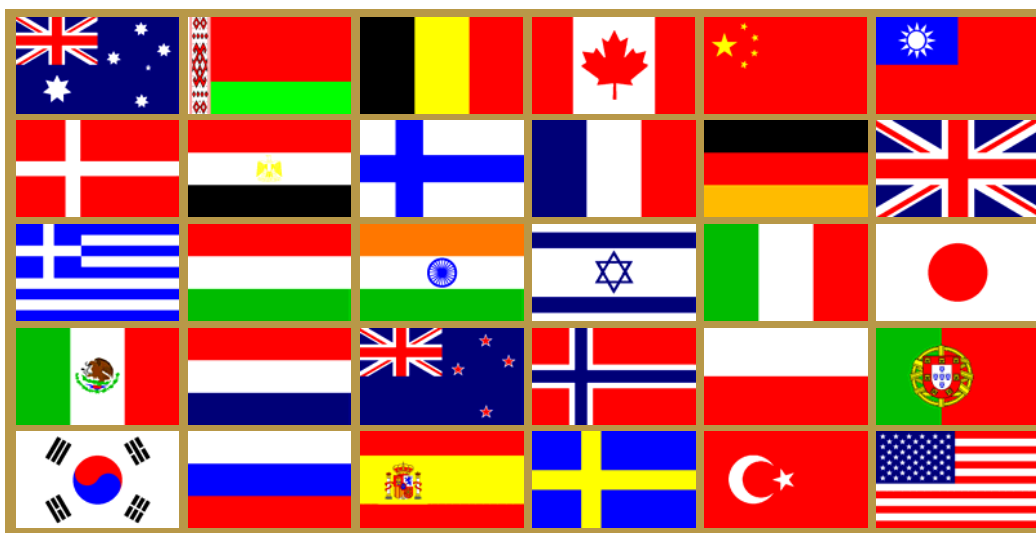


*In Celebration of the Fiftieth Anniversary of
The Combustion Institute*



1954 – 2004



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The Combustion Institute*

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5001 Baum Blvd, Suite 635

Pittsburgh, PA 15213

Phone: (412) 687-1366

<http://www.combustioninstitute.org>

PREFACE

The Combustion Institute was founded in 1954. It is a non-profit, scientific and engineering society whose sole purpose is to promote research in the field of combustion science. This is done through the dissemination of research findings at regional, national and the biennial international symposia, and through the publication of the symposium proceedings and the Institute's journal, *Combustion and Flame*. The Institute serves as the parent organization for national sections organized in many countries, numbering 29 as of 2004. The operation of the Combustion Institute is maintained on a very modest level, with simple procedures dedicated to the support of this important field of study that cuts across many scientific and engineering disciplines.

The success of the biennial symposia is at the heart of the special character of the Institute. These gatherings have been able to strike a balance between the presentation of high quality research and the social settings that encourage personal interactions. The spirit generated by this ambiance encourages Institute members to pursue excellence in their technical work and openness in their presentations as well as supportive criticism in their evaluations of colleagues' work.

Since its founding, the Institute has grown in membership, scope, and stature. The Institute and its members have played a pivotal role in the advancement of the various scientific and technical disciplines that constitute the broad arena of combustion. It is therefore with immense satisfaction and pride that we celebrate the fiftieth anniversary of the founding of the Institute, and it is with much enthusiasm that we dedicate ourselves to the betterment of mankind in the next fifty years through the service of combustion.

In this commemorative booklet we have assembled items of reflections, recollections, and information that are of historical values to the Institute. It is hoped that the reader will find them informative and inspiring.

The assistance of Ms. Sue S. Terpack of the Institute headquarters, Professor John K. Bechtold of the New Jersey Institute of Technology, and Dr. Tianfeng Lu of Princeton University in the preparation of this document is very much appreciated.

Daniel J. Seery, President (1996-2000)

Chung K. Law, President (2000-2004)

July 2004

TABLE OF CONTENTS

FOUNDING OF THE COMBUSTION INSTITUTE	1
Narrative by Howard Palmer: Bernard Lewis and the founding of the Combustion Institute ...	1
Narrative by Hoyt Hottel: The Early Days and the Founding of the Institute	3
HIGHLIGHTS OF THE INSTITUTE AND SYMPOSIA	6
Publication of <i>Combustion and Flame</i>	6
Honors and Awards	6
Quality of Symposium Papers	6
Inclusion of Symposium Papers in SCI	7
Poster Sessions and Reading Room	7
Internationalization	7
Advances in Combustion	8
CHRONOLOGY OF COMBUSTION SYMPOSIA	10
SECTIONAL HISTORICAL NOTES	13
Australia and New Zealand Section	13
Belgian Section	14
British Section	15
Chinese Section	19
Chinese - Taipei Section	20
French Section	21
German Section	22
Greek Section	23
Hungarian Section	23
Italian Section	24
Japanese Section	25
Netherlands Section	26
Russian Section	27
Scandinavian-Nordic Section	28
Central States Section	30
Eastern States Section	31
Western States Section	32
POSTSCRIPT	33
APPENDIX A: INSTITUTE MEDALS	34
Bernard Lewis Gold Medal	34
Alfred C. Egerton Gold Medal	34
Ya. B. Zeldovich Gold Medal	35
Silver Combustion Medal	35
APPENDIX B: PRESIDENTS OF THE COMBUSTION INSTITUTE	37
APPENDIX C: EDITORS OF <i>COMBUSTION AND FLAME</i>	37

FOUNDING OF THE COMBUSTION INSTITUTE

The Combustion Institute was formally recognized as a professional society on July 1, 1954. The various events and considerations that led to this occasion have been described in narratives delivered by Professors Howard Palmer and Hoyt Hottel on two separate occasions. These narratives are reproduced below.

Narrative by Howard Palmer: Bernard Lewis and the founding of the Combustion Institute (on the occasion of commemorating Bernard Lewis at the 25th Symposium, 1994)

The founding of this biennial assembly of combustion researchers is largely attributable to the energy, devotion, skill and vision of Bernard Lewis. Indeed Professor Hoyt Hottel, who was an active participant in that founding and who graciously provided us with some written recollections of those early events, entitled his notes “The Combustion Institute, i.e. Bernard Lewis”. We are much indebted to Hoyt, and also to Ted Olson, our chair for this special occasion, for their help in reconstructing some of that early history, of which there seems to have been no formal record.

The first two Combustion Symposia were organized in 1928 and 1937 under the auspices of the Gas and Fuel Division of the American Chemical Society. Examining the authorship of papers in those meetings, one sees that the symposia were international in scope. One also finds that contributions came from government, universities and industrial laboratories. So the pattern of breadth, both geographic and technical, was set early in our history. The 1937 symposium was put together by Bernard Lewis, who gave the opening address and coauthored four of the papers, three of them with Guenther von Elbe, who was at that time on the staff of the Coal Research Laboratory at Carnegie Institute of Technology.

By the latter half of the 1940’s, interest in combustion had grown enormously, and this prompted Bernard to consider planning another combustion symposium. He called together a group of combustion scientists and engineers to discuss the matter. The group included Bernard Lewis and Guenther von Elbe from the U.S. Bureau of Mines, W.T. Olson from the (then) National Advisory Committee on Aeronautics, Joseph O. Hirschfelder from the University of Wisconsin, Hoyt Hottel and Glenn Williams from MIT, Wheeler Lovell from the Ethyl Corporation and J.B. MacCauley from Pratt and Whitney Aircraft.

Bernard’s eloquent presentation of the case for another symposium brought an enthusiastic response, and it was agreed that the University of Wisconsin be asked to host the meeting (which it did), that the meeting be international, and that it be regarded as the first of a continuing series of combustion symposia.

Held at Madison in 1948, the Third Symposium was a great success. Funds were contributed by government agencies, educational institutions, and by eighteen industrial concerns that provided funds for travel of overseas participants and for publication of the proceedings. This symposium set another pattern that became an important feature of future meetings: it included five informal and lively discussions on special topics of interest. Such discussion sessions remained a part of the symposia through the Fifteenth Symposium. Many of us here have vivid memories of those sessions and some of the exchanges that took place in them!

At the conclusion of the Third Symposium, the Standing Committee on Combustion Symposia was formed. It included three members from the U.S. – Lewis, Hottel and A.J. (Tony) Nerad from the General Electric Company – and four honorary members from overseas: Sir Alfred Egerton from Great Britain, Paul Laffitte from France, J.J. Broeze from Holland and Eugene Mertens from Belgium.

The Fourth symposium, held at MIT in 1952, was very successful and included the first paper from Japan. At this symposium it became clear that the loose organization could not be sustained for a variety of reasons, fiscal and administrative. The need for a more formal structure began to emerge. Indeed we find that the Fifth Symposium, held in Pittsburgh in 1954, was the last to be held under the auspices of the Standing Committee, which by now had been augmented with members from Switzerland (K. Clusius), Germany (Wilhelm Jost), Australia (W.E. Kennedy), Austria (Heinrich Mache), Canada (D.C. MacPhail), Spain (Gregorio Millan), Sweden (E.H.W. Weibull) and Japan (Sakai Yagi).

The establishment in 1954 of what was named The Combustion Institute is described in the Preface to the Fifth Symposium volume. The new, nonprofit, incorporated organization provided a central source of information, a place of records, an identity for soliciting funds, efficient means of setting up future symposia and necessary legal protection for the decision-making officers of the Institute. The good offices of Bernard Sturgis of the DuPont Company facilitated the required legal tasks.

All that was 40 years ago. It is interesting to look back and rediscover some aspect of Bernard Lewis' vision for The Combustion Institute. In this case there are written records, including the articles of incorporation, the original by-laws and minutes of early meetings of the Board of Directors. Perhaps the most striking item from the by-laws is the requirement for membership: "There shall be one class, membership at large, open to all who are in agreement with its purposes. The Board of Directors or the Executive Committee may provide that all registrants at any symposium will automatically become members of the organization". And that is what occurred. For several symposia following the founding, the registration fee included \$3 to pay for a two-year membership, surely one of the technical world's greatest bargains. Bernard fervently espoused that concept of easy accessibility, and that policy has continued, in the form of uniquely small membership dues and remarkably low subscription costs for the Institute's journal, *Combustion and Flame*.

The Institute also has sought to continue Bernard's wish that it have minimal administrative superstructure. In 1954 we had one full-time employee, the inimitable Helen Barnes, running the Institute's office Pittsburgh. Now we have doubled that, and have a part-time accountant also, for an organization that may well be ten times its size in 1954. This is possible only because of a remarkable level of volunteer effort by Officers, Board Members, and the membership at large. The history of the makeup of the Board of Directors offers further insight into Bernard's vision for the Institute. It was very important to him that the Institute's activities and objectives be based upon real-world needs. We find that from 1954 through 1974, more than 40 percent of the members of the Board were employed in industry. A further reflection of this concept was the specification that there be balanced representation from industry, universities and government.

The early days were not, of course, without their tensions. Professor Hottel recalls that "During the days of planning the new Institute a few problems arose out of differences in viewpoint. . . Sir Alfred Egerton and Dr. Lewis expressed concern over a possible excessive weighting of the Symposium volume with applied combustion problems. Others supported the importance of applications. It is believed that a reasonable balance was reached." Most of us would agree that a reasonable balance was reached and continues, even while healthy tensions also continue to challenge us.

Bernard Lewis stayed on as President of the Institute longer than he wanted. From the minutes of the third meeting of the Board we find: "Discussion of the President's proposal for a change of officers was terminated by a vote to continue the existing officers." This happen again from time to time. Eventually he succeeded in retiring as president and was promptly named Honorary President for life. He continued to the end of his active days, i.e. until about two years ago, to meet with the Executive Committee and the Board, to attend the Symposia, and to bring his wisdom, critical appraisal, foresight, and his well known rhetorical powers to every matter under consideration.

An accurate and quite touching summary of the results of Bernard Lewis' efforts and vision is found in a letter to him written by the late Joseph F. Masi of the Directorate of Aerospace Sciences, on the occasion of Bernard's receiving the Pittsburgh Award in 1974:

"There is no substitute for The Combustion Institute. That loosely-knit, minimally-formalized, highly-motivated organization fills a vital need that could not be met by the formal scientific and engineering societies. The International Combustion Symposia are the primary forum for exchange of information on combustion research and for interaction between research and technology. The published proceedings of the symposia, together with the Institute's journal *Combustion and Flame*, are generally recognized as the principal archival repositories, world-wide, of combustion research results. These and many other activities make The Combustion Institute appear to be an "inevitable" product, spontaneously appearing and growing to meet the needs of the combustion community.

[However,] far from being a spontaneous growth, The Combustion Institute's founding and nurturing required vision, leadership and perseverance in the face of obstacles. A number of dedicated people have helped at various times, but you have been the central guiding spirit over the years. . .”

One really cannot improve upon Joe Masi's warm tribute to the Institute and its sire and shepherd, Bernard Lewis.

The founding of The Combustion Institute rounds out the threefold technical thrust of the life of Bernard Lewis. He pioneered in the scientific study of combustion; he helped throughout his life to bring combustion science to the solution of technical problems; and finally, through his vision for this remarkable organization, which is a true community of researchers, he provided international intercommunication to the benefit of combustion science, and international friendship to the benefit of humanity.

Narrative by Hoyt Hottel: The Early Days and the Founding of the Institute (on the occasion of a special session in his honor at the 27th Symposium, 1998).

In September 1928, the Gas and Fuel Division of the American Chemical Society sponsored a Symposium on Combustion, with Professor G.G. Brown of the University of Michigan as Chairman. The papers were presented as part of the annual American Chemical Society meeting at Swampscott, Massachusetts, and in print occupied 60 pages in the journal, *Industrial and Engineering Chemistry*. In 1937, Dr. Bernard Lewis was instrumental in organizing a Second Symposium on Combustion, which was again sponsored by the American Chemical Society at its annual meeting in Rochester, New York. Dr. Lewis was Chairman. The papers were printed in three successive issues of *Chemical Reviews*.

The Second World War served to emphasize the practical significance of combustion research, particularly in the area of high-output combustion in aviation power plants; and at the instigation of Dr. Lewis a group of individuals met in Pittsburgh to consider the desirability of holding a Third Symposium on Combustion. This one, with Dr. Bernard Lewis and Professor J.O. Hirschfelder as Joint Chairmen, was held at the University of Wisconsin in August 1948. It was the first to devote a full week to combustion, the first not sponsored by an existing scientific or technical society, the first to which a large number of contributors and guests from outside the United States were invited, and the first to be published in a single volume. At the Wisconsin meetings a Standing Committee was set up to maintain continuity of the concept of more-or-less regular combustion symposia, and to handle finances. After the Fourth Symposium at the Massachusetts Institute of Technology in 1952, and the Fifth at the University of Pittsburgh in 1954, The Combustion Institute was founded; and succeeding Symposia were held under the auspices of that new society.

