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SHOULD MEDICAL INVENTIONS BE PATENTED?

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FOR some years the medical profession has been confronted with the question of whether or not it is ethical to obtain patent protection on medical inventions. The pros and cons of this question have been argued ad infinitum, and so far as the writer can determine in his contacts with members of this profession no general agreement has as yet been reached. It appears that on this subject the medical profession is still split roughly into two groups, one of which asserts that it is quite proper to obtain patent protection on medical inventions, and the other of which asserts that such procedure is unethical and a violation of the doctor's duties to the public.

The writer has on frequent occasions been retained by doctors to obtain patent protection on their inventions, and during the course of this work he has invariably been requested to give his views on the desirability of patenting medical inventions from the standpoint of the doctor's duty to the public. Because of the apparent interest of the medical profession in this question it is believed that a brief résumé of the fundamentals of patent law and their application to medicine, biochemistry and related fields might be of assistance to those physicians who at some time during their careers may become inventors and be confronted with the difficult question of what they should do with their inventions.

Although the writer's profession is patent law every effort has been made to approach this question from as fair and impartial a position as possible. The reasoning upon which the conclusions are based has been reduced to practically axiomatic principles, and it has been attempted to explain these principles in such plain language that the non-legal reader should have no difficulty in forming his own opinions. In this manner it is believed that any unintentional bias will be most successfully avoided.

Before going into this article further it might be

in certain outbreaks is attributable not only to the microorganism, but also to certain of the materials incorporated into the ration to stimulate growth of the bird. Powdered skim-milk and buttermilk in certain formulas for chick rations seem to be the most flagrant offenders in this regard. Too many wheat middlings are under suspicion also. The cardinal problem in coccidiosis control is to construct a ration that is adequate in vitamin and vitamin-like materials for the normal development of the host, but at the same time lacks inordinate coccidium-stimulating properties. The third diet described above is a step in this direction.

This investigation is being supported in part by grants from the American Academy of Arts and Sciences and from the Industrial Science Research Fund at Iowa State College.

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THE FERMENTATION OF CIGAR-LEAF TOBACCO[1]

CONTRARY to the observations of Loew,[2] investigations at the Pennsylvania Agricultural Experiment Station emphasize the significance of microorganisms in the normal fermentation of cigar-leaf tobacco. An epiphytic flora, consisting chiefly of members of the genera *Bacillus, Staphylococcus, Aspergillus, Penicillium, Rhizopus* and *Mucor,* was found upon the cured leaf. During the fermentation, species of the genus *Bacillus* were found to multiply rapidly; agar plate counts of these organisms increased from values of less than 500,000 per gram to values in excess of 2,000,000,000 per gram. Direct counts revealed increases from an initial figure of less than 500,000,000 per gram to counts greater than 15,000,000,000 per gram. The rate of multiplication depended, among other factors, upon the quality of the substrate, the amount of moisture present and the temperature maintained. Although members of this genus were present in the spore state at the end of the curing process, chains of vegetative cells of this group appeared in the early stages of the subsequent fermentation. Two types take part in this extensive multiplication of spore-formers. One type was easily identified as *B. megatherium.* The latter organism represents either a peculiar variation of *B. subtilis,* or it may be classified as a previously undescribed species. The second organism is a slender, motile rod, forming central to excentric spores. The response of this bacillus to biochemical tests corresponds closely to the reactions of *B. subtilis.* Colonies upon agar are spreading, adherent and somewhat mycoides-like.

Staphylococci were frequently observed upon cured and fermenting tobacco. Occasionally the numbers equaled or exceeded those of bacilli, but in many cases the normal fermentation progressed without the appearance of this organism; on the other hand, bacilli were always found in the fermenting tobacco.

Although present in significant numbers on cured tobacco, members of the genera *Aspergillus, Penicillium, Mucor* and related types were found to decrease in number during the course of the fermentation. It was found, however, that an acid-agar medium was of value in the study of cured and curing tobacco. The predominance of *Aspergilli* and *Penicillia* on these plates seemed to indicate a tobacco difficult to ferment. This, apparently, is associated with the degree of complexity of carbohydrate and nitrogenous material in the leaf.

Studies of the catalase activity of the tobacco revealed a direct relation between the number and the activities of the microorganisms on the leaf. Low bacterial counts were invariably accompanied by slight catalase activity and high counts by considerable catalase activity. Any experimental treatment of the leaf that resulted in the inhibition of bacterial growth prevented increases in catalase activity. Any increase in catalase activity was accompanied by an increase in bacterial numbers. Catalase activity was restored to tobacco rendered inactive by heat treatment when inoculated with cultures previously isolated from tobacco.

This work will be reported in detail in a series of technical bulletins of the Pennsylvania Agricultural Experiment Station.

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[1] Authorized for publication on July 29, 1937, as paper No. 781 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

[2] O. Loew, "Curing and Fermentation of Cigar-Leaf Tobacco," U. S. Dept. Agr. Rep't. 59, 1899; "Physiological Studies of Connecticut Leaf Tobacco," U. S. Dept. Agr. Rep't. 65, 1900; "Catalase, A New Enzyme of General Occurrence, with Special Reference to the Tobacco Plant," U. S. Dept. Agr. Rep't. 68, 1901.

BOOKS RECEIVED

GOLDSCHMIDT, RICHARD. *Ascaris, the Biologist's Story of Life.* Pp. ix + 390. 160 figures. Prentice-Hall. $3.25.

GROVE, W. B. *British Stem-and-Leaf-Fungi; Coelomycetes.* Vol. II. Pp. ix + 407. 133 figures. Cambridge University Press, Macmillan. $6.00.

MORGAN, WILLARD D. and HENRY M. LESTER. *The Leica Manual.* Pp. 553. 437 figures. Morgan and Lester, New York.

TITCHMARSH, E. C. *Introduction to the Theory of Fourier Integrals.* Pp. x + 390. Oxford University Press. $6.00.

ZEMANSKY, MARK W. *Heat and Thermodynamics.* Pp. xii + 388. 101 figures. McGraw-Hill. $4.00.