Does Patent Consciousness Interfere With Cooperation Between Industrial and University Research Laboratories?

L. A. Hawkins, *Consultant, Research Laboratory, General Electric Company, Schenectady, New York*

ALTHOUGH OUR PATENT SYSTEM IS among the older of our national institutions, there still appear to be misunderstandings concerning it which are not confined to the less educated portion of our public.

A recent meeting of scientists brought forth an implied criticism of our patent system in the statement, which seemed to meet acceptance with many, that overconcern for patents caused many industrialists to draw an iron curtain around their research laboratories, thereby excluding from their research staffs the visits of other scientists and preventing the mutually helpful interchange of information and the stimulating exchange of ideas which are vital to the rapid progress of scientific knowledge.

In every occupation of mankind there are shortsighted individuals, and there may be some industrialists who would prefer to confine their research men in an ivory tower, but it is strange that such a policy should be blamed on the very institution which makes such a policy needless and foolish.

If we had no patent system, then indeed it would be necessary for an industrialist, if he had a research laboratory, to make the hard choice between free scientific exchange, with the practical certainty of frequent and immediate financial loss, and scientific isolation, with the long-range certainty of ultimate sterility. Or perhaps he might attempt a compromise, with the probability of incurring both kinds of loss. Under such conditions, probably very few companies would start or long maintain a research laboratory. It would need a farsighted, courageous, and patriotic industrialist with a long pocketbook to undertake research under such conditions. Such a man, fully realizing that in the long run industrial progress is dependent on scientific research, and that, if there were no industrial research in this country, his whole industry and his company along with it would suffer mortally from competition of other countries where industrial research conditions were more favorable, would decide that he must support some research, even in the face of certain immediate loss in domestic competition.

Our patent system obviates the necessity for such hard decisions. It makes it possible to operate a research laboratory with doors wide open to the stimulating visits of outside scientists, without loss and with the great benefit of the mutual fertilization of ideas which such visits produce.

Patenting an invention protects the inventor or his employer from the gratuitous pirating of its benefits by others. If others wish to share in those benefits, they may be made to share in its cost, through reasonable royalty payments. The effect on the research man in industry is that he is free to welcome fellow scientists from universities or other industrial laboratories, exchange information with them, discuss experiments, compare ideas, and argue on theoretical matters.

The prime function of a research laboratory is to seek new scientific facts. A newly-discovered fact may suggest a patentable application or new material, but the invention is incidental to the scientific work which claims the research man's main interest and which is not patentable. If there were no patent system, not even that scientific work could be freely discussed with fellow scientists for their mere presence in the laboratory would involve possible loss, through their observing and disclosing, quite possibly in all innocence, to its competitors practical developments in progress in the laboratory. Without a patent system, the only safeguard for discovery and its practical applications would be complete secrecy. Furthermore, no industrial research laboratory could safely welcome visitors or send its men to meetings of scientific societies except in the role of sponges, permitted only to absorb in silence.

With our patent system the industrial scientist may enjoy all the freedom to give and take which is possessed by his peers in the universities. The only restraint on his tongue or pen is that, if his work suggests a possible patentable practical application, his first disclosure should be to his patent attorney; and, if the latter thinks a patent application advisable, reasonable time should be given to prepare the necessary papers before further disclosure is made. If he observes this trifling and temporary restraint, the industrial scientist may enjoy to the full his intercourse with his fellows, free and unconstrained, and the institution he serves may reap the undoubted benefit such intercourse yields.

A few industrialists and possibly a very few directors of research may not even yet be fully awake to the opportunity of free scientific exchange in safety which our patent system makes possible. The increasing frequency of exchange of visits between industrial laboratories, as well as between these and the universities, shows that the number of those who have not yet seen the light is small and is growing smaller. As concerns those few, to blame the patent system rather than their

individual blindness for their shortsighted policy is surely an error.

No human institution is perfect, and our patent system is a human institution. Indeed the advisory committee appointed by President Roosevelt has recommended certain minor changes in it, which informed opinion quite generally believes might be adopted with advantage by Congress, but the basic principles of that system the committee found to be sound.

Their finding seems supported by the record. With that system in force, our Nation has achieved the greatest fertility in invention and the greatest industrial progress the world has yet seen. Many a small manufacturer, protected by his patent, has built up a highly prosperous business with some meritorious specialty. Manufacturers large and small, to the number of over 2,500, relying on the patent protection they could obtain for applications of research, have founded and are profitably operating research laboratories and thereby helping in the advancement of their industries, the national economy, and scientific knowledge. As for the scientist himself, if he wishes to take advantage of the facilities offered by an industrial laboratory for research in his special field of interest and if he finds that he may do so with no sacrifice of his precious privilege of free discussion with his fellow scientists, whatever their associations may be, he should give thanks where thanks are due—to our patent system.

Theory of Reactions of Cells to Goitrogenic Thiopyrimidines

Louis Laufer and Earl D. Stewart

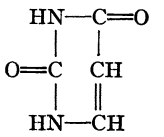
Schwarz Laboratories, Inc., New York City

CERTAIN SULFANILAMIDES, as well as thiourea and its derivatives, have been found by Astwood (*1*) to be effective in the treatment of hyperthyroidism. One of the most potent of these derivatives is thiouracil (II). Clinical tests (*7*) on more than 1,000 patients have proved its curative value. In about 10 per cent of the patients, however, toxic reactions such as skin rashes, urticaria, fever, agranulocytosis, and leukopenia occur in the first five weeks of treatment and, as a result, a number of deaths due to the administration of thiouracil have been reported. Thiothymine (IV), or 5-methyl thiouracil, has also been tested (*10*) on rats and clinically, and found to be less effective than thiouracil in cases of thyrotoxicosis.

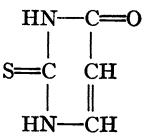
Reports by Astwood (*2*) and by Leys (*4*) have shown that alkyl substitution in the 6-position of the pyrimidine yields products which are as active, or more active, than thiouracil without any toxic reactions appearing in clinical tests. Thus, 6-normal propyl thiouracil (VI) (*2*) is about 11 times as active as thiouracil. Miller, *et al.* (*6*) showed that thiopyrimidines react with several equivalents of iodine, supporting the hypothesis that these compounds may prevent thyroid hormone synthesis in the gland by blocking the iodination of hormone precursors. They also state that these compounds may decrease iodine liberation by action on the appropriate oxidative enzymes and suggest this also as an explanation for the antithyroid action of the sulfa drugs.

We would like to go somewhat further in explaining the action of the mercaptopyrimidines, basing the explanation on the available evidence. We would postulate that thiouracil and thiothymine, in addition to reacting with iodine, act as antivitamins or antibiotics. The term "antibiotic" is used here somewhat more generally than may be customary, for lack of a better way of expressing the effect of any agent whose presence interferes with or prevents normal cell proliferation *in vivo*. The cells may be those of microorganisms foreign or injurious to the host, or cells of the body tissues or circulatory system of the host proper.

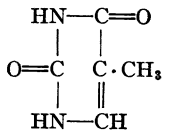
Snell and Mitchell (*8*) have proved uracil to be an essential metabolite for the growth of microorganisms, very strongly suggesting vitamin action. Similarly, thymine (*9*) can partially replace folic acid as an essential nutrilite for lactic acid bacteria. The structural similarities of uracil (I) and thiouracil (II) and of thymine (III) and thiothymine (IV) are shown below.



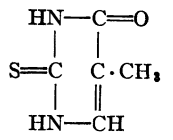
(I)



(II)



(III)



(IV)

The conversion of a vitamin or an essential nutrilite