It is difficult for the young engineer or scientist to visualize the relatively primitive state of knowledge of fluid mechanics or nonisothermal chemical kinetics, especially in application to combustion, in 1928 when the First Symposium on Combustion was held. Those of us who have worked in the combustion area for a long time are reminded, by reading the proceedings of the first two Symposia, of how far combustion has come as a field of science and engineering since then. At the same time we are impressed with the clear evidence that the basis was being laid, in those days, for today's powerful approach to problems considered wholly unmanageable in the 1930's. The Burke and Schumann paper on diffusion flames cuts through the intricacies of the multi-component diffusion process and represented the first development of the concept of a conserved scalar in a two component diffusion process, with the solution for the locus of stoichiometric ratio determining the position of the flame front. This paper had perhaps more influence on the engineering science of combustion than any ever published. The Smith and Pickering paper presaged the detailed studies, twenty years later, of cellular flame structure, and the multizone of premixed flames. W.E. Garner's examination of flame-radiation data shows the effects of seeking chemical explanation of phenomena more dependent on thermal or fluid mechanical processes. Stevens' soap-bubble method of studying constant-pressure flame propagation in homogenous mixtures produced data which have never been understood. Payman's useful empirical rules for converting flame-speed or pressure-rise data for one geometry to

values applicable to another are recorded. The First Symposium closes with several papers on the then-pressing problem of engine knock.

The Second Symposium papers show the growth in sophistication of combustion research that characterized the nine-year period since the First. The papers by Brewer, Bradford and Finch, Landau, and Townsend laid the basis for considering the ignition process quantitatively. The papers of Pease, of Harris and Egerton, of Newitt on hydrocarbon oxidation, the summary paper by von Elbe and Lewis on hydrocarbon combustion mechanism, Kassel's pioneering work on the first and second limits of hydrogen explosion are early contributions in a field of which has grown explosively but still leaves unanswered many of the questions raised in 1937. The papers on flame propagation are headed by the paper of Lewis and von Elbe, one of the first to attempt quantitative testing of a mathematical model of flame propagation against fundamental data. Several papers on combustion thermodynamics show how to handle problems of the burned gas in open flames and engines. A large number of papers on Diesel and Otto cycle engines attest to the pressing problems of knock in engines. The Lovell and Campbell paper on the relation of molecular structure of fuels to their tendency to knock in an Otto cycle engine is the first paper in a distinguished series which brought order into the area and gave us a quantitative empirical picture of structure in relation to knock; but we do not even to-day have the full explanation of their orderly findings.

It was not the purpose of the Third Symposium held at Wisconsin in 1949 to limit the presentation of papers to invited speakers on specified topics. This procedure had been used before and had much to recommend it. Rather, it was felt that new research workers who had entered the field since the Second Symposium, the number of which had grown many-fold, should have an opportunity to present their findings, thereby affording stimulus to their research and the research of others. The seeds for today's plenary lectures were round table discussions. The titles and those invited to lead the discussions were:

- "Thermodynamics and the Physical Properties of Hot Gases," by J. O. Hirschfelder
- "Turbulence and Its Effects on Combustion and Flame," by J. K. L. MacDonald
- "Application of Spectroscopy to Flame Research," by A. G. Gaydon
- "Theory of Ignition and Flame Propagation," by G. von Elbe
- "Thermochemistry," by F. D. Rossini

At the end of the Third Symposium a Standing Committee was set up to see that the symposium papers were published and that plans be made for the next symposium. The Committee members were Bernard Lewis, chairman, Hoyt C. Hottel, secretary and A. J. Nerad of General Electric Co., treasurer. Five years elapsed before it was decided to hold the next symposium, the Fourth, at M.I.T., Cambridge, Massachusetts, in September, 1952. The need for a Standing Committee became clearer when fund-raising for the fourth symposium started. Corporations had to identify to their stockholders the organization to which they made a contribution; there was a possible conflict between fundraising by an educational institution for its own purposes and funds requested from industry for the symposium by a member of the educational institution. Bernard and I were not in full agreement on how to allot travel funds to foreign guests; he wanted all foreign invitations to include first-class travel reimbursement, while I wanted to stretch the funds over a larger foreign list. Glenn Williams was chairman of the entertainment committee for the Fourth Symposium, and he was told he could have no funds from those collected to support the symposium; he had to solicit funds from local industry to cover the cost of a pre-symposium welcoming cocktail party. M.I.T. contributed lecture rooms without charge, and paid the salaries of a large staff to expedite registration at the Symposium. At the end of the Fourth Symposium the Standing Committee was reelected, this time with four honorary foreign members: Sir Alfred C. Egerton, Professor Paul Laffitte, Dr. J. Broeze, and Professor Eugene Martens.

The Fifth Symposium (International) on Combustion, held at the University of Pittsburgh in 1954, was the last in the series of three postwar symposia to be sponsored and published by the Standing Committee on Combustion.

At the 1952 Symposium, held at M.I.T., it had been suggested that serious thought be given to the formation of a permanent organization devoted to the interests of the science of combustion. Such an organization, it was felt, could put the important work done by the Standing Committee on a firm footing and better meet the needs of research and development in this field. It would also provide a responsible body for dealing legally and effectively with various problems. Accordingly a subcommittee of ten, with representatives from industry, government, and universities in the United States, was formed to consider the advisability and feasibility of establishing a permanent society. After a year and a half of careful study and discussion with numerous individuals and professional groups, the subcommittee – in conjunction with similar committees headed by the honorary members of the Standing Committee in Belgium, France, Great Britain, and the Netherlands – recommended the formation of The Combustion Institute.

On July 1, 1954, The Combustion Institute was incorporated in the State of Delaware as a non-profit professional society, whose purpose is to promote the science and application of combustion and to disseminate knowledge in this field. Its activities include the organization of symposia and publication of the proceedings and related projects consistent with its stated purpose. It is not intended that the Institute will compete with other societies either in its meetings or publications. Its interests embrace a wide field of scientific activity not covered by the meetings of established societies.

During the days of planning the new Institute a few problems arose out of difference in viewpoint, but all were solved. The interests of Sir Alfred Egerton and Dr. Bernard Lewis were primarily in the area of physical chemistry, with little attention given to fluid-mechanics-related control of combustion. Both men expressed concern over a possibly excessive weighting of the symposium volumes with applied combustion problems. Others, especially representatives of industry, supported the importance of the applications. It is believed that a reasonable balance has been achieved.

HIGHLIGHTS OF THE INSTITUTE AND SYMPOSIA

Since its founding fifty years ago, the Combustion Institute has had a profound impact on the advancement of combustion science. While it is impossible to list all the important developments that have taken place over the years, the following Institute activities are of particular significance.

Publication of *Combustion and Flame*

Following the 6th Symposium, the Institute initiated publication of a new archival journal, *Combustion and Flame*. The aim was to provide a primary outlet for results from the rapidly increasing amount of combustion research, especially those works coming to fruition during the two-year intervals between Symposia. Sir Alfred Egerton assumed the position of Editor-in-Chief, with two editorial offices, one in the U.S. and one in the U.K. Bernard Lewis became the U.S. Editor and A.R.J.P. Ubbelohde was the first U.K. Editor. Volume 1 was published in 1957. Forty-seven years later, *Combustion and Flame* is a monthly journal that has published 137 volumes consisting of 64,000 pages. The dual US/UK editorships have continued successfully, with the addition of several Deputy Editors and an Editorial Advisory Board. As with the Symposia, the international character of the Institute is reflected in the worldwide origins of papers submitted for publication. The current subscription price of \$52/year for members of the Institute is among the lowest for professional journals, allowing for a wide circulation.

Combustion and Flame is one of the highest ranked journals in the technical areas that it covers. According to the statistics for 2003 compiled by the Institute for Scientific Information (ISI), the organization that publishes the Science Citation Index (SCI), the Impact Factor for *Combustion and Flame* is 1.872. It is ranked 4/62, 2/63, 7/119, and 2/39 among journals in energy and fuels, engineering, chemical engineering, and thermodynamics, respectively.

The list of the editors of *Combustion and Flame* is given in Appendix C.

Honors and Awards

Starting from the 7th Symposium three awards have been conferred at each symposium. These are the Bernard Lewis Gold Medal “for brilliant research in the field of combustion, particularly...”, the Alfred C. Egerton Gold Medal “for distinguished, continuing and encouraging contributions to the field of combustion”, and the Silver Combustion Medal for an outstanding paper presented at the previous symposium. The Ya. B. Zeldovich Gold Medal “for outstanding contribution to the theory of combustion or detonation” was established at the 23rd Symposium. The lists of awardees of these medals are given in Appendix A.

It is to be noted that, in accordance with the wisdom of the founders of the Institute, especially that of Bernard Lewis, there is only one class of membership in the Institute. Consequently, the Institute is one of the few professional societies that do not have distinguished membership grades such as fellows. This has led to the development of a special, enlightened culture within the Institute, one that is focused on scholarship and quality, and that promotes dialogue among its members regardless of the “seniority” of individuals.

Quality of Symposium Papers

With the rapid increase in activity in combustion research worldwide, particularly since the mid-1970's, the number of symposium paper submissions has risen steadily, plateauing around 750-800 since the mid-1990s. To accommodate this increase, the number of sessions was increased, to 2, 3, 4, 5, 6, and 7 at the 8th, 9th, 18th, 20th, 25th, and 29th Symposia respectively, and a second proceedings volume was added starting with the 26th volume. Despite these efforts, the acceptance rate for oral presentation and publication in the symposium volume has remained in the low to mid-40% range, making symposium acceptance rate one of the most competitive in the scientific community.

Historically, the selection of papers for presentation at symposia was conducted rather informally until the 10th symposium, at which an abstract of 1000 words was reviewed by three referees. However, as the symposia emerged as a prestigious forum for presentation and publication, it became apparent that a more thorough review process was

needed. By the 18th Symposium full-length papers were required for review, and by the 27th Symposium a rebuttal from authors was incorporated in the review and paper selection process. The review process continues to evolve as the Institute is committed to identifying papers of the highest quality.

Inclusion of Symposium Papers in SCI

Because of the high quality of the papers submitted to the symposia, and the rigorous review and selection process, especially from the 1980s, papers published in the Proceedings of the Symposium were generally recognized as being of the same quality as those published in the premier journals such as *Combustion and Flame*. However, these papers were not included in the Science Citation Index which excludes “symposium” papers as a matter of policy. This omission had become a serious problem for authors as more academic institutions and government agencies began to base their performance and accomplishment evaluations of individuals on the SCI statistics. After repeated efforts spanning almost a decade, just prior to the 28th Symposium the Institute succeeded in convincing the Institute for Scientific Information that the high quality of Combustion Symposium papers warranted their inclusion in SCI. The title of the proceedings was also changed at that time to *Proceedings of the Combustion Institute* from *Proceedings of the nth Symposium (International) on Combustion* in order to avoid the incorrect impression the word “symposium” would convey.

Poster Sessions and Reading Room

Poster sessions were implemented at the 18th Symposium to provide a forum for the growing number of scientists and engineers who desired to participate and present work-in-progress papers. This has become a popular feature of the symposium and indeed, about 500 work-in-progress posters are scheduled for presentation at the 30th Symposium.

Another important improvement of the Symposia was the implementation of the Reading Room, starting from the 22nd Symposium. Before this time the papers presented at the symposium were available only when the proceedings volume was published; this could take up to nine months after the symposium. This caused considerable uncertainty and delay in the dissemination of the information presented at the symposium. Thus with the implementation of the Reading Room the attendees can now read the papers before the presentation, and request copies so that the information contained therein can be accurately and timely transmitted and cited.

Internationalization

Since its founding, the Institute has always strived to maintain an international involvement. In earlier years, however, the officers were primarily US members, due mostly to the facts that the Institute is a US-registered entity and that it was easier for the US members to conduct the day-to-day functions of the Institute since the headquarters is based in Pittsburgh. Furthermore, the Papers Chairs were also US members and again this was largely due to convenience in terms of mails and filings. Since the mid-80's, however, there has been a significant increase in research activities in non-US countries, particularly in Asia, and advances in telecommunications have obviated the concern with centralizing the mails and filings. With these obstacles no longer in place, non-US members have sought a greater presence in leadership positions, and suggestions for a more equitable representation between the US and non-US members have been embraced with enthusiasm. Current representation is fairly evenly divided among US and non-US members, a distribution that is very much consistent with the number of papers presented at the symposia and published in *Combustion and Flame*. At present the Institute is truly an international society. In addition to the tradition of alternating the symposium sites, and having a US and a non-US Editor for *Combustion and Flame*, we now have a vice president for sectional affairs and a secretary for sectional affairs on the Executive Committee, a US and a non-US co-chair for the symposium technical program, the Board of Directors is approximately evenly distributed, and the first non-US president, Professor Brian S. Haynes of the Australia Section, will take office at the conclusion of the 30th Symposium. (The list of the presidents of the Institute is given in Appendix B).

The international nature of the Institute is also reflected in the large number of international sections, of which there are now 29. These sections regularly hold technical meetings, either locally or jointly with other sections, and participate fully in all Institute functions. Historical narratives have been provided by most of these sections and are presented in a later section of this document. The following is the list of the international sections and the years when they were established.

Section (Year)

Australia/New Zealand (1954)	Japan (1954)
Belarus (1998)	Mexico (1984)
Belgium (1954)	Netherlands (1954)
Canada (1954)	Poland (1972)
China (1982)	Portugal (1986)
Chinese-Taipei (1994)	Republic of Russia (1990)
Egypt (1980)	Republic of Korea (1988)
France (1954)	Scandinavian - Nordic (2000)
Germany (1954)	Spain (1954)
Great Britain (1954)	Sweden (1954)
Greece (1998)	Turkey (1956)
Hungary (1960)	USA-Central (1966)
India (1954)	USA-Eastern (1968)
Israel (1958)	USA-Western (1962)
Italy (1954)	

Advances in Combustion

Papers published in the proceedings volumes and *Combustion and Flame* reflect the state of combustion research. Since combustion is basically an application-driven scientific discipline, the active areas of investigation reflect societal needs while the scientific tools and knowledge that are used in the investigation represent the state of the art in scientific research. While many technology drivers have periodically appeared, in hind-sight the following major drivers have persisted and have provided major stimuli in the advancement of combustion science and technology. In the early days of combustion research there was much interest in safety issues, such as explosion and flammability limits. In the 1950's and 60's the interests in aero-propulsion and then rocket propulsion emerged, together with internal combustion engines, particularly on the issue of knock. Towards the late 60's concerns over combustion-generated pollutants, first on NO_x and then soot, arose. The societal cost of urban and wildland fires was recognized in the early 70's. Energy conservation and combustion efficiency emerged in the mid-70's, together with micro-gravity combustion. In the 80's and 90's the role of combustion in climatic change was recognized, while the potential of synthesizing materials through combustion generated much interest. All these major technology-drivers have persisted to this day.

