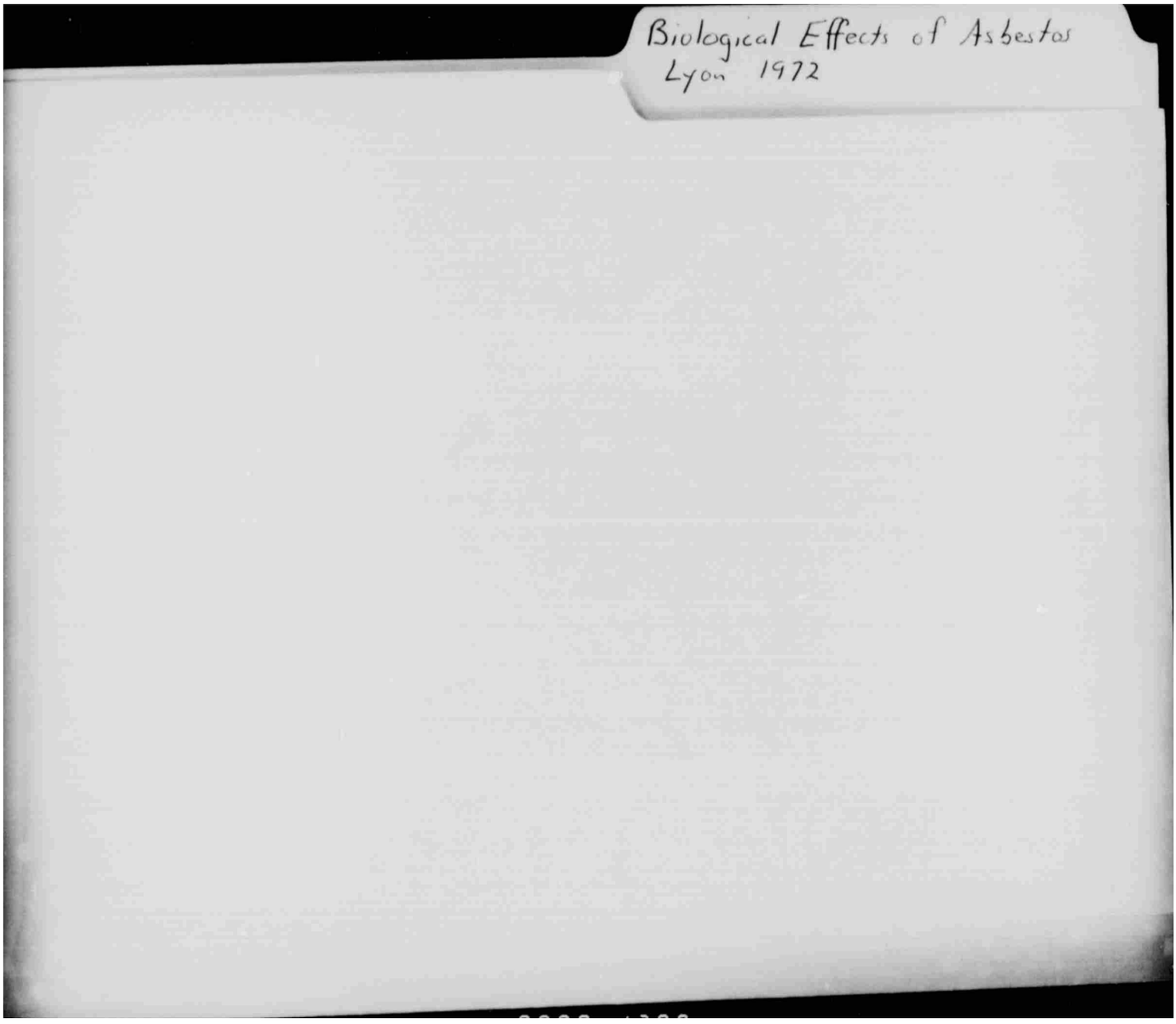
