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1st July, 1959.

TOBACCO MANUFACTURERS' STANDING COMMITTEE

REPORT FOR

YEAR ENDED 31st MAY, 1959

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TOBACCO MANUFACTURERS' STANDING COMMITTEE

Report for Year Ended 31st May, 1959

The Tobacco Manufacturers' Standing Committee was set up to assist research into questions concerned with the relationship between smoking and health, to keep in touch with scientists and others working on this subject in the U.K. and abroad, and to make information available to scientific workers and the public.

This report describes the main developments in the work of the Committee during the year ended 31st May, 1959.

ORGANISATION

The Annual Report for 1958 published by the British Empire Cancer Campaign contains the following paragraph:-

"During the year under review the Tobacco Manufacturers' Standing Committee requested that it might have the benefit of the advice of the Scientific Advisory Committee of the Campaign on certain schemes of research in the field of cancer. The Campaign was happy to accede to this request."

The Committee welcomes this arrangement: the advice of the Scientific Committee of the Campaign in the medical field will be of great value.

Mr. G.F. Todd, who has been Statistical Adviser to the Committee, has resigned from this post but will be available as a Consultant to the Committee.

OBJECTIVES

During the past year the Tobacco Manufacturers' Standing Committee has formulated in more precise terms its policy and objectives in research into the relationship between smoking and health. On the recommendation of its scientific advisers, the Committee has approved the following as being the main fields of research with which it should be concerned :-

1. Factors affecting smoking habits.
2. The Chemical and physical properties of tobacco and tobacco smoke.

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Activity
benefits.

3. The principles of the smouldering process applicable to tobacco.
4. Biological effects of tobacco smoke.
5. Factors affecting the incidence of lung cancer.
6. The physiological and psychological effects of human smoking.

The Committee is also endeavouring to keep itself informed of the progress of fundamental work in the general field of cancer research.

The main body of this report deals under each of the headings listed above with research which was carried out in the year under review and which was directly supported by the Committee. As is well known, research has also been carried out over the last four and a half years under the auspices of the Medical Research Council.

RESEARCH DIRECTLY SUPPORTED BY THE COMMITTEE

1. Factors affecting Smoking Habits

(a) In 1957, the Committee published the first of a series of Research Papers designed to make information available to research workers.

Research Paper No.1, Statistics of Smoking, summarised information about smoking levels in the leading countries of the world and gave further detailed information about the smoking habits of people in the U.K. A second edition, bringing the figures up to date and including some additional tables, was published in May of this year.

(b) Research Paper No.2, The Reliability of Statements About Smoking Habits, which was published in October 1958, described some of the difficulties of obtaining accurate information about smoking habits.

The report showed that smoking habits were far from invariable and that statements by smokers of their past smoking habits tended to be influenced by their current smoking habits. A second edition has now been printed.

(c) At the suggestion of Sir Ronald A. Fisher, the Committee has financed two investigations designed to throw light on the possible role of genetic factors in influencing smoking habits. An enquiry into the

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smoking habits of identical and non-identical twins was carried out by Prof. Frhr.von Verschuier in Munster, Germany. A preliminary report on this enquiry was published by Sir Ronald Fisher (1) and a more detailed analysis by Mr. G.F. Todd and Mr. J.I. Mason is in the press. The results of this research indicated that there was a tendency for the smoking habits of identical twins to be more alike than those of non-identical twins - a tendency which is consistent with the view that genetic factors influence smoking habits. A second enquiry on the same subject, also financed by the Committee, is being directed by Dr. L. Cavalli-Sforza of the University of Parma based on twins in Parma, Pavia and Florence.

2. Chemical and Physical Properties of Tobacco and Tobacco Smoke

(a) A considerable amount of work has been carried out over the years in the research divisions of member companies in order to ascertain the basic (principles of the) chemical and physical nature of tobacco smoke. These principles, which provide the framework within which research continues, can be summarised as follows.

Tobacco smoke is an aerosol of droplets dispersed in a gas phase.

It contains three broad groups of compounds :-

Permanent gases, including oxygen, nitrogen, carbon dioxide and carbon monoxide.

Vapours, including for example, water vapour, largely condensable on a cold surface.

Particles consisting of a complex mixture of substances with a wide range of boiling points.

The particulate phase of cigarette smoke consists of oily droplets which are believed originally to be extremely small in size - namely, from less than one-tenth of a micron to about half a micron - and grow in size by merging with one another. If it is accurate to assume that the large particles simply represent aggregations of smaller particles - and there is no evidence to suggest otherwise - then larger particles will not differ significantly in chemical constitution from smaller particles.

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In this context some account of the properties of tips attached to cigarettes may be appropriate. These tips made of crepe paper, cotton wool, cellulose acetate fibres or similar material, when attached to cigarettes, have three main operational characteristics :-

*Is this
shrinky tip?
What about water-
proofing - or
other methods.*

- (i) They will ^{mainly} stop the passage of particulate material and will not reduce either the permanent gases or the condensable vapours in the smoke.
- (ii) Primarily they retain the larger particle sizes.
- (iii) From the chemical standpoint they would be expected to operate unselectively on the particulate phase.