Looking back, there have been two major periods during which there have been significant spurts in growth in global combustion research, namely the 1950's and 1970's, being stimulated by aero-propulsion and energy/environment, respectively, as just mentioned. These growths were enabled by significant developments in scientific tools, and also spurred the growth of new methods of analysis. Specifically, in the 50's the rigorous conservation equations for chemically reacting flows were first written down, and analyses for some combustion phenomena, simple as they may appear, were attempted. The 70's was truly a period of excitement, with the confluence of the use of several crucial tools in research being recognized and actively developed. These involved the use of computers to solve simultaneously the complicated diffusion-affected fluid motions in the combustion environment and the complex reactions involved in fuel oxidation and pollutant formation. Laser diagnostics were being applied to probe the processes of elementary reactions and the structure of flames, while theoretical and

computational calculations were employed to describe the kinetics of elementary reactions. Mathematically rigorous analysis of combustion phenomena was also finally made possible through the development of activation energy asymptotics. Perhaps more importantly, such growths were enabled by the participation of some giants in the field of aerothermochemistry in the 50's, such as von Karman and Hirschfelder, and the subsequent influx of a large corps of outstanding researchers from different disciplines. In the end, it was the scientific manpower that made the difference, as is always the case in scientific research.

Combustion research is at both an exciting and crucial juncture. Exciting in that it has finally emerged from a branch of empirical science, based on concepts such as one-step overall reactions and incompressible (*i.e.* constant density) flows, to one in which some simple combustion phenomena, such as the propagation speed and structure of the laminar one-dimensional hydrogen/air flame, can be described with moderate confidence, accuracy, and rigor. An equally important development is the recognition of the simultaneous importance of fluid mechanics and chemical kinetics in most combustion phenomena, and the interest and ability to merge them for comprehensive descriptions. Perhaps even more important, the roadmap to tackle complicated phenomena relevant for practical applications, involving complex turbulent flows and fuel oxidation, is also crystallizing. The prospect of making truly significant contributions both fundamentally and practically has never been greater. All the technology drivers mentioned above are still present, with some of them such as greenhouse gas emissions and climatic change assuming even more prominent roles. New drivers such the development of micro-combustors and nano-propellants are also emerging. Furthermore, because of the diverse disciplines involved in combustion, we are well equipped to make contributions in other technological areas as well, such as guiding the development of large computing systems, the application of complex and reduced reaction mechanisms to atmospheric chemistry, the modeling of the transport and chemical processes in fuel cells, the simulation of biological systems, the understanding of such astrophysical phenomena as the dynamics of supernovae, etc. It is obvious that combustion scientists and engineers, with their broad knowledge and expertise in the diverse disciplines straddling the physics of flows and the chemistry of reactions, at scales that range from the molecular to the cosmic, are well positioned to make substantial contributions to the continued advancement of civilization.

Clearly it is not possible to be comprehensive in a brief historical overview of the Institute and the Symposia. Suffice to say that over the past 50 years the Combustion Symposia have provided an ideal setting for stimulating discussions in all the definable areas of combustion research. These discussions have led to many productive collaborations and fruitful new ideas. It was the devotion and vision of Bernard Lewis that created this fortunate ambiance, and it is the volunteer efforts by Institute members that will continue to sustain these gatherings.

CHRONOLOGY OF COMBUSTION SYMPOSIA

First Symposium on Combustion

Held at the Seventy-Sixth Meeting of the American Chemical Society at Swampscott, Massachusetts, September 10-14, 1928.

Chair: George Granger Brown

Second Symposium on Combustion

Held by the Division of Gas & Fuel Chemistry at the Ninety-Fourth Meeting of the American Chemical Society, Rochester, New York, September 9–10, 1937.

Chair: Bernard Lewis

Third Symposium on Combustion and Flame and Explosion Phenomena

University of Wisconsin, September 7–11, 1948.

Chair: Bernard Lewis

Fourth International Symposium on Combustion (Combustion and Detonation Waves)

Massachusetts Institute of Technology, Cambridge MA, September 1–5, 1952.

Papers Chair: Stewart Way

Fifth International Symposium on Combustion (Combustion in Engines and Combustion Kinetics)

University of Pittsburgh, Pittsburgh PA, August 30–September 3, 1954.

Papers Co-Chairs: Stewart Way and Glenn C. Williams

Sixth International Symposium on Combustion

Yale University, New Haven CT, August 19–24, 1956.

Papers Chair: Walter T. Olson

Seventh International Symposium on Combustion

London and Oxford, August 29–September 3, 1958.

Papers Chair: J.W. Linnett

Eighth International Symposium on Combustion

California Institute of Technology, Pasadena, CA, August 28–September 3, 1960.

Papers Chair: S. S. Penner

Ninth International Symposium on Combustion

Cornell University, Ithaca, NY, August 27–September 1, 1962.

Papers Chair: Walter G. Berl

Tenth International Symposium on Combustion

University of Cambridge, England, August 17–21, 1964.

Program Chair: Raymond Friedman

Plenary Lecturer: R.G.W. Norrish, on “The Study of Combustion by Photochemical Methods,”

Eleventh International Symposium on Combustion

University of California at Berkeley, August 14–20, 1966.

Program Chair: A.L. Berlad

Plenary Lecturer: A.G. Gaydon, on “The Use of Shock Tubes for Studying Fundamental Combustion Processes”

Twelfth International Symposium on Combustion

University of Poitiers, Poitiers, France, July 14–20, 1968.

Program Chair: Marjorie W. Evans

Plenary Lecturer: J.E. Dubois

Thirteenth International Symposium on Combustion

University of Utah, Salt Lake City, UT, August 23–29, 1970.

Program Chair: Melvin Gerstein

Plenary Lecturer: Howard Emmons, on “Fluid Mechanics and Combustion”

Fourteenth International Symposium on Combustion

Pennsylvania State University, University Park PA, August 20–25, 1972.

Program Chair: J.P. Longwell

Plenary Lecturer: Hoyt C. Hottel, on “Combustion and Energy for the Future”

Fifteenth International Symposium on Combustion

Toshi Center Hall, Tokyo, Japan, August 25–31, 1974.

Program Chair: William C. Shipman

Plenary Lecturer: Felix J. Weinberg, on “The First Half-Million Years of Combustion Research and Today’s Burning Problems”

Sixteenth International Symposium on Combustion

Massachusetts Institute of Technology, Cambridge MA, August 15–20, 1976.

Program Chair: Frederick Kaufman

Plenary Lecturer: J.P. Longwell, on “Synthetic Fuels and Combustion”

Seventeenth International Symposium on Combustion

University of Leeds, Leeds, England, August 20-25, 1978.

Program Chair: Roger Strehlow

Plenary Lecturer: Heinz Gg. Wagner, on “Soot Formation in Combustion”

Eighteenth International Symposium on Combustion

University of Waterloo, Waterloo, Canada, August 17-22, 1980

Program Chair: Robert M. Fristrom

Plenary Lecturer: Robert F. Sawyer, on “The Formation and Destruction of Pollutants in Combustion Processes: Clearing the Air on the Role of Combustion Research”

Nineteenth International Symposium on Combustion

Technion-Israel Institute of Technology, Haifa, Israel, August 8–13, 1982.

Program Chair: Jack B. Howard

Plenary Lecturer: Frederick Kaufman, on “Chemical Kinetics and Combustion: Intricate Paths and Simple Steps”

Twentieth International Symposium on Combustion

University of Michigan, Ann Arbor, MI, August 12–17, 1984.

Program Chair: C.T. Bowman

Plenary Lecturer: W.G. Agnew “Room at the Piston Top: Contributions of Combustion Science to Engine Design”

Twenty-First International Symposium on Combustion

Technical University of Munich, Germany, August 3–8, 1986.

Program Chair: Daniel J. Seery

Hottel Lecturer: Adel Sarofim, on “Radiative Heat Transfer in Combustion: Friend or Foe”

Twenty-Second International Symposium on Combustion

University of Washington, Seattle, USA, August 14–19, 1988.

Program Chair: Gerard M. Faeth

Hottel Lecturer: Janos M. Beer, on “Stationary Combustion: the Environmental Leitmotiv”

Twenty-Third International Symposium on Combustion

University of Orléans, France, July 33–37, 1990.

Program Chair: Richard G. Gann

Hottel Lecturer: P.P. Gray, on “Chemistry and Combustion”

Twenty-Fourth International Symposium on Combustion

University of Sydney, Australia, July 5–10, 1992.

Program Chair: Chung K. Law

Hottel Lecturer: F.A. Williams, on “The Role of Theory in Combustion Science”

Twenty-Fifth International Symposium on Combustion

University of California at Irvine, CA, USA, July 31–August 5, 1994.

Program Chair: Elaine S. Oran

Hottel Lecturer: Frank Marble, on “Gasdynamic Enhancement of Non-Premixed Combustion”

Twenty-Sixth International Symposium on Combustion

Universita Federico II, Napoli, Italy, July 28–August 2, 1996.

Program Co-Chairs: Norbert Peters and Charles K. Westbrook

Hottel Lecturer: K.N.C. Bray, on “The Challenge of Turbulent Combustion”

Twenty-Seventh International Symposium on Combustion

University of Colorado, Boulder, CO, USA, August 2–7, 1998.

Program Co-Chairs: Donald K. Hardesty and Brian S. Haynes

Hottel Lecturer: J. Wolfrum, on “Lasers in Combustion: From Basic theory to Practical Devices”

Twenty-Eighth International Symposium on Combustion

University of Edinburgh, Scotland, July 30–August 4, 2000.

Program Co-Chairs: James F. Driscoll and Sebastien Candel

Hottel Lecturer: Irvin Glassman, on “Supersonic Flight and Cooking over Wood-Burning Stoves:
Challenges to the Combustion Community”

Twenty-Ninth International Symposium on Combustion

University of Hokkaido, Sapporo, Japan, July 21–25, 2002.

Program Co-Chairs: Jurgen Troe and Forman A. Williams

Hottel Lecturer: S. Candel, on “Combustion Dynamics and Control: Progress and Challenges”

SECTIONAL HISTORICAL NOTES

The following notes are presented as they were received, with minor modifications for editorial uniformity.

Australia and New Zealand Section

The Australia and New Zealand Section has a rich history of various contributions to Institute activities in spite of the long distances involved in traveling to the Symposia and the relatively small population. Australia's huge reservoir of fossil fuels and the energy reliant mineral industry is responsible for much of the interest in Australia. The Founding Chairman of the Institute in Australia was Dr David Warren, who spent most of his professional working life at the Aeronautical Research Laboratories (ARL) in Melbourne. David had worked with one of the founders of the Institute, Sir Alfred Egerton, in London and was naturally keen to support the activities of the Institute in Australia and New Zealand.

David was an inspiring Founding Chairman who developed ingenious ways to maximize the involvement of Section members in the Symposia. His most famous innovation was the traveling Symposium tour in which Section members combined attendance at the meeting with an often eventful tour of Europe and North America. Members who participated in the tour of Greece and Egypt before the Haifa Symposia still recount in vivid detail a day on that tour which had them passing through at least three international air terminals in one crowded day of the itinerary. The profits from these tours were used to support member's travel grants to attend the Symposium, and this tradition of strong Section support continues to this day, although the tours are sadly no more.

David also achieved considerable fame, although belatedly, for his invention of the black box flight recorder. David's interest in this device, now standard equipment, was inspired by the mysterious crash of the first jet-powered aircraft, the Comet. His initial attempts at development attracted little support or interest in Australia. However an informal visit to ARL by Sir Robert Hardingham, the former British air Vice-Marshal, resulted in a swift trip to the UK, aboard a British bomber to demonstrate the recorder. Naturally David used the opportunity to attend the Seventh Symposium held in 1958 at Oxford University.

More than 40 years after he invented the recorder, David was officially recognised in the 2002 Australia Day Honours list. He was appointed an Officer in the General Division of the Order of Australia for his "service to the aviation industry, particularly through the early conceptual work and prototype development of the black box flight data recorder". David maintains links with the local Section to this day. For example, the highlight of the 2002 Australian Symposium on Combustion and the Seventh Australian Flame Days was his talk at the conference dinner. The scene was set by the reflections from the sunset and the city lights over the River Torrens and the bountiful supply of South Australian red wines. Dr Warren reminded us of the early traditions of the Institute drawn from his 25 years as chair. Our major traveling award, the David Warren Travelling Fellowship, ensures that David's contributions will continue to be celebrated.

David was succeeded as Section Chair by Professor Bob Bilger from the Department of Mechanical Engineering at Sydney University. Bob has also been a very strong supporter of the Institute since his first attendance at the Symposium in Poitiers in 1968. He often recounts the story of the train ride from Paris to that event, and the life-long friendships made. Bob was awarded a Silver Medal (with Assaad Masri) at the 22nd Symposium and the Ya. B. Zel'dovich Gold Medal at the 24th Symposium, and worked hard on aspects of internationalisation of the Institute during service on the Board.

Bob was the driving force in the Australia and New Zealand Section hosting the 24th Symposium at the University of Sydney in 1992, after previously seeking to host earlier meetings. In what could be seen as a trial for the Olympics 8 years later, many tributes came in congratulating us on the "best Symposium ever". There were 634 technical registrants and about 280 accompanying visitors. There was hardly a hitch in the arrangements and the weather was quite mild for a Sydney winter. A spectacular fire in a nearby wool store around midday on Monday

got the Symposium off to a suitable start. The success of the Symposium was the result of much hard work, particularly on the part of the local organising committee.

After the Sydney Symposium Bob stepped down as Chair, and Professor Brian Haynes from the Department of Chemical Engineering, University of Sydney guided the Section through the 1990s and beyond. Brian has also been an outstanding supporter of the Institute, and has attended every meeting since the Fifteenth Symposium in Tokyo in 1974. He has made many contributions to these events, including co-chairing the 27th Symposium in Boulder. Brian is currently Vice President / President Elect of the Institute.

The Section continues to support the Symposia by presentation of high quality research, by attendance, and by major contributions to the Program Committee. At the Chicago Symposium later this year, John Mackie (University of Sydney), Assaad Masri (University of Sydney) and Graham (Gus) Nathan (Adelaide University) are all Colloquium Chairs, continuing a long tradition of Australian involvement.

The Section also holds a biannual local meeting, recently in conjunction with the Australian Flame Research Committee, which attracts contributors from academia, research institutes, and industry. Students are encouraged to attend this meeting by the provision of travel grants, and prizes are awarded for best papers in several categories. On the final day of the 2002 Adelaide conference the Turbulence, Energy & Combustion (TEC) group from within the Schools of Chemical & Mechanical Engineering at Adelaide University added a new tradition to the meeting by presenting and lighting a new ceremonial cauldron. One feature of this “in-house” cauldron is the combustor, based on the system developed by the group for the Sydney 2000 Olympic Torch and the famous “flying” stadium flame, which continues the high standard of innovation set by our Founding Chair.

International activities have also been pursued in recent years through participation of Section members in the Asia-Pacific Conference on Combustion (ASPACC), in conjunction with other Asia-Pacific regional section members.

The strong support of the Australia and New Zealand Section is built on a strong membership base, usually of around 70-100 members. These members have traditionally been drawn from very active combustion research groups, including the Universities of Sydney, Newcastle, Monash and Adelaide, and government research institutes such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and the Defence Science and Technology Organisation (DSTO). However, the Section has always also attracted membership from key industries, such as the power industry, who directly draw on the results and achievements of section activities.

