

Catalogue of the papers and correspondence of

Sir John Cowdery Kendrew FRS

(b. 1917)

VOLUME I

List of Contents

Foreword

General Introduction

Sections A - F

by Jeannine Alton
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FOREWORD

The completion of this Catalogue of the personal papers of Sir John Kendrew is a significant event in the work of the National Cataloguing Unit for the Archives of Contemporary Scientists, both in the nature of its subject matter and in the manner of its achievement.

This is not the only occasion on which we have undertaken the task of working on the papers of a living scientist. But it is the first time that an opportunity has been taken to examine such a large collection at a time when the subject was retiring from his major scientific and academic commitments, and was still available to guide us in our analysis of its contents. We are extremely grateful to Sir John for his ready co-operation in this task.

The project has also been significant because it has provided an excellent opportunity to engage the experience and expertise of Mrs Jeannine Alton, the former Executive Director of the Contemporary Scientific Archives Centre. It is difficult to imagine how the task could have been completed within the time available to us without the dedication of Mrs Alton. All researchers in the history of molecular biology will be greatly in her debt.

Finally, the project could not have been tackled without the generous and understanding help of the Leverhulme Trust. On behalf of NCUACS I would like to record our gratitude to the Director, Sir Rex Richards, and the Trustees of the Leverhulme Trust, for their support.

R.A. Buchanan
Director, NCUACS
June 1989

GENERAL INTRODUCTION

PROVENANCE

The material was received from Kendrew at various dates April 1987 to April 1989. Certain additional papers, chiefly those relating to his personal life or to ongoing concerns, remain in his charge during his lifetime.

OUTLINE OF THE LIFE AND CAREER OF SIR JOHN KENDREW

John Cowdery Kendrew was born on 24 March 1917. His mother, Evelyn Sandberg, was a distinguished art historian; she lived in Italy and the boy was brought up by his father Wilfred George Kendrew, tutor of St. Catherine's and Reader in Climatology at Oxford University. They lived in Oxford and also at Bladon near Woodstock; walking and cycling expeditions were frequent, with early interests in natural history, birds and flowers, buildings and (later) photography. Kendrew was educated at the Dragon School Oxford (1923-1930) and Clifton College Bristol (Scholar, 1930-1936), of both of which he became a Governor. In 1936 he went to Trinity College Cambridge as a Major Scholar. While his main subject was chemistry he made it his business to profit as widely as possible from the range of subjects available; he studied and attended lectures in physics, mathematics and biochemistry, taking the last two as half-subjects in Part 1 of the Tripos. He kept up his skills as a photographer and added a growing love of music; these, with architecture and archaeology, remain permanent features of his life. In June 1939 he graduated with First-Class Honours in chemistry and immediately began research in reaction kinetics in the Department of Physical Chemistry. By December 1939, following up an undergraduate interest in radio developed in the Signals Unit of the Cambridge OTC, he was appointed as a Junior Scientific Officer at the Air Ministry and worked first on radar and from 1940 on operational research with special reference to anti-submarine warfare, bombing accuracy and radio aids. Most of his war service was spent abroad, in Cairo with Middle East Command and then in India and Ceylon with South-East Asia Command where he was

officer in charge of operational research and Scientific Adviser to the Allied Air Commander-in-Chief, holding the honorary rank of Wing Commander.

Wartime travels and encounters were to have major effects on his future career. J.D. Bernal, met in Cairo, India and Ceylon, persuaded him of the importance of research into protein, and this was reinforced by a meeting with L.C. Pauling in the course of a roundabout journey home via Australia and America in the spring of 1945. Though he hesitated for some time and explored the possibility of remaining in Government service to continue operational research and planning for peacetime policies, he decided to return to Cambridge, and began a collaboration with M.F. Perutz under the direction of Sir Lawrence Bragg at the Cavendish Laboratory.

Thus began a heroic period: in Kendrew's career and in those of his collaborators, in the subject of research - X-ray crystallographic analysis of protein structure - , in the Cavendish Laboratory and the University of Cambridge. In October 1947 the Medical Research Council set up a Unit for the Study of the Molecular Structure of Biological Systems with Perutz and Kendrew as its total staff; this was the origin of the now famous Laboratory of Molecular Biology, currently more spaciouly housed than in the cramped quarters and huts where such brilliant work was achieved in the 1950s. After exploring many possible problems and materials Kendrew chose myoglobin and in particular sperm-whale myoglobin as the most suitable for analysis by X-ray crystallography; he and his collaborators eventually succeeded in producing a three-dimensional model at a resolution of 6-Å in 1957 and 2-Å in 1959. This long and often tedious haul, requiring much manual experimentation as well as increasingly sophisticated computing resources to handle large amounts of data, was rewarded when he shared the Nobel Prize in Chemistry with Perutz (who had continued to work on haemoglobin) in 1962, that *annus mirabilis* when F.H.C. Crick and J.D. Watson (both of the MRC Unit) shared the Prize in Physiology or Medicine with M.H.F. Wilkins for the determination of the structure of DNA.

Alongside the laboratory work, Kendrew had maintained his links with university life principally through Peterhouse which had welcomed him during the early postwar years as a Research Fellow 1947-1953 and later as a Supernumerary Fellow. He was Director of Studies in Natural Sciences for many years with responsibility for selection and tuition of undergraduate members, as well as holding several College offices. He later became an Honorary Fellow of Peterhouse, as also of his undergraduate college, Trinity.

To this period also belongs Kendrew's marriage to Elizabeth Jarvie 1948 and subsequent divorce 1956. J.D. Watson, who was under Kendrew's supervision as a research student, lodged at their home during his early days in Cambridge.

From about the late 1950s Kendrew became more involved in scientific matters in the wider world. He was a founding member and first Honorary Secretary of the British Biophysical Society; in 1959 he undertook the Editorship of the new *Journal of Molecular Biology* which he retained until 1987; he was Deputy Chief Scientific Adviser Ministry of Defence 1960-1963; and he served on committees and advisory boards of the Royal Society where he had been elected to the Fellowship in 1960. With the award of the Nobel Prize this involvement gained momentum and an altogether new dimension in international terms with the development of the European Molecular Biology Organisation (EMBO) and its Laboratory (EMBL); the first exploratory talks seem indeed to have coincided with the journey to Stockholm at the end of 1962. Here too the way was to be long and hard. The formation of an active international association of scientists working in molecular biology (EMBO) was relatively easily achieved during 1963 and 1964, but the formal funding and organisation of such a body required intergovernmental political agreement and did not come until 1969 when the European Molecular Biology Conference (EMBC) was established by agreement by thirteen West European states. The Laboratory project, which was especially dear to Kendrew, was even longer in reaching an agreement (1973), a secretariat and research programme in place (1974) and a formal opening (1978). In all these developments Kendrew was closely involved, on the Council of EMBO, as Chairman of its Laboratory Committee and later its Secretary-General, as Secretary-General of EMBC, and as Project Leader and first Director-General of the EMBL.

Many other commitments to national and international science policy also belong to these years. In Britain they include service on the Council for Scientific Policy and chairmanship of some of its committees and working parties 1964-1972, service on the Defence Scientific Advisory Council 1969-1974, continuing service on the Council and other committees of the Royal Society and on other learned societies in particular the British Biophysical Society and the Institute of Biology. Examples of increasing involvement in international science and scientific policy can be seen in his appointment as Governor of the Weizmann Institute Israel 1964 and the Vice-Presidency and Presidency of the International Union of Pure and Applied Biophysics 1964-1972.

During the 1960s Kendrew continued his research on myoglobin, refining the resolution to 1.4-Å and determining the co-ordinates of virtually all the 2500 atoms in the molecule. In the later 1960s however his other commitments increasingly absorbed his time and energy and his official move to Heidelberg as Director-General of EMBL in 1975 marked the end of active research. The creation of the EMBL as a physical entity and more importantly as an international centre of excellence where several teams and research projects could co-exist and collaborate was a lasting achievement. In addition, or in consequence, Kendrew's diplomatic skills, mastery of detail and experience in chairmanship made him constantly in demand on a wider stage. He served, often as chairman, on the scientific councils or advisory boards of laboratories or research institutions in Naples, Basel, Brussels, Stockholm, Heidelberg and others, on various UNESCO committees, and on many electoral boards for honours and appointments in Britain and abroad. His formal association with science at the international level may be said to have culminated in his service with the International Council of Scientific Unions (ICSU) as Secretary-General 1974-1980 and President 1983-1988.

Kendrew's original contract of secondment from the Medical Research Council and appointment as Director-General of the EMBL was renewed twice, until 1982 when he retired on reaching the age of 65. His last appointment brought him back to Oxford as President of St. John's College until 1987. Since then he has lived in his house near Cambridge, maintaining his connections or continuing active involvement with many organisations, notably as Past-President and Member of the Executive Board of ICSU, as Chairman of the Board of Governors of the Joint Research Centre of the European Economic Communities, and other international associations.

DESCRIPTION OF THE COLLECTION

The material is very extensive and provides information not only on virtually all aspects of Kendrew's own career but on many of the individuals and organisations connected with it. The papers are presented as shown in the List of Contents. Additional explanatory notes or information accompany the separate sections and many of the sub-sections and individual entries in the body of the catalogue. The following paragraphs are intended only to draw attention to material of particular interest.

It should be said at the outset that the entire collection reflects on almost every page what are probably the best-known features of Kendrew's personality: on the one hand his methodical and analytical power, his meticulous not to say obsessive insistence on accuracy and comprehensive documentation, shown in his lifelong interest in record-keeping and the devising of recondite systems for information storage and retrieval; on the other hand, an aloofness or elusiveness of temperament which sets certain limits to personal relations. There are a steadiness and control, a detachment combined with seemingly tireless application which constitute a formidable intellectual armoury and which are present from the earliest records.

Thus, Section A (Notebooks, Notes and Essays) though mainly covering early school and undergraduate work 1930-39 is remarkable for its maturity and for the quantity and quality alike of the content. It is classified under a system of Kendrew's own devising which, though intrinsically clear and flexible, involved careful pagination with at least two referents, and an appreciable measure of cross-referencing in order to amalgamate school and university work; as there are some 9000 manuscript pages of notes, not counting notebooks and essays, the degree of labour required would not have been contemplated, let alone undertaken and carried through, by many. A modern historian of intellectual or educational development will be grateful for the scrupulous indexing of topics, the very full notes of lecture courses and the careful identification of lecturers. The latter included most of the leading figures in Cambridge science immediately before and after the Second World War and some visiting lecturers (J.E. Lennard-Jones, F.W. Aston, R.G.W. Norrish, E.K. Rideal, F.P. Bowden, J.A. Ratcliffe, W. Cochran, F.G. Hopkins, M. Dixon, F.G. Mann, W.J. Pope, D.D. Woods, J. Needham, A. Neuberger, D. Keilin, K. Bailey, I. Langmuir may be cited among very many others). The total sequence therefore provides an exceptionally comprehensive picture of the education available at that time at a well-run school science department and a major "science" university.

Section B (Second World War) chronicles Kendrew's overseas service and contributions to operational research, and contains original reports from various commands by him and others. It also includes several letters or private reports on his analysis of the war situation at various dates, of the current and future state of operational research and of his own career plans, his suggestions and proposals for the postwar organisation of government science, and a punched card, designed by him, to be used by aircraft patrol

crews to record incidents.

