100, 107; 1944; see *The Lancet*, 542, Oct. 21, 1944), which indicates that intravenous administration of *p*-amino-hippuric acid delays the renal excretion of penicillin, merits further trial.

Lieut.-Colonel Bigger (*The Lancet*, 400, Sept. 23, 1944) claims that penicillin is, contrary to the statement made about it by many writers, inactivated by human blood or serum. The degree of inactivation varies, however, considerably with different specimens of serum and is much greater at body temperature than at lower temperatures. It may lead the bacteriologist to under-estimate the amount of penicillin in the serum of a patient, particularly when the concentration is low. Inactivation *in vivo* is probably chiefly important in cases in which the excretion by the kidneys is slow. The author, discussing the fact that penicillin is excreted chiefly by the kidneys, refers to Sir Howard Florey's comparison of the struggle to maintain an adequate concentration of penicillin in the blood to efforts to fill a bath while the plug is out. If, Colonel Bigger says, penicillin is constantly being inactivated by the plasma, we should add to this comparison a running cold tap and, in view of the difficulties of supply, a boilerman highly conscious of the need for fuel economy. The author also discusses the work of C. H. Rammelkamp and S. E. Bradley (*Proc. Soc. Exp. Biol. and Med.*, 53, 30; 1943), who found that the administration of 'Diodrast' (B.P. diodone) delays the excretion of penicillin.

Marie Kalisova (*Brit. Med. J.*, 597, Nov. 4, 1944) describes "the dramatic effect of penicillin on what would otherwise have been a hopeless case of acute appendicitis" in a child aged four. The penicillin was introduced directly into the peritoneal cavity, and by repeated aspirations of exudate from this cavity and its replacement by penicillin the patient's condition improved and his life was saved.

G. LAPAGE.

ANTISEPTICS

THE first Lister Memorial Lecture of the Society of Chemical Industry was delivered on November 9 by Sir Alexander Fleming, of St. Mary's Hospital, London, at the University of Edinburgh; the title of Sir Alexander's address was "Antiseptics".

Lord Lister, in his epoch-making work, used carbolic acid as an antiseptic in surgery. This had the advantage of attacking all microbes equally, but the disadvantage of being poisonous to man and of destroying the leucocytes or white corpuscles of the blood which themselves act as the chief weapon in the body's own antiseptic armoury. The latest antiseptics, on the contrary, have a much greater effect against certain bacteria but are less destructive to leucocytes; the antibacterial to antileucocytic ratio of penicillin is 250,000, of sulphanilamide 1,000, but of carbolic acid only $\frac{1}{2}$.

Sir Alexander Fleming described his discovery of penicillin in 1929. There had been nothing in the literature to make anyone suspect that a substance with the chemical constitution of penicillin would have antibacterial value. The discovery had to come by chance, and it was his good fortune that the chance had presented itself to him. While working on quite a different subject he noticed that a mould (later proved to be *Penicillium notatum*), growing as a contamination on a culture plate, made a noteworthy change in colonies of staphylococci on the plate. Thanks to his long interest in antiseptics and

to his previous discovery of the natural antiseptic, lysozyme, Sir Alexander kept the plate for examination instead of throwing it away as many bacteriologists must have done before. The lapse of ten years between his discovery of penicillin and its preparation in a concentrated form suitable for therapeutic trial by the Oxford workers was due to the difficulty of concentrating and purifying it. This was a chemical problem. He himself was a bacteriologist.

It is calculated that pure penicillin, even if diluted to 1 in 50 million or more, will inhibit the growth of staphylococci, the common microbe of boils and carbuncles. On the other hand, it is so non-poisonous that, so far as Sir Alexander is aware, no one has yet had enough to poison a man. Like the sulphonamides, it is very specific, affecting certain microbes but having little or no action on others. It seems unlikely that we shall ever get an antiseptic which will affect all microbes without being poisonous to some human cells, but we shall have to arm ourselves with a series of chemicals covering the whole range of microbic growth. This will make it more difficult for the medical man; he will have to pay more attention to bacteriology than heretofore.

Penicillin is not perfect. For one thing, it is so rapidly destroyed in the stomach that it cannot be given by the mouth. There is still scope for the chemist to synthesize it, and then tinker with the molecule so that the imperfections can be remedied. There are thousands of other micro-organisms which may be capable of manufacturing even better antiseptics than penicillin, or ones which might give a clue to the chemical linkages responsible for the destruction of bacteria. The work is not finished—it is just beginning—and it is for the chemists now to carry it further.

THE SCOTS PINE (*Pinus sylvestris*)

By ALEXANDER L. HOWARD

I remember, I remember,
The Fir-tree dark and high.
I used to think their slender tops
Were close against the sky.

THOMAS HOOD.

THIS tree, which is often incorrectly called 'fir' or 'Scotch fir', is a native of Britain, and the most important of our coniferous trees. From earliest days magnificent pine forests have grown in the Scottish Highlands where, as the Rev. C. A. Johns says, the seeds have been carried far and wide by the violent winds which are prevalent in that country, and also by rooks who are "Nature's planters of Pine Woods".

Gerard (1545-1612) speaks of these trees as

"growing in Cheshire, Staffordshire, and Lancashire where they grow in great plentie, as is reported before Noah's flood, but then being overflowed and overwhelmed, have been since in the mosses and waterie moorish grounds, very sound and fresh until this day; and so full of resinous substance that they burn like a torch or linke, and the inhabitants of those countries do call it Firre Wood and Fire woode unto this day."

Some people consider the Scots pine an uninteresting tree, and it is true that when reared under modern conditions in regular rows the conventional habit of its growth is apt to destroy its decorative value.