Belgian Section

Coal-mining and quarrying were important industrial activities related to the development in Belgium at the end of the nineteenth century. The Government (Parliament) created a (research) Institute connected with the National Coal Board to deal with safety problems in mines. Later, a research centre for explosives was also established to study rock blasting. Therefore the Belgian scientific combustion community was interested mostly to begin with those two main topics.

After the World War II, Professor Eugène Mertens de Wilmars (1889-1970) at the University of Louvain (Chemical Industry) gave a paper on carbon combustion at the 3rd Symposium and was chosen as an honorary member of the Standing Committee on Combustion Symposia (1948-1954).

Right from the beginning of the Combustion Institute Dr. Louis Deffet (1906-1972), head of the Centre de recherches pour l'industrie des produits explosifs (CRIPE) located in Brussels was selected as the Belgian representative in the Combustion Institute Committee. Acting also as the first chairman of the Belgian section he remained in that capacity until his death. He was also member of the Board from 1962 till 1968. Besides his activities in the field of high pressure, powders and explosives he organized five national meetings dealing with solid detonations and unstable compounds behaviour. He was instrumental to organize in Brussels (1967) the First International Colloquium on Gasdynamics of Explosions initiating therefore the famous series of scientific meetings called presently “ICDERS”.

The reported activities in combustion from the 4th till the 13th Symposia were focused mainly on flame propagation, ions and excited species in flames. These investigations were conducted at Louvain University under the guidance of Professor Adolphe Van Tiggelen (1914-1969) who has been honoured in 1961 with the most prestigious Belgian scientific award, "Prix Francqui" for his important contribution to the understanding of flame processes.

A series of biennial "Journées d'études" of the section was established starting from 1972 until the present time. The various topics touched upon during these meetings were dealing with hydrocarbon combustion, fires, dust explosions, safety in industries, elementary reactions in gas phase, gaseous detonations, flame structure, chemical kinetics, modelling, boilers and heating systems, pollutants, etc.

Professor Pierre Van Tiggelen at the Université catholique de Louvain was elected section chairman in 1972 and acted until 1992.

It is worth to also mention that in May 1983 a meeting was called upon to commemorate the bicentennial of the pioneering work of Jean Pierre Minckelers and co-workers (Jean FrançoisThysbaert and KarelVan Bouchaute). Indeed, in 1783 at the old "Studium Generale" (Louvain) they worked out the production of an inexpensive gas extracted from coal pyrolysis to inflate balloon and used it as lighting gas (gas-light) in their lecture halls. They also performed the very first measurements of "flammability limits" of those gaseous mixtures at that time. So it was a good reason to celebrate it by a scientific colloquium "Current Topics in Combustion" in 1983 co-organized with the help of Professors Stefan De Jaegere and Jozef Peeters of the Katholieke Universiteit te Leuven. The historical part of the meeting was combined with an air-balloon event taking place in the Arenberg Castle in Heverlee/Leuven.

In May 1992, Professor Jacques Vandooren took over the chairmanship of the section. He organized the "Journées d'Etudes" on the basis of a new format: several contributed oral papers with a plenary lecturer introducing the main subject. Such a method and the increase of interest forced him to run the colloquium on more than a one-day meeting. It allowed more time for social activities, for instance, we were able to celebrate Dr. R.M.Fristrom's seventieth birthday in 1992, cultural visits, outings, even getting our traditional banquet at the top of the Atomium in Brussels in 2000. In 1996, Professor Vandooren also created a kind of silver medal of the Belgian section: the "Prix Adolphe Van Tiggelen" for the most brilliant presentation of a paper by a scientist below 30 years old at the previous "Journées d'Etudes". The selection is made by a scientific committee with foreign and Belgian members. The diploma and the prize were officially presented by Mrs. Adolphe Van Tiggelen at the following meeting. So far, Mrs. Katia de Vriendt, Rany Ancia, Alexandra van der Loos and Mr. Koen Vanoverberghe (all young Ph.D.s) have been nominated successively and have received their awards. The first one was presented at a joint meeting with the French section in Lille on May 1997.

Other joint meetings have been set up with the Dutch section in Eindhoven (1999) and Brussels (2002) and we are looking forward to the 18th meeting in May 2004 and to the European Combustion Meeting in May 2005 in Louvain-la-Neuve.

Although small by its size to be compared with other sections (around 25 active members and maybe up to 50 interested people), the Belgian Section has been always active in combustion at home and abroad. We ever have been enjoying presenting our research results and current works to the combustion community, attending all international symposia from the third one.

British Section

The Section was formed essentially at the same time as the International Institute, largely under the influence of Sir Alfred Egerton, to whom (upon his death) the Proceedings of the 1960 Symposium in Pasadena were dedicated. Although no record of the first meeting of the British Committee is available, the 1954 Symposium in Pittsburgh lists three members, Egerton, Stanley Clarke (Joseph Lucas, Burnley, makers of engine ignition systems) and Peter Lloyd (National Gas Turbine Establishment). Others active in the early days were R.G.W. Norrish, J.W. Linnett and A.R. Ubbelohde.

It is clear from these earliest names that the Section had academic and industrial involvement. This has continued, as has its wish to represent the full range of combustion science and engineering interests in its activities. In 2003, it had 194 members, comprising 123 academic and 71 industrial. It has always encouraged students to join; last year there were 30. Their special membership rate also applies to retired members; last year there were 29 such. The activities of the Section are overseen by a Committee, comprising 12-15, again endeavouring to represent the full span of combustion.

Particularly over the past few years, industrial membership has shown a gradual decline, largely resulting from the declining emphasis placed on combustion by Government and industrial organisations, including research-funding bodies. The view sometimes seems to be that combustion has been around a long time, so surely we know it all by now! Given the vast changes in choice and use of energy occurring now and set to continue and probably to accelerate, such a view seems grossly short sighted. It is causing increasing concern to members of the British combustion community, who sees its task as providing a counter-force to this, but it is an uphill struggle.

One of the main ways the Section communicates with members is through a Newsletter, produced several times a year. This has been highly successful, largely to the efforts of its editors. The last three of these have been Derek Bradley, Brian Tyler and now Tony Burgess. Each has carried it forward and made their own distinctive contributions to its development. More recently, this has been augmented by a web site. As well as providing a wider range of information to members, this can address a wider interest group and act as a possible recruiting mechanism.

The main Section activity has been and remains the organisation of 1-Day Technical Meetings - normally held in Spring and Autumn (Fall) of each year. There used to be a third around early December. A major factor in these being discontinued was an occasion when the meeting had to be cancelled at the last-minute because of inclement weather, with a sudden fall of snow playing havoc with road and rail transport. (Many of our European colleagues must continue to be surprised at how regularly such disruptions happen in Britain, given our relatively mild winters.) Late cancellations always provide severe headaches for organizers. This was no exception; lesson learned.

The Committee endeavours to make these 1-day meetings varied in subject matter. A selection from the past decade includes Combustion in Gas Turbines; Industrial Combustion Hazards; Auto-ignition; Numerical Simulation in Combustion; and Flame Chemistry, to single out but a very few. The size of audience varies but is generally in the range 40-100. To increase their impact, meetings are normally held in conjunction with another group with a combustion interest, e.g. from Institute of Physics, Royal Society of Chemistry, or Institute of Mechanical Engineers.

Political developments in Europe have given a new dimension to our activities. We have been delighted to work with other European Sections in the organization of joint meetings. As well as their technical objective, these meetings provide enjoyable social occasions. In some cases, attempts have also been made to use them to stress a political message about the significance of combustion knowledge and so, hopefully, aiding Governments' future energy policies.

On an international level, the main events are the biennial Combustion Symposia. The British Section has been fortunate to organize four of these. Below are a few anecdotes, which hopefully capture some of the flavour of these meetings.

London/Oxford in 1958: Because it was over 40 years ago, few memories survive. But Tony Burgess, then a student (well it was a long time ago) does recall his supervisor, Charles Cullis, giving him £10 to cover attendance. This is the only symposium held on split sites. The meeting began in London, with an inaugural lecture in the famous Lecture Room of the Royal Institution (where previous lecturers have been Faraday, Davy and Rumford). Then, with the permission of the Lord Mayor, Sheriffs and Corporation of the City of London, a Sunday evening gala banquet was held amid medieval splendour in the Guildhall. The traditional "Loving Cup Ceremony" lent emphasis to what Sir Alfred Egerton termed "the Brotherhood of Science - friends in search of truth" - still true today in the Institute. Attendees then decamped to Oxford in a special train drawn by one of new gas turbine-powered locomotives, provided by British Rail. The main technical part of the meeting was held here, with many

delegates accommodated in the somewhat spartan surroundings of the old Colleges. Away from the main technical sessions, an informal discussion was held one evening on the topic “The Study of Combustion: Is it an Art or Science?”, presided over by Prof. A.R.J.P. Ubbelohde. Worth repeating?

Cambridge in 1964: Having sampled the delights of Oxford, six years later the Symposium moved to the equally ancient surroundings of Cambridge. Again, much accommodation was provided in the colleges, which, although splendid architecturally, retained some of their historical character in a rather too practical way. One of the local organisers remembers a US guest and his wife, staying in college, asking if a shower was available. The Porter’s face fell; he had never heard of showers - washing facilities were still provided by jugs of hot water being brought to bedrooms. Another problem arose with a couple booked into Pembroke College. The College Porter became very excited - a woman had never slept in the college before. A rapid re-think was needed and the couple moved into a hotel.

Cambridge provided many delights for the Social Programme. The Banquet was held at Woburn Abbey. This sounds very grand, except for the fact, not fully appreciated by the organisers, that it was not in the Abbey itself but in a marquee in the grounds. The grounds, of course, were not entirely flat and one attendee recalls a somewhat doddering waitress knocking over a glass of wine while serving soup at the start of the meal. The table sloped towards his wife and so the wine rolled straight into her lap. To add to her discomfort especially, and also that of other attendees, it was a very cold night. The guests, in particular accompanying visitors, were therefore not pleased that the speaker at the banquet felt it was the occasion for another long, and not very scintillating, plenary lecture.

Leeds in 1978: The Wednesday Outing was to the memorable Roman city of York, with its city walls and many ancient sites. As the entertainment, a baroque string quartet played in the Assembly Rooms. With the ancient surroundings of such a venue, surely nothing could go wrong. Unfortunately it did. Hoyt Hottel, stepping into the road, was hit by a passing vehicle and rushed to hospital for treatment to a nasty injury to his skull.

One of the cultural strengths of northern Britain is traditional brass bands and the Tuesday evening concert featured one. Derek Bradley spent considerable time over the previous 3 years, listening to possible choices before finally selecting one, the Imperial Metals Band. Subsequently, they came very close to winning the national brass band competition. Among the items on the programme was Tchaikovsky’s “1812 Overture”. To play on the combustion theme, it had been hoped to simulate the battle’s cannon fire by real explosions; a serious snag arose - it proved impossible to synchronise these with the music. Nevertheless, Bernard Lewis was delighted with the evening and asked if he might go backstage afterwards to talk with members of the band.

Edinburgh in 2000: This is still too recent to allow a proper perspective. But the organizers are grateful to Dan Seery, then Institute President, for effectively selecting the venue for the Welcome Reception. The local organizers had hoped to use the Royal Museum of Scotland for the banquet but it proved unable to cope with sufficient numbers. But, some months ahead of the symposium, Dan was checking out facilities. He was shown the Museum in passing and quickly realised its potential for the Reception.

The Wednesday outing was at Oxenfoord Castle for an afternoon of Highland Games and BBQ. Although the skies were gloomy, no rain fell, even though a few miles away in Edinburgh itself, rain poured down. Problems of acoustics in McEwan Hall: architecturally splendid but not designed as lecture hall

The above gives a very brief snapshot of the past; what of the future? The Section’s general structure and pattern of activity is set to continue. It maintains a full commitment to European and international Institute activities, while, at home, trying hard fully to represent the interests and concerns of combustion scientists and engineers. A top item on the last theme is the quest for new methods of increasing awareness of combustion among university undergraduates and, a trickier task, in school science teaching. A busy future seems assured!

Canadian Section

Canada has significant reserves of fuel and forest resources and an active presence in the global energy production and utilization sectors. With these come a large variety of issues related to combustion efficiency, fire and

explosion safety and combustion-generated pollution. From coal to crude oil, natural gas to tar sands, forest reserves to manufacturing operations and winter climates to rural villages, there are many challenging problems to be addressed by the Canadian combustion community. Therefore, it is important to advance and encourage multi-faceted combustion research in Canada, since it has the potential to yield significant and lasting economic and social benefits to the country. In recognition of these needs, the Canadian Section of the Combustion Institute was formed in 1954 and has fostered and served the combustion research community for the past 50 years.

The Canadian Section of the Combustion Institute was formed after the 1954 International Combustion Symposium in Pittsburgh upon the advice of Dr. E.W.R. Steacie, then President of the National Research Council of Canada. It was established to provide opportunities for networking amongst Canadian combustion researchers from industry, government and academia, as well as to provide a forum for intellectual stimulation and the exchange of ideas in the context of Canadian combustion needs. From its beginnings, the Canadian Section encouraged the participation of established and student researchers alike, a tradition that is still upheld today.

For the first 21 years, the workings of the Canadian Section were very well managed by Professor Lloyd A. Thompson of McGill University, with the able assistance of Diana Steiner. Most of the early technical meetings were held in conjunction with the Canadian Society of Chemical Engineers, as special sessions dealing specifically with combustion-related topics and applications. During these early years, the fledgling Canadian Section hosted two larger technical meetings of the Eastern Section of the Combustion Institute and was very active in the International Symposia. The Section's most notable paper was given in 1964, at the 10th Symposium on Combustion, when Canadian Nobel Laureate John Polanyi (Chemistry 1986) presented a paper with Dave Snelling on hydrogen-halogen reaction chemistry (Vol.10, pp.403-409, 1965). This is one of the only Combustion Symposia papers ever authored or co-authored by a Nobel Laureate. From its small beginnings, the Canadian Section had grown to over 35 members by 1975. It was time to launch an independent organization with its own governance and technical meetings.

Also in the early 1970's the energy crisis hit, giving rise to a significant increase in issues relating to fuels and energy in the Canadian context. This further prompted the Canadian Section to expand its role in mobilizing the combustion community by formalizing and intensifying its activities. At a general meeting of the members in Montreal, the newly formed Canadian Section elected their first Board of Directors with Prof. Henry Becker of Queen's University serving as Chair from 1975 until 1981. This first Board included many distinguished members of the combustion research community: Profs. Tom Brzustowski (vice-chair), Frank Steward, Ghazi Karim and John Dove, with Dr. Robert Sandri as Secretary and Dr. Gerry Penner as Treasurer. Under Henry Becker's tenure, the operating principles for the Board of Directors were formally established, by-laws and aims for the section were drafted, and a newsletter and annual technical meetings of the Section were instituted. The first independent Canadian Section meeting was held in 1977 in Banff, Alberta with 21 papers in theoretical and applied combustion. It is interesting to note that, at this time membership fees were very reasonable - only \$4.00 per year! For his outstanding service to the Canadian Section of the Combustion Institute, Henry Becker received the Section Distinguished Service Award in 1988.