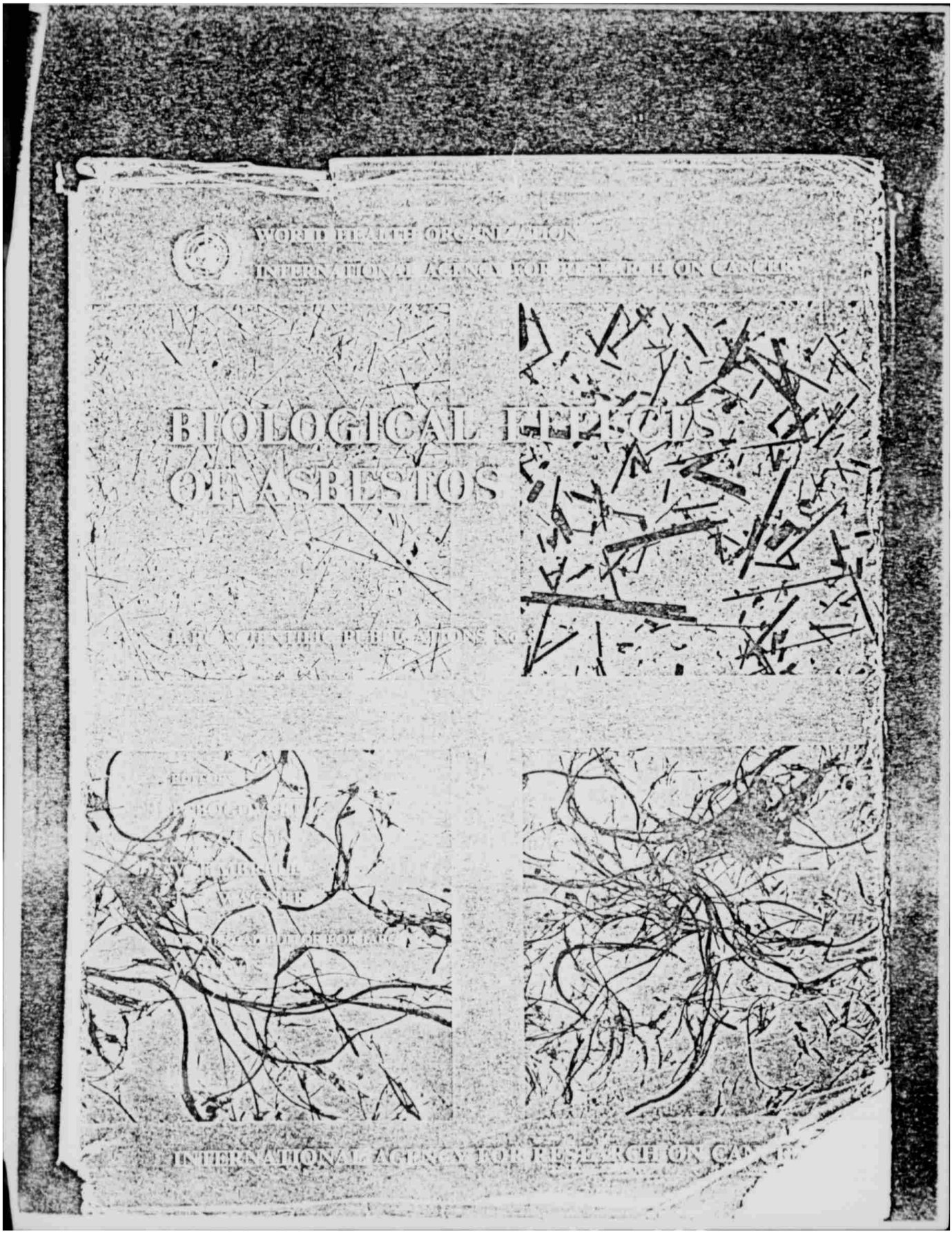