The efficiency of the tip depends on the material of which it is made and, for any given material, the smoke retention efficiency changes with the resistance to air flow, which is a function of the amount of material actually contained in the tip.

The cylinder of cigarette tobacco behaves in the same way as a tip but tips can be made of crepe paper, cotton wool, cellulose acetate fibres and other materials so as to give greater retention of the smoke than the tobacco cylinder at the same resistance to air flow. A tip, depending on its properties, may increase the smoke retained in the butt by about 10% to 20% above what would have been retained by the same length of tobacco.

*if can be
greater and
then OK.*

It will be clear from the foregoing that the concept of a tip which can selectively remove any single constituent of the particulate phase of cigarette smoke seems likely to prove illusory. In other words, a tip can only be expected to reduce the amount of any constituent of the particulate phase of smoke pro rata with the proportion of the particulate phase that it retains.

(b) During recent years a number of different methods of measuring cigarette smoke condensate (commonly but inaccurately described as "tar") have been introduced. The different methods ^{of measurement} give different results, and to remedy this situation the manufacturers represented on the Committee have agreed on a standard and scientifically reliable procedure for preparing and measuring cigarette smoke condensate (for use in this country) Details of this procedure will be described

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in a Research Paper to be published in the near future.

(c) During the year, the Committee published Research Paper No.3, The Constituents of Tobacco Smoke: an Annotated Bibliography, edited by Dr. H.R. Bentley and Mr. E.G.N. Berry. This provides for research workers an authoritative bibliography from which the literature on any particular compound or group of compounds in tobacco smoke can be quickly selected. The bibliography has been well received by research workers and it will be the aim of the Committee to issue supplements from time to time in order to keep it up to date and to cover the rapidly increasing literature on tobacco smoke.

(d) As was pointed out in the Committee's last Annual Report, the arsenic content of U.K. cigarettes has now been reduced to an extremely low level. Routine tests of cigarettes have continued in the laboratories of member companies and this trend has been confirmed. The average content of arsenic in U.K. cigarettes at the present time is about 3 parts per million. This compares with about 7 p.p.m. in 1956 and about 40 p.p.m. ten years ago.

3. Principles of the Smouldering Process Applicable to Tobacco

On the recommendation of Sir Alfred Egerton, D.Sc., F.R.S., the Committee is supporting research designed to extend knowledge of the principles of smouldering combustion, with a view to obtaining more information about the reactions that take place during the actual burning of a cigarette. The experiment is being carried out by Dr. F.J. Weinberg and Mr. K. Gugen at the Imperial College of Science and Technology, London, under the direction of Sir Alfred Egerton and, as a first step, a simple physical analogue to the cigarette, consisting of carbon particles in a silica tube, has been developed to act as a standard of smouldering behaviour which can be studied in detail.

4. Biological effects of Tobacco Smoke

(a) A considerable amount of work has now been done in various laboratories in different parts of the world in which cigarette smoke, either in its aerosol form or as condensate, has been applied to laboratory animals. The conditions of most of these experiments are such that it

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is frequently difficult, if not impossible, to make valid generalisations as to the biological effects of tobacco smoke from the particular conclusions of the experiment, and the Committee has been advised that there is need for extended biological experiments on a more systematic basis, using cigarette smoke derived from automatic smoking machines which more closely reflect actual smoking conditions. The Committee is taking steps to see how best it can promote research in this field.

The need for an acceptable and quantitatively reliable test for measuring the biological effects of tobacco smoke has frequently been stressed. Equally it is necessary to have such a test before the value of any of the methods which have been suggested for "improving" cigarettes can be assessed. For example, it has been suggested that cigarettes can be "improved" by reducing the "tar" content, by reducing the temperature of combustion or by adding chemical inhibitors which will reduce the polynuclear hydrocarbon content of smoke, but in the present state of knowledge it is impossible to say whether or not any of these ideas is useful. Biological research of the type now proposed, if it is successful, would enable progress to be made in the long term in investigating these suggestions.

(b) While these proposals are being worked out, the Committee is supporting research in this field by individuals entirely independent of the Committee who are working in academic institutions or hospitals. Support of these enquiries by the Committee has mainly taken the form of supplying to the individual concerned cigarette smoke condensates or sub-fractions thereof, which have all been prepared in the laboratories of member companies under the same carefully standardised smoking conditions.