In 1980, the Canadian Section hosted the 18th Symposium at the University of Waterloo under the able leadership of Tom Brzustowski and colleagues. This symposium drew over 800 attendees with an active program on topics ranging across the breadth of combustion science and its applications. Unlike previous symposia, complete manuscripts had to be submitted for consideration at this symposium, a poster session for work in progress was piloted and invited lectures, selected to maximize attendance, were presented at the beginning of each day before the parallel sessions began. Many aspects of this format have persisted to the present International Symposia. What many attendees will recall, however, was the unique lighting system with green lights for most papers, but yellow then red lights to illuminate more long-winded speakers. Using this system, the many parallel sessions around the UW campus were kept to a very tight schedule. Tom Brzustowski received a Distinguished Service Award in 1989 for his longstanding contributions to the Canadian combustion research community.

In the period between 1975 and 1990, membership in the Canadian Section nearly tripled, from the original 35

members to close to 100 members. The fees similarly increased from \$4.00 to a still very reasonable \$7.50 per year. The level of activity in the Section intensified and its international reputation grew under the able stewardship of Henry Becker, Professor Frank Steward of the University of New Brunswick (1981 – 1985) and Professor Doug Dale of the University of Alberta (1985 – 1989). Other Board members during this period included Bernie Weichula, George Lee, John Wong, Jack Odgers, Jim Wallace, Mike Bardon, Phil Hill, Detlef Kretschmer, Deniz Karman and Kannan Tennakore.

Doug Dale established the Distinguished Service Awards, re-instituted Section newsletters and focused additional attention on expanding combustion research and educational activities across Canada. The first survey of combustion laboratories and experimental facilities was completed in 1983 and Detlef Kretschmer was tasked with documenting the growing number of university courses relevant to the Canadian combustion community.

Indeed, during this time, the Section thrived in pursuit of its aims:

- 1) expanding and enabling attendance at its annual technical meetings, as well as at the International Symposia
- 2) encouraging dissemination of research results and knowledge
- 3) stimulating combustion education through university-based and professional development courses
- 4) drawing attention to issues in combustion science and applications that were of particular interest in Canada and
- 5) cooperating with other government agencies, industry, universities and any interested parties in development and application of combustion science in Canada or internationally.

Annual technical meetings of the Canadian Section continued in venues throughout the country and, in 1986, Ghazi Karim and Doug Dale were instrumental in establishing the first joint meetings with the Western States Section of the Combustion Institute in the lovely western mountain venue of Banff, Canada (1986 and 1990). These latter meetings opened the door for increasing representation of international researchers at the Spring Technical Meetings of the Canadian Section, a trend that continues today.

Over the next decade, the Chairmanship of the Canadian Section passed to Professor Jim Wallace of the University of Toronto (1989 – 1992), followed by Dr. Ömer Gülder (1992 – 2001), then of the National Research Council of Canada, but currently a professor at the Institute for Aerospace Studies, University of Toronto. Other more recent members of the Board include Bob Evans, Mike Pegg, Dave Checkel, Andrzej Sobiesiak, Greg Smallwood, Paul Amyotte, Patric Ouellette and Janusz Kozinski. The Section has continued to grow to about 125 members with an ever-increasing number of student members. To encourage these students to become active members of the international combustion community, Ömer Gülder instituted a special student travel award to enable one or more students to attend and present a paper at the International Combustion Symposia. Also on the international front, Ömer Gülder is currently a very active member of the Board of Directors of the Institute, following in the footsteps of Henry Becker and John Lee who previously served in that capacity.

The Annual Spring Technical Meetings of the Canadian Section of the Combustion Institute continue to attract presentations in a broad variety of areas from combustion science to applied combustion systems. These alternate in a “west-central-east-central-west” pattern to ensure accessibility to Canadian researchers from all regions of the country. They have evolved to include 45-60 contributions per year, with an excellent mix of student, industrial, academic and government participants. The high quality of the contributions, and the low cost and somewhat informal flavour of these meetings are designed to encourage student participation and foster networking amongst the broader Canadian combustion community.

Chinese Section

The Combustion Section of the Chinese Society of Engineering Thermophysics was established in 1978, at which time the Section was comprised of nearly 30 members. Since then, the Section has organized Chinese combustion science and technology conferences each year.

Starting in 1978 Chinese scientists and professors working in combustion began attending the Symposia, giving presentations and participating in worldwide combustion activities. From the beginning, Chinese scientists and

engineers were attracted to the high-level academic activities and kindness of all participants of the Institute, and decided to apply to be a group member as Chinese Section of the Institute. The application was approved in 1982 by The Board of Directors. Professor Huang Ning, an expert in aircraft engines from Beijing Aerospace University, was the first chairman of the Chinese Section.

Professor Ning was succeeded in 1986 by Professor Hongji Wang from Chinese North-West Technology University, who was also an expert in aircraft engines. In 1990 Professor Shaoxi SHI from Tianjin University, whose contributions are in the area of internal combustion engines became the chairmen, and since the spring of 2000 - Professor Xuchang XU, best known for his work in coal combustion, from Tsinghua University has served.

In 1996 Professor Shaoxi SHI was elected to the Board of Directors of the Institute, and he served until his untimely death in September 2000. His successor is Professor Xuchang XU, who will serve until 2008.

By 1988, the total number of members in The Chinese Section had grown to 139, and in 1994 110 members were selected to frequently communicate with international combustion scientists and experts, as members of the Institute.

The Chinese Section teamed with other Asia-Pacific regional section members affiliated with the Combustion Institute, namely the Australia/New Zealand, Chinese-Taipei, Japanese and Korean Sections, to organize the first Asia-Pacific Conference on Combustion (ASPACC) in 1997. This hugely successful conference provided an opportunity for scientists, researchers, and engineers of diverse experiences to exchange current regional information and new ideas on combustion science and technology and also to serve to present state of the art, and future directions in this area for science and engineering applications through the regional and global scientific partnership.

Following the successful first Asia-Pacific Conference on Combustion (ASPACC-97) held in Osaka Japan in 1997, The Chinese Taipei Section hosted the second Asia-Pacific Conference on Combustion (ASPACC-99) in 1999. The third Asia-Pacific Conference on Combustion (ASPACC 2001) was hosted in 2001 by the Korean Section, and the fourth Asia-Pacific Conference on Combustion (ASPACC 2003), was hosted by the Chinese Section in 2003 in Nanjing. All the conferences were very successful, and the number of attendees in 2003 swelled to more than 220.

Chinese - Taipei Section

In response to the spectacular economic growth and industrial developments and the mounting national energy and environmental issues in Taiwan, Dr. H. H. Chiu urged the need for organized national efforts to promote modern research and development activities that aim to elevate the national capabilities and enhance the participation in the international activities of global need. To this end, the plan for the establishment of such an organization was contemplated in March 1991. The Combustion Institute of ROC (CIROC) was established in June 1992, and became a Section Member of the Combustion Institute in July 1992.

Over the past years, CIROC has evolved to become an institute of the finest quality in the country promoting impressive institutional activities, and leading strong initiatives in international programs including participation and hosting international conferences. The institute which has been fortunate to have active members of the board headed by the Chairman Dr. J. C. Yang (1992-1996), Dr. T. M. Liou (1996-2000), and Dr. Y. B. Su (2000-2004) currently has more than two hundreds members from academia, industry, government and semi-government agencies of the nation. Membership is expected to grow in the future as the nation's industry expands the productivity in the coming decades.

Section Activities (1999-2004): In May 1999, the Institute was honored to host the second Asia-Pacific Conference on Combustion (ASPACC-99) at National Cheng Kung University, Taiwan. The theme was "21st Century Combustion Progress with Global Partnerships". It was a very successful international conference. The 10th, 11th, and 12th national conferences (annual) on combustion were successfully held in March 2000, 2001, and 2002, respectively, each with almost 90 contributing papers in the major subject area covering fire research, combustion

modeling and diagnostics, combustion chemistry and fuel science, propellants and propulsion technology, spray combustion, internal combustion engines, industrial furnaces and boilers, and laminar and turbulent combustion research. The 13th national conference was held in March 2003 with 113 contributed papers, and the keynote speaker was Professor C. K. Law, President of the Combustion Institute. The 14th annual national conference on combustion was just held on March 27, 2004 at National Central University with 127 contributed papers in seven parallel sessions. We invited Professor K. K. Kuo of the Penn. State University to be the keynote speaker. The title of his speech was “Importance and challenges of combustion processes in hybrid rocket propulsion systems of the 21st century”. The CIROC also held several large workshops on “Dioxin”, “De-NO_x & De-Dust”, and “Energy and Combustion” in these past years. In addition, the Institute publishes “Combustion Newsletter” quarterly to disseminate institutional announcements and exchange of information among the members and various organizations in the nation. Moreover, members of CIROC took active part in major international conferences in combustion and related subject areas. As a section member of the Combustion Institute, CIROC actively participates in Combustion Symposium International and affiliated regional meetings, for example, the upcoming 30th Symposium, the 28th and 29th Symposiums, 17th-19th ICDERS, ASPACC 2001 & 2003, and many others.

Prospect: Keeping pace with the rapidly evolving technological and scientific interests of the 21st century, CIROC contemplates seeking international collaboration among various international Sections of the Institute and affiliated organizations. Furthermore, CIROC encourages and assists active members of the Institute to establish international collaborations in the area of mutual interest to stimulate the research and upgrade the scientific knowledge and quality of research.

French Section

The founding chairman of the French Section (1954) was Professor Paul Laffitte who was the head of the Laboratoire de Chimie Generale located in Paris-La Sorbonne. Paul Laffitte was succeeded by Professor Numa Manson, head of ENSMA (1976-1978), Dr. Marcel Barrere, researcher at ONERA (1979-1980), and Dr. Ralph Delbourgo, head of the Centre de Recherches sur la Chimie de la Combustion et des Hautes Temperatures (1981-1984). In 1984, the Section assumed the name “Groupement Francais de Combustion (GFC) - French Section of the Combustion Institute”. Then the following chairmen were Dr. Gerard De Soete, researcher at the Institut Francais du Petrole (1985-1990), Dr. Denis Stepowski, researcher at CORIA-Rouen (1991-1998), Dr. Iskender Gokalp, head of the Laboratoire de Combustion et Systemes Reactifs - Orleans (1999-2002) and Pr. Jean-Francois Pauwels, head of the Laboratoire de Physicochimie des Processus de Combustion et de l’Atmosphere - Lille since 2003.

The main goal of the Section is to promote research in combustion in France, enhance exchanges with industrial applications, promote exchanges within the global combustion community, and support and facilitate relationships with the other European sections.

Members of the Section come from academic laboratories, industrial research laboratories, and national centers. The research areas are reaction kinetics, pollutant formation, laminar flames, fire research, turbulent combustion, detonation, explosion, supersonic combustion, heterogeneous combustion, propulsion and engine combustion, new technology concepts, stationary power systems, diagnostics and sensors, and others.

At the international level, the French Section organized two biennial international symposia, namely the 12th held at the University of Poitiers in 1968, and the 23rd held at the University of Orleans - CNRS in 1990. In 1975, the Section and the University of Orleans hosted the Second Combustion Institute European Symposium and recently in 2003, also in Orleans, the European Combustion Meeting (ECM 2003) with more than 300 participants. The International Colloquium “Berthelot, Veille, Malard and Le Chatelier” was held at the University of Bordeaux in 1981.

The French Section members have actively participated in all the symposia as authors of papers. The significance of their contributions is highlighted by the active participation of their members on the Board of Directors and the Technical Program Committee. At the symposia, plenary lectures were given by Pr. Jacques Emile

Dubois (University of Paris VI; Poitiers, 1968), Dr. Thierry Poinot (IMFT Toulouse; Naples, 1996), Pr. Paul Clavin (University of Aix - Marseille; Edinburgh, 2000) and Pr. Sebastien Candel (EM2C-EC Paris; Sydney, 1992). Pr. S. Candel was also the Hottel Lecturer in Sapporo (2002) and the Program Co-chair in Edinburgh (2000). Many members of the Section served as chairperson of various colloquia.

The primary section activities remain the organization of joint-meetings with other European sections, and of one-day technical meetings. Joint meetings were organized with the sections of Italy (Amalfi, 1987; Capri, 1992), United Kingdom (Rouen, 1989), Germany (Mulhouse, 1995), Belgium (Lille, 1998) and United Kingdom and Germany (Nancy, 1999). Usually the annual technical journey is held in conjunction with an industrial group having a combustion interest, e.g Institut Francais du Petrole (IFP), Air Liquide, Centre d'Etudes Atomiques (CEA), Gaz de France (GDF),... and recently with the French Section of the International Flame Research Foundation (IFRF) on the subject matter "Laser diagnostics, from the laboratory to the industrial application" (Paris, 2004).

The Section encourages and financially supports the participation of its student members at the Symposia. Since 1992, 40 grants were given to young researchers who present their PhD work at the Symposia. The "Day of PhD Students in Combustion" is organized each year (Paris, 2000; Lille, 2001; Orleans, 2002; Paris, 2003; Nancy, 2004). Since 1987, 12 students have been awarded by the biennial "Paul Laffitte Prize" for the best PhD thesis in combustion. Another action for students and engineers is the participation of the organization of the "School of Combustion", planned each two years over a 10-days period. It has been successively held at Marseille (IRPHE Marseille, 1987), Oleron (LCD-Poitiers, 1989), Cargese (CORIA-Rouen, 1991), Collonges la Rouge (EM2C-EC Paris, 1994), Nouan le Fuzelier (LCSR-Orleans, 1996), Oleron (PC2A-Lille, 1998), Mont Saint Odile (LGRE-Mulhouse, 2000), Lalonde des Maures (IRPHE-Marseille, 2002) and Oleron (LCD-Poitiers, 2004).

The Section communicates with its members through a Newsletter, sent several times a year and a new website: <http://www.gfcombustion.asso.fr>.

At present there are 120 academic and industrial members involved in all aspects of combustion research.

German Section

Following the 3rd and the 4th Symposia, Professor Dr. Wilhelm Jost started to develop a section of the Combustion Institute in Germany. It was founded in 1954. One main intention was to increase the German interest in the international combustion research and to stimulate participation at the International Combustion Symposia.

Towards the mid-sixties the activity in combustion research in Germany started to increase appreciably and the "Deutsche Flammentag" was founded as a regular meeting every two years. It was mainly oriented towards technology aspects of combustion. The German Section of the Combustion Institute participated together with other scientific societies (Deutsche Vereinigung für Verbrennungsforschung e.V. (DVV), VDI-Gesellschaft Energietechnik (VDI-GET)) in the organisation of the "Deutsche Flammentag". It also arranged meetings on special combustion topics together with other scientific societies as e.g. the Bunsengesellschaft, DECHEMA, a. o.