Section C (Research) is one of the major components of the collection and furnishes a very full record of Kendrew's research, including some of his collaborators' work. It is concerned almost entirely with protein structure analysis, beginning in 1946, and includes the devising of computer programs to handle and process data on machines of progressive sophistication (EDSAC I, EDSAC II, Mercury, IBM 7090 and others), the many years of experimentation with types of myoglobin until in December 1952 sperm-whale emerged as the most promising crystal source, and the ensuing protracted sequence of diffraction pictures, phase determination, scaling, manual and computer calculations leading up to the establishment of contour maps and the final three-dimensional picture at successive Angström resolutions. There is also material on the concurrent and subsequent work on amino-acid sequencing by chemical methods in correlation with the crystallographic analysis. In addition to the main sequence of notebooks, notes and data, there is material relating to specimens, apparatus and models, and correspondence with collaborators and colleagues extending over more than twenty years. The progress of the work can thus be followed in great technical detail. On a more immediately accessible level, there are reports, project diaries, summaries of experimental findings, charts of progress, work-allocations and the like written from the bench or in correspondence throughout the period, and covering key points such as the identification of the best crystalline protein, the excitement of the eventual syntheses and their publication. Attention is drawn to these and other items of interest in the introduction to Section C and at various points in the body of the text.

Section D (The MRC Laboratory Cambridge) is a relatively short section, but contains correspondence on the new building and its extension conducted by the Director M.F. Perutz, and some material on equipment and staff. There are also agendas, minutes and research proposals for Laboratory Board meetings, and a full record of committee meetings of Kendrew's own Structural Studies Division from 1969 (no.1) until his secondment to Heidelberg in 1975.

Section E (Cambridge: University and College) is another short section and does not fully reflect Kendrew's work as lecturer and teacher, or his committee service at Cambridge. His own extremely detailed notes on entrance and scholarship examinations for Peterhouse and the "King's Group" of

colleges in the 1950s are again of interest for the history of education.

Sections F, G and H are all devoted to the history of European molecular biology and constitute another major component of the collection, covering twenty years 1962-82. The extent of the material made it expedient to present it in separate sections for the Organisation EMBO (Section F), the Conference EMBC (Section G) and the Laboratory EMBL (Section H). A general introduction to the topic and to the material has been prepared as well as the specific introductions preceding each section. As has already been stated, Kendrew was closely involved in the movement from its earliest inception; he held high office in its key committees and secretariat and was also active in several channels of the science policy establishment in Britain such as the Council for Scientific Policy and the International Relations Committee of the Royal Society. His unique place at or near the centre of events makes his record of special value in several regards. It is remarkably complete and contains the early history or "founding papers" of all three European bodies, many of them in the form of manuscript or informal letters exchanged with distinguished colleagues throughout Europe as well as in Britain where the Cambridge MRC Laboratory itself provided the first Chairman of EMBO, M.F. Perutz, and many founder members such as S. Brenner, H.E. Huxley, F.H.C. Crick and A. Klug. In addition, the first Secretary-General of EMBO, J. Wyman, has at Kendrew's request made over his own papers and correspondence on the subject for incorporation in the present collection. All aspects of the European molecular biology movement are thus covered: negotiations, discussions and agreements at personal, official, national and international level; research projects, membership and elections; buildings and staffing; budgets, costings and funding - made dangerously unpredictable for the laboratory project by the global inflation and fluctuating European exchange rates in the 1970s; and as time advances a proliferation of committees and working parties. The element of doubt, unfavourable comment and hostility is not neglected; the efforts of founder members to keep the project alive by personal contacts is evident in many contexts. Kendrew's own notes of discussions, planning and problems at all stages are of the greatest interest, especially for the laboratory project; Section H also includes documentation of his own career at EMBL.

Sections J and K are concerned respectively with UK and with international societies and organisations. Each has an alphabetical list of contents and most of the items have a descriptive entry or introductory note.

Of special interest in Section J are the "founding papers" of the British Biophysical Society, papers of the Council for Scientific Policy including those of the Working Groups on molecular biology, on the proposal for EMBL and on the Dainton and Rothschild reports on the organisation of research, and the Council's Standing Committee on International Relations. There is also a full record of the High Energy Particle Physics Review Group chaired by Kendrew, and material relating to various committees and sub-committees of the Royal Society. Correspondence with W.L. Bragg and others at the Royal Institution provides useful links with Kendrew's research career during the myoglobin project; material for the Design Research Unit shows him in an unexpected role in the 1940s submitting ideas for industrial and design applications of scientific advances.

On the international scene (Section K) there are records of Kendrew's extensive service on the councils or advisory boards of institutions and laboratories and of their research programmes - examples among others are the Basel Institute for Immunology, the Laboratory of Molecular Embryology Naples, the Max-Planck-Gesellschaft Munich, the Molecular Biology Department Free University of Brussels, the United Nations University Tokyo - and good documentation for his long and continuing association, begun in 1963, with the Weizmann Institute Israel. The international scientific unions are represented by Biochemistry (IUB) and Pure and Applied Biophysics (IUPAB), but chiefly by the International Council of Scientific Unions (ICSU) which remains one of Kendrew's most important commitments and in which he held high office from 1974.

Section L (Lectures, Publications, Reviews) was considerably expanded at a late stage in the compilation of the catalogue by Kendrew's decision to include his folders of lectures and talks 1946-1987. These appear as addenda and have been extensively cross-referenced to related material, conferences, invitations and other events elsewhere in the collection. They contain many more lectures than previously available and include substantial courses given in America and Japan, and various special invitation lectures.

Section M (*Journal of Molecular Biology*) has been treated separately from other publications because of Kendrew's long involvement with the journal as Editor-in-Chief from its inception and as a Director of Academic Press. Once again there are "founding papers", careful notes and analyses by Kendrew, and miscellaneous material on the fortunes and vicissitudes of the journal and

its publishers over a time-span of thirty years.

Section N (Visits and Conferences) is not extensive and is far from reflecting the extent of Kendrew's travels. His notoriously peripatetic existence becomes apparent by the accumulation throughout the collection of references to journeys in connection for example with European molecular biology, or on behalf of ICSU and its constituent unions, or the official visits for the Council for Scientific Policy, or the regular visits and meetings at other laboratories and institutions.

Sections O, P and R are all short sections. Section O (Correspondence) is not extensive since Kendrew kept almost all his correspondence in the files or notebooks to which it related. One touches here on the reticent element in his temperament; the correspondence is open and friendly yet rarely develops into long-term exchanges. Section P (References and Recommendations) covers a long period and is international in range; some is subject to restricted access. Section R (Biographical) contains some interesting material on Kendrew's career and appointments, including many offers of posts in Britain and abroad. Unsurprisingly, it contains little of a personal nature.

A Bibliography and an extensive index of correspondents complete the catalogue.

It will be seen that the collection comprises material of very different nature and of potential interest in several fields of enquiry. There is the full history of a major scientific discovery as such (the structure of myoglobin) and, in the many research proposals put forward by individuals and institutions including EMBL, examples of how leading scientists saw the key developments in their subject at a particular time. There is material on intellectual training and the diffusion of changing scientific concepts by filtering to a wider public awareness through the educational process at various levels. The international aspects of science can be studied in the organisation, assemblies, membership and evolving preoccupations of the scientific unions and especially of their central body ICSU; while there is exceptional coverage of one field of European co-operation in the history of EMBO, EMBC and EMBL. The material relating to the *Journal of Molecular Biology* reflects an important aspect of the scientific process: the evaluation and

communication of research findings and the criterion of peer-judgment. Of perhaps more specialised interest is the evidence of the scientific contribution to the war effort during the Second World War, seen here in the correspondence and reports on operational research in several fields of hostilities and in the responsibility exercised by people still in their early twenties. It should be recalled that the documents on all these topics include both official papers in the shape of minutes, reports and the like, and also Kendrew's own meticulous notes, drafts and comments which greatly supplement the official material, and background correspondence and discussions which rarely form any part of them.

Some sections or items in the collection may be subject to restricted access.

ACKNOWLEDGEMENTS

Thanks are due primarily to Sir John Kendrew for initially allowing his papers to go forward for cataloguing, and for his continuing invaluable interest in the process. He has made himself freely available for consultation at every stage and placed his almost total recall at the disposal of the compiler. At his instance, Dr. R.G. Parrish and Professor J. Wyman have also made relevant material available from their own records.

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Hazel Gott has faced the processing and revising of the catalogue with remarkable resilience and aplomb.

SECTION A

NOTEBOOKS, NOTES AND ESSAYS

A.1-A.120

INTRODUCTION

NOTEBOOKS

A.1-A.25	School
A.26	War service
A.27	University (postwar)

NOTES AND ESSAYS

A.28-A.31	School
A.32-A.118	University
A.119	War service
A.120	Later miscellaneous notes

INTRODUCTION

This section includes early school and university notebooks, notes and essays from 1930 to 1939, and one notebook each from Kendrew's war service (A.26) and his later Cambridge career (A.27). There are also some later miscellaneous research notes and postwar lecture notes (A.120). The laboratory notebooks, observations and notes relating to his principal postwar research on myoglobin and other proteins are in Section C.

The most remarkable feature of the material presented here is the diligent care with which Kendrew wrote up his work even from the earliest stages of his career, culminating in the major indexed series of notes at A.40-A.117 which incorporates material from lectures, literature searches and laboratory experiments, drawing on school work as well as Cambridge sources, all classified under a system of his own devising.

The school notebooks are of the standard hardback type, all paginated, bearing not only contemporary legends such as "Set 4" but later inscriptions in red ink showing where they fall into the major indexed series. No notebooks of this kind survive from Cambridge, Kendrew having come to prefer loose pages of small quarto format from his school sixth form period onwards.

Although Kendrew's own talents and diligence were the essential factors in building his career, mention should be made of the high level of work expected and attained at Clifton. The head of Science 1920-40 was the historian of science and later scientific editor E.J. Holmyard. Kendrew recalls (private communication August 1988) that when he entered the sixth form Holmyard prescribed not one of his own many textbooks which were widely used in schools at the time but a German text; no translation was available and the set had rapidly to acquire a reading knowledge of scientific German. The head of physics was W.C. Badcock, whom Kendrew recalls as a particularly good teacher. Comments by these and other masters can be seen on the class exercises in the notebooks and in the essays at A.29. The general essays at A.30, often very thoughtful and marked with critical care, were written for Holmyard and for the Headmaster N. Whatley.

Kendrew did not reach Cambridge until 1936 and the war was to disrupt his and many other lives in 1939. But he had three years of exposure to some of the country's most distinguished scientific minds and used the opportunity fully, offering Chemistry, Physics, Biochemistry and Advanced Mathematics in Part I of the Natural Sciences Tripos and Chemistry in Part II. His extensive reading, assiduous lecture attendance and note-taking are dauntingly documented in the major indexed series, and the careful recording of lecturers' and supervisors' names is valuable for the history of education. On his return to Cambridge in 1946, the focussing of his interest in biochemical and crystallographic studies can be seen in the continuing meticulous lecture notes from 1946. His own work as lecturer and college supervisor and director of studies, for which equally careful records were kept, can be seen in Section E.

