and that the amount of amyl alcohol formed was equivalent to the quantity of leucine which disappeared in the course of the reaction. It follows, therefore, that the ammonia must be absorbed by the yeast as rapidly as it is produced and be converted into insoluble albuminoid material.

Evidently the formation of fusel oil is dependent on the assimilation of nitrogen by the yeast and it was found, by further experiments, that the addition of asparagine, $H_2NCOCH(NH_2)CH_2CO_2H$, or of certain ammonium salts such as the carbonate or sulphate, all of which liberate ammonia far more readily than the amino-acids, such as the leucines, almost completely prevents the formation of fusel oil. The results were the same irrespective of the kind of yeast employed and of the presence or absence of leucine from the mixture. Solutions of ordinary molasses behaved like those of pure sugar. The formation of fusel oil under industrial conditions appears, therefore, to be due essentially to the presence of amino acids in the mash, and not to those which the yeast contains. It is also obvious that the removal of these acids is not necessary for the prevention of the formation of fusel oil.

The same chemist has also carried out a number of experiments on the production of certain higher and more complicated alcohols from amino acids, in the presence of fermenting sugar. He finds that the action is a general one and that it appears to resemble certain activities in plants. Thus, from phenylalanine, $C_6H_5CH_2CH(NH_2)CO_2H$, he obtained phenylethyl alcohol, $C_6H_5CH_2CH_2OH$, which is the chief constituent of the odoriferous material of the rose.

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BOTANICAL NOTES

HOW TO STUDY THE FUNGI

GEORGE MASSEE, the well-known mycologist of Kew, has brought out a useful 'Text-book of Fungi' (Duckworth and Company, London), which is intended to serve as an introduction to those new lines of research included in the morphology, biology and physiology of the fungi, 'and also to indicate where fuller information may be obtained.' The reader will observe that the book is not, like some of its English predecessors, a book of *information,* only, but it is intended to foster investigation and research, in accordance with present-day ideas as to the proper function of a text-book for advanced students. For it must be remembered that this is no elementary presentation of the subject for children in the secondary schools, or others who have not had a good preliminary training in the 'general botany' courses in the college or university. It is, on the contrary, a book for the college or university student who has already acquired a good general notion of the fungi, and their relations to other members of the vegetable kingdom, and who is now ready to take up their particular study.

The book is roughly divided into three parts: I., Morphology, Physiology, Biology, etc. (195 pages); II., Pathology (36 pages); III., Classification (183 pages). In the first, such topics as the cell, anatomy of fungi, formation of spores, sexual reproduction, asexual reproduction, effect of light, effect of low temperature, respiration, transpiration, enzymes, parasitism, symbiosis, heteroecism, mycoplasm, chemotaxis, geographical distribution, ecology, phylogeny, etc., are taken up at greater or less length, and it is safe to say that any properly prepared student who carefully goes over this part of the book will do so with great profit, and will get a very good modern understanding of these plants. In the second part the student finds helpful discussions of the diseases caused by fungi, the spread of disease by means of hybernating mycelium, legislation against disease-producing fungi, etc. The third part opens with a discussion of the classifications of the fungi, followed by a systematic account of the orders and families. The author arranges all fungi under six orders, namely; Phycomycetes, Hemiascomycetes, Ascomycetes, Hemibasidiomycetes, Basidiomycetes, Deuteromycetes. The text is illustrated with 141 figures, which add much to the usefulness of the book.

A NEW EXPLANATION OF THE TOLERANCE AND INTOLERANCE OF TREES

Before a recent meeting of the Society of American Foresters Mr. Raphael Zon read a paper presenting the new explanation of the tolerance and intolerance of trees.

The theory of tolerance as formulated by Pfeil and Gustav Heyer and the classification of trees into light-needing and shade-enduring is the foundation upon which the forester bases all his practical work in silviculture. Many biological, ecological and silvicultural facts have, however, been accumulating which tend to show that the increased growth of trees after thinning or the possibility of securing reproduction of certain species only in full light or after heavy thinnings, are due chiefly to temperature and moisture condition, and, not, as has been supposed, to light requirements. It has been found, for instance, that the same structural differences which occur between trees growing in the open and trees growing in the shade, such as the reduction of leaf surface, the diminution of intercellular spaces, the lengthening of the palisade cells, etc., occur also between trees growing in dry or in moist situation, or in a dry or humid atmosphere. It has also been observed that trees within the same climatic region are more tolerant of shade when grown in fresh or moist soils, than when grown on dry or poor soils.

Fricke, a German silviculturist, has proved recently by a number of very interesting and convincing experiments that the failure of Scotch pine to grow under the shade of mother trees was not due to lack of light, but to deficiency of moisture, which is a result of competition with the roots of the larger trees.

In a stand of pine about one hundred years old, with a crown density of 0.7, growing on poor sandy soil, where the light requirements of pine are greatest, a number of isolated groups of suppressed young pines were located. The young pines were ten years old and about a foot and a half high. These groups were surrounded by ditches so that the roots of the neighboring large trees were cut through to a depth of ten inches. The little trees within the ditched areas immediately responded. The needles had double the length of the preceding summer, the terminal shoots became longer and the growth generally thrifty and has continued so, while the young growth not surrounded by ditches retained the same suppressed character. Subsequently he determined by analyses that the soil moisture content in the areas surrounded by ditches was from 30 to 40 per cent. higher than that on contiguous areas not ditched and penetrated by the roots of living trees.

