These spots do not develop on the top leaves of the plant, yet it has not been possible to reproduce them, by repeated inoculations, on the lower leaves. This suggests that the effect of leaf position is an indirect one. It is possible that the high atmospheric humidity and high rainfall in the central rainlands favour the development of the grey-brown spot type, particularly on the lower leaves, which are more subjected to rain splashes. This spot type does not appear under the drier conditions of Khartoum. Sabet[3] has previously reported a similar instance in which mahogany leaf spots caused by *X. khayae* are small and dry in the Khartoum area, but large, with broad, dark green wet-shining margins in the central rainlands.

It is unlikely that the two spot types are produced by two distinct strains since isolates from the two types produce one type of spots under similar conditions. It is concluded that they are caused by one strain of *Xanthomonas sesami*. The dark brown type develops readily under a wide range of environmental conditions. Development of the light brown type requires a more exacting environment, possibly high atmospheric humidity and rainfall.

K. A. Sabet

Faculty of Science,
University of Khartoum.

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Selective Nitrogen Assimilation by *Poria weirii*

Soil under a stand of *Alnus rubra* Bong. in mixture with conifers was found to contain markedly higher levels of nitrate nitrogen than soil under an adjacent stand of pure conifers[1]. This phenomenon has substantial implications for the ecology of root pathogens and their antagonists in forest soils. We were particularly interested in *Poria weirii* Murr., a severely damaging pathogen of conifer roots in western North America, and we have therefore investigated its ability to assimilate nitrate nitrogen.

Many fungi, including Basidiomycetes such as *Collybia tuberosa* (Fr.) Quél. and *Lentinus tigrinus* Fr., can use nitrate nitrogen[2,3] and therefore presumably produce nitrate reductase, the enzyme required for reduction of nitrate to usable ammonium. Other fungi, however, cannot use nitrate nitrogen, for example, *Armillaria mellea* (Vahl. ex Fr.) Kummer[4], many other higher Basidiomycetes[5–8], and members of the Saprolegniaceae[9] and Blastocladiales[3]. *Streptomyces* species, notable among the organisms likely to antagonize *P. weirii*, commonly thrive on nitrate as a nitrogen source[10–13].

Experiments were designed to determine (*a*) the relative growth of *P. weirii* when supplied respectively with nitrogen equivalents in nitrate, ammonium, or amino forms; and (*b*) whether *P. weirii* produces nitrate reductase.

Poria weirii was grown on Jennison's[7] liquid medium with potassium nitrate, ammonium chloride, and asparagine, as respective sources of nitrogen. Each form of nitrogen was included at each of three concentrations, corresponding to 10, 100, and 1,000 p.p.m. nitrogen in the medium. In each case four replicate flasks were inoculated with 4 mm agar disks cut from margins of colonies of *P. weirii* growing on malt agar. Cultures were grown for 40 days at room temperature (24°–28° C), after which the mycelial mats were collected, dried overnight at 105° C and weighed.

The procedure for extraction of nitrate reductase was essentially that devised by Nason and Evans[14]; the enzyme activity of the cell-free extract was determined by the colorimetric test for nitrite. At the beginning of the experiment (zero time) 0·05 ml. enzyme extract was added to give a final volume of 0·5 ml. containing 0·1 ml. of 0·1 molar potassium nitrate, 0·05 ml. of $2·6 \times 10^{-5}$ molar flavin adenine dinucleotide (FAD), 0·04 ml. of $2·0 \times 10^{-3}$ molar reduced diphosphopyridine nucleotide (DPNH) and 0·26 ml. of 0·2 molar pyrophosphate buffer, at *p*H 7·0. After incubation for 20 min at 26° C, 0·9 ml. of water and 0·5 ml. of sulphanilamide reagent were added to stop the reaction, followed by 0·5 ml. of *N*-(1-naphthyl) ethylenediamine reagent to develop the colour. After 20 min, the optical density was read on a colorimeter at 540 mμ. Control tubes lacking DPNH were used to correct for turbidity caused by the enzyme. A fungus known to produce nitrate reductase, *Neurospora crassa*, was used to check the technique.