NOTEBOOKS

SCHOOL

Physics

- A.1 Notebook "Physics" with red ink indications for main index on cover and front page. Paginated 1-140.
- pp.1-56, "Electricity", 1930
pp.58-84, "Mechanics" "Hydrostatics", 1931
pp.86-119, "Light"
- A.2 Notebook "Physics", with red ink indications for main index on cover and front page. Paginated 1-140.
- pp.1-87 used, "Heat", 1931
- A.3 Notebook "Physics. Electricity and Magnetism. Lab", with red ink indications for main index on cover and front page. Paginated 1-70. All pages used. 1932.
- A.4 Notebook "Physics. Mechanics and the properties of matter. Lab", with red ink indications for main index on cover and front page. Paginated 2-134. All pages used. 1932.
- A.5 Notebook "Physics. Electricity and magnetism. Lecture". Paginated 2-70. pp.2-38 used. 1932.
- A.6 Notebook "Physics. Mechanics and the properties of matter. Lecture". Paginated 2-50. Not all pages used.
- pp.2-8, 1932
pp.9-10, 1933

- A.7 Notebook "Sound. Lab.", with red ink indications for main index on cover and front page. Paginated 1-10.

pp.1-4 used, 1933.
- A.8 Notebook "Light. Lab.", with red ink indications for main index on cover and front page. Pagination added later to conform with main index system 41(b)-90(b).

pp.41(b)-86(b), 1933
- A.9 Notebook "Heat. Lab.", with red ink indications for main index on cover and front page. Pagination added later to conform with main index system 61(c)-110(c).

pp.61(c)-106(c), 1933
- A.10 Notebook "Sound. Lec[tu]re", paginated 1-30.

pp.1-15 used, 1933

Chemistry

- A.11 Notebook "Chemistry Lecture", paginated 1-68.

pp.1-53 used, with Index at rear, 1931.
- A.12 Notebook "Chemistry Lecture", paginated 1-68. Dated on front page 1931 but work continues to 1932 and includes revision work for Clifton internal and School Certificate examinations.
- A.13 Notebook "Laboratory notebook", with red ink indications for main index on cover and front page and index (probably added later) on front page. Paginated 1-40.

pp.1-38 used, 1931.
- A.14 Small format notebook "Chemistry", probably not part of the school sequence. Paginated 1-97. Mainly concerned with classification of elements and periodic table. Undated, but press cuttings stuck at rear, on latest discoveries in physics, are dated 1932.

- A.15 Notebook "Chemistry. Extra Lab. 1932", paginated 1-30.
pp.1-25 used, 1932.
- A.16 Notebook "Inorganic Chemistry Lecture". Paginated 3-139 (index
on front page). Undated but 1932 (see A.17).
- A.17 Notebook "Inorganic Chemistry Lecture II", paginated 3-69. Not
all pages used. 1932.
- A.18 Notebook "Chemistry Organic Lecture", paginated 2-72.
pp.2-62 used, 1932.
- A.19 Notebook "Chemistry Organic Practical", with red ink indications
for main index on cover and front page. Paginated 1-60.

pp.1-33, 1932
pp.34-54, 1933.
- A.20 Notebook "Inorganic Lab.", with red ink indications for main
index on cover and front page, and index (probably added later)
on front page. Paginated 1-64. 1933.

pp.1-41, Analyses, 1933
pp.42-60, Volumetric analysis, 1933-34
pp.61-64, Qualitative analysis [1933]
- A.21 Notebook "Inorganic Lab.", with red ink indications for main
index on cover and front page, and index (probably added later)
on front page. Paginated 71-137.

pp.71-112, 1934
pp.113-137, 1935.
- A.22 Notebook "Chem. Lab.", with red ink indications for main index
on cover and front page, and index (probably added later) on
front page. Paginated (probably added later) 241-260.

pp.241-259, Analyses, 1935.

A.23 Notebook "Inorganic Analysis", paginated 2-43. Undated; handwriting suggests a date 1932-33.

A.24 Notebook (not standard school sequence format) "Organic Chemistry". Paginated 2-61. Not all pages used. Undated but c.1932.

Analyses, notes on the literature.

A.25 Notebook "Geography Notes", undated and probably very early during Kendrew's time at the Dragon School, Oxford.

Notes, maps, mnemonics. (Kendrew's father was Reader in Climatology, Oxford University and he was attracted to the study of geography at one time.)

WAR SERVICE

A.26 Kendrew's S.O. Book 135, signed and headed "Summary notes".

Material runs 22 November 1940 to 14 March 1941 and covers a wide range of topics on radar and coastal air defence, including diagrams of circuits and installations, lists of air stations and their equipment, notes of visits to coastal squadrons, comments on personnel and equipment. The visits were mainly to squadrons in Scotland and in Northern Ireland, and the material was the basis of Kendrew's reports at B.26.

UNIVERSITY (POSTWAR)

A.27 Binder of "Filofax" pages inscribed "Peterhouse Cambridge", with index of topics as follows:

Mathematical formulae	Sociology
Mathematics	Archaeology
Physics	Geography
Statistics and probability	Botany
General biology	Photography
Psychology	Chronology

Own notes, and notes on books and articles read. Undated but post 1947.

NOTES AND ESSAYS

SCHOOL

- A.28 Demonstrations and notes on explosives.
- A.29 Essays and questions on scientific topics, some written to time limits as revision or preparation for examinations. A few dated, various dates 1933-35.
- A.30 General essays written for E.J. Holmyard and N. Whatley.
- A.31 Miscellaneous shorter notes.
- Included here are two letters received by Kendrew at Clifton in reply to enquiries by him: 1932 from K. Sisam about word omitted from Concise OED; 1935 from J. Read on a phenomenon omitted from textbook on organic chemistry.

UNIVERSITY

Essays and questions

- A.32 "Supervision with Dr Mann 1937" (F.G. Mann, Trinity, Reader in organic chemistry).
- A.33 "Supervision with Dr Feather 1937, 1938" (N. Feather, Trinity, University Lecturer in physics).
- A.34 "Supervision with Dr Feather 1938".

- A.35 Miscellaneous essays, some for F.G. Mann, most for "Dr Hoar"
[T.P. Hoar], others without attribution.

A.32-A.34 are on the small quarto pages used for the main indexed series of notes. A.35 is on the large quarto often used in Cambridge in the 1930s.

Teaching material

- A.36 Practical biochemistry, Michaelmas Term 1937.
Material for 24 classes.

- A.37 Practical biochemistry, Lent Term 1938.
Material for 22 classes.

- A.38 Practical biochemistry, Easter Term 1938.
Material for 5 classes.

Examinations

- A.39 Natural Sciences Tripos question papers: Preliminary 1937, Part I 1938 (Chemistry, Biochemistry, Physics, Mathematics), Part II 1936, 1939 (Chemistry).
- Some papers annotated by Kendrew.

Major indexed series of notes and lectures

This consists of almost 9,000 manuscript pages of small quarto format. The main period covered is Kendrew's undergraduate career 1936-39, but school notes and lecture notes are also included and the Cambridge lectures extend to postwar courses 1946-50 (see A.49, A.61, A.91-A.93, A.104-A.107, A.111).

Kendrew's method of classification is preserved separately at A.40 in the "code-book", also written on the same format on loose pages. It is clear and flexible. There are four basic topics: chemistry, physics, biology, mathematics, each with a code prefix. For chemistry this is upper case letters A-D, for physics lower case letters a-h, for biology Greek characters α - δ and for mathematics Roman numerals I-IV.

Within each topic the organisation is as follows:

code prefix followed by numbered pages - systematic notes and notes on the literature
eg. C.1-C.172.

numbered pages followed by code prefix - lecture notes eg. 113C-320C.

numbered pages followed by code prefix in brackets -
laboratory notes eg.
1(C)-70(C).

Almost all the sequences have an index of contents. In addition the "code-book" contains a detailed subject index of elements, compounds, methods, definitions, apparatus and instruments etc. Cambridge lecturers are always named and some of the main source books for the notes are also identified. A few invitation lectures outside the routine university teaching programme are also included. The total sequence thus provides an exceptionally full conspectus of the intellectual training then available, though it may be doubted how many took such diligent advantage of it.

A.40

"Code-book", explaining classification system and including subject index.

Chemistry

Code-prefix upper case letters, subdivided into:

- A. Systematic inorganic chemistry.
- B. Theoretical and general chemistry.
- C. Physical chemistry.
- D. Organic chemistry.

A. Systematic inorganic chemistry

- A.41 Systematic inorganic chemistry notes, arranged by groups, each group indexed, the whole paginated A0-A473 with some pages sub-divided.
- A.42 Part I Lecture course "Inorganic chemistry", by H. McCombie, Lent and Easter terms 1938, paginated 0A-33A. Index on first page.

B. Theoretical and general chemistry

- A.43 General notes and notes on the literature (school and university material), index on front page, paginated B0-B165, some pages sub-divided.
- A.44 Part II lecture course "Theoretical Chemistry" by J.E. Lennard-Jones, Michaelmas 1938, Lent 1939, index on front page, paginated 0B-77B.
- A.45 Part II lecture course "Thermodynamics" by J.K. Roberts, Michaelmas 1938, index on front page, paginated 78B-142B.
- A.46 Part II lecture course "Crystal Chemistry" by R.C. Evans, Lent 1939, index on front page, paginated 143B-218B.

- A.47 Part II lecture course "Valency" by W.C. Price, Easter 1939, index on front page, paginated 219B-243B.
- A.48 Chemical Society lecture "Fireworks" by Dr R.E.D. Clark, paginated 244B-247B.
- A.49 "Theories of molecular structure" by J.E. Lennard-Jones, Lent and Easter terms 1950, index on front page, paginated 248B-412B.
- A.50 Laboratory notes, mainly Cambridge work 1937-39 but includes a little earlier school work, paginated 1(B)-202(B).

C. Physical chemistry

- A.51 General notes and notes on the literature, mainly university but some school material, indexes on pp.C0, C60, C160, paginated C0-C187, some pages sub-divided.
- A.52 Part I lecture course "Physical chemistry" by R.G.W. Norrish, Michaelmas 1937, index on front page, paginated 0C-111C.
- A.53 Part II lecture course "General physical chemistry", Michaelmas 1938 (by F.P. Bowden) Lent 1939 (by E.K. Rideal), index on front pages, paginated 113C-320C.
- A.54 Part II lecture course "Colloids", Michaelmas 1938, by E.K. Rideal, index on front page, paginated 321C-374C.
- A.55 Part II lecture course "Surface reactions", Michaelmas 1938, by E.K. Rideal, index on front page, paginated 375C-432C.

- A.56 Part II lecture course "Some aspects of biocolloids", Michaelmas 1938, by E.K. Rideal, index on front page, paginated 433C-475C.
- A.57 Part II lecture course "Electrochemistry", by F.P. Bowden, Lent 1939, index on front page, paginated 476C-530C.
- A.58 Part II lecture course "The structure of molecules" by C.B. Allsopp, Lent 1939, index on front page, paginated 531C-582C.
- A.59 Part II lecture course "Reactions in solution" by E.A. Moelwyn-Hughes, Easter 1939, index on front page, paginated 583C-615C.
- A.60 Lecture "Recent developments in the study of films. By Dr Langmuir of the GEC" [Irving Langmuir], 13 October 1937, paginated 616C-617C.
- A.61 "Modern theoretical aspects (polymers)", Summer 1946, by F. Eirich, paginated 618C-636C.
- A.62 Laboratory notes and experiments October 1937 - February 1939, paginated 1(C)-169(C).

D. Organic chemistry

- A.63 Systematic organic chemistry notes on acrylic compounds, index on front pages, mainly university but includes a little school material, paginated D1-D335, many pages sub-divided, some re-numbered and a jump in numeration at D130.
- A.64 Systematic organic chemistry notes on cyclic compounds (benzenoid rings), index on front pages, includes a little school material, paginated D400-D698.
- A.65 Systematic organic chemistry notes on cyclic compounds (quinonoid rings), alicyclic, and others, indexes on D700, D760, paginated D700-D947 with a jump in numeration at D812.