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BIOLOGICAL EFFECTS
OF ASBESTOS

Asbestos is a valuable component of modern technology. Its large-scale application in fire-proofing adds an important safety element to house- and shipbuilding and the manufacture of hundreds of industrial and domestic appliances. Nevertheless, by the 1950's it was known that the inhalation of asbestos dust could lead to lung cancer and later it was shown to be associated with mesotheliomas of the pleura and peritoneum. Workers in the asbestos industries were certainly "at risk" and there was anxiety about a possible risk in non-industrial situations. It became essential to establish which of the types of asbestos were responsible and to clarify the evidence by epidemiological and experimental studies, so that preventive measures could be suggested.

This book presents the most recent and comprehensive results of the international studies initiated by the International Union Against Cancer (UICC) through its Committee on Geographical Pathology in 1964, and continued under the auspices of the International Agency for Research on Cancer. Fifty-four review articles and research reports deal with the epidemiological aspects, the pathology of asbestos-associated diseases, physics and chemistry of asbestos and its industrial applications. Summaries of the discussion are included as well as the report of the Advisory Committee on Asbestos Cancer.

Cover photos:

Top left: Crocidolite
Top right: Amosite
Bottom left: Canadian chrysotile
Bottom right: Rhodesian chrysotile
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WORLD HEALTH ORGANIZATION

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

BIOLOGICAL EFFECTS OF ASBESTOS

Proceedings of a Working Conference held at the International Agency for Research on Cancer, Lyon, France, 2 – 6 October 1972

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IARC Scientific Publications No. 8

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER
LYON
1973

The International Agency for Research on Cancer (IARC) was established in 1965 by the World Health Assembly as an independently financed organization within the framework of the World Health Organization. The headquarters of the Agency are at Lyon, France, and it has Research Centres in Iran, Kenya and Singapore.

The Agency conducts a programme of research concentrating particularly on the epidemiology of cancer and the study of potential carcinogens in the human environment. Its field studies are supplemented by biological and chemical research carried out in the Agency's laboratories in Lyon and, through collaborative research agreements, in national research institutions in many countries. The Agency also conducts a programme for the education and training of personnel for cancer research.

The publications of the Agency are intended to contribute to the dissemination of authoritative information on different aspects of cancer research.

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FOREWORD

The study of the effects on man of the inhalation of asbestos dust goes back long before the International Agency for Research on Cancer came into being. The International Union Against Cancer (UICC) through its Committee on Geographical Pathology was co-ordinating an international study from 1964 within which the group working at the Medical Research Council Pneumoconiosis Unit, Penarth, UK was playing a leading part.

When the research programme of IARC got under way, asbestos was one of the environmental carcinogens that demanded our attention and we were very fortunate to have been able to conclude a research agreement with the MRC Pneumoconiosis Unit to permit the intensification of their on-going study.

The international collaborative programme involved work in many different centres and so the proposal to bring all the people together for a meeting to assess the present state of knowledge of the relation between asbestos and cancer was both timely and welcome.

We are extremely grateful therefore to Dr Gilson, Dr Wagner, Dr Timbrell and their colleagues who co-operated so strongly with us in the organisation of the meeting in Lyon. We were especially pleased that the first occasion on which we used our new building brought together so many scientists from all over the world. The meeting was most successful. I hope that this present volume will prove to be as valuable.

JOHN HIGGINSON, M.D.
Director

International Agency
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INTRODUCTION

The modern asbestos industry dates from the discovery in the 1870's of large deposits of chrysotile fibre in Canada and Russia, followed by the commercial exploitation of three other types of fibre—crocidolite, amosite and anthophyllite. Previously regarded as curiosities, these fibrous silicate minerals rapidly found applications, including large-scale use in fire-proofing and reinforcement for cement in building materials. There are now numerous products which depend upon asbestos, some of which require specific types of fibre. This demand has led to a vast increase in production to the present level of more than four million tons per annum. As no satisfactory substitutes have been found for many of these uses, asbestos is likely to remain an essential material for years to come.

By the 1950's it was accepted that the inhalation of asbestos dust could lead to pulmonary fibrosis and carcinoma of the lung, and more recently that an association exists between exposure to asbestos dust and the development of diffuse mesotheliomas of the pleura and peritoneum. The mesotheliomas appeared to occur after a long lapse period, forty years, following in some cases only slight exposure to asbestos dust. Anxiety that sufficient exposure to produce mesotheliomas might occur in non-industrial situations indicated a need for an urgent assessment of the situation. It became essential to establish which type, or types, of asbestos were responsible for the development of the conditions, and to clarify the evidence through epidemiological and experimental studies. It might then be possible to suggest methods for the prevention of the diseases.

In 1963, following correspondence with Dr T. Mancuso, and with advice and encouragement from Dr H. L. Stewart, a small planning group was organised to consider the feasibility of an international approach to the investigation of the cancers associated with exposure to asbestos dust. This committee reported to Dr J. Higginson, who was then Chairman of the Geographical section of the UICC. It was planned that a working party should be convened. At this stage a request was received from Dr I. J. Selikoff to take part in a New York Academy of Sciences Conference on "The Biological Effects of Asbestos" (New York, October, 1964). The working group met after this Conference, summarised the available knowledge on "asbestos and cancer" and made recommendations for further investigations. A sub-committee was formed to co-ordinate the implementation of these proposals.

In order to widen international aspects of the study a second conference was held in Dresden in 1968. This was a most successful meeting at which valuable information was presented and further international studies were planned; the proceedings of this conference have been published recently [1].

