

has a large mineralogical collection and a nice chemical laboratory, in which he makes his analyses.

Let us now turn from what the Siamese have done for science to what they are going to do.

The King has instructed Dr. Gowan to erect an observatory in which regular barometric and thermometric measurements are to be made. The rainfall and the tides will also form a subject of measurements. Other instruments will be added in time. As the Siamese have a great fancy for photography, we shall perhaps soon see regular photographs of the sun taken in Bangkok. Various spectroscopes and telescopes are at the present moment on their way out from England. It is also intended to build a chemical laboratory in the palace. The King's bodyguard are being instructed by Mr. Alabaster in taking surveys. At the moment I write this, they are out on a surveying expedition.

All this shows that the inhabitants of Siam have a great fancy for science, if it does not show more. Strong liking for a subject is generally accompanied with, if not caused by, the ability to deal with it and to overcome its difficulties. Let us hope that some of the Siamese will take up their favourite subject, not as amateurs merely, but with all the seriousness of a profession. Many of them visit Europe for several years. If some of these were to go through a course of science, the knowledge thus gained, added to their natural intelligence and love of science, would soon make them good observers and able experimenters.

In the meantime it will be interesting to watch the growth and development of a country in which science is the recognised and favourite study. English men of science cannot refuse their sympathy to a king who, under great difficulties, does his best to improve his country, and who readily accords to science the position which they are striving to obtain for it in their own land.

ARTHUR SCHUSTER

THE RESTING-SPORES OF THE POTATO FUNGUS

FOR some reason unknown to me (but probably owing to meteorological conditions pertaining to this season or the last) the potato fungus began its ravages this summer a month or six weeks earlier than usual. It not only appeared out of season, but it came in a different form from anything within the memory of the younger botanists of the present generation. It is considered probable that the present condition of the disease is similar with that long ago known as "the curl," a pest known a considerable time before *Peronospora infestans*, Mont., was described as European.

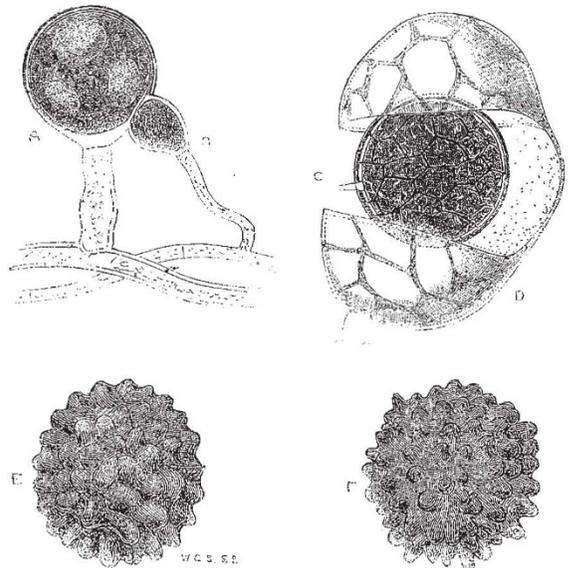
At the beginning of June I had potato-leaves sent to me for examination from the office of the *Journal of Horticulture*; these leaves were badly diseased, spotted and foetid, and from certain of the stomata a few threads of the *Peronospora* were emerging; this fact, from the unusually early appearance of the fungus, I made a special note of.

On June 16 Mr. Berkeley brought leaves sent to him for examination by Mr. Andrew Murray, (which were spotted in an exactly similar manner with mine), to the meeting of the Royal Horticultural Society. At the same time Mr. Berkeley exhibited a sketch of two rather large nodulose (or reticulated) bodies found by him within these leaves, as a possible species of *Protomyces*, but since then known to be the resting-spores of *Peronospora infestans*, Mont., here illustrated.

The presence of these warted bodies in the leaves, as seen by Mr. Berkeley, led me to make a searching examination of the Chiswick plants then greatly suffering from the pest, and I at once found similar bodies very sparingly diffused amongst the tissues of the leaves, with a few branches of *Peronospora* and threads of mycelium, and two semi-transparent bodies of different sizes which were new to me. On attempting to disengage these presumed speci-

mens of *Protomyces* from the black, hard, and corroded spots on the leaves by maceration in water, I found the continued moisture greatly excited the growth of the mycelium. After the lapse of a week the threads bore (amongst the intercellular spaces of the leaves) the semi-transparent bodies of two sizes which I had before seen and measured, and which I now refer without doubt to the oogonium and antheridium of the potato fungus. It is very uncommon to find a fungus bearing sexual and asexual fruit at the same period of growth, and in this instance the old asexual fruit was very sparingly produced. I, however, afterwards found the fungus with both forms of fruit and with ripe free resting-spores, inside the cavities of the putrid stems, and I found the ripe resting-spores and the sexual organs sometimes in conjugation within the tissues of the potato tubers when the substance was reduced by decomposition to the softness and semi-transparency of butter.

By keeping the potato-plants closely under observation from that time to this, a period of from six to seven weeks, I have seen and figured these bodies in every stage of growth, and have been able to preserve some of the best material for future careful mounting. Those who may care to know in detail how, from the slightest clue at first, the subject was worked out to its present aspect may refer to the *Gardener's Chronicle* for July 10, 17, and 24 last, and to this week's *Journal of Horticulture*.



Oogonium antheridium and mature resting spore of *Peronospora infestans*, Mont.

The antheridia, oogonia, and oospores (or resting-spores) in *Peronospora infestans*, Mont. are very similar, with the same bodies in other species of *Peronospora*, in fact when they are drawn to scale and placed side by side there is very little difference to be detected. The accompanying illustration shows the oogonium (A) and antheridium (B) in contact as taken from the tissues of the leaf. At C is shown a semi-mature resting-spore with its fecundating tube attached and its coat of cellulose accidentally pushed aside by maceration in water, as taken from a putrid potato-stem. At E is illustrated the perfectly mature resting-spore, free from its coat of cellulose taken from a tuber in the last stage of decomposition. At F is shown the resting-spore of *Peronospora arenaria*, Berk. drawn to exactly the same scale to show similarity in size and conformation. The figures in the cut are uniformly enlarged seven hundred diameters, and the mature oospore or resting-spore measures on the average .00142 inch in length, and .00114 inch in breadth.

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