- A.66 "Organic chemistry - general", notes and notes on the literature, school and university material, index on first page, paginated D1000-D1147.
- A.67 Part I three-term lecture course "Organic chemistry" by W.J. Pope, Michaelmas 1936, Lent and Easter 1937, P. Maitland, Easter 1937, index on front pages, notes for Lent 1937 only, paginated 1D-5D, pages much sub-divided.
- A.68 Part II three-term lecture course "Organic chemistry" by F.G. Mann, Michaelmas 1938, Lent and Easter 1939, index on front page, lectures all dated, very full notes paginated 6D-351D.
- A.69 Part II lecture course "Stereochemistry", by W.J. Pope, Lent 1939, index on front page, paginated 352D-397D.
- A.70 "Some aromatic compounds", lecture to Chemical Society 22 October 1937 by F.B. Kipping, paginated 398D-404D.
- A.71 Laboratory notes, analyses and experiments 1936-39, paginated 1(D)-179(D). Pp.78(D)-92(D) are "Report of work carried out at ICI Laboratory, Blackley, Manchester August 1938".

Physics

Code-prefix lower case letters, sub-divided into:

- a Electricity
- b Light
- c Heat
- d Mechanics: properties of matter
- e Sound
- f Atomic physics: general
- g Crystal physics
- h Philosophy and scientific method

a Electricity

- A.72 Notes and notes on the literature, mainly university (to 1939) but includes a little school material, indexes on a0, all5, paginated a0-a158, several pages sub-divided.
- A.73 Part I lecture course "Electricity" by J.A. Ratcliffe, Michaelmas 1937, Easter 1938, index on front pages, paginated 0a-204a.
- A.74 Practical electricity, laboratory notes and experiments at Clifton, 1935-36, some initialled W.C.B. [Badcock], paginated 131(a)-239(a); earlier pages to be supplied from notebooks at A.1, A.3
- A.75 Practical electricity, laboratory notes and experiments, Cambridge 1937-38, paginated 241(a)-404(a).

b Light

- A.76 General notes, school and university material, indexes on b0 and b152, paginated b0-b234.

- A.77 Part I lecture course, by A. Wood, Lent and Easter 1937, index on front pages, paginated 1b-114b.
- A.78 Practical light, laboratory notes and experiments, at school 1935 paginated 91(b)-110(b), earlier pages to be supplied from notebooks at A.1, A.2, A.8, and university 1937-38 paginated 117(b)-222(b).

c Heat

- A.79 General notes, school and university material, indexes on c0 and c36, paginated c0-c97, several pages much sub-divided.
- A.80 Part I lecture course "Heat", by Dr H. Carmichael, Lent 1938, index on front page, paginated 0c-112c.
- A.81 Practical heat, laboratory notes and experiments, at school 1935 paginated 111(c)-134(c), earlier pages to be supplied from notebooks at A.2, A.9, and university 1936-37 paginated 141(c)-198(c).

d Mechanics: properties of matter

- A.82 General notes, school and university material, index on front page, paginated d0-d125.
- A.83 Part I lecture course "Mechanics" by A. Wood, Michaelmas 1936, index on front pages, paginated 1d-100d.
- A.84 Practical mechanics, laboratory notes and experiments, at school 1935 paginated 71(d)-100(d), earlier pages to be supplied from notebooks at A.1, A.4, and university 1936-38 paginated 101(d)-204(d).

e Sound

- A.85 General notes, index on front page, paginated e0-e22.
- A.86 Part I lecture course "Sound", by A. Wood, Lent and Easter 1937, index on front page, paginated 1e-39e.
- A.87 Practical sound, laboratory notes and experiments 1936 paginated 11(e)-23(e); pp.1(e)-10(e), referring to school work, to be supplied from notebook at A.7

f Atomic physics

- A.88 General notes and notes on the literature, index on front page, school and university material, paginated f0-f103, some pages sub-divided.
- A.89 Part I lecture course "Isotopes", by F.W. Aston, Michaelmas 1936, index on front page, paginated 0f-22f.

g Crystal physics

Most of this material is postwar.

- A.90 Notes on the literature, index on front page, paginated g0-g51.
- A.91 Lectures on "Crystal Physics: selected topics" by W.H. Taylor, Lent and Easter 1946, index on front pages, paginated 0g-101g.
- A.92 Lectures on "Fourier methods" by H.D. Megaw, Lent 1948, index on front page, paginated 102g-147g.
- A.93 Lectures on "Some properties of the reciprocal lattice", by W. Cochran, Lent 1950, paginated 148g-179g.

h Philosophy and scientific method

- A.94 Notes on the literature (made in last terms at school 1936)
paginated h1-h23.

Biology

Code-prefix Greek characters, sub-divided into:

- α Biochemistry
- β Zoology
- γ Botany
- δ Physiology

 α Biochemistry

Much of this material is postgraduate or postwar.

- A.95 Notes on the literature, university and postwar, index on front page, paginated $\alpha 0$ - $\alpha 75$.
- A.96 Part I three-term lecture course "Biochemistry", Michaelmas 1937, Lent and Easter 1938, index on front pages. Given by a series of lecturers; names include F.G. Hopkins, D.J. Bell, E. Holmes, T.R. Parsons, E.H.F. Baldwin, D. Needham, J. Needham, M. Dixon, D.D. Woods. Paginated 0α - 353α , some pages sub-divided.

- A.97 "Cell respiration and biological oxidations", by M. Dixon, Michaelmas 1939, index on front page, paginated 354 α -417 α .
- A.98 "Some aspects of intermediary metabolism", by Dr Holmes, Michaelmas 1939, index on front page, paginated 418 α -432 α .
- A.99 "Biochemistry of carbohydrates", by D.J. Bell, Michaelmas 1939, index on front page, paginated 433 α -483 α .
- A.100 "Enzymes", by M. Dixon, Michaelmas 1939, index on front page, paginated 484 α -535 α .
- A.101 "Plant biochemistry", by N.F. Hill, Michaelmas 1939, index on front page, paginated 536 α -587 α .
- A.102 "Organisation and physical chemistry of amino-acids and proteins", by A. Neuberger, Michaelmas 1939, index on front page, paginated 587 α -620 α .
- A.103 "Some aspects of protein chemistry", by Professor Ferry (visiting lecturer from Harvard), 23 November 1937, paginated 621 α -623 α .
- A.104 "Respiration and respiratory carriers", by D. Keilin, Lent 1946, index on front page, paginated 624 α -669 α .
- A.105 "Methods of X-ray analysis and their application to biological problems", by M.F. Perutz, Lent 1946, index on front page, paginated 670 α -699 α .
- A.106 "Protein and enzyme kinetics", by P. George, Easter 1946, index on front page, paginated 700 α -736 α .
- A.107 "Proteins", by K. Bailey, Michaelmas 1946, index on front page, paginated 737 α -766 α (last note reads "course abandoned").

- A.108 Practical biochemistry, laboratory notes and experiments, Michaelmas 1937, Lent 1938, index on front pages, paginated 0(α)-151(α).

β Zoology

- A.109 Notes on lectures at Clifton 1936, index on front page, paginated 0 β -118 β .

γ Botany

- A.110 Notes on lectures at Clifton 1936, index on front page, paginated 0 γ -145 γ .

δ Physiology

- A.111 Part II lecture course "Cell Physiology" by E.N. Willmer, A.L. Hodgkin, D.K. Hill, Michaelmas 1946, Lent 1947, index on front page, paginated 0 δ -129 δ .

Mathematics

Code-prefix Roman numerals, sub-divided into:

- I General notes
- II Analysis
- III Vectors and statistics
- IV Differential equations

I General notes

- A.112 Miscellaneous mathematical notes, algebra, trigonometry, calculus, mechanics, index on front pages, paginated I 0-I 74.

II Analysis

- A.113 "Analysis", by H.M. Taylor, Lent 1937, index on front pages, paginated II 1-II 151.

III Vectors and statistics

- A.114 "Vectors, tensors, numerical methods, interpolation statistics", by R.S. Stoneley, Michaelmas 1937, Easter 1938, index on front pages, paginated III 0-III 172.
- A.115 Unpaginated notes and calculations on tensors.
- A.116 Statistics. Notes and calculations, undated but probably done during war (on poorer quality paper). Includes on pp.III 225-III 232 a "Summary of ORS (B.C.) Report 113 Note on the comparison of loss rates" dated 1 November 1944. Index on front page, paginated III 174-III 232.

IV Differential equations

- A.117 Part I lecture course "Differential equations, special functions, integrals", by F.C. Powell, Lent 1938, index on front pages, paginated IV 0-IV 133.

Other University notes

- A.118 Notes, experiments, laboratory work, abstracts and notes on the literature, July 1939 - January 1940, on mutarotation, Kendrew's first research work with E.A. Moelwyn-Hughes. See also C.1.
- A.119 Notes on radar research carried out with TRE (Telecommunications Research Establishment, Malvern) February-June 1940 on Barkhausen-Kurz oscillators, aerials, valves etc. Also notes on the literature. Made on same format as main university notes but not paginated.
- A.120 Bundle of small format "Filofax" notes on scientific subjects but miscellaneous content and date. Includes:
- Notes on the literature (proteins, X-ray diffraction).
- Notes taken at lectures, mainly special lectures at Cambridge 1946-49.
- Notes taken at visits and conferences, papers and discussions, visits to laboratories and research in progress, including visits to USA 1951, 1953. Material extends to 1962.

SECTION B

SECOND WORLD WAR

B.1-B.60

INTRODUCTION

CAREER AND CORRESPONDENCE

B.1	Career
B.2-B.24	Correspondence and papers 1941-46

NOTES

B.25	Notes
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REPORTS

B.26, B.27	Coastal Command
B.28	Bomber Command
B.29	Anti-submarine warfare
B.30	Combined Operations
B.31	Methodology
B.32-B.41	Middle East Command
B.42-B.47	South East Asia Command
B.48-B.53	Postwar papers

HISTORY OF OPERATIONAL RESEARCH

B.54-B.60	Correspondence, papers, drafts
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INTRODUCTION

Kendrew (private communication July 1988) describes how he came to be involved with radio research in prewar Cambridge as follows:

"Being a contrary character, at my public school where almost everyone joined the OTC I refused to do so; at Cambridge, where almost no one joined, I proceeded to do it. I joined the Signals Unit, of which W.B. Lewis was - I think - Commanding Officer. Having joined, a friend (Jim Wilkins) and I discovered that Lewis had a contract with the War Office to develop ultra-shortwave two-way radio, and that he needed spare-time help with this. The work was non-secret and had no connexion with radar; the wavelengths involved were 3m and 66cm - very short by the standards of those days; but it meant that we could evade some uniformed parades and various tedious chores by enrolling ourselves with him in what I think was known as the Research Section - and as far as I remember we were the only members of it. As a consequence I had my picture in the newspaper relaying results from the track to the scoreboard at an athletic meeting at the White City (the headline read 'Meet the walking wireless man'). When the War came I was interviewed by the Cambridge Recruiting Board and told to continue my academic research, which I did not find very satisfying with all my friends going off to the armed services. I had no idea about radar but I had heard a rumour that Lewis was involved in something interesting and I wrote to him with the result that I was recruited into TRE."

His wartime career began in December 1939 when he was appointed a Junior Scientific Officer at the Air Ministry and he remained a Temporary Civil Servant with Honorary commissioned rank throughout. He worked on Operational Research (OR) with special reference to anti-submarine warfare, bombing accuracy and radio aids. During the early months of 1940 he worked as an officer of TRE (see A.119) and in the autumn of that year was seconded to Coastal Command to study and advise on the installation and operation of ASV (Air Detection of Surface Vessel) equipment (B.26). In September 1941 he was posted with the rank of Squadron Leader to Middle East Command, visiting Malta in October and December to instruct aircrew and controllers in the use of ASV; from December 1941 he was stationed in Cairo at Headquarters RAF Middle East,

concerned with coastal, bomber and army co-operation matters. During this period he produced a very successful "Handbook for aircrews and controllers", often referred to as a "Bible" (B.35). In December 1943, after a period of home leave, his rank was raised to Wing Commander on his move to South East Asia Command where he served in India and Ceylon as officer in charge of OR and, from June 1944, as Scientific Adviser to the Allied Air Commander-in-Chief South East Asia. His long period of overseas service ended when he handed over his command in February 1945 and returned via Australia, the South West Pacific and USA to London where he rejoined the Air Ministry in June 1945. After considerable thought about the prospects of remaining in government service, Kendrew accepted a Senior Department of Scientific and Industrial Research grant to continue his academic career at Cambridge and resigned from the Ministry with effect from 10 January 1946.