With the establishment of the International Agency for Research on Cancer, it was considered that the asbestos problem, which was now being investigated by epidemiologists, morbid anatomists, experimental pathologists, physicists and chemists, was exactly the type of study to be integrated into the Agency's programme of environ-

[1] Holstein & Anspach, eds. (1973) *Internationale Konferenz über die biologischen Wirkungen des Asbestes, Dresden, 1968*

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mental carcinogenesis. Accordingly, a research agreement was concluded with the Agency in 1968, and in 1970 the project was expanded with the Agency's support. The following year it was decided that a further meeting of the working group was appropriate to review the progress that had been made in implementing the 1964 recommendations and to collate the information now available on these cancers.

As it was considered that the situation should be reviewed on a wide basis, the working party was requested to "assess the biological effects of asbestos". Authorities on various aspects of the problem were invited to submit papers which were circulated beforehand and presented for discussion; these were summarised by rapporteurs.

After the conference, an advisory committee to Dr J. Higginson, the Director of the IARC, met to prepare a progress report and to make recommendations for further work. This study has completed what we consider to have been a successful eight-year phase. The proceedings of the conference and the recommendations of the advisory committee to the IARC have now been prepared as a publication, which we trust will provide an authoritative international review of the asbestos cancer problem and show where further research is most needed.