When planted with other trees it stands out conspicuously; but probably to appreciate its beauty to the full it should be seen as so many famous artists loved to paint it, in a group standing on high ground, thus outlined against the sky.

Under good conditions the Scots pine grows with great rapidity, reaching a height of about 100 ft., a clean bole of 70–80 ft., with a girth of 10–11 ft.

The bark is tough and fissured; the lower part of a dark reddish-brown, and the upper smoother and bright red. In early life the thick bushy foliage grows in pyramidal form flattening out later into tiers of irregular shape.

Johns tells us that in the Highlands of Scotland

“almost every district bears the trace of the vast forest with which at no very distant period, the hills and heaths were covered . . . on the South of Ben Nevis a large Pine forest . . . was burned to expel the wolves.”

One wonders whether Robert Bridges had made a study of scientific forestry when he wrote:

“His spear, to equal which the tallest pine hewn on Norwegian hills . . . were but a wand.”

However that may be, it is a fact that in Norway, Sweden, Finland and Russia the Scots pine has played the most important part in the economic history of these countries; especially in Russia has the subject received intense study, and been given every scientific assistance, but unfortunately the same cannot be said of Great Britain, with the exception of some effort since the establishment of the Forestry Commission.

It is not surprising, therefore, that the quality of British-grown pine has been found generally very inferior to that imported from these other countries. Whereas in the U.S.S.R. an excellent system of grading has been adopted, in most other places, either little attention has been paid to the question, or conditions do not allow of much variation, for the general quality of the timber is fairly uniform, and up to now could not be classed in a high grade. The variation in England, however, is considerable, some districts producing excellent timber while others only poor quality.

Lord Sackville told me that one of his ancestors three hundred years ago brought from Memel Scots pine planks to provide floors for the long galleries at Knowle Park, Sevenoaks, as the trees growing on his own land, though abundant, were of poor quality.

In the time of Samuel Pepys, Scots pine was only imported in one dimension—three inches by nine inches and 12 ft. in length. These were termed ‘deals’ in England; other sizes were termed ‘planks’, ‘battens’ and ‘scantlings’. Curiously enough, whereas the other terms were never adopted except for their real meaning, the word ‘deal’ became known to describe any kind of coniferous wood regardless of size, the name being still used wherever English is spoken.

Samuel Pepys, under date of October 18, 1664, records in his Diary:

“Thence to the Exchange, and so home to dinner, and then to my office, where a full board, and busy all the afternoon, and among other things made a great contract with Sir W. Warren for 40,000 deals Swinsound, at £3.17/- per hundred.”

One hundred deals of similar character would cost to-day £69 17s. Swinsound was a port of Norway,

about a mile from Fredrikshald, close to Frederikstadt, and now called Halden. The deals were hand-sawn and of superior quality. Norwegian imports, under the name of ‘Christiania’, continued, and the name ‘Christiania deals’ was still in use up to 1939. Probably the last shipment into England was in 1878, after which Norwegian supplies failed. From this time forward importations from Sweden, Finland and Russia increased in volume year by year; later supplies were received from Canada, America, southern Europe and Poland. All these revealed an ever-growing destruction of the larger trees. For several years after 1878 shipments consisted of more than 75 per cent of sizes 3 in. by 9 in. and larger, with only 25 per cent of smaller dimensions, but by the year 1939, except for the U.S.S.R., only 15–20 per cent could be obtained of the larger sizes. While with the Russian a better average of large sizes was maintained, not more than one piece in five was free of the centre, whereas in earlier years only one centre piece would be found with four or five quite free. Throughout, the inclusion of sap wood has greatly increased, and scantling sizes are almost all sap wood. The foregoing is a clear indication of the manner in which the forests are being exhausted.

In 1937–38 we expended the immense sum of £51 million on importations from Sweden, Norway, Finland, the U.S.S.R., Esthonia, Latvia, Lithuania, Poland, Yugoslavia and Rumania, the principal of which was Scots pine. This was used for joists, beams, rafters, flooring, etc., and the better qualities for joinery work, doors, window-frames, shelves and cupboards, etc. Prior to this War (1939) trees grown in Great Britain were used only for rough work such as gates and fences, and for estate purposes, but lately so great has been the demand that what was once considered inferior is now regarded of great value. Bearing in mind the vast building operations which will be necessary for many years after the War, Scots pine will be more than ever in demand, and should be planted freely in all suitable areas where the climate and soil are congenial, and reared on the most scientific principles of forestry, in order that the quality may be improved.

PRINCIPLE AND PRACTICE IN VEGETATIVE PROPAGATION

PRACTICES of vegetative propagation of plants, originated in antiquity, and used without change for many centuries, have probably received a greater inspiration from modern science than any other of man's ancient occupations. The discovery of plant hormones made it possible to propagate species which had previously defied the greatest horticultural skill. There are, however, many other factors which have recently been passed in masterly review by R. J. Garner*.

Although the title of the pamphlet places special emphasis on pome and stone fruits, the work includes consideration of a wide variety of plant species, and certain generalizations are possible. New growth is a better source of cuttings than older material, and the presence of abundant stored carbohydrate food also assists this form of propagation. Indeed, soaking cuttings in sugar solution has often induced rooting. Lateral shoots are superior to terminals, and basal

* Imp. Bur. of Hort. and Plantation Crops. (Tech. Comm. No. 14.) Pp. 1–79. (I.A.B. Central Sales Branch, Agricultural Research Building, Penglais, Aberystwyth, Jan. 1944.) 3s. 6d. net.