

remembered, for example, that the deepest shafts at Laurion, some half a millenium earlier, were not all that short of some 400 ft.

That the enormous amount of work done in making these analyses and in collecting the data together was

eminently worth while no one can possibly doubt, and all those interested in ancient metals must owe the authors most grateful thanks. But there is most clearly a long, and very difficult, row still to hoe—how difficult may, perhaps, not yet have been fully realized. F. C. THOMPSON

SWEDISH FORESTRY

THE two well-known Swedish forestry publications, *Meddelanden från Statens skogsforskningsinstitut* and *Kungl. Skogshögskolans skrifter*, are continued in a new series, *Studia Forestalia Suecica**, which began in 1963. This series includes original papers and publication will take place at irregular intervals. Of the first nine numbers, one has an English summary, another gives a condensed version in English and the remaining seven are in English with Swedish summaries. The range of subjects is wide. There are two accounts of resistance-biology concerning Scots pine and the twisting rust and the snow blight fungus. The second is an interesting study of the relative susceptibility to this fungus of different provenances of Scots pine in Sweden. The result of the experiments is confirmation of observations first made in 1923 that the resistance of the northern provenances is far greater than that of the southern ones except that plants from seed collected from the Arctic Ocean coast show a greater degree of susceptibility than plants from the interior of Upper Norrland. Thus the conclusion is reached that southern provenances of Scots pine should not be planted farther north but northern provenances may be introduced towards the south. Two excellent coloured plates show the difference between infected and healthy seven-year-old Scots pine seedlings.

Another interesting mycological paper is an experimental study of the influence of temperature on the antagonistic effect of *Trichoderma viride* on that very important root fungus *Fomes annosus*. The significance of the results—not new but certainly confirmatory—is that *T. viride* is active at higher temperatures than *F. annosus* requires for growth. Thus there may be but a short period during the growing season when *T. viride* can have any appreciable effect on *F. annosus*.

Although it is known what are the relative amounts of water-soluble substances occurring in litter from various

* Skogshögskolan, Stockholm. *Studia Forestalia Suecica*. Nr. 1: *Preparering av Virkesavlägg på Is*. By Av Bengt Ager. Pp. 227. 15 kr. Nr. 2: *Studies on the Germination in Seeds of Scots Pine (Pinus silvestris L.), with Special Reference to the Light Factor*. By Bengt Nyman. Pp. 164. 12 kr. Nr. 3: *Leaching and Decomposition of Water-Soluble Organic Substances from Different Types of Leaf and Needle Litter*. By Nils Nykvist. Pp. 31. 3 kr. Nr. 4: *The Influence of Temperature on the Antagonistic Effect of Trichoderma viride Fr. on Fomes annosus (Fr.) Oke*. By Arne Persson-Hüppel. Pp. 13. 2 kr. Nr. 5: *Resistance of Snow Blight (Phacidium infestans Karst.) in Different Provenances of Pinus silvestris L.* By Erik Björkman. Pp. 16 + 2 plates. 3 kr. Nr. 6: *Melampsora Pinitorqua (Braun) Rostr.—Pine Twisting Rust: Some Experiments in Resistance-biology*. By Allan Klingström. Pp. 23. 3 kr. Nr. 7: *Enzymatic Splitting of Sucrose by Some Strains of Valsa nivea Fr.* By Arne Persson-Hüppel. Pp. 29. 3 kr. Nr. 8: *Determination of Mechanical Damage on Scots Pine Seed with X-ray Contrast Method*. By S. K. Kamra. Pp. 20. (2 plates.) 2 kr. Nr. 9: *Om Kostrads/Inläkts-Analys Inom Skogliga Företag*. By Av Karl Viktor Algvere. Pp. 169. 15 kr. (Stockholm: Svenska Skogsvårdsföreningen, Box 16316, 1963.)

tree species, much less is known about the factors which influence the leaching of these substances. In a well-written paper, the author describes a comparison between seven different leaf and needle litters, and some very interesting results emerge. The total amount leached in a single day when expressed as a percentage of the dry weight of the litter ranges from 25 per cent in ash to 8 per cent in beech. Water-soluble substances are easily leached from leaf litter, especially alder, ash and birch, and slowly from pine and spruce litter. Temperature influences the rate of leaching in some species more than in others, and the amount of water-soluble substances is greater when leaching takes place under anaerobic rather than aerobic conditions. The author also describes the constituents of the water-soluble substances. This is a very useful contribution to an important subject.

In recent years, more and more attention has been directed to forest economics. Why this is so is described in a dissertation (No. 9) which considers managerial-economics (cost-revenue analysis), the objectives of the forest enterprise and its management planning. The present-day profitability of forestry is conditioned by progressive mechanization which is itself a result of the decrease in the supply of man-power and a rise in wages and, in some cases, to falling timber prices. Because some of the traditional methods of calculation in forest economics are based on out-dated theories, it is therefore essential that the subject must be reevaluated and adjusted to those principles which are adopted in general economics. In his final chapter "Management Planning of the Forest Enterprise" K. V. Algrere shows in a most able and succinct manner that, until now, management plans have been rather rigid and he suggests that they should be regarded primarily as an instrument for revenue planning and as a basis for cost planning. The author rightly considers that planning must include establishing the justifiable density of the road network and trying to set certain standards for it. In fact, what he calls "Budgeting as a means of forestry planning" is really a case of tracing the consequences of the different possible courses of action as a result of expressing the planned activities of the enterprise in terms of costs and revenues, which are expected to occur during the planning period. By this means budgeting deals with the enterprise as a whole and thus effects a proper co-ordination of the various components into a joint programme.

C. J. TAYLOR

SPECTRA AND REACTIONS IN HYDROGEN—OXYGEN—NITROGEN FLAMES WITH ADDITION OF CYANOGEN AND NITRIC OXIDE

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IN the course of a programme of work on the combustion of small amounts of various substances under the controlled conditions of a premixed hydrogen-oxygen-

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nitrogen flame at atmospheric pressure we have observed the spectra produced by quantities of about 1 per cent of cyanogen, with and without a further about 1 per cent of nitric oxide in such a flame.

The characteristic emission spectra of the species CN, NO, NH, CH and OH were observed photographically