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V. TIMBRELL J. C. WAGNER

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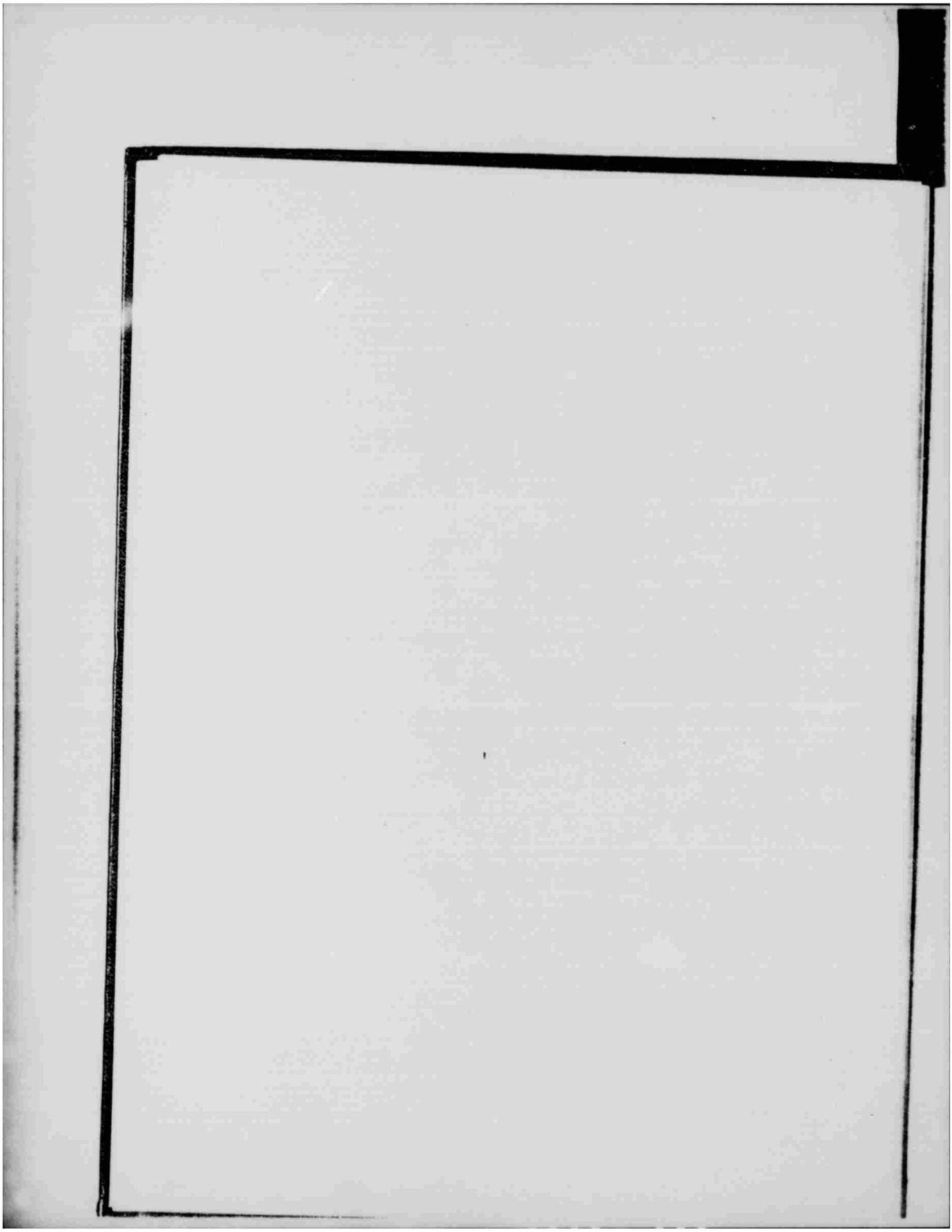
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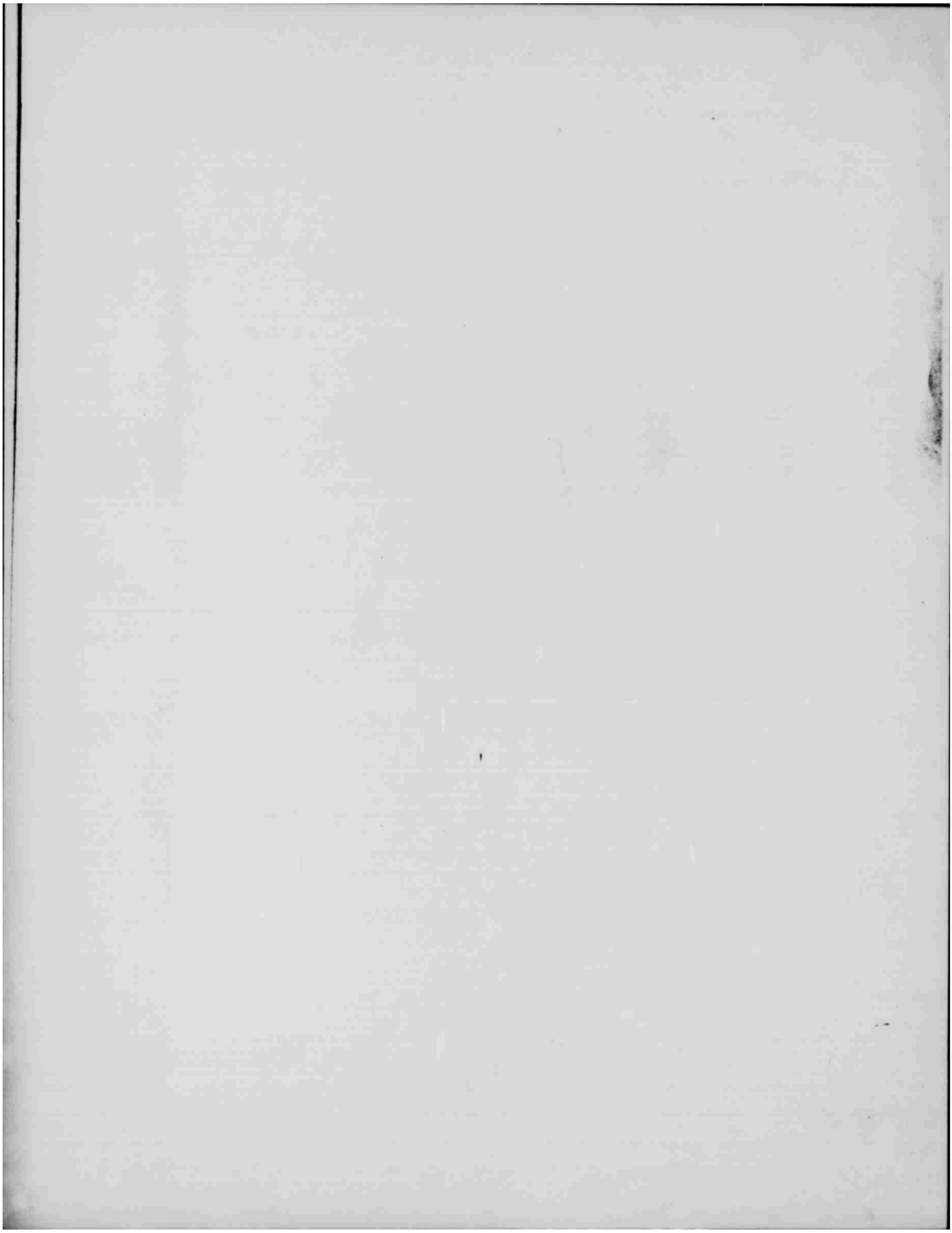
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