The essential requirement of detailed and accurate data for the compilation of official OR reports chimed well with Kendrew's meticulous temperament and fostered, if it did not inspire, a continuing interest in the indexing and organisation of information (B.25, B.36, B.37, B.52).

An account of operational research in the RAF and of Kendrew's wartime contributions can be found in Air Ministry Air Publication 3368, *The Origins and Development of Operational Research in the Royal Air Force*, London HMSO, 1963.

CAREER AND CORRESPONDENCE

Career

- B.1 Miscellaneous documents on Kendrew's wartime career: appointment as Junior Scientific Officer Air Ministry December 1939, notification of commissions as Squadron Leader September 1941, Wing Commander December 1943.

Correspondence and Papers 1941-46

These are the contents of Kendrew's "Personal" or "D/O" (Demi-Official) files and consist of letters, carbon copies, memoranda and shorter communications sent or received by him, principally during his overseas service at HQ RAF Middle East and with South East Asia Command. The documents had been numbered and tagged by him, a new file being opened when the total reached about one hundred items. The files thus created were bulky and in poor condition, and have been replaced with the contents divided into more manageable units while retaining their original order; it should be noted that this numerical order does not correspond to the chronological order of writing, reflecting the postal and administrative delays often referred to in the letters themselves.

The documents cover all aspects of Kendrew's service career during this extensive period:- postings and promotions of self and colleagues, preparation and circulation of OR reports, personal news of friends serving elsewhere, visits to or with Kendrew by others, testing of equipment, data collection etc. A leit-motif is delays and inadequacy of supplies and personnel. Some indication is given in the entries of material of special interest, but there has been no attempt to calendar the full range of the correspondence.

15 December 1941 - 19 May 1943

- B.2 15 December 1941 - 11 September 1942 (numbered 1-25).

Setting up OR in Cairo; Kendrew's manual for pilots (R.17, see B.35); proposal (July) to transfer him to India to initiate an OR Section (strongly resisted because of pressure of work and shortage of personnel in Cairo); includes several letters from Kendrew to R.A. Watson-Watt on OR matters.

B.3 7 September 1942 - 17 March 1943 (numbered 26-50).

OR in Ceylon; reports; visits by J.D. Bernal and S. Zuckerman, including Kendrew's notes prepared for Zuckerman and P.M.S. Blackett on OR matters and on his own career.

B.4 10-25 March 1943 (numbered 51-75).

Comment on OR reports 24 and 29; correspondence with Zuckerman.

B.5 25 March - 19 May 1943 (numbered 76-100).

Includes letter from Kendrew 10 May detailing his Middle Eastern service and requesting return to UK.

2 May - 8 November 1943

B.6 23 May - 8 November 1943 (items numbered 1-33 and one unnumbered).

Return to UK September. Unnumbered letter of 8 November gives account of current work in London and plans under discussion for Far East and South East Asia.

26 January - 10 June 1944

B.7 13 January - 22 February (numbered 1-25).

Arrival at ORS SEAC Delhi, organisation and staffing.

B.8 21 February - 13 April (numbered 26-50).

OR organisation in Australia, London, Washington, science and scientists in India.

B.9 14 April - 4 May (numbered 51-75).

B.10 28 May - 10 June (numbered 76-102).

6 June - 23 August 1944

B.11 6-25 June (numbered 1-25).

B.12 17-30 June (numbered 26-50). N.B. Letters go up to 17 July.

Kendrew's letter of 17 July is a full analysis of the war situation in South East Asia, the future of OR in the Pacific theatre, and his own career for the remainder of the war and subsequently.

B.13 20 July - 7 August (numbered 51-75).

B.14 3-23 August (numbered 76-100).

22 August - 5 December 1944

B.15 22 August - 5 September (numbered 1-25).

B.16 28 August - 16 September (numbered 26-50). N.B. Letters go up to 21 October.

Reports and information on SEAC and Pacific theatre, move of ORS to Kandy, Ceylon, visit by J.D. Bernal, proposed visit by A.C. Menzies.

B.17 22 September - 8 November (numbered 51-75).

Work on night vision, acclimatisation, reports, visit by J.D. Bernal, A.C. Menzies.

B.18 15 November - 5 December (numbered 76-100).

Visits by J.D. Bernal, A.C. Menzies, C.H. Waddington. Kendrew's letter of 17 November (no. 78) refers to the opportunity offered him to return to UK as Officer in charge of ORS Fighter Command, and his view that the commitments of the Command had by then been so reduced that the posting was not attractive to him.

23 November 1944 - 27 February 1945

B.19 23 November - 20 December 1944 (numbered 1-30). N.B. Letters go up to 5 January 1945.

B.20 2-16 January 1945 (numbered 31-60). N.B. Letters go up to 29 January.

B.21 29 January - 27 February (numbered 61-90).

Kendrew handed over OR Section to his successor, G.A. Roberts, on 27 February, leaving on 4 March to return to UK via Australia, New Guinea, the Philippines, USA and Canada.

B.22 Arrangements for tour of Australia, South West Pacific Area and USA, January-April 1945. Mainly official signals, passes etc.

B.23 Miscellaneous correspondence December 1944 - 4 March 1946.

These are the unnumbered contents of a "D/O" file and include continuing correspondence on Kendrew's Pacific and American tour before returning to UK, exchanges with staff members, continuing work on OR and on postwar career plans, testimonials for former serving officers.

B.24 Shorter correspondence on pay, allowances, taxation during overseas service in SEAC, December 1943 - October 1945.

NOTES

B.25 Miscellaneous manuscript notes.

This is an assemblage of tightly written notes on a series of small format (17mm x 9mm) early "Filofax" lined and graph pages, with dividers. They are not in chronological or alphabetical order but follow the coded "Arrangement of notes" devised by Kendrew and laid out on the first two pages of the sequence.

The material is divided into two main areas "Operational" and "Technical". It contains, often in very condensed form, information on a wide variety of topics relating to air power, allied and hostile, in all theatres of war, radar and navigation aids, bombing and detection devices, circuits and equipment, anti-submarine warfare, analyses of performance in defence and attack etc. It derives variously from a study of official documents or published reports, Kendrew's own activity in operational research and visits to air stations, committee or policy decisions. Most entries are dated, the main coverage being July 1939 - May 1945, but there are sections under "TRE" and "RDF Hist." which incorporate material going back to 1930.

See A.119 for Kendrew's notes on radar research February-June 1940, A.26 for his S.O. Book of notes on radar and coastal air defence November 1940 - March 1941, A.116 for notes on OR.

REPORTS

Most of these bear the wartime classification "Secret" or "Most Secret". Several are by Kendrew, or by members of his OR units who feature in the correspondence files. Some are of interest in bearing notes by Kendrew about their history (see B.27, B.28 and also B.60) and there are copies of two papers by P.M.S. Blackett (B.31) described as "classics" by H.M. Barkla (private communication November 1987).

The material is duplicated typescript, sometimes with manuscript additions or corrections.

Coastal Command

B.26 Reports by Kendrew on arrangements for ASV (Air Detection of Surface Vessel) installation and use in Coastal Command squadrons, visits, inspections and flights to test equipment. Various dates January-September 1941.

B.27 Kendrew's folder of Coastal Command reports (not a complete set), June 1941 - March 1943, with running classification ORS/CC.

Nos. 125, 127, 128, 130 (by Kendrew), 131 (by Kendrew), 132, 133, 134 (undated report and diagrams by Kendrew on U-boat hunts carried out off Ireland), 135, 142, 143, unnumbered, 144, 145, 146, unnumbered, 150, 160 (undated report and diagrams by Kendrew), 181, 186, 192 (with manuscript diagrams by Kendrew), 204, 210, 212A, 218 (with manuscript note by Kendrew "Draft of unpublished ORS/CC Report No. 218"), 222.

Bomber Command

B.28 ORS (B.C.) Reports nos. 14, 40, 52, S.176 (with a manuscript note by Kendrew "Officially destroyed"); reports dated 1942, 1944 and an undated report.

Anti-Submarine Warfare

B.29 Miscellaneous reports and manuals 1941-42, 1944.

Combined Operations

- B.30 Miscellaneous papers 1942.

OR Methodology

- B.31 Two papers by P.M.S. Blackett October 1941, "Scientists at the Operational Level" (ORS/CC 154), and "Note on certain aspects of the methodology of Operational Research" (incorrectly dated October 1942).

Middle East Command

- B.32 Kendrew's binder inscribed "ORS/ME Routine Reports on A/S [anti-submarine] and anti-shipping operations", with his manuscript index.

Reports run December 1941 - July 1943, not necessarily in numerical or chronological order, as follows: R4 (missing), 5, 8, 11, 14, 15, 20, 22, 29, 28, 37, 33, 35, 45.

- B.33 Kendrew's binder inscribed "ORS (ME) Bomber operations. Close-support operations. Defensive ground RDF" [Radio Direction Finding], with his manuscript indexes for each topic.

The papers are variously classified as M [Memorandum], R [Report], V [Visit] and are not necessarily in numerical or chronological order.

Bomber operations February-July 1943: M.27, R.34, M.28-32, R.41, R.30, R.32, R.36, R.39, R.43.

Close-support December 1942 - August 1943: V.4, V.8, M.29, R.40, R.48.

Defensive ground RDF February 1942 - August 1943: M.8, R.16, R.18, R.19, M.17, M.18, R.21, M.19, R.25, V.5, M.26, R.47.

- B.34 Kendrew's binder inscribed "ORS (ME) Miscellaneous papers by J.C.K. and Coastal Section". There are four sections each with his manuscript index.

continued

Miscellaneous reports on sea operations January 1941 - August 1943: unnumbered, M.1, M.3, M.5, M.15, R.24, R.26 (missing), M.25, unnumbered, M.33, R.42.

Miscellaneous short reports on sea operations (by Kendrew), without official numbers, March 1942 - June 1943.

Papers on close-support and radio aids, January-September 1942: M.6, M.7, M.9, unnumbered, R.7, unnumbered. See B.40 for correspondence and memoranda about R.7.

Miscellaneous papers (by Kendrew), without official numbers, March-November 1942. Paper listed for 12 September is missing.

- B.35 "The operational employment of ASV Mk.II: a handbook for aircrews and controllers."

This was originally ORS (ME) Report no.17 of 1 July 1942, by Kendrew, which was very favourably received and issued separately. It is referred to in the correspondence, often as Kendrew's "Bible". Folder includes copy of R.17 as first issued, revised edition of 1 August 1943 and version issued by RAAF Headquarters Melbourne n.d.

- B.36 Miscellaneous reports part or all by Kendrew March, May, June 1943.

- B.37 Miscellaneous reports by ORS (ME) additional to those in Kendrew's binders. Includes R.49, Education Publication no.1 (Glossary of technical terms and abbreviations), but mainly related to Instruction no.34 (Operational and intelligence summaries and reports), preparation and design of log sheets, card indexes (some annotations by Kendrew and others).

See B.60 for a historical report by ORS ME.

- B.38 Coastal Command Tactical Instructions (CCTI), circulated by HQ, RAF, ME but not produced by them. Not a complete set.

Nos. 15, 18, 22-27, 29, 30, 32-37, 41.