It must, therefore, be conceded that the moisture conditions play an extremely important part in determining the behavior of trees growing in shade and in light, and that the rôle which light plays is by no means an all-important one. The theory of the tolerance and intolerance of trees as hitherto understood is not tenable and must be thoroughly revised.

A LABORATORY MANUAL

Some time ago Bergen and Davis's book entitled 'Principles of Botany' was noticed in these columns (Science, January 25, 1907). We have now a companion or supplementary volume in the 'Laboratory and Field Manual of Botany' (Ginn) by the same authors, intended for the use of pupils in high schools, and perhaps in the smaller colleges. It includes ten or eleven chapters on such topics as laboratory methods and equipment (full of excellent suggestions); structure and physiology of seed plants (accompanied with forty-two suggestive experiments); type studies, preceded by the study of the plant cell (beginning with simple forms and passing regularly to higher and higher types); ecology (accompanied with many studies); botanical microtechnique (full of excellent advice); culture methods (containing much of great practical value); material, apparatus, and supplies (a most helpful chapter for the teacher); bibliography (carefully classified); glossary, etc. The book is so evidently the result of years of experience by the authors in the supervision of botanical laboratory work that we are not surprised at its air of practicality and work-

ableness. It must prove most useful in the better class of high schools.

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LINNÆUS AND THE NEW YORK ACADEMY OF SCIENCES

THE commemoration on May 23 by the New York Academy of Sciences of the two-hundredth anniversary of the birth of Linnæus took place in accordance with the program that has already been printed in SCIENCE. In the morning exercises were held in the American Museum of Natural History, where there was an exhibition of animals and minerals known to Linnæus; a presentation of letters by delegates from other societies, and an address by Dr. J. A. Allen on 'Linnæus and American Zoology.' After luncheon had been served to invited guests, the exercises were resumed in the New York Botanical Garden, where there was an exhibition of American plants known to Linnæus; an address by Dr. P. A. Rydberg on 'Linnæus and American Botany,' and lantern slides of American flowers known to Linnæus were exhibited by Dr. H. H. Rusby. In a walk through the garden, trees known to Linnæus were pointed out by Dr. W. A. Murrill. Later the bridge over the Bronx River on Pelham Parkway between the Botanical Garden and the Zoological Park was dedicated in memory of Linnæus and a bronze tablet was unveiled. The tablet was presented by Dr. N. L. Britton, president of the New York Academy of Sciences, and was accepted by the commissioner of parks of the Bronx. Addresses were also made by Dr. George F. Kunz, president of the American Scenic and Historic Preservation Society, and by Mr. Emil F. Johnson, president of the United Swedish Societies of New York. There was singing by the American Union of Swedish Singers, and the Swedish minister to this country and the Swedish consul of New York City were present. Subsequently there was an exhibit of animals known to Linnæus in the New York Zoological Park. In the evening the exercises were continued at the Museum of the Brooklyn Institute of Arts and Sciences, addresses being made by Mr. F. A. Lucas and Mr. E. L. Morris. There was a reception at the New York Aquarium given by the New York Zoological Society to the New York Academy of Sciences. The committee of the New York Academy in charge of the celebrations was: Nathaniel L. Britton, Hermon C. Bumpus, William T. Hornaday, Frederic A. Lucas, Charles H. Townsend, William Morton Wheeler.

SCIENTIFIC NOTES AND NEWS

M. DOUVILLE has been elected a member of the Paris Academy of Sciences in the section of mineralogy in the place of Bertrand.

PROFESSOR A. S. WARTHIN, of the University of Michigan, has been elected president of the American Association of Pathologists and Bacteriologists.

PROFESSOR CHARLES F. BURGESS, of the department of chemical engineering of the University of Wisconsin, was elected to the presidency of the American Electro-chemical Society at the fifth annual meeting held in Philadelphia.

ON the occasion of the centennial of the University of Maryland honorary degrees will be conferred as follows: Doctor of science—Dr. Henry D. Fry, Baltimore; Dr. Alexander C. Abbott, University of Pennsylvania; Dr. Henry J. Berkley, Johns Hopkins University; Edwin S. Faust, Strassburg; Dr. Isaac Stone, Washington, D. C.; Dr. Charles P. Noble, Philadelphia; J. Homer Wright, Harvard University; Dr. J. Whitridge Williams, Johns Hopkins University; Dr. N. G. Keirle, Baltimore. Doctor of laws—Dr. Wm. T. Councilman, Harvard University; Major-surgeon James Carroll, U. S. A., Washington, D. C.; Dr. Simon Flexner, Rockefeller Institute for Medical Research; Professor W. D. Halliburton, King's College, London; President G. Stanley Hall, Clark University; Dr. Francis L. Patton, Princeton, N. J.; Judge James McSherry, Frederick, Md.; Surgeon General Walter Wyman, U. S. N., Washington, D. C.; Dr. S. J. Meltzer, New York City; Professor William T. Porter, Harvard Medical School; Dr. William J. Mayo, Rochester, Minn.; Pro-