observations to be recorded elsewhere indicate that this is the case and that many times, eggs were deposited where they were unable to survive.

F. E. CHIDESTER

U. S. PUBLIC HEALTH SERVICE

A PARAFFINE RULER FOR DRAWING CURVES

SINUOUS lines of almost any form can be drawn with the aid of a ruler constructed in the following manner. Points are plotted on a sheet of paper which is then placed on a smooth board and slender nails somewhat larger than pins are driven into the wood at each point. A strip of any flexible material such as whalebone, metal or bristol board is bent around to fit the uprights and held in place by other nails. The edges of the paper are then turned up and melted paraffine poured in to a depth of about a quarter of an inch. When the paraffine is thoroughly hardened the nails are draw out, their spaces filled up by means of a hot metal point and the sheet of solid paraffine broken in two along the strip which is in the form of the line to be drawn.

Such a ruler, of course, must be made for each curve, although for a symmetrical one only one half need be made. This method gives an evenly modulated curvature which can be trimmed if necessary. When several graphs are to be grouped together as many trials as necessary can be made in a short time until a good arrangement of them is drawn.

A practical point of importance is to have the liquid as cool as possible before pouring otherwise it will penetrate the paper and become fastened to the substratum. After a little experience a mold can be made quickly, although it requires some time for the cast to harden. For those who do not have occasion to draw many arcuations a device of this kind produces fairly satisfactory results and takes the place of rather expensive splines.

D. F. JONES

CONNECTICUT AGRICULTURAL EXPERIMENT STATION

THE HANDWRITING ON THE WALLS OF UNIVERSITIES

A CORRESPONDENT sends us the following extract from Dr. Geoffrey Martin's popular exposition of "Modern Chemistry and its Wonders" (1915), suggesting that as it applies very largely to American universities also, it may be advisable to reprint it in SCIENCE.

The color industry started in England some fifty years ago, flourished immensely for twenty years and then passed away to Germany, where now gigantic factories control the world's markets.

This loss of supremacy in a world-industry is a fact to make Englishmen sad and thoughtful, and those who have lived, as I have lived, in Germany, and have seen her numerous universities and great technical schools filled with eager students, know perfectly well the reason of this disaster. It is not so much the fault of our practical men—who in energy and judgment and general sagacity are, despite all critics, splendid, full of bold enterprise—as the *fault of our universities*, who have *failed entirely* to get into touch with practical men. Instead of encouraging research—and it was this that laid the basis of the German chemical industry—our university senates have done their level best by legislation to keep our best students off it, or to make it so unprofitable that they prefer to enter some other form of activity. Let me give an instance of how the greatest difficulties are placed by the universities before students attempting to undertake scientific research.

When a student enters an English, and still more a Scottish, university, he sees before him a long series of oncoming examinations. Almost every year he has to pass an examination of increasing difficulty, and the only subjects that count are the stereotyped ones, on which questions may be asked at some forthcoming examination. In an atmosphere of examinations he lives, breathes, and has his being. Finally, after some four to six years' hard work, he passes the B.Sc. examination, which is an examination of considerable difficulty. Now mark, up to this point he has only been learning what others have done before him. At no time has he reached the confines of knowledge, or advanced it in any way. His parents now step in. The father says, "My son, we have given you a good education; for four to six years we have maintained you at a university, and you have shown your ability by passing innumerable examinations

of a highly complicated nature, and it is now time that you pass into the great world to earn your own living.'' And so the young man passes out of the university without ever being even introduced to methods of research, or ever touching the boundaries of human knowledge. Being a university man, he hardly ever passes into the great world of affairs, but retires into the badly paid and despised teaching profession—and the worst of it is that *it is our very best students who invariably turn to the sheltered ranks of the teachers. It is only students who fail to pass the Chinese-like wall of examinations who join the business world and enter factory or workshop.* Perhaps, however, the young man, in spite of every discouragement meted out to him by the university authorities by means of suppressive legislation, is resolved to remain on in order to do research work. He works hard for two years longer (for research work is difficult and laborious), and at the end of that time has discovered enough to produce a small paper—nothing more can be expected after two years' work. Then as a rule this single little paper is not considered sufficient by the university authorities to merit the highest academic recognition, and so he leaves the university with no reward for his extra work. The highest academic honors involving recognition of research work are thus in this country confined to one class of men—namely, to university teachers, who remain on in the laboratories working out problems in science often for years; and the business world, *where the highest inventive and practical ability is really needed,* never or very seldom receives men trained in methods of research. The heads of factories or workshops, and even the directors of huge industrial undertakings, have never been introduced themselves either to the spirit or practise of research, and so are entirely out of sympathy with it. In Germany, however, a different system prevails, and it *pays* a student to remain on in order to undertake research, as it helps him afterwards in obtaining a good position in the industrial world. Such men gradually rise to the top, become directors of firms, and hence a sympathetic view of scientific work has become a characteristic of the German industrial world. It is all a matter of university legislation, and in Great Britain it is hopeless for the average student to attempt to obtain high academic honors involving research, and so he does not try. If any research work is done in this country research students must be *paid* to do it, the payment taking the form of research scholarships! In Germany a celebrated professor can have as many helping hands as he desires to carry on his investigations, his students forming willing and unpaid assistants, who afterwards pass out into the industrial world, carrying methods of research and influence there also. Here, however, students in any numbers can not be got to undertake or assist research going on in the university, for no good of it will come to them. There is nothing fundamentally different between the natures of German and English students. The difference in the enthusiasm for research, however, is that the legislations of the German and English universities are different, so that in Germany research work helps a student in getting a diploma, and so his living, whereas in this country it is of no practical advantage for a student to undertake research work.

SPECIAL ARTICLES

TWO DESTRUCTIVE RUSTS READY TO INVADE THE UNITED STATES[1]

The application of the adage, "an ounce of prevention is better than a pound of cure," to the spread of crop pests has now became an established procedure for the United States through the activities of the Federal Horticultural Board. One of the difficult factors in securing success is learning about pests before they have been introduced or have attracted much attention. The hollyhock rust did not seem important in the mountainous regions of Chili, but it spread over all the world between 1869 and 1886, reaching the United States last, doubtless due to our "splendid isolation" from South America in transportation facilities. The Colorado potato beetle, as another instance, had to leave its native home and food plants to become a recognized menace to crops. It seems worth while, therefore, to call attention to two rust fungi that seem to possess the possibilities of great harm, but which have not yet invaded the United States proper.

The peanut crop is a large and growing industry of the southern states. There is a rust of peanuts widely distributed in South America, and becoming common in the West India Islands. It is usually designated as

[1] Presented to the American Phytopathological Society at the St. Louis meeting, January 1, 1920.