- B.39 Coastal Command Tactical Memoranda (CCTM), circulated by HQ, RAF, ME but not produced by them. Not a complete set.

Nos. 2, 13, 20-23, 25-29, 31-35, 41, 44-46, 49, 50, 54, 57-59.

- B.39A Miscellaneous naval reports and memoranda.
- B.40 Correspondence and memoranda 1942 about Kendrew's report "Some aspects of air co-operation with the army and possible radio aids thereto" (R.7 at B.34) suggesting wider use of "Rebecca" RDF system.
- B.41 Small format photographs of Italian submarine hit off Tobruk November 1942 (3) and tank hit in Western desert April 1943 (2).

South-East Asia Command

- B.42 Progress reports of ORS Air Command, by Kendrew, nos. 4-7, January-December 1944.
- B.43 "Miscellaneous papers produced by self", November 1943, October 1944 and n.d. ("Pacific Report" - incomplete), a few miscellaneous notes, calculations, graphs.
- B.44 ORS Air Command Reports nos. 6-11, 13-21 February-December 1944 (no.6 by Kendrew and others).
- B.45 ORS Air Command Memoranda nos. N.7, 9-12, January-December 1944 (no. 12, on bomb and depth charge trials in Ceylon jungle, is by Kendrew and includes photographs of him on site after explosions).
- B.46 ORS Air Command Memoranda nos. NB 16, 17 April, June 1944; unnumbered report April 1944; two papers from Jungle Targets Research Unit February 1945 on bomb and napalm trials.
- B.47 Folder of reports assembled by Kendrew from Australian and American sources on various topics in preparation for continuation of hostilities in Pacific theatre April 1944 - May 1945: radar and weapons requirements, flame-thrower fuel, fatigue in tropical conditions etc. Some are referred to in the correspondence files.

Postwar Papers

Reports, suggestions and plans by Kendrew on specific OR matters and on the organisation of government science.

Operational research

- B.48 "Notes on a project for the compilation of a comprehensive manual of bombing data . . . ", 16 May 1945 written during Kendrew's visit to Washington on his way back from SEAC, with correspondence August 1945.
- B.49 "Operational research in RAF Commands", December 1945 with a note "written for the Joint Sciences Committee, A.Sc.W" [Association of Scientific Workers].

Organisation of Science

- B.50 "Notes on the national organization of science" August 1945.
- B.51 Ideas on government science, and on own career, in the form of a letter to C. Gordon (Air Ministry) August 1945.
- B.52 "On the application of mechanical indexing systems to the Central Register" (of scientific manpower) September 1945. Included here is an example of a punched card for aircraft patrol report, designed by Kendrew, probably at an early stage of his war service.
- B.53 "The post-war strength of scientific staffs in the defence ministries, and its relation to post-war staffing of government research generally" n.d.

HISTORY OF OPERATIONAL RESEARCH

Correspondence, Papers, Drafts

- B.54 Correspondence 1948 with official historian of early ASV, including Kendrew's recollections and comments on his own OR work in Coastal Command and Middle East.
- B.55 "Wise remarks on OR", notes for a talk or article, part in short-hand which Kendrew taught himself during the war, n.d.
- B.56 Kendrew's review (for *Endeavour*) of A.P. Rowe's *One story of radar*, 1948.
- B.57 "Operational Research".

Part-typed, part manuscript draft for extensive (14 pp) article requested for *Science and Mankind*, the journal of the World Federation of Scientific Workers, but not submitted because it was thought unlikely to obtain security clearance. Includes correspondence 1948-49.
- B.58 Proposed research project on OR 1974.
- B.59 Brief correspondence 1986 on commemorative lunch for 50th anniversary of OR in RAF
- B.60 "The air-sea war in the Mediterranean January 1942 - May 1943", an ORS ME report, no author, date or number, with a note by Kendrew "Unpublished draft".

SECTION C

RESEARCH

C.1-C.308

INTRODUCTION

EARLY RESEARCH

C.1 Reaction kinetics

INFORMATION RETRIEVAL/DATA PROCESSING

C.2-C.5 Information retrieval

C.6-C.15 Computation on EDSAC I

PROTEIN ANALYSIS PROJECTS

C.16 Adult and foetal sheep haemoglobin 1946-58
C.17 Muscle 1947-54
C.18 Protein solubility c.1949
C.19 Procollagen 1951-52
C.20 Controlled shrinkage of protein crystals 1952
C.21 Polypeptide configuration 1953
C.22 X-ray experiments 1953
C.23 Not used. Material transferred to C.1
C.24 Chymotrypsinogen c.1956
C.25, C.26 Correspondence "New proteins" 1947-69

EARLY RESEARCH REPORTS

C.27 Reports 1946-53

MYOGLOBIN

NOTEBOOKS (Kendrew and collaborators)

C.28-C.40	Preliminary work
C.41-C.100	Main myoglobin programme
C.101-C.116	Collaborators' notebooks
C.117-C.125	Atomic co-ordinates/amino-acid sequencing
C.126-C.129	Miscellaneous

NOTES AND DATA (Kendrew and collaborators)

C.130-C.169	Preliminary work
C.170-C.189	Main myoglobin programme
C.190-C.195	Collaborators' notes and data
C.196-C.198	Miscellaneous

MATERIALS AND APPARATUS

C.199-C.202	Supplies and specimens
C.203	Optical diffractometer
C.204	Microcamera
C.205-C.207	Densitometer
C.208, C.209	Computer time

COLLABORATORS AND STAFF

C.210-C.238	Individual files
C.239-C.247	Chronological files

CORRESPONDENCE

C.248-C.272	Aspects of myoglobin
C.273-C.277	Atomic co-ordinates/amino-acid sequencing
C.278-C.291	Publications

MODELS

C.292	Skeletal model
C.293-C.297	Ball-and-spoke model
C.298	Science Museum London
C.299-C.307	Correspondence

MISCELLANEOUS

C.308	Pantographs
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INTRODUCTION

The keystone of Kendrew's research is the three-dimensional analysis of the structure of myoglobin for which he shared with M.F. Perutz the Nobel Prize in Chemistry in 1962. His Nobel Lecture, and the adapted version published in *Science*, 139, 1963, give a clear account of the stages of the research, the particular problems encountered and the techniques evolved to deal with them. The lecture also makes plain that Kendrew's overriding interest in the structure of protein ("I had no doubt that this problem above all others deserved the attention of anyone concerned with fundamental aspects of biology" *art.cit.*, p.1259) dates from the later part of the Second World War (see L.149 for a lecture given by Kendrew at Clifton in which he recalls his talks on the subject with J.D. Bernal during the war, probably on one of Bernal's visits to South-East Asia Command mentioned in Section B). Thus the early prewar research on reaction kinetics (C.1) had no sequel and the remainder of the material is all related to some aspect of protein analysis.

From the first, and long before the choice of a suitable material had been achieved, Kendrew realised how important a factor would be the rapid handling of very large amounts of data and information. It is interesting to see the fascination with note-keeping, filing and organisation present in the schoolboy (Section A) and fostered by operational research in war (Section B) finding a kind of bureaucratic apotheosis in the sustained effort of accuracy required for the long haul to the final successful three-dimensional picture - a task which Kendrew himself said he would not wish to undertake a second time. Be that as it may, Kendrew was certainly ahead of many of his colleagues in seeing the necessity to harness the full range of automatic information handling techniques.

This perception shows itself in two lines of enquiry. One, immediately after his return to Cambridge in 1946, is the organisation of his, and later his team's, rapid access to all the relevant literature via a system (then relatively new) of punched cards; these cards, and the punch, both of which he designed himself, remained in use for many years (C.2-C.5). The other is the investigation of computation and data processing, dating from 1949 and aimed in the first instance at the resources of the EDSAC I machine at the Cambridge University Mathematical Laboratory (C.6-C.15). As the research

developed, more sophisticated machines became available and were put to use in Cambridge and elsewhere, so that the work was always going forward at the limit of technical practicability.

The material presented under the heading "Protein Analysis Projects" at C.16-C.24 generally antedates the main myoglobin programme; it may include projects that were not taken further by Kendrew and his team, or the application of X-ray diffraction techniques to other research topics. Of considerable interest is the correspondence at C.25, C.26 which shows Kendrew's search, over a long period of time, for suitable protein material and his work with new materials referred to him by others. This provides in many ways a bridge between the preliminary work and the launch of the main programme.

The Nobel Lecture already mentioned is of course a retrospective discussion of a completed project, when lines of strategy may be more easily discerned from the final eminence of success. It is of special interest therefore to have the brief annual reports which Kendrew sent to the Master of Peterhouse during his tenure of a Research Fellowship; these are at C.27 and chronicle the slow steps towards the goal as they were actually being taken. They confirm two of the principal problems: the choice of a suitable protein for analysis in adequately sized crystals, and the devising of high-speed computational techniques to process the data. The reports, which run from 1947 to 1953, conclude in very positive terms both on a personal level with the granting to Kendrew of "unlimited tenure" by the Medical Research Council, and on the professional level with the sense that technical difficulties had been overcome, experimental material identified and the way cleared for the main diffraction programme. (The identification of sperm whale as the most promising source of myoglobin crystals occurred in December 1952 and is referred to in appropriately enthusiastic terms in Kendrew's correspondence of that date; see especially C.17, C.25, C.199).

Optimistic as this may have later appeared, it was sufficiently the case for it to be taken here to mark the end of the preliminary work and the opening of the assault on the myoglobin molecule which is very fully documented, presented in the order shown in the list of contents, and including notebooks, data, observations, diagrams and charts, calculations, draft routines, printouts and corrections, correspondence and "think-pieces" by Kendrew and the team of short- and long-term collaborators at Cambridge and the Royal Institution in London. The main lines of the work are clear from the

Nobel Lecture and other publications: the narrowing of choice of material to Type A sperm whale myoglobin; the progressively more complex analysis at 6-Å (approximately 1955-57, using EDSAC I), 2-Å (1959, using EDSAC II and Mercury), and 1.4-Å (begun 1960 using IBM 7090), and the use of X-ray evidence in correlation with chemical data for amino-acid sequencing. In addition to the published papers which marked the progress of the research (particularly the collaborative communications in *Nature*, 181, 1958, 185, 1960, 190, 1961 and, for the earlier work, the extended follow-up papers in *Proc. Roy. Soc.*), several of the notebooks include project diaries, charts of progress, allocations of responsibility and the like, written "from the bench" or in correspondence. Examples of such can be found at C.59, C.63, C.77, C.117, C.126, C.127, C.169 and also in some of the informal talks at L.145.

It may be appropriate here to point out that for all the stress laid on mechanical computation, and indeed the presence of EDSAC and other printouts, the notebooks are remarkable for the sheer quantity of calculations and tabulations, phase diagrams, electron density maps and the rest laboriously worked by hand, by Kendrew as well as his collaborators, not to mention the careful logging and summaries of experimental programmes which were always his personal charge.

The excitement of the final complete syntheses at 6-Å and 2-Å and their publication is well captured in the correspondence at C.288, C.289. W.L. Bragg contributes characteristically warm-hearted letters and Kendrew's own letter of thanks and congratulation to his collaborators (C.288) is enthusiastic as well as informative.

EARLY RESEARCH

Reaction kinetics

- C.1 Material relating to research with E.A. Moelwyn-Hughes, July 1939 - January 1940; the results were published as a collaborative paper "The kinetics of mutarotation in solution" in *Proc. Roy. Soc.* 176, 1940.

Material includes brief statement of research, "the experimental investigation of certain enzyme reactions ... in the first instance the enzymic hydrolysis of non-reducing disaccharides ... the technique employed will be the polymetric one, using the very sensitive instrument equipped in this Department [Physical Chemistry, Cambridge] by the late Professor Lowry", charts and graphs of mutarotation and heat reactions of arabinose, lactose, maltose, mannose, xylose.

