

**PRIVATE & CONFIDENTIAL**

Research & Development Establishment,  
British-American Tobacco Co. Ltd.,  
SOUTHAMPTON.  
21st January, 1955

**DOCTOR JORGEN LAM**

Dr. Lam visited R. & D. Establishment on January 14th-15th.

He is a lecturer, teaching chemistry to Medical students, at the Chemical Institute of the University of Aarhus, Denmark. He has been working for the past few years on problems connected with the composition of tobacco smoke and has published several papers dealing with temperature measurements during the combustion of cigarettes, cigars and pipes, and with the determination of the amount of benzo[a]pyrene and other aromatic polycyclic hydrocarbons formed during the pyrolysis at different temperatures of aliphatic hydrocarbons, isolated from cigarette stubs, or of a similar synthetic aliphatic hydrocarbon, diethyl.

More recently, he has become interested in two other aspects

- (a) the products of the further pyrolysis of aromatic polycyclic hydrocarbons
- (b) the pyrolytic products of the phytosterols.

He feels that the possible re-combustion of condensed aromatic hydrocarbons is a greater source of danger than is benzo[a]pyrene itself. He claims to have isolated small amounts of phytosterols from tobacco (? smoke), in the leaf of which they are known to occur. These sterol substances are hydroaromatic compounds, closely related to cholesterol, Vitamin D and the bile acids. He was questioned as to whether he suspected, or had found, methylcholanthrene in his products. (This is a strongly carcinogenic polycyclic hydrocarbon which can be derived by pyrolysis of

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certain bile acids, e.g. cholic acid.). Dr. Lan admitted that while the thought had occurred to him, he had been unable to detect the presence of this substance.

He was shown all the equipment used by the Smoke Group, from the autosmoker to the recording microphotometer and the various techniques employed were discussed at length. The dangers were emphasised of using only such techniques as ultra-violet spectrophotometry for the identification and estimation of micro-quantities of materials in tobacco smoke and he agreed with this.

The applications to which the methods had been put were explained, e.g. "fronts" and "backs" of cigarettes, attempted catalysis, etc., and Dr. Lan appeared to be impressed with the work and the results to date. He suggested a catalyst might lower the burning temperature of a cigarette and was interested to learn that so far we had not been able to achieve this result.

He has never, in fact, worked with tobacco smoke, but has confined his attention to pyrolysis, in a tube furnace at various temperatures, of the hydrocarbons he has extracted from stubs. His researches to date have been entirely unaided and he is seeking a grant to cover the salary of a girl technician as assistant. It was pointed out to him that his conditions of formation of benzpyrene etc. were highly artificial and hardly resembled those in a cigarette. He found that the amount of benzpyrene formed fell off sharply with decrease in pyrolysis temperature. The inconsistency of this observation with the recorded greater amount of

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benzopyrene per gram of tobacco combusted in the case of pipe smoke (formed at a relatively lower temperature) was discussed without any firm conclusion being reached.

His separation of aromatic polycyclic hydrocarbons was in agreement with the earlier findings by Dr. Hughes and his temperature measurements agreed with those of Dr. Cronshaw. He had not carried the analysis of these measurements to the same degree as was done at R. & D., nor had he considered the effect of conduction along thermocouple leads. He had not been so much interested in absolute values as in finding roughly comparable conditions for his pyrolysis experiments.

Dr. Jan expressed interest in the work of Lindsey and Cooper and hoped to see them on his return to London. He was then going to Paris to see Duval and Lacouragne. The question of 3,4,9,10-dibenzopyrene in tobacco smoke was discussed and he was informed of the assessment which Dr. Bentley and the writer had formed of the work of Pernet and Neukorn at Lausanne. He agreed that on the flimsy evidence which they found, he would not be prepared to accept the presence of this substance in smoke.

He raised the question of the work of Bard and his associates, which led to a discussion of the methods used to produce paper "tars" and the estimation therein of benzopyrene by both these and the French workers. The relationship between the various groups of French workers (Cusin, Duval, Latarjet, Royer) was explained. He was urged to raise this point with them, since the paper is combusted in a highly artificial manner.

Dr. Jan seemed to think that atmospheric pollution plays a big

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part in the cancer problem, and apparently has been trying to interest Glemesen into doing a statistical study of the pollution-lung cancer connection for commuters who pass through an underground railway station (in Copenhagen?). He seemed particularly impressed by the work of Kotin and Falk in Los Angeles, whom he visited during his stay in Canada and the U.S. They have studied the formation, composition and biological effects of smog, engine exhausts, etc.

We had hoped to glean information on Wright's work at Toronto, and of others whom he visited in the U.S., e.g. Tennessee Eastman, at Kingsport, Tenn., Wynder at New York. Ian was very reticent on these aspects; he claimed very little knowledge of what Wright was doing before, during or after his stay. He did remark that he thought Wright's method of attempting to separate smoke condensate by means of picric acid precipitations was rather foolish. He mentioned that Wright had two Indians working for him and that he felt their work to be unreliable. We formed the impression, possibly erroneous, that his stay in Canada had not been altogether happy.

On the whole, Ian impressed us as a sincere and honest worker, who is a reasonably good chemist with considerable experience in the fractionation of the aromatic polycyclic hydrocarbons by chromatography.

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His further work would appear to be along the lines mentioned above. He certainly seems to be worthy of some financial support and encouragement. Since he has not been able, in general, to devote his whole time to research, the extent of his work to date is very praiseworthy. The help which a good assistant could give him would be considerable. Although his work is only connected with cigarettes remotely (at one remove, so to speak), nevertheless, he is exploring pathways which are relatively untrodden, but which could have a bearing on the problem.

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