The Committee is in this way assisting the following individuals:-

Dr. T.D. Day, M.A., M.D., of the Department of Experimental Pathology and Cancer Research, University of Leeds, who has been receiving the neutral fraction of cigarette smoke condensate for use in skin painting experiments with mice;

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Professor J.W.S. Blacklock, M.D., F.R.F.P.S.G., of the Department of Pathology, St. Bartholomew's Hospital, London, who has been receiving denicotinised whole smoke, smoke neutral fraction and the acids, bases and phenols of cigarette smoke for injection into the lungs of rats and guinea pigs;

Dr. F.J.C. Ree, M.A., D.M., B.M., B.Ch., of the Cancer Research Department of the London Hospital, who has been receiving whole smoke condensate and smoke phenols for skin painting experiments and cocarcinogenesis studies using mice; and

Dr. I. Lasnitzki, M.D., of the Strangeways Research Laboratory, University of Cambridge, who has been supplied with the neutral fraction of cigarette smoke condensate and with sub-fractions of this enriched in aromatic hydrocarbons and aliphatic hydrocarbons respectively for tissue culture experiments on human foetal lung tissue preparations.

In all these collaborative projects, full responsibility for the experiments rests in each instance with the individual concerned, and it is expected that results, when available, will be published in scientific journals. The Committee is thus making available to independent investigators the experience of the scientists of member companies in a field, namely the chemistry of tobacco smoke, where the Committee can claim to possess a unique body of expert knowledge.

(c) The Committee has made a donation of £15,000 to the Royal College of Surgeons over a period of the next two years in order to enable a pilot experiment to be carried out under the supervision of Professor G.J. Cunningham. In these experiments it is hoped to apply directly to the lungs of experimental animals cigarette smoke condensates and fractions prepared in the research laboratories of member companies.

5. Factors affecting the incidence of Lung Cancer

Whatever might finally prove to be the true explanation of such statistical association as may exist between lung cancer and cigarette

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smoking it is beyond doubt that other factors also are associated with lung cancer and with the apparent rise in the incidence of the disease in recent times.

There is evidence that lung cancer is associated inter alia with air pollution (2), industrial carcinogens (3) and with other respiratory diseases (4,5). Attention has also been drawn again recently (6) to the possible effects which improved diagnosis and changes in mortality from inflammatory and infectious lung diseases might have had on the apparent increase in the incidence of lung cancer. In his most recent Annual Report on the State of the Public Health (7) the Chief Medical Officer of the Ministry of Health noted certain clinical impressions to the effect that emotional disturbances played an important part in the development of cancer, and considered that these impressions merited detailed study.

The Committee is justifiably concerned with research into any factors associated with lung cancer and particularly with the very difficult problem of trying to assign relative significance to each.

The presence of a strong urbanisation gradient in British lung cancer mortality data has led the Committee to support an investigation by Dr. G. Dean M.D., of Port Elizabeth, South Africa, following studies previously made by him into lung cancer incidence in British immigrants to the Union as compared with that of the Union-born white population. The Committee has also agreed to finance a study by Dr. D. Kissen, M.B., Ch.B., Research Associate in Psychosomatic Medicine in the University of Glasgow on the relationship of smoking habits and emotional factors to cancer of the lung, cancer in other sites, and other diseases.

6. Physiological and Psychological Effects of Smoking

A very great deal remains to be learnt about the effects of smoking on the smoker. In recent years considerable attention has been given to the possible harmful effects of smoking but it is practically a truism to say that tobacco smoking has beneficial effects. If this were not true, it would become extremely difficult to explain the world-wide

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acceptance of tobacco as an aid in contending with the day-to-day stresses of living. The reasons for this widespread acceptance of tobacco and the nature of the main effects of smoking - whether physiological or psychological - are not as yet understood. So far as the Committee is aware, no intensive investigation of these aspects of smoking is in hand elsewhere, and it has therefore arranged to support work in this field.

Preliminary discussions have been held to see if it is practicable to measure objectively certain physiological effects of smoking, e.g. by way of stimulant or sedative action.

Mass-Observation Ltd., in conjunction with Dr. H.J. Eysenck, Prof. of Psychology in the University of London, has carried out an enquiry on behalf of the Committee designed to throw light on some of the psychological characteristics of different types of smokers. A report on the results of the enquiry is in preparation and will be published in due course by Mass-Observation Ltd.

RESEARCH FINANCED THROUGH THE MEDICAL RESEARCH COUNCIL

As is known, in December 1953 the manufacturers represented on the Committee arranged to make available over the next seven years a fund of £250,000 to aid research designed to ascertain the true cause or causes of lung cancer, and on the advice of the Minister of Health they placed this sum at the disposal of the Medical Research Council. The Medical Research Council in its annual reports gives details of research carried out under its auspices aided by grants from various bodies including this Committee. During the year under review a number of papers bearing on this work have also been published in the technical and scientific Press.

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The Committee acknowledges the valuable assistance in scientific matters which it has received not only from the research divisions of member companies, but also from those who are engaged in independent research. The Committee is especially grateful to the eminent men of medicine and science who have given freely of their time to discuss the Committee's problems.

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- No.2 The Reliability of Statements about Smoking Habits
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- No.3 The Constituents of Tobacco Smoke: an Annotated
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