Also included here are two manuscript and typescript drafts for a paper on "The mechanism of unimolecular gas reactions" by Kendrew and M.H.J. Webb (a research student of Kendrew), one set dated April 1953, the other April 1954, with brief calculations in the hand of J.M. Bennett and a letter from I.F. Trotter. No paper of this title is listed in the Bibliography. (Material originally found with "Protein Analysis Projects" and transferred here on Kendrew's advice.)

See also A.118.

INFORMATION RETRIEVAL/DATA PROCESSING

Information Retrieval

- C.2 Correspondence with colleagues on sorting and classification methods, with special reference to punched cards 1946-49, 1951, 1969.
- Includes letter December 1946 to E. Orowan (then working at the Cavendish Laboratory) from J. von Neumann on research on electronic searching device and on his own electronic computer project, and correspondence 1947-51 on abstracting and indexing systems at UNESCO, American Chemical Society and elsewhere in USA.
- C.3 Correspondence 1946-52 with manufacturers of punched card systems on supply of cards to Kendrew's design (his letter of 17 April 1950 also mentions J.M. Mitchison as involved in design). A little correspondence with colleagues interested in the system is also included.
- C.4 Correspondence 1949-50 with manufacturers on supply of punch for cards to Kendrew's design (drawings and diagrams included); also included is letter 1973 from a colleague still using one of the punches.
- C.5 Miscellaneous manuscript notes and diagrams by Kendrew, on "Classification schemes", "Punching schemes", punched card applications, topics to be referenced etc.
- Specimens of punched cards for various purposes, some annotated or designed by Kendrew.

Computation on EDSAC I

The material concerns methods of using the EDSAC machine (Electronic Delay Storage Automatic Computer) for the computation of 2- and 3-dimensional Fourier and Patterson syntheses. Kendrew's early collaborator on this work was J.W. Bennett whom he met at Cambridge through H.E. Huxley and who later worked at Ferranti; they published papers on the topic in *Acta crystallogr.*, 5, 1952 and in the official publication of the Inaugural Conference of the Manchester University Computer, 1951.

See C.196 for the end of the work on EDSAC I before its replacement by EDSAC II, and also C.80, C.208, C.209.

Notes and calculations

- C.6 "Miscellaneous programming ideas", n.d. c.1949 some on verso of contribution to Barcroft volume published 1949.
- C.7 "Two-dimensional low symmetry", n.d., some on EDSAC programme sheets, some on verso of 1948, 1949 publications.
- C.8 "EDSAC 2-dimensional Patterson programme", some dated 1950, 1952 and later "modification" by D.W. Green 1955.
- C.9 "EDSAC 3-D programme", EDSAC sheets dated 1953, 1954, undated notes.
- C.10 "EDSAC 2-dimensional Patterson Fourier programmes". Notes, calculations, programmes and narratives by Kendrew, D.M. Blow and another, some sheets dated 1954, 1956, 1957.
- C.11 Miscellaneous notes, graphs, narratives on Patterson peaks, some dated 1952 and referring to work on Pauling helix calculated by F.H.C. Crick.

Work with J.W. Bennett

- C.12 Notes and calculations (some by H.E. Huxley), short report by Bennett on "EDSAC Crystallographic Computations".
- C.13 "Fourier methods", notes, calculations, letter from Bennett, note by another on "probable error in synthesis ... "
- C.14 Correspondence, arrangements, drafts etc. for conferences, papers and publications. Includes Institute of Physics X-ray Analysis Group, November 1950 (Kendrew and Bennett presented a paper on "Some crystallographic calculations with EDSAC"), Symposium on Advanced Techniques in Structure Determination Stockholm July 1951 (Kendrew and Bennett's paper "Crystallographic computations with a high-speed digital electronic computer" was accepted but it is not clear whether they attended), Inaugural Conference of the Manchester University Digital Computer July 1951. Some additional notes and calculations are included.

See L.145 for texts of papers.

Related material

- C.15 Research proposal for X-ray Analogue Computer for Crystal Structure Analysis, Pennsylvania 1949-50.
- "The Anisograph", correspondence and information 1950.
- EDSAC order codes.

PROTEIN ANALYSIS PROJECTS

These are presented in chronological order, with Kendrew's titles or descriptions. Many refer to materials or experiments which feature in the notebooks at C.30-C.34.

Adult and foetal sheep haemoglobin

- C.16 Correspondence 1946-58 on research results, supplies, publications, some addressed to M.F. Perutz including letter 18 August 1947 from D.C. Hodgkin commenting critically on a draft paper on foetal haemoglobin (the joint paper by Kendrew and Perutz later published in *Proc. Roy. Soc.*, 194, 1948).

Muscle

- C.17 Correspondence 1947, 1950-54 with colleagues on methods, materials, results etc. Much of the material relates to collaborative work with H.E. Huxley and includes reference to their joint paper in *Nature*, 170, 1952 and to Huxley's work as Commonwealth Fund Fellow at MIT 1952-54 (see also C.220). Kendrew's letter of 23 December 1952 announces the successful crystallisation of "the most marvellous myoglobin crystals, from sperm whale of all odd places" (see also C.25).

See C.20 for other collaborative work with Huxley.

Protein solubility

- C.18 Graphs and diagrams, n.d., c.1949.

Procollagen

- C.19 Brief correspondence 1951-52.

Controlled shrinkage of protein crystals

- C.20 Mainly 1952, relating to collaborative papers by Kendrew and Huxley. Includes manuscript draft of paper given to Chemical Society Symposium, 7 February, on "Stepwise lattice changes in haemoglobin crystals", Huxley's heavily-corrected manuscript on "Discontinuous lattice changes in haemoglobin crystals" and final agreed draft for version published under that title in *Acta crystallogr.*, 6, 1953. A later letter (1965) on the work is also included.

See also C.17.

Polypeptide chain configuration

- C.21 Brief correspondence 1953, 1973.

X-ray experiments

- C.22 Correspondence 1953 on request for Kendrew to take X-ray pictures of bacterial spores.
- C.23 Not used. Material transferred to C.1.

Chymotrypsinogen

- C.24 Data and calculations, mainly by M.M. Bluhm, related to collaborative paper with Kendrew published in *Biochim. biophys. Acta*, 20, 1956.

Correspondence "New proteins"

Kendrew's own description on the folder is "New proteins". The material is correspondence 1947-69 with colleagues on various proteins and their suitability for X-ray analysis, some, particularly in the early years, initiated by Kendrew in the search for suitable crystalline materials for the X-ray diffraction programme, some sent by others for his interest or attention.

C.25 1947.

1952. Includes a letter to H. Neurath from Kendrew 22 December 1952, writing enthusiastically about whale myoglobin: "we recently struck an absolute gold-mine in the shape of whale myoglobins of various species. One form - from sperm whale - is one of the most favourable protein crystals yet ... " (See also C.17).

C.26 1953-69.

EARLY RESEARCH REPORTS

C.27 Reports by Kendrew on his research, teaching and publications 1946-53.

"Report on crystallographic studies of protein carried out during 1946", addressed from Cavendish and Molteno Laboratories and perhaps intended for departmental annual report, January 1947.

Report to Master of Peterhouse on first year of Research Fellowship July 1947 - June 1948; refers to "formation of MRC's Unit for the Study of the Fine Structure of Biological Systems, with Dr M.F. Perutz as Director and myself as an independent part-time member", research on foetal haemoglobin, horse myoglobin etc. August 1948.

Molteno Institute report June 1947 - June 1948.

Reports to Master of Peterhouse 1948-49, 1949-50 (refers to work on EDSAC), 1950-51, 1951-52 (papers with J.M. Bennett, H.E. Huxley, continuing difficulty in obtaining suitable crystals), 1952-53 (final report on termination of Research Fellowship, granting of "unlimited tenure" by MRC, successful identification of "a very wide choice of experimental material, and all that remains is to exploit it.")

MYOGLOBIN

NOTEBOOKS (Kendrew and collaborators)

Preliminary work

C.28 Binder of "Filofax" pages inscribed "Peterhouse Cambridge" (same format as A.27) with index of topics as follows:

Mathematics

Physics Photography

Chemistry

Biochemistry

Crystallography

Physical methods of investigation

EDSAC

Protein structure

Structure of other biological macromolecules

Haemoglobin Myoglobin

Current research

Material runs c.1946-53 and includes own notes, notes on the literature, notes and information from colleagues' research (Huxley, Crick, Perutz) etc.

C.29 Similar "Filofax" binder, inscribed with address of Kendrew's house at Linton, but material is mainly 1940s. Includes notes on books and articles read (extensive notes on Szent-Györgyi's *Nature of life*), lectures and conference papers, "Haemoglobin meeting" 1946 etc. and a little later (1970) material.

C.30

Loose-leaf notebook of small quarto pages (same format as main indexed series of earlier university notes at A.40-A.117). The material, which is extensive, covers various dates 1946-53; there is an index listing the "Research notes - project numbers" which run 10-25, each with a numbered thumb index card. The projects are:

10 Adult sheep methaemoglobin

Experiments, data, crystallisation November 1946 - "Summer" 1947.

11 Foetal sheep methaemoglobin

Experiments, crystallisation, dialysis November 1946 - July 1947.

12 Horse myoglobin

Removed for extended treatment in separate notebooks. See C.31, C.32.

13 Foetal human methaemoglobin

Crystallisation of various samples November-December 1946, January-July 1948.

14 Horse methaemoglobin - shrinkage

Refractive index measurements, crystal preparation November-December 1946.

15 Whale myoglobin

Removed for extended treatment in separate notebooks. See C.33, C.34.

16 Miscellaneous X-ray experiments

January 1947, January 1948, August 1949.

17 Ox myoglobin

Experiments January-July 1947, February-March 1951.

18 Microcamera

Attempts to take fibre photographs, camera adjustments, calculations of absorption coefficients, April-June 1947.

19 Theoretical calculations - chain configurations

July 1949 - February 1950.

20 Miscellaneous biochemical work

Tests on rat haemoglobin July 1949, gelatin November 1951.

21 Chymotrypsinogen

Removed and kept with work on whale myoglobin. See C.34.

22 Lamprey haemoglobin

Experiments November-December 1951.

23 Muscle

Calculations and diagram June-July 1952, with a "Note : November 1952. These are very bad notes. However the paper is now published and is the best source of information." The reference is to the joint paper with H.E. Huxley "Extractability of the Lotmar-Picken material from dried muscle", *Nature*, 170, 1952. See C.17.

24 Sea-lion myoglobin

Brief notes only, March 1953.

25 Penguin myoglobin

Brief notes only, March 1953.

Note

Preceding the "project numbers" as listed above is a series of "Notes from January 1946 - August 1946" which have no project numbers, presumably because they antedate the system. They deal with work on adult and foetal sheep methaemoglobin (nos. 10 and 11 of the main list) and are given a separate index of cross-references. Among the experiments is one dated July 1946 on the "Identity of monoclinic and orthorhombic forms of foetal methaemoglobin - the crucial experiment!".

C.31 Horse myoglobin

This is no. 12 of the projects listed in C.30, which developed into a major research topic. It has its own index running 12-1 to 12-34, 12-40, of which 12-29 to 12-34 appear separately at C.32.

The work is on specimens received from various sources, crystallisation, X-ray examinations, Patterson and Fourier projections, phase calculations etc. mainly October 1946 - March 1949, re-examined November 1952.

C.32 Horse myoglobin

Continuation of C.31, index numbers 12-29 to 12-34.

Preparation and crystallisation February 1950 - January 1952 using various methods and apparatus, and with various collaborators (including J.D. Watson).