Table 1. MEAN DRY WEIGHT OF MYCELIUM OF *Poria weirii* GROWN IN SYNTHETIC MEDIA CONTAINING VARIOUS SOURCES OF NITROGEN*

Nitrogen (ppm)	Source: Potassium nitrate (mg)	Ammonium chloride (mg)	Asparagine (mg)
10	2·55	17·75	20·33
100	2·00	32·00	32·48
1,000	1·28	37·23	40·08

* Mean of four replicates.

Table 2. NITRATE REDUCTASE ACTIVITY OF *Neurospora crassa* AND *Poria weirii*

Reagent	Addition (ml.)	(ml.)	(ml.)	(ml.)
0·1 molar KNO_3	0·10	0·10	0·10	0·10
$2·6 \times 10^{-5}$ molar FAD	0·05	0·05	0·05	0·05
$2·0 \times 10^{-3}$ molar DPNH	0·04	0·04	0·04	0·04
0·2 molar pyrophosphate, *p*H 7·0	0·26	0·26	0·26	0·26
Enzyme extract	0·05	0·10	0·15	0·20
Water	0·90	0·85	0·80	0·75
O.D. at 540 mμ for *N. crassa*	0·01	0·03	0·05	0·06
Nitrite formed for *N. crassa*	1×10^{-3} μmole	$2·5 \times 10^{-3}$ μmole	$3·0 \times 10^{-3}$ μmole	$4·5 \times 10^{-3}$ μmole
O.D. at 540 mμ for *P. weirii*	0	0	0	0
Nitrite formed for *P. weirii*	0	0	0	0

Poria weirii did not use nitrate as a nitrogen source but grew well with ammonium or amino nitrogen (Table 1). Its behaviour in culture was markedly similar to that reported for *Armillaria mellea*[4], another serious destroyer of tree roots. Moreover, the cell-free extracts of *P. weirii* completely lacked nitrate reductase activity (Table 2).

The high nitrate content of the soils under the stand with *Alnus rubra* appears disadvantageous to *P. weirii*: it cannot use nitrate nitrogen but antagonists such as *Streptomyces* spp. can. On the basis of these results and those of other investigations of this biological complex which are now in progress, we tentatively conclude that *Alnus rubra* mixed with conifers has a potential in the biological control of *P. weirii* and probably other pathogens on many sites of the Douglas fir region.

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C. Y. Li

Department of Microbiology,
Oregon State University,
Corvallis, Oregon.

K. C. Lu
J. M. Trappe
W. B. Bollen

Forestry Sciences Laboratory,
Forest Service,
U.S. Department of Agriculture,
Corvallis, Oregon.

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GENETICS

Criminal Behaviour and the *XYY* Male

In 1965, Jacobs *et al.* published their preliminary findings of a chromosome survey conducted at a maximum security hospital, The State Hospital, Lanarkshire, Scotland[1]. The most remarkable finding in the completed survey was the discovery among 315 men of nine patients with an *XYY* sex chromosome constitution. Their behaviour, together with their pattern of crime, has now been closely studied. The full clinical details of this investigation will be published elsewhere by us, and this communication directs attention to the ways in which the *XYY* males differ from males with an *XY* sex chromosome complement at the same hospital.

All the patients admitted to this hospital have severely disordered personalities and they have been classified according to whether the cause is known or not. For example, some have brain damage which followed infections, others are epileptics, and others suffer from a psychosis. The largest group of patients have no known cause for their personality disorders. All the men with an *XYY* complement were classified in this category and eighteen other men have been randomly selected from this group for comparison with the nine *XYY* males. Seventeen of the eighteen control males were known to have an *XY* sex chromosome complement, the remaining being one of twenty-seven who had not been willing to be investigated when the chromosome survey was carried out.

