

PRIVATE & CONFIDENTIAL

Research & Development Establishment,
British-American Tobacco Co. Ltd.,
SOUTHAMPTON.

VISIT TO THE TED BATES AGENCY, 666 FIFTH AVENUE, NEW YORK CITY.
FRIDAY 9th MAY, 1958.

Persons seen: Mr. A.M. Foster
Mr. D.C. Loomis
Mr. T.H. Black:

As a result of conversations with Mr. Dodde, a visit was made to the above Agency for discussions.

Mr. Loomis and Mr. Black are advertising account executives dealing with the accounts of Brown & Williamson Tobacco Corp., and particularly with advertising matter for VIGORIX cigarettes. Mr. Foster is a management executive of the Agency with responsibility in this field.

The Agency was approached some time ago by a consultant scientist who had been carrying out some preliminary examination of tobacco smoke from various cigarettes and who claimed to have found results which could be of interest to agencies engaged in cigarette advertisement. This scientist was thereupon retained by the Agency to do further studies and these were augmented by independent work in a second consultant laboratory.

The scientists are Mrs. Wanda Farr and Mrs. Althea Revere. One works in a laboratory on Martha's Vineyard, an island off the coast of Massachusetts, and the other in Camden, Maine. One of them, (Mrs. Revere ?), is an electron microscopist who worked at one time for the General Electric Company; the other employs optical microscopic techniques.

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The work falls into at least two phases. Only Phase I has been completed, and this is described below.

Cigarettes, purchased on the open market, are smoked at each laboratory and samples of the smoke are collected by different techniques. Each scientist examines five samples of smoke from each brand of cigarettes, the area of the sample examined being selected by the experimenter at her discretion. According to Mr. Foster, no contact between the two laboratories occurs until after the photographs and data on each brand have been collected. I could not ascertain whether the conclusions drawn from these results are arrived at collectively or independently.

Optical Microscopy

The cigarettes are smoked in a smoking machine of the type developed by the American Tobacco Co., and the smoke is accumulated in a chamber of 300 ml. capacity. The smoking conditions are: one puff per minute, of 35 ml. volume. Three puffs are taken from the beginning of the cigarette and three from the middle portion.

The combined smoke from the six puffs is then allowed to settle for 3 hours onto a microscope slide, placed beforehand in the chamber. It is then covered by a second slide and examined under the microscope at a magnification of 100.

Large agglomerates of droplets are seen. Certain of these are uniform in appearance, but some are of two or three phases, as indicated by the intensities of the brown colorations of various areas. There is, moreover, in nearly all cases a speckled background, referred to as the 'matrix'.

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Many cigarettes of differing brands give pictures, under these conditions, which show the presence of particulate matter. These have been identified in specific instances as particles of tobacco, animal hairs (rabbit), paper hairs, fungus spores and crystalline material. In addition, in the case of filter-tipped cigarettes, filter fragments (e.g. Estron) and, in those cases where filter additives are employed, particles of additive material are claimed to have been identified.

Conclusions concerning the viscosity and nature of the condensed smoke are drawn from the appearance of the edge of the liquid agglomerate, i.e. the thickness of the interfacial boundary due to the change in refractive index is taken as evidence for a more viscous material with a highly curved interface.

VICEROY cigarettes, both with filter tip removed and intact, were compared with four regular brands and four filter-tipped brands. The regular brands examined were CAMEL, LUCKY STRIKE, CHESTERFIELD, PHILIP MORIS and VICEROY (without the filter); the filter-tipped brands were WINSTON, MARLBORO, TAREYTON, KENT and VICEROY.

On the basis of the cleanest smoke, i.e. that with fewest particles of solid matter in the areas examined together with the most homogeneous liquid agglomerates, filter-tipped VICEROY had the cleanest smoke and VICEROY without the filter came third. Filter-tipped VICEROY gave fewest solid particles but some of the liquid agglomerates were two-phase globules.

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Electron Microscopy

Smoke prepared from the first three puffs only of a cigarette is allowed to impinge directly onto a thin platinum screen backed by a plastic. The samples are examined immediately in the electron microscope at a magnification of 20,000.

Mr. Foster was sure that most of the samples were unshaded by metal before examination. I forbore to point out that either technique requires high-vacuum operation and that, therefore, all substances which are volatile are thereby removed. What is photographed is the "ghost" of what was originally present.

The photographs showed spherical droplets of as small as 0.01μ in diameter, together with some larger droplets. Some of the samples gave evidence of fibrous matter, which was "identified" as tobacco stem material, although it was only $0.1 - 0.01\mu$ in diameter. Evidence of much larger particles was provided by irregular areas of shadow on the electron-micrographs.

