasite of the Japanese beetle reported by Fox and the writer[1] has been found in a limited area in New Jersey during 1929, 1930 and 1931. It has not been found in a large number of grubs obtained from other parts of New Jersey and from Pennsylvania. In the locality referred to the mortality of the beetle grubs was high during the two previous years due to the activity of the nematode.

Steiner[2] studied the parasites taxonomically and found that they belonged to the family Oxyuridae and described the form as a new genus and species under the name of *Neoaplectana glaseri*.

The nemas are cultivated on standard meat infusion agar plates containing 1 per cent. dextrose, and having a reaction of pH 7.4. Gravid, ovoviviparous females from infected grubs are placed on the surface of the plates together with a water suspension of an actively growing yeast. After two days at room temperature the surface of the plates swarms with larval nematodes which soon mature. From four to five days are consumed in the development of each generation and transfers are usually made after the second generation.

[1] SCIENCE, 71: 16–17, 1930.
[2] *J. Wash. Acad. Sci.*, 19: 436, 1929.

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.