There are three ways in which the *XYY* males differed importantly from the controls. First, although the patients in the two groups have penal records of comparable length, those of the *XYY* males include considerably fewer crimes of violence against persons. Thus, the nine *XYY* males had been convicted on a total of ninety-two occasions, but only eight of these convictions (8·7 per cent) had been for crimes against the person, while eighty-one (88·0 per cent) had been for crimes against property. In contrast, the eighteen control males had been convicted on 210 occasions, and forty-six of these (21·9 per cent) had been for crimes against the person while 132 (62·9 per cent) had been for crimes against property. Second, the disturbed behaviour of the *XYY* patients showed itself at an earlier age. This is reflected in a mean age at first conviction of 13·1 yr, compared with a mean age of 18 yr for the control patients, a difference which is significant at the 5 per cent level. Third, in the families of these patients the incidence of crime among the siblings of the *XYY* patients is significantly less than among those of the control patients. Thus, only one conviction is recorded among thirty-one sibs of the *XYY* patients while no less than 139 convictions are recorded for twelve of sixty-three sibs of the control patients.

The distribution of intelligence quotient among the *XYY* males probably reflected the distribution among the patients of the hospital as a whole. Seven were considered to be mentally sub-normal, but it is worth noting that the pattern of behaviour among the two whose intelligence quotients were not unusually low conformed with those of the other seven.

The picture of the *XYY* males that emerges from examination of those detained at the State Hospital is of highly irresponsible and immature individuals whose waywardness causes concern at a very early age. It is generally evident that the family background is not responsible for their behaviour. They soon come into conflict with the law, their criminal activities being aimed mainly against property, although they are capable of violence against persons if frustrated or antagonized. Their failure to respond to corrective measures leads to a sentence of prolonged detention in safe custody at an earlier age than is usual for offences of this kind. All nine men with an *XYY* chromosome complement conform fairly closely to this broad description and it seems reasonable to suggest that their antisocial behaviour is due to the extra *Y* chromosome.

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W. H. Price
M.R.C. Clinical Effects of Radiation Research Unit,
Western General Hospital,
Edinburgh, 4.

P. B. Whatmore
State Hospital,
Carstairs, Lanarkshire.

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Microgeographical and Ecological Distribution of Colour Morphs of *Botryllus schlosseri* (Ascidiacea)

Botryllus schlosseri (Pallas), a compound ascidian widely distributed on European and western Atlantic coasts, is well known for its colour polymorphism, which has been shown to be under genetic control[1–4]. In the Venetian Lagoon *Botryllus* is found chiefly in two typical biotopes: the piles marking the navigable canals which cross the Lagoon, and the beds of *Zostera* which cover its bottom.

A colony of *Botryllus*, founded by a larva, grows by budding up to hundreds and thousands of zooids. Its life cycle consists of a long series of blastogenic generations which at a temperature of 18° C succeed each other at a rate of one a week[5]. Sexual reproduction in the Lagoon starts in April and continues until November. The new colonies in their turn reach sexual maturity in 1 or 2 months, and so several generations co-exist, reproducing at the same time. Like most other ascidians *Botryllus* is hermaphrodite, but, because the ripening of spermatozoa is somewhat delayed in comparison with the ripening of eggs[6], selfing does not occur in the presence of spermatozoa from other colonies. Fertilization of eggs and development take place inside the zooids, and free-swimming larvae are liberated; these settle down and metamorphose within a few hours.

We collected colonies of *Botryllus* in two areas of the Lagoon, Venice and Chioggia, about 20 km apart, from two piles stations in Venice and from a single piles station and a *Zostera* station in Chioggia. The two stations in each area were about 1,300 m apart. The colonies on the beds of *Zostera* were collected at an average depth of 2·5 m and those on the piles from this same depth up to the surface. Samples from each station were collected in March and July 1964, the March samples accounting for the composition of the population after wintering and those of July including also the first generations of the new year.

The colonies were classified in the laboratory according to the presence or the absence in the zooids of (*a*) orange pigment and (*b*) an intersiphonal double band. These are genetic characters controlled by two independent genes[1–4], both with an allele for the presence of the character dominating over an allele for the absence. A total of 2,587 colonies were examined; their distribution in the samples taken from the different stations and the frequencies of one of the phenotypes related to either gene considered are reported in Table 1.

The χ^2 test by the Brandt and Snedecor method was used for the statistical analysis of the samples. The results, which are given in Table 2, may be summarized as follows: (1) the two samples from each station do not differ significantly in either character; (2) the same is true of the animals taken from the two piles stations in Venice, whereas those sampled from the two stations, the