In 1983 the German members of the Institute prepared new bylaws for the German Section by which the section became a registered non-profit institution. Axel Martinengo became manager of the German Section. Shortly afterwards the planning of the 21st International Combustion Symposium started. This Symposium took place in Munich on August 3 - 8, 1986. It was the first Symposium held in Germany and proved to be a successful and pleasant meeting.

In 1988, the German Section established an award – the Wilhelm-Jost-Prize – for an excellent combustion paper of young person being presented at the "Deutsche Flammentag". The first recipient was Klaus Görner in 1989. In 2000 new awarding rules were passed, naming the award Wilhelm-Jost-Medal. In the beginning of the nineties the members discussed the inauguration of a second prize for a life's work in the field of combustion. The three institutions involved in the organisation of the "Deutsche Flammentag" agreed upon the rules of the awarding of a Rudolf-Günther-Prize being presented for the first time in 1997 to Rudolf Jeschar from Clausthal.

Over the years the “Deutsche Flammentag” became a successful meeting with good participation also of other European sections of the Institute. Furthermore, the German Section over the past 20 years organized enjoyable and successful Joint Meetings with other European Sections. In order to increase the cooperation within Europe the European Combustion Federation was founded in April 1993.

The activity of the German-speaking combustion researchers is demonstrated by the fact that at the previous symposia a respectable number of participants from the German Section took part. Furthermore, a considerable number of the Institute medals has gone to the German section in the last 20 years, as noted below:

Egerton Gold Medal: W. Jost (1962)

Lewis Gold Medal: H.Gg. Wagner (1972), K.H. Homann (1994), J. Troe (1996)

Zeldovich Gold Medal: N. Peters (2002)

Silver Medal: J. Warnatz (1982), P. Roth et al. (1992), K.H. Homann et al. (1994)

Greek Section

ΙΝΣΤΙΤΟΥΤΟ ΚΑΥΣΗΣ

ΕΛΛΗΝΙΚΟ ΤΜΗΜΑ

The Greek Section was founded in Athens in 1996 and is thus one of its youngest sections! It currently has more than 50 full, active members from all over Greece as well as from abroad. Its major aim is to provide a forum for knowledge transfer in the field of combustion and related scientific and technological disciplines among academic researchers, graduate students and combustion professionals and thus, ultimately, promote combustion research in Greece. This is accomplished mainly through the organization of national meetings held on a regular basis. The first meeting of the Greek Section was held in Athens in November 1997, followed by meetings in Thessaloniki in November 1999 and Patras in November 2003. The Greek Section also organises or actively participates in one-day meetings and seminars, mainly in collaboration with industry or other scientific bodies, in a variety of combustion related topics. The Greek Section is also actively pursuing international collaboration within the framework of the Combustion Institute and is currently organising, together with the Italian Section, a joint international meeting to be held in Corfu, Greece in June 2004.

Hungarian Section

Motto: *“There is nothing more practical than a good theory!”*

Theodore von Kármán (Budapest, 1881 – Aachen, 1963)

The Hungarian Section of The Combustion Institute (HTCI) was founded in 1958 as the first national committee from a former Eastern-Bloc Country. The founder and first Chairman of the Hungarian Section was Prof. Zoltán G. Szabó. Prof. Szabó was renowned world-wide for his work in reaction kinetics and catalysis. He was a person of great authority who also helped the formation of national sections in other Eastern-European Countries as well. Prof. Szabó was a Honorary Life Chairman of HTCI until his death in 1995. In 1987, Prof. Károly Reményi took over the chairmanship. Among his scientific achievements is the development of a new fluidized-bed coal combustion method. For this work he was awarded the highest Hungarian civil award, the Széchenyi Prize. In 1999, Prof. Sándor Dóbé was elected as the new Chairman of the Hungarian Section. Prof. Dóbé is a reaction kineticist, who studies the kinetics of elementary reactions of relevance to combustion chemistry and the chemical processes of the atmosphere. The secretary of HTCI is Prof. László Barta, who is an expert on the reduction of pollutant emissions from flames.

The motto we have chosen is one of the famous ‘bon mots’ of Prof. Theodore von Kármán that we believe is highly relevant to present-day combustion science and technology as well. Kármán was born in Budapest and lived and worked in Germany and the USA. He is widely regarded as “father of supersonic aviation” but he, together with his fellow ‘US-Hungarians’ Prof. Béla Karlowitz and Dr. György Millán, contributed also very significantly to the development of combustion theory and the foundation of modern branches of combustion science and technology. They were even among the driving forces to create The Combustion Institute some 50 years ago, as recorded in the Minutes of the Round Table Discussions at the 4th and 5th Symposia held in 1952 and 1954. Following von Kármán’s generation, the next great Hungarian name is Prof. János M. Beér. Prof. Beér made an immeasurable contribution to the promotion of combustion science and technology in the US and all over the world serving as an officer to the Institute for decades. His “radially stratified flame core burner” is a prime example of a rigorous scientific approach to solve a practical problem (even von Kármán would be satisfied!). While we are proud of these Hungarian scientists, it is sad to say that they were forced to leave Hungary by oppressive regimes before World War II and after the Hungarian Revolution in 1956.

Activities of the Hungarian Section are aimed at accomplishing the general objectives of the Institute within Hungary and through scientific cooperation internationally. Regular technical meetings (spring/fall) have been organized to orient Hungary’s combustion research in more integrated and interdisciplinary directions. The one-day technical meetings are usually devoted to special topics, e.g., “*Bioenergetics*” or “*Chemical Kinetics and Thermochemistry of Combustion Reactions*”, or provide an overview on combustion research and technical development activities at university departments, research institutes, power plants, etc. Also, the Hungarian Section organized or helped organize several combustion related international workshops and conferences, such as “*The 2nd International Specialists Meeting of the Combustion Institute on Oxidation*” (1982) and “*The 12th International Conference on Modeling Fluid Flow*” (2003).

The Hungarian Section has supported and encouraged the participation of its members at the Symposia. On average, there were 4 Hungarian attendees at the Symposia dating back to the 20th Symposium held at Michigan in 1984. We took part also in the work of Program Subcommittees reviewing symposium papers. At the early Symposia, in the 60’s and 70’s, the Hungarian participation was made possible almost exclusively by the generous financial support of the Institute for which herewith we express our thanks and appreciation.

The Hungarian Section of TCI currently consists of 29 regular members and 7 invited persons. Prof. Beér (MIT, USA) is an Honorary Member of the Section. The main R&D areas represented in the Section include fire research, chemical kinetics, environmental protection and energetics. Most of our members work at academic institutions and universities, 14 of them have the DSc scientific degree; six of us are managers or engineers coming from the energetic industry.

It is imminent that Hungary will join the European Union where it will face stringent anti-pollution regulations. This means enormous challenge also for the combustion science and technology in Hungary. Meeting this challenge will be one of the most important tasks for the Hungarian Section in the coming years, but we will succeed by improving the interaction and collaboration between combustion research institutions and industrial partners.

Italian Section

The Italian Section was established in 1954, at the same time as the Institute. Professor Cesare Codegone (Politecnico di Torino, 1954-1960) was its first Chairman, followed by Professor Carlo Padovani (Politecnico di Milano, 1960-1976). But it was not until Professor Leopoldo Massimilla (Università di Napoli “Federico II”) took over the Chairmanship of the Section in 1976 that the Italian Section started playing an increasingly active role in the life of the Institute. The liveliness of the Italian Section has been steadily preserved under the chairmanships of Antonio D’Alessio (1983-1991), Antonio Cavaliere (1991-1997) and Piero Salatino (1997 to date). Section Secretaries Pier Giorgio Lignola, Antonio Cavaliere, Colomba Di Blasi and Raffaele Ragucci also deserve mention for their decisive contribution to the sectional activities over the years.

The late sixties, early seventies represented the time when significant effort to generate combustion research up to recognized international quality standards was triggered in Italy. A number of events contributed to this, mostly related to the figure of Leopoldo Massimilla, professor of Chemical Engineering at the University of Naples "Federico II". In 1968 Massimilla founded the Laboratory for Combustion Research of C.N.R. in Naples, to become later Institute for Combustion Research, which has gained international reputation over the years for the quality and the variety of contributions given to combustion science. Since then, a number of individuals and research centers disseminated throughout Italy have steadily contributed to preserve and increase the visibility and the reputation of the Italian Section. The growth of the Italian Section culminated with the decision taken in 1992 by The Combustion Institute to select Italy, and Naples in particular, as the host of the 26th Combustion Symposium to be held in 1996. About 1600 people gathered in Naples for this event, which turned out to be one of the most successful ever since.

Members of the Italian Section have actively participated at the symposia as authors of papers. The number of papers presented peaked at 16 at the 26th Symposium and 12 at the 27th Symposium. The topical areas covered reflect, with a few exceptions, the more general balance of combustion science worldwide. The significance of the technical contributions by its members is highlighted by their receiving the 1986 Silver Combustion Medal, awarded to Professor Antonio D'Alessio, Dr. Federico Beretta, and Dr. Antonio Cavaliere, and the 2000 Bernard Lewis Gold Medal, awarded to Professor Antonio D'Alessio. The liveliness of the Italian Section in the international combustion community is further witnessed by the active involvement of its members on the Board of Directors, Awards Committee, and Technical Programs Committee.

The Italian Section organizes meetings and other events on a regular basis, with the aim of stimulating dissemination of scientific and technical knowledge on combustion and to provide an informal forum for discussion among specialists. The first six national events (since 1976 to 1982) were informal meetings. Starting with the 7th event (in 1984), meetings were organized in a more structured way and summaries of contributed lectures and/or proceedings were distributed to participants and published. Since its birth to date, the Section has organized 27 Annual Combustion Meetings. Many of them have been bilateral or multilateral events jointly organized with other sections of the Institute (French, 1987 and 1992; German, 1989; Soviet Union, 1990; Swedish, 1992; Spanish, 1993; Portuguese, 1994; Scandinavian-Nordic, 2003, and Greek, 2004). In addition to national or joint meetings, the Italian Section hosted the 26th Symposium in Naples (1996), contributed to the organization of the series of Mediterranean Combustion Symposia, to the 2003 European Combustion Meeting, to several workshops and events in combustion or in closely related areas.

The membership of the Italian Section is steadily around 120 people, rather evenly distributed between different geographical areas and between academic research, applied research and industry.

Japanese Section

A small group of combustion researchers started on 1953, where they talked about selection of representatives to be sent abroad. This group became a core at the establishment of the Combustion Researchers' Society of Japan (Japanese Section of the Combustion Institute) in May 1955, just after the establishment of the Combustion Institute. The number of members at the establishment was 37 and that of supporting organizations was 18. Prof. S. Yagi of the University of Tokyo was the first chairman.

The first issue of "Combustion Research," the journal of the Combustion Researchers' Society, was published on 1959 and the first Japanese Symposium on Combustion was held in 1963. Thereafter, the Combustion Researchers' Society of Japan has become larger year by year and the number of members at present is more than 700. During this history, the Combustion Researchers' Society of Japan changed its name to the Combustion Society of Japan. This change of the name was at the request of majority of our members, but the role as the Japanese Section of the Combustion Institute has been retained. At this opportunity a logo was adopted. At present, it was used at the front cover of our journal.

So far, our Section has hosted two International Symposia on Combustion. The 15th Symposium was held in Tokyo in 1974. This is the first Symposium outside of North America and Europe. The chairman of the local arrangement committee was Prof. T. Hikita and the honorary chair was Prof. S. Yagi. A number of our members made efforts to manage the Symposium successfully with strong support by donation from Japanese organizations. In 2002, the 29th Symposium was held in Sapporo, the beautiful city in Hokkaido. The chairman of the local arrangement committee was Prof. K. Ito and the Symposium was managed successfully by the efforts of many members, especially those in Hokkaido. For this Symposium, the Japanese Section of the Combustion Symposium asked donation from Japanese organizations. The donation was spent for supporting the Symposium as a part of expenses.

The members of the Japanese Section of the Combustion Institute received 3 Gold medals and two silver medals. Specifically, Prof. S. Kumagai was awarded the Alfred Egerton Gold medal at the 17th Symposium, Prof. Tsuji was awarded the Bernard Lewis Gold medal at the 22nd Symposium, and Prof. T. Niioka was awarded the Alfred Egerton Gold medal at 28th Symposium. Furthermore, Professors S. Kumagai and H. Isoda received the Silver Medal at the 7th Symposium, while Dr. H. Matsui with Prof. Jhon H. Lee received the same medal at the 16th Symposium. Members of our section are proud of these Medal winners.

Members of our Section have generously contributed their service to the Institute in all aspects and at all levels of governance, including memberships in the Executive Committee, Board of Directors, Technical Program Committees, and the Editorial Board of Combustion and Flames.

Our Section is proud of what it has done in the past for promotion of combustion science.

Netherlands Section

The first representative of the Netherlands in the Combustion Institute Committee was Dr. J.J. Broeze, Director of the Royal/Dutch Shell Laboratory in Delft. Previously he was also author of the only contribution from the Netherlands to the 2nd Symposium, held in 1937, and the 3rd Symposium, held in 1948. The contributions to combustion research of Broeze and his colleagues at the Shell Laboratory, especially in the area of Diesel engine combustion, were well recognised internationally. At the 3rd Symposium Broeze was one of the four honorary foreign members of the Institute, appointed for the purpose of retaining close contact with co-workers in their countries. And the 1953-1954 Crompton-Lanchester medal of the Automobile Division Council of the Institution of Mechanical Engineers was awarded to him.

Judged from the contributions to the proceedings of the international symposia, the nature of the participation of the combustion researchers in the Netherlands in the activities of the Institute has changed over the years. In the first period, up to the 12th Symposium, we find a very limited number of contributions, all coming from industrial laboratories: Shell, Staatsmijnen (presently DSM) and Philips. In the 9th Symposium a contribution appears from the International Flame Research Foundation, located in IJmuiden, at the site of the Dutch Iron and Steel Industry, Hoogovens (presently Corus). (It should be remarked that the Dutch Section of the Institute and the Dutch Flame Committee which is member of the IFRF are separate organisations with separate membership list and meetings agenda.) The Foundation has had significant impact on the progress of industrial combustion research and in fact is older than the Institute. At the occasion of its 50th anniversary a memorial volume has been published. After a period of silence, lasting until the 21th Symposium, the IFRF started to be a regular contributor to the International Symposia, with papers published by R. Weber and co-workers in every symposium, from the 22th until the 29th Symposium.

The activities in the Dutch Section in the late 60s and early 70s were growing, mainly due to increased effort on combustion at the government research organisation TNO. At the 'Central Technical Institute TNO', J. de Graaf and G. Snellink made fundamental investigations on acoustic interferences of flames. (To be able to solve practical questions, e.g. burners in warehouses were quite noisy). At the TNO defence laboratory, the present Prins Maurits Laboratory, strong interest came up to start work on gas and dust explosions, while the research on propellant

combustion and high explosive detonation increased its quality level. New facilities were built in that time and diagnostic high speed cameras became available. Gasunie Research and others joined in. About twenty, up to thirty people came to meetings like the annual meeting at TNO in Rijswijk and later elsewhere. People took it serious and discussions were good; there was a constructive atmosphere. There was also a group of participants of TU Delft, Mechanical Engineering, working on fundamentals of industrial combustion.