A peculiar feature was associated with the smoke from FULLER BROS'S cigarettes, in that it appeared to act as a solvent, or as a reactant, for the plastic backing to the platinum grid. This was indicated by irregular tears in the background, distinguishable from the normal "pin holes" which occurred in nearly all photographs.

The differences between cigarettes of different brands were less clearly discernible using this technique, probably because of the much smaller area of sample covered. Once again, VICTORY gave the cleanest smoke in terms of freedom from solid matter.

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The Implication Behind the Work

Mr. Foster pointed out that the definition of smoke "tars" was very variable and that the weight of "tars" reported depended upon the method used in estimation. He stated that the outcome of the F.T.C. hearings in Washington on the subject of tar measurement and filter evaluation was to the effect that the measurement, and hence the definition, of tar was a matter for personal preference. It is true that the Consumers Union procedure, which reports the weights of chloroform-soluble tar, will fail to record the weight of insoluble material or foreign matter. This objection should not apply to the Foster D. Snell method, reported in Readers' Digest, which approximates to the method used at Southampton for standard whole tar.

Mr. Foster rightly insisted that much of the weight so recorded is not "tar", but includes the weight of volatile materials which steam distil from the cigarette. He has taken note of recent work by Kotin, in Los Angeles, and of a study by Dautreband, Cartry, van Harkorn and Ceroghoti, entitled "Essai de l'evolution de la Silicose", published as a monograph by Union Miniere du Haut-Katanga, 1954. Both these studies suggest that tar in the presence of solid particles is more active biologically than are either tar or particles individually.

He therefore wishes to argue that since VICEROY gives a "clean" smoke, i.e. little evidence of solid particles or of two-phase globules under the optical microscope, it is not so important that VICEROY yields a relatively high smoke "tar" as measured.

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Further Action Planned

Mrs. Farr and Moore have written a monograph on the work, illustrated with colour micrographs and electron micrographs, and in which brands are identified by name and the financial assistance of Brown & Williamson is acknowledged. This will be published by Life Research Foundation (a non-profit organisation, presumably controlled by the Ted Bates Agency) by placing copies in the Library of Congress, certain University libraries and by private circulation to some 2,000 selected physicians. Once the work is published then matter given in the monograph may be quoted in advertising copy.

Mr. Foster and Mr. Loomis are a little uneasy to let this loose on the world and would have been glad to have had independent corroboration. They are, to a considerable extent however, dependent upon successful advertising campaigns.

Phase II of the work will be concerned with microchemical analysis of the various objects and droplets described.

Comments

This seems a highly equivocal piece of work with dangerous aspects and which could rebound badly.

It depends mainly upon the results from optical microscopy. The fact that small particles of additives or of tobacco can be detached is hardly surprising. The attribution of small fibres from non-filtered cigarettes to a contribution from the cigarette paper rests on very tenuous evidence and the observation may be of an artefact arising from the use of tissues used to clean the slide before the

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experiment or from the atmosphere. Atmospheric contamination could also account for the animal hairs. One fibre does not mean much by itself. The presence of crystalline material may be of interest in relation to the use of certain casing materials. CHESTERFIELD cigarettes give a smoke showing no crystals. Does this brand contain naphthol in the casing material or is it merely flavoured?

The meaning attached to the two and three-phase globules is very questionable and the viscosity conclusions are equally dubious when one considers the manner in which the samples are prepared. The "matrix" possibly corresponds to the true particle size of the smoke. To draw any worthwhile conclusions about the nature of the aerosol from the observation of a stale smoke deposit which is then compressed between two slides in a non-standard way is taxing credibility.

The criticisms apply less strongly to the electron-microscopic samples - apart from the important objection already made regarding the loss of volatile material. The size of the smoke droplets is about right for tobacco smoke i.e. $1.0 - 0.1 \mu$, remembering that some material has been volatilised. Particles already observed in optical microscopy will naturally appear bigger under the electron microscope; but this does not reinforce the argument any more strongly.

The synergistic effect of solid particles upon biological damage caused by tar (or of tar upon damage caused by solid particles) may be a valid one. However, a smoker inhales dust and soot constantly and a reduction of a minute quantity introduced concurrently with tobacco smoke would not appear to matter. On the other hand, evidence

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is accumulating that a reduction in biological activity of smoke goes hand in hand with a reduction in "tar", although it has not been placed yet on a firmly quantitative basis. Thus the weight of "tar" is meaningful on a comparative basis.

Brown & Williamson emerge from the monograph as far too obviously the interested party for the findings to be taken seriously by outside scientists and the whole project has the air of an advertising stunt rather than a serious contribution to knowledge.

D. G. Felton

DGF/JW/46D
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