The 25th Symposium, with four contributions from the Netherlands, signals a sudden rise in the level of activity which has persisted up to the present day. In particular a significant increase in effort was noticed at the Technical Universities of Delft, Eindhoven and Twente and at the Universities of Groningen and of Nijmegen. These university groups now fully participate in modern combustion research, combining advanced laser diagnostics experimental techniques with computational fluid dynamics and theoretical analysis. The increased effort at universities also led to changes in the board and activities of the Dutch Section. In the mid 90s there was a three year period without national symposia. A fresh start was made on January 23, 1998. At the site of the Gastec company in Apeldoorn a symposium was held on “Burner research in the Netherlands”, and a new board was elected with members coming from the technical universities of Eindhoven and Delft. It was the first symposium co-organised with The Technology Foundation STW. The funding organisation STW has created the “Platform for clean and efficient combustion” to stimulate research on this subject in the Netherlands. Most of the members of the platform are also members of the Institute. Since 1998 every year a symposium has been organised jointly between STW and CI, and for several years the Dutch Flame Committee of the IFRF also co-organises this meeting, which is now called COMBURA, for “combustion research and applications”. There have also been two joint meetings between the Belgian and Dutch Sections, in 2000 and in 2002. In total there are two Section Meeting a year. At present there are over seventy members, most of which are actively involved in combustion research.

Russian Section

A meaningful contribution of the Russian Section to the Combustion Institute is the establishment of the Ya. B. Zeldovich Gold Medal. The proposal was initiated in 1988 by Nikolai Kidin, a pupil of Ya. B. Zeldovich, after the death of Zeldovich in December, 1987. Kidin contacted Prof. Howard Palmer, then the President of the Institute, proposing a joint award of the Combustion Institute and the Scientific Council on Combustion of the USSR Academy of Sciences in honor of Zeldovich. This proposal was supported by Professors Derek Bradley (who was that time the President of the British Section) and Numa Manson and our team (A.G.Merzhanov, A.A.Borisov, V.S.Babkin and others) brought these letters to the Seattle Symposium in 1988 and delivered them to the Board of Directors. Subsequently H.F.Calcote (then President of the Institute) and Ralph Delbourgo (International VP) visited Moscow and Alma-Ata in 1989 and worked with A.G.Merzhanov, A.A.Borisov and N.I.Kidin on the establishment of the Award. The proposal was approved by the Board of Directors of the Institute and the Russian Academy of Sciences in 1990 and the first award was given to A. G. Merzhanov at the Orleans Symposium in the same year.

The Russian section was subsequently established in 1991, with Merzhanov being the first Chair, and Kidin being the present Chair. From 1990 many different international conferences were organized by the Russian Section, such as the Italian-Soviet Meeting in Piza, 1990, the Russian-Japanese Meeting in Chernogolovka, Russia, 1993, the Israeli-Russian Meeting in, Haifa, 2001, and the Zel'dovich Memorial I, in Voronovo, Russia, 1994.

Through the financial support of the Institute many Russian scientists (if their papers were accepted for oral presentations) were able to attend the Symposia from 1990 and we would like to express our gratitude for this support. Furthermore, due to efforts of Professor Robert Sawyer who visited us at the time of Second Coup and the decision of Board we have been receiving 10 complementary subscriptions of *Combustion and Flame* since 1994, with the following distribution: Armenia (1), Ukraine (1), Kazakhstan (1), Belorussia (1), and Russia (6). This has proven to be most helpful because of the difficult financial situation in the Academy of Sciences and other scientific centers. So we are still surviving and hope for future collaboration with The Combustion Institute and

CONGRATULATE THE PRESIDENT, EXECUTIVE COMMITTEE and BOARD of DIRECTORS on the OCCASION of 50th ANNIVERSARY of CI!!!

Republic of Korea Section

Combustion researchers in Korea filed an application to establish a Combustion Institute Section in Korea on April 24, 1986. The application was approved on October 3, 1986 at the 21st Symposium. After the approval, the first General Meeting and Section Seminar were held on October 31, 1987 at Seoul National University with 5 lectures and 60 participants. The late Prof. Kyung-Kook Cho was elected as the first Chair of the Section.

Since then, the Section has been led by the Chairs of Profs. Byung-Ryun Choi (1991-92), Hyun-Dong Shin (1993-99), Ho-Young Kim (2000-03) and Dr. Won-Bae Kim (2004-). The number of members of the Section has expanded significantly and currently there are 443 members including students, 6 supporting members and 6 sponsoring members. The Section holds combustion symposium biannually and the last 27th Symposium was held on December 12-13, 2003 with 45 paper presentations.

The Section established the Korean Society of Combustion, which was approved by the Ministry of Science and Technology, Korea on October 20, 1997. The Section published the first volume of the Journal of the Korean Society of Combustion in 1997 and currently it is published quarterly.

The first publication on combustion work from Korea can be traced back to 1962. It is a paper by Prof. Chae Chin Suh on combustion in solid propellant rocket motor, published in the Journal of the Korean Society of Mechanical Engineers (vol. 3, 1962). After that Prof. Ok Yong Yang published a paper on swirl burner combustion (ibid., vol. 11, 1971) and Prof. Kyung-Kook Cho on extinction phenomena (ibid., vol. 11, 1971). In the 1960s, only one paper was published in Korea, while the number of publication increased substantially in the 1970s and 1980s with 14 and 73 papers, respectively. International journal publications were initiated by Prof. Suk Ho Chung in *Combustion and Flame* (vol 64, 1986) and the 21st Symposium (1986).

Since the establishment of the Section, international activities have increased. The participation at the symposium first started in 1976 at the 16th Symposium, and the total participants increased to 32 at the 29th Symposium. Currently, Prof. Suk Ho Chung is a member of the Board of Directors of the Institute and a member of the Editorial Board of *Combustion and Flame*, while Dr. Jong Soo Kim is on the Editorial Board of *Combustion Theory and Modeling*.

The Section organized several international conferences with success. The 3rd Asia-Pacific Conference on Combustion (Prof. Hyun-Dong Shin, Chairman) was held on June 24-27, 2001 at Seoul National University with 168 paper presentations and 221 participants from 18 countries. The 5th International Workshop on Catalytic Combustion (Dr. Sung-Kyu Kang, Chair) was held on April 29-May 1, 2002, Seoul with 65 paper presentations and 97 participants from 14 countries. The 1st Workshop on Combustion Theory (Dr. Jong Soo Kim, Chair) was held on July 28~30, 2002 at Seoul National University.

The research environment in the Section has been greatly improved since the establishment of the Section.

Scandinavian-Nordic Section

During the nineties there was within the Swedish Section a lively discussion as how to broaden its activities as well as creating a true Scandinavian-Nordic Section. Until then the other Nordic countries did not have any section by themselves and they were loosely associated with the Swedish section. The opinions within the Swedish Section were slightly incoherent on how to proceed and encouraged by the Management of the Institute, there was in 1998 an action to go ahead and to form the Scandinavian-Nordic Section side by side with the Swedish section. In order to present bylaws, Marcus Aldén got the corresponding bylaws from the Italian and British sections and together with Erik Olsson preliminary bylaws for the new section was constructed. To justify a true Nordic participation, it was clear that each country should have at least one member on the Board. Also the name of the Section was discussed

in detail. The initial alternatives were; The Nordic Section and the Scandinavian Section. However, since the Nordic section gave a somewhat ambiguous meaning and strictly speaking Finland is not part of Scandinavia, a compromise was found – The Scandinavian-Nordic Section. After initial discussions between some of the major active groups in Denmark, Finland, Norway and Sweden, a suggestion of officers and bylaws were thus presented for the Combustion Institute. In the Letter to the Board of the Combustion Institute 22/1 1999, the following arguments for creating the Section were presented:

The Nordic countries, in this case Sweden, Norway, Finland and Denmark, have a long and vital tradition within the field of combustion science and technology. There is also a number of strong, and often independent, combustion related industries located in this area, e.g. Sweden has a strong automobile and power generation industry; Norway has an extensive energy and petroleum industry; Finland has a strong energy and equipment manufacturing industry and Denmark has its natural gas and chemical industry. Throughout history the Nordic countries have also had a long tradition of co-operation and collaboration regarding education, science, culture and societal issues in large. It is thus only natural that we submit a joint proposal, in order to form a Scandinavian-Nordic Section including the countries mentioned above. The main explicit reasons for a joint proposal are;

- The Nordic countries have in large similar interest within the area of combustion.
- A Scandinavian-Nordic Section would make four comparatively small countries a stronger unit within the CI.
- A Scandinavian-Nordic Section would further strengthen the links between the Nordic countries within the area of combustion research and development.
- A Scandinavian-Nordic Section would increase the possibility to make joint large arrangements, e.g. in hosting a future CI conference.
- A Scandinavian-Nordic Section would have a possibility in getting financial support, e.g from the Nordic Council.

Furthermore, the decision to present a joint application has been reached after a series of discussions on both the national and the Nordic level, resulting in a massive support from the combustion community, both academically as well as industrially. A special issue has been the possible co-existence with or merger with the Swedish Section. On that issue, informal discussions were held with Professor Sebastian Candel, VP Sectional Affairs, resulting in the recommendation to write a separate proposal. We are, however, also in the future open for a proposal from the Swedish Section to formally join the Scandinavian-Nordic Section.

Still encouraged to go ahead with the establishment of the Section, a first and constitutive Board meeting was held on Denmark Oct. 20 1999. At this first meeting a Board was constituted and the following objectives for the Section were agreed:

- Stimulate research and development in the area of combustion.
- Further increase the interaction in the field, e.g. by joint conferences and workshops.
- Strengthen the Scandinavian-Nordic vision within the field and thus increase its influence on the European and international scene.

The main areas to be covered by the Section would thus closely follow the ones covered by the Institute, *i.e.* fundamental and applied sciences related to combustion processes and combustion devices with a close connection to relevant national industries. The Section would further aim at optimising the co-operation with other relevant organisations in our countries. The goal was to have at least one Topical Meeting each year and a General Section Meeting every other year, if possible together with one or several other Sections.

On April 27, 2000, a Topical Meeting was held at the Lund Institute of Technology in the area of *Combustion Laser Diagnostics* with Marcus Aldén as coordinator. A second two-day Topical Meeting was held Oct. 15-16, 2000 at Åbo Academy University. The topic of the Meeting was *Combustion Modelling* and Pia Kilpinen was the organizer.

In April, 2001, the first Biennial Meeting and General Section meeting was held at Chalmers University of Technology with 97 participants. A Topical Meeting was held in September, 2002 at ComputIT in Trondheim directed towards the *Eddy Dissipation Concept* with Björn Magnussen as coordinator and responsible

In 2003 the Section held its second General Section Meeting in combination with a joint Italian-Scandinavian/Nordic section meeting in Ischia, Sept. 18-21.

At present, the number of members is 143 distributed as; Sweden: 85, Norway: 11, Finland 27, Denmark: 20.

Central States Section

The Central States Section was organized in April 1966 at a technical meeting on "Basic Problems and Modern Instrumentation Related to Internal Combustion Engines." This meeting was held in Chicago and organized by Prof. T. Paul Torda, of the Illinois Institute of Technology (IIT), who was elected as the section's first Chairman. In the beginning, the section's four officers were all from Chicago, and affiliated with IIT, the IIT Research Institute, and the Institute of Gas Technology. The organizing Board of Advisors also included members from the Ethyl Corporation, General Motors, the NASA Lewis Research Center (now renamed after astronaut John Glenn), the University of Illinois, and the University of Wisconsin. The section's first official meeting was held in March 1967 at the NASA Lewis Research Center in Cleveland, Ohio on the topic of "High Intensity Industrial Combustion." The meeting was organized by board member Dr. Richard J. Priem, of NASA. Torda served as Chairman of the Central States Section from its inception until 1979, for a total of 13 years. Priem served the section as a board member for 24 years until 1990, with the notable positions of Vice Chairman (1968-1978) and Chairman of the Board of Advisors (1978-1982). For their unflagging service, Torda and Priem are each honored as a Chairperson Emeritus of the section. Since its creation, the Central States Section has held annual technical meetings in the spring. Although the earliest meetings were held in the north, it quickly became a tradition to alternate the meeting site between the northern and southern halves of the section. The section meetings were periodically held jointly with the Eastern or Western States Sections. Beginning in 1999, this interaction became formalized as a biannual joint meeting for all three U.S. sections, held in the years between the international symposia. The section's technical meetings were organized around a variety of topics over the first two decades, until a consistent theme of "Combustion Fundamentals and Applications" was established. Industrial applications have remained an important focus of the Central States meetings since the section's foundation. To accomplish this objective, the Board of Advisors includes balanced membership from academia, industry, and government laboratories. Bound proceedings were not produced for the section's technical meetings until 1987. Recently, in 2000, the section ceased to provide bound meeting proceedings and instead made the papers available on CD-ROM. It is anticipated that the meeting proceedings will continue to be produced on electronic media into the future. Regardless of the proceedings format, the section has used a standard length of 6 pages for those papers. Today, the Central States Section has grown to encompass over 300 members from about 100 institutions. Roughly 80 papers are presented at the section's technical meetings, neglecting joint meetings. These meetings also include two to four keynote presentations on significant combustion topics, including the James E. Peters Plenary Lecture. The lecture is named in honor of the dedicated service of Prof. Peters, of the University of Illinois at Urbana-Champaign, who died in 2000 as the result of an accident while serving as the Chairperson of the section. The section meeting attendance is typically 100 to 150 individuals, of which a large fraction are students. The student presenters at section meetings are eligible for an Outstanding Student Presentation Award. The section also encourages student participation in the international symposia by offering the James E. Peters Student Fellowship and additional travel support.

Eastern States Section

This year marks the fiftieth anniversary of the founding of the Combustion Institute. While our bi-annual Symposia have become the hallmark of the Institute, smaller more localized sectional meetings have played an important role in the development of the field of combustion. The sectional meetings have been an important resource in the testing of new ideas, in rehearsing papers for the summer meetings and they have served as a “coming out” venue for many of our graduate students. The move to create U.S. sectional meetings was initiated in the west and advanced eastward with the Central States Section preceding us by two or three annual meetings. In March of 1967, an organizational committee met for the purpose of starting an Eastern Section. Unlike the other two sections, the committee included a Canadian representative to formalize the inclusion of the Eastern Provinces in the Eastern Section. Our Canadian colleagues spun off to be part of a national Canadian section about 20 years ago (we altered our name to the Eastern States Section from Eastern Section in 1992 to reflect this change). However, the Canadian as well as the Mexican sections have made requests to be a part of our joint meetings. This issue has yet to be resolved but should be addressed in upcoming joint meetings.

The first meeting of the Eastern States Section took place in November 1967 under provisional status in Pittsburgh, the site of our parent organization. On July 6th, 1968 the Board of Directors of the Combustion Institute approved the formation of the section during the 12th Combustion Symposium in Poitiers, France. The first Chair of the section was Dr. Robert Levine of NASA. The second meeting, held at the University of Massachusetts in October 1968, was, in effect, the first one as a formally established section. This meeting had fewer attendees (116) than the first (128), with the numbers of presentations being 25 and 32, respectively.

Sectional meetings were originally held once a year in the Fall at sites selected based on proximity to institutes of higher learning. However, beginning in the late ‘70’s and then continuing on a regular basis in the mid ‘80’s, the “North-South” policy was instituted by the Section’s Executive Board. In odd years, the meetings were held up north and in even years the meetings were held down south. A departure from this rotation occurred in March of 1993 when the Eastern and Central States Sections held a joint meeting in New Orleans during the “Storm of the Century.” While the North-South policy has continued to be a popular decision, we now only have one Eastern States Section meeting every two years. This is due to the establishment of the Joint Meetings that are held every other year and hosted by one of the three U. S. sections. The Eastern States Section hosted the first Joint Meeting in Washington, DC in 1999 and we are scheduled to host the 2005 meeting in Philadelphia. The joint sessions present a new opportunity for us to act on a national level with a single voice to present issues of national concern. This process has already begun with the creation in March of 2003 of the Executive Board of the U.S. Sections of the Combustion Institute.

Over the past 36 years the Eastern States Section has developed its own personality and special traits, some of which are shared by the Institute as well as by our sister sections. We adopt a formality, or professionalism, in our conduct and exhibit mutual respect, but also maintain a level of informality that allows for a free exchange of new ideas and discussion - we still only require 3-4 page extended abstracts for presentation at our meetings. In spite of the difficult funding situation in recent years, our meetings have maintained over 100 presented papers usually with three parallel sessions. One of our most important traditions is the continued support and encouragement of our students. In 1978, we substantially reduced registration fees for students and shortly thereafter initiated a program to provide honoraria to student presenters. These policies have continued to the present day. Recently, we’ve been able to extend this support to student presenters at the international meetings. The new talent, creativity and fresh ideas brought to this community by these younger members are invaluable. In return, our community can promise a complex, interdependent, interdisciplinary science that will continue to offer challenges and opportunities. Through the tireless efforts of Professor Phil Westmoreland, we adopted the WWW for information exchange nearly 10 years ago. But there is potential for a more expanded role, specifically in its use as an educational and information center for combustion-related issues. It makes sense to join our U.S. and international colleagues in this endeavor.

In closing, it should be pointed out that the Combustion Symposium has been hosted by Eastern States Section member organizations a total of eight times though only two of the meetings took place after the Eastern States

Section was formally established (1st – 1928, Swampscott, MA; 2nd – 1937, Rochester, NY; 4th – 1952, MIT; 5th – 1954, University of Pittsburgh; 6th – 1956, Yale University; 9th – 1962, Cornell University; 14th – 1972, Penn State and 16th – 1976, MIT). The Eastern States Section continues to remain a vibrant contributor to education and research in combustion science and technology.

Western States Section

The Western States Section was the first regional section in the United States and was provisionally organized in 1956 in coordination with the newly incorporated Combustion Institute. From its inception, the Western States Section has offered an informal venue to present and discuss combustion research, and the first Western States meeting was held in 1957, with William J. Bennet as the section chairman and Gilbert S. Bahn as section secretary.

The original Western States Section by-laws were ratified on May 29, 1957. Professor Ernest Starkman from UC Berkeley was elected vice-Chair in 1959. Dr. Robert Levine was elected Chair in 1961, Professor Starkman in 1965, and Dr. Al Gordon in 1969; Dr. Gordon remains an honorary member of the Western States Board. The by-laws were revised slightly in 1986, and again in 2003, providing a testament to the mission and principles established by the Section's founders.

The Western States Section shares a unique relationship to the Combustion Institute, as seen in the early volumes of the Combustion Symposium Proceedings. For example, the Combustion Institute itself makes a first appearance in the Preface pages to the Proceedings of the Sixth Symposium, supported by the Combustion Committee from around the world. The Western States Section is included in the header region with the Combustion Institute in the Eighth Symposium volume, again supported by the Combustion Committee. By the 11th Symposium, the Western States Section, along with the other U.S. Sections, appear as part of the United States contingent of the Combustion Committee.

A few of the Western States Section traditions which harken back to the very first meetings include requiring full papers before presentation is allowed, providing preprints of all papers to meeting participants, and hosting semi-annual Fall and Spring conferences. In addition to providing an informal outlet for research and discussion, the Western States Section includes student travel support as a primary mission so that student researchers may attend Section meetings as well as the International Combustion Symposium. The formula by which these funds are disbursed is still fondly termed the "Bowman Formula" in honor of its author, and former Western States Section Chair, Professor C. Thomas Bowman.

The Combustion Symposium has been hosted by Western States Section member organizations six times (8th-1960 California Institute of Technology; 11th-1966 UC-Berkeley; 13th-1970 University of Utah; 22nd-1988 University of Washington-Seattle; 25th-1994 UC-Irvine; 27th-1998 University of Colorado), and the Western States Section, nearly as old as the Combustion Institute itself, remains a vibrant contributor to education and research in combustion science and technology.

Special thanks to Dr. Gilbert S. Bahn for his detailed recollections of the founding of the Section.

POSTSCRIPT

On June 26, 2004, Med Colket and Dan Seery met briefly with Newman Hall in New Caanan, CT. Newman is the last known surviving member of the original 1954 Board of Directors. During the conversation he expressed pride in the Combustion Institute and great admiration for Bernard Lewis. He praised Bernard's inclusive approach-using the broadest definition of combustion research and encouraging an international outlook and membership.

Newman said he was attracted to the complexities of combustion research - a subject where "one had to study not just the process but also the context" to solve a problem. To understand a combustion system the researcher must combine the details of the chemistry with knowledge of the often-changing flow conditions.

Newman went on to say that the Combustion Symposia provide an ideal social and technical venue for addressing these complexities, and his recollections of past symposia mirror the feelings of many Institute members. We benefit from the unique openness that encourages members to pursue technical excellence and to be forthright in their presentations as well as in their evaluations of colleagues' work.

APPENDIX A: INSTITUTE MEDALS

Bernard Lewis Gold Medal

"For brilliant research in the field of combustion, particularly on. . ."

<u>Year</u>	<u>Awardee</u>	
1958	Bernard Lewis	...minimum ignition energy
1960	A. G. Gaydon	...in the field of flame spectroscopy
1962	G. B. Kistiakowsky	...detonation phenomena
1964	R. G. W. Norrish	...flash photolysis
1966	V. N. Kondratiev	...spectroscopy and reaction kinetics
1968	Philip Bowden	...initiation and growth of explosions
1970	Bela Karlovitz	...turbulence and flame stretch
1972	Heniz Gg. Wagner	...reactions in flames
1974	Charles P. Fenimore	...the mechanisms of elementary kinetics
1976	Guenter von Elbe	...kinetics and combustion waves
1978	Peter Gray	...theoretical & experimental thermochemistry of combustion processes
1980	Felix J. Weinberg	...the adaptation of physical measurements to flame processes
1982	Brian Spalding	...the creation of theoretical models
1984	Ya B. Zeldovich	...the kinetics of combustion processes
1986	George H Markstein	...the instability of combustion waves
1988	Hiroshi Tsuji	...the fundamental aspects of flames
1990	Forman A. Williams	...mathematical analysis of flames
1992	Jack B. Howard	...the kinetics of soot formation & coal pyrolysis
1994	K.-H. Homann	...flame structure and soot formation
1996	Jürgen Troe	...the kinetics of association-dissociation reactions
1998	K.N.C. Bray	...turbulent reactive flows and compressible nonequilibrium phenomena
2000	Antonio D'Alessio	...optical diagnoses of soot formation and coagulation
2002	Fred C. Lockwood	...combustion in furnaces

Alfred C. Egerton Gold Medal

"For distinguished, continuing and encouraging contributions to the field of combustion"

<u>Year</u>	<u>Awardee</u>
1958	Alfred C. Egerton
1960	Hoyt C. Hottel
1962	Wilhelm Jost
1964	P. Laffitte

1966	J.O. Hirschfelder
1968	Howard W. Emmons
1970	A.R. Ubbelohde
1972	Wm. Hinckley Avery
1974	John P. Longwell
1976	T. Morris Sugden
1978	Seiichiro Kumagai
1980	Glenn Carber Williams
1982	Irvin Glassman
1984	Adel F. Sarofim
1986	Janos M. Beér
1988	Antoni K. Oppenheim
1990	Graham Dixon-Lewis
1992	Derek Bradley
1994	Hartwell F. Calcote
1996	William Alfonso Sirignano
1998	Howard B. Palmer
2000	Takashi Niioka
2002	Ben T. Zinn

Ya. B. Zeldovich Gold Medal

"For outstanding contribution to the theory of combustion or detonation"

<u>Year</u>	<u>Awardee</u>
1990	A. G. Marzhanov
1992	Robert W. Bilger
1994	Amable Liñán
1996	Boris V. Novozholov
1998	Craig T. Bowman
2000	Elaine S. Oran
2002	Norbert Peters

Silver Combustion Medal

“for an outstanding paper presented at the previous symposium”

1958	Seiichiro Kumagai & Hiroshi Isoda “Combustion of Fuel Droplets in a Falling Chamber”
1960	Peter Francis Knewstubb & T. Morris Sugden “Mass Spectrometry of the Ions Present in Hydrocarbon Flames”
1962	Tucker Carrington “Fluorescence and Rotational Relaxation of OH Radicals in Flames”
1964	C. William Shipman, Dr. Alexander Vranos, & Norman M. Howe, Jr. “Turbulent Mass Transfer and Rates of Combustion in Confirmed Turbulent Flames”

- 1966 Arthur A. Westenberg & Robert M. Fristrom
“H and O Atom Profiles Measured by ESR in C₂ Hydrocarbon-O₂ Flames”
- 1968 R. L. Taylor, M. Camac, & R. M. Feinberg
“Measurements of Vibration-Vibration Coupling in Gas Mixtures”
- 1970 Frederick Stucky Billig & Gordon Leslie Dugger
“The Interaction of Shock Wave and Heat Addition in the Design of Supersonic Combustion”
- 1972 Felix J. Weinberg & Michael Davis Fox
“Measurements of Flame Area in Terms of Saturation Current”
- 1974 Arthur Fontijn, Shelby C. Kurzius, & James J. Houghton
“High-Temperature Fast-Flow Reactor Studies of Metal-Atom Oxidation Kinetics”
- 1976 George H. Markstein, Lawrence Orloff, & John de Ris
“Upward Turbulent Fire Spread and Burning of Fuel Surfaces”
- 1978 F. A. Williams
“Mechanism of Fire Spread”
- 1980 Hidenori Matsui & Hak Shan Lee
“On the Measure of the Relative Detonation Hazards of Gaseous Fuel-Oxygen and Air Mixtures”
- 1982 Jurgen Warnatz
“The Structure of Laminar Alkane-, Alkene-, and Acetylene Flames”
- 1984 Jack B. Howard & James D. Bittner
“Mechanisms of Hydrocarbon Decay in Fuel-Rich, Secondary Reaction Zones”
- 1986 Antonio D’Alessio, Federico Beretta, and Antonio Cavaliere
“Ensemble Laser Light Sprays in Isothermal and Burning Conditions”
- 1988 Assaad Masri & R.W. Bilger
“Turbulent Non-Premixed Flames of Hydrocarbon Fuels Near Extinction: Mean Structure from Probe Measurements”
- 1990 (1) D. L. Zhu, F. N. Egolfopoulos, & C. K. Law
“Experimental and Numerical Determination of Laminar Flame Speeds of Methane/(Ar, N₂, CO₂) –Air Mixtures as Function of Stoichiometry, Pressure and Flame Temperature”
(2) Robert J. Kee, Jr., James A. Miller, Gregory H. Evans, & Graham Dixon-Lewis
“A Computational Model of the Structure and Extinction of Strained, Opposed Flow, Premixed Methane-Air Flames”
- 1992 Paul Roth, Ortwin Brandt, & Sabine von Gersum
“High Temperature Oxidation of Suspended Soot Particles Verified by CO and CO₂ Measurements”
- 1994 (1) Matthias Hausmann, Peter Hebggen, & Klaus-Heinrich Homann
“Radicals in Flames: Analysis and Scavenging Reaction”
(2) M. D. Smooke, Y. Xu, R. M. Zurn, P. Lin, J. H. Frank, & M. B. Long
“Computational and Experimental Study of OH and CH Radicals in Axisymmetric Laminar Diffusion Flames”
- 1996 Robert H. Hurt & Kevin A. Davis, “Near-Extinction and Final Burnout in Coal Combustion”
- 1998 Charles J. Mueller, James F. Driscoll, David L. Ruess, & Michael C. Drake
“Effects of Unsteady Stretch on the Strength of a Freely-Propagating Flame Wrinkled by a Vortex”
- 2000 P. Bucher, R. Yetter, F. L. Dryer, T. Parr & D. Hanson-Parr
“PLIF Species and Ratiometric Temperature Measurements of Aluminum Particle Combustion in O₂, CO₂ and N₂O Oxidizers, and Comparison with Model Calculations”
- 2002 Scott T. Sanders, Jeffrey A Baldwin, Thomas P. Jenkins, Douglas S. Baer and Ronald K. Hanson
“Diode-Laser Sensor for Monitoring Multiple Combustion Parameters in Pulse Detonation Engines.”

**APPENDIX B:
PRESIDENTS OF THE COMBUSTION INSTITUTE**

1954-1968	Bernard Lewis	1985-1988	Howard Palmer
1968-1970	J. P. Longwell	1988-1992	Hartwell F. Calcote
1970-1976	Glenn C. Williams	1992-1996	Robert F. Sawyer
1976-1980	Robert S. Levine	1996-2000	Daniel J. Seery
1980-1984	Raymond Friedman	2000-2004	Chung K. Law
1984-1985	Frederick Kauffman		

**APPENDIX C:
EDITORS OF *COMBUSTION AND FLAME***

Editor-in-Chief: A.C. Egerton (1957–1960)

Editor (Europe/Asia/Australia)

A.R. Ubbelohde (1957–1960)
F.H. Garner (1960–1965)
P.G. Ashmore (1965–1975)
J. Bradley (1975–1982)
K.N.C. Bray (1982–1988)
D. Bradley (1988–2000)
A. Hayhurst (2000–present)

Editor (North America/Japan)

B. Lewis (1957–1969)
W.G. Berl (1969–1972)
H.B. Palmer (1972–1985)
R.A. Strehlow (1985–1991)
G.M. Faeth (1991–1997)
C.T. Bowman (1997–2003)
J.F. Driscoll (2003–present)