C.33 Whale myoglobin

This is no. 15 of the projects listed in C.30. Whale myoglobin became eventually the material of choice for the main programme after further narrowing down of various types of whale (blue whale, finback etc. analysed elsewhere in the notebooks and notes) to the sperm whale. The notebook has its own index running 15-1 to 15-59. Work in this book covers 15-1 to 15-29 only, the continuation having been transferred to a separate notebook (C.34).

Experiments on specimens prepared by J. Keilin (then working in Molteno Institute Cambridge), crystallisation, diffraction pictures etc., December 1946 - October 1952, with an occasional later note 1953, 1954.

At rear of book are notes on preparations and methods.

C.34

Continuation of C.33 with index running 15-30 to 15-55 (and some further subdivisions). There is a separate list of references to work on the sperm whale material (the eventual choice) and the book also includes tests on many types of myoglobin other than whale: porpoise, seal, dolphin, penguin, tortoise, carp, and some mixed crystals.

The work is mainly the "1952 Programme" for "Crystallisation of whale myoglobin", with M.M. Bluhm and R.G. Parrish, beginning October 1952. Entries continue to August 1954.

At rear of book is work on chymotrypsinogen September-October 1951, September-October 1953 (project no. 21 in the numbered list in C.30).

Note

C.34 is the last of the early notebooks to use small quarto format pages. The following notebooks C.35 *et seq.* in the preliminary and main series are all large quarto loose leaf binders. Most have labelled divider cards to separate sequences of material, and many have an outline index at the front or for each sub-division. There is a system of pagination with a code of letters and/or numbers but no explanatory codebook appears to survive.

The material dates from 1953 i.e. when initial problems of obtaining suitable crystals were largely solved and the main concern was with the determination of ligands for the attachment of heavy atoms and the final selection of "Type A" sperm whale myoglobin. Within each notebook the material may extend over a period of years, and is also diverse in character, including notes and calculations, charts, graphs, printouts, densitometer diagrams, electron density contour maps, narratives or summaries of work in progress, and correspondence. While the great majority of the work continues to be in Kendrew's own hand, there are also notes, calculations, letters and memoranda by members of the Cambridge and Royal Institution teams or by colleagues elsewhere. Attention is drawn to these and to other matters of special interest wherever possible.

C.35

Pleochroism of monoclinic and sperm whale crystals.

Index at front, listing topics 1-11, and pages numbered accordingly. Extensive notes, calculations, graphs and diagrams, ideas and critiques in pencil and ink with corrections and comments in red ink, March 1953 - May 1957. Topic 11 in the index is "Paramagnetic resonance results" and the material incorporates correspondence, results and collaborative research with D.J.E. Ingram with whom Kendrew published a note on "Electron spin resonance in myoglobin and haemoglobin", *Nature*, 178, 1956. See also 0.16.

C.36

Work on myoglobin and haemoglobin of sperm and finback whale, and of horse, subdivided into:

"Intensity distribution", charts, observations, calculations, notes 1954-56, correspondence J. Donohue, F.H.C. Crick (see also 0.7), V. Luzzati.

"Rotary dispersion", charts, correspondence P. Doty 1957.

"Finback 3-D", Pattersons, notes, progress sheets 1954.

"Fourier theory", Kendrew's notes on a course of lectures by J. Cochran, Michaelmas term 1957.

"Magnetic properties of haem proteins", Kendrew's notes on a course of lectures by J. Griffith, Lent term 1958.

- C.37 Data, analyses, diagrams, photographs of various types of myoglobin, identified as Type A through to Type L, some pages with dates 1953-56. Included in the section on "Type D" (blue whale) is a manuscript draft perhaps for an outline programme of work titled "Rod directions in sperm monoclinic and blue whale myoglobins. An attempt to establish the directions by looking for projected rods in Patterson projections, and correlating these. Also a comparison between sperm monoclinic and blue whales", 3 August 1953.
- At rear of book, brief note on chymotrypsinogen.
- C.38 Miscellaneous work, subdivided into:
- "Heavy atom - chemical work", including "Imidazole programme" (undated notes), "Isocyanide programme" (Kendrew's narrative and notes on progress 1954-55), "Nitroso-compound programme" (narrative and notes 1955), "Dyes" (1955, by Dintzis and Bodo, re-examined 1959).
- "Standard intensities", charts and calculations for finback whale myoglobin.
- "Experimental", mainly on camera settings, correspondence, 1956.
- "X-ray pictures", detailed charts and observations 1954-57 on various types of myoglobin and ligands.
- "Preparations", notes on preparation of king penguin, finback and sperm whale, 1955.
- C.39 "Type C heavy-atom". Work on seal myoglobin, which Kendrew refers to in his 1963 *Science* article as a close runner-up to the final choice of sperm whale. Material includes notes, calculations, data, EDSAC sheets, electron density contour maps etc., most by Kendrew but including contributions and/or correspondence from R. Hart and R.E. Dickerson at Cambridge and from H. Scouloudi who continued to work on seal myoglobin for many years at the Royal Institution and later at the Molecular Biophysics Laboratory Oxford. There are two main periods of work, February-November 1956, May-July 1958. See also J.121.
- C.40 Work on type D; heavy atom attachment, densitometer diagrams at various exposures, X-ray precession camera photographs. Not all in Kendrew's hand. Only one page dated (January 1957).

Main myoglobin programme

This is a sequence of stiff-backed looseleaf binders, all with a number and (from C.63 onwards) a descriptive title on the spine. They begin on 5 May 1954 with the attachment of heavy atoms to type A crystals, and continue to November 1963, covering the X-ray analysis programme at 6-Å, 2-Å, 1.5-Å and 1.4-Å. Kendrew numbered the first 39 books in Roman numerals from I to XXXIX and this order is preserved (C.41-C.79); the last of these contains work dated October 1959. Subsequent books are presented in chronological order as far as possible; they include a much higher proportion of collaborators' work.

With very few exceptions, the books are meticulously kept, with labelled sub-dividers, usually an index or list of contents and pagination with code letters and figures. A very substantial proportion of the work (up to C.79) is in Kendrew's own hand and, when collaborators' work or data are included, they have usually been checked through by him.

The notebooks are here presented as a separate sequence mainly for archival convenience and partly because they represent the final research record assembled by Kendrew. Other records on the same topics, antedating or concurrent with these but kept in a different format, are preserved among the collaborators' notebooks (C.101-C.116) and the notes and data (C.170-C.195) and should be consulted as supplementary documentation.

Although the catalogue entries attempt to give dates for the work in each book, these can be no more than an approximation. In fact few dates are used except in Kendrew's narrative logs of experiments, on some of the contour maps and EDSAC printouts, and in correspondence; the main identification lies in the code letters and numerals used as pagination; it is these which constitute the chronology of the multiple projects which were going forward simultaneously.

- C.41 Type A heavy atom (Book I). Narratives, observations, calculations, scaling, contour maps, printouts. Includes some work by Bodo. May 1954 - September 1957.
- C.42 Type A heavy atom (Book II). Work on met-myoglobin standard intensities. Measurements, calculations, scaling and rescaling, radial distribution. Narrative at front of book runs July 1955 - June 1956.
- C.43 Type A heavy atom (Book III). Index of topics at front. Includes some work by Dintzis and others. Measurements, scaling factors, contour maps, printouts. July 1955 - April 1957.

- C.44 Type A heavy atom (Book IV). Index of topics at front. Includes some work by Dintzis, Bodo and others. Narratives, calculations, contour maps, radial distribution charts, temperature and scaling factors, printouts. September 1955 - June 1957.
- C.45 Type A heavy atom (Book V). Index of topics at front. Includes some work by Dintzis and others. Narratives, calculations, tables of signs, scaling, contour maps. October 1955 - May 1958.
- C.46 Type A heavy atom (Book VI). Index of topics at front. Includes some work by Dintzis and others. Calculations, scaling, structure factors, sign determination, contour maps, graphs, printouts. June 1956 - December 1957.
- C.47 Type A heavy atom (Book VII). Index of topics at front: a and c projection with ligands at 2.7 Å. Includes collaborators' work. Summaries, charts of observations, scaling, Pattersons, graphs, contour map. Few pages dated, July 1956 - June 1957.
- C.48 Type A (Book VIII). Three-dimensional data 6-Å. Includes some collaborators' work. Summaries, data, Lorenz corrections, radiation effects, difference Fourier, scaling, contour maps, graphs. Few pages dated, May-September 1956.
- C.49 Type A (Book IX). Three-dimensional data 6-Å. Index and summaries at front. Includes collaborators' work. Charts, calculations, scaling, Fourier, contour maps, correspondence and data from D.C. Phillips. Few pages dated, June 1956 - May 1957.
- C.50 Relative b co-ordinate - methods involving single h/a derivatives (Book X). Index and summaries at front. Includes collaborators' work. Divider card 23.6 "Theory" includes notes by H. Wyckoff (a principal collaborator in this work) and F.H.C. Crick. Calculations, structure factors, printouts, charts, phase circles, graphs, contour maps. Few pages dated, June-November 1956.
- C.51 Type A heavy atom (Book XI). Calculations of D, D₁, D₂. Index and summary at front. Includes collaborators' work. Calculations, results, graphs. Few pages dated, February-June 1957.

- C.52 Type A heavy atom (Book XII). Work on H succinate and H diammine derivatives. Index and summary^g for both topics^g. Includes work by Wyckoff and others. Calculations, Fouriers, structure factors, printouts, contour maps, graphs. Few pages dated, May 1956 - May 1958.
- C.53 Type A heavy atom (Book XIII). Work on H I₂. Index and summary at front. Includes collaborators' work^g, in particular by H. Wyckoff, who also contributed a note on the previous history of the computations. Intensity data, scaling, radial distribution, Pattersons, repeat computations, graphs, printouts, contour maps. One printout dated November 1956.
- C.54 Type A heavy atom (Book XIV). Work on porpoise and sperm whale (main collaborator J. Kraut) 1956; PCMS and H am₂: index and summary, scaling and structure factors, radial^g distribution, contour maps, printouts, graphs January-December 1956; PCMA: index and summary, scaling, Fouriers, radial distribution, contour maps, summary dated January 1957.
- C.55 Type A heavy atom (Book XV). Work on PCMS and Au. Index for each topic. Includes collaborators' work. a and c projections, intensities, calculations, Pattersons, printouts, contour maps, b projections, scaling, contour maps. Few pages dated January-May 1957.
- C.56 Type A heavy atom (Book XVI). Work on Au/PCMS b, a and c projections. Index for each topic. Includes collaborators' work. Data, scaling, structure factors, printouts, contour maps, Pattersons, graphs. Few pages dated, March-May 1957.
- C.57 Type A heavy atom (Book XVII). Work with various heavy atoms and projections. Index for each topic. Includes collaborators' work. Data, calculations, Fouriers, contour maps, graphs. Only one page dated May 1957.
- C.58 Type A heavy atom (Book XVIII). Work with various heavy atoms in 3D. Index for each topic. Includes collaborators' work. Intensities, scaling, contour maps, tables of 3D data for specific crystals. Only one page dated May 1957.

- C.59 Type A heavy atom (Book XIX). Work on 6-Å 3D Fourier synthesis. Includes collaborators' work but much is by Kendrew himself including summaries or reflections on methods and results. Index for each topic as follows:
- "Relative y". Notes, diagrams, graphs, calculations, reflections by Kendrew on various structure factors, part related to suggestions by W.L. Bragg with whom correspondence is included. In his letter to Bragg of 21 July Kendrew writes: "Phase determination out to 6-Å is virtually complete ... I am very pleased with the way this has gone, and think there will be very few major ambiguities of phase indeed ... While I am away phase diagrams out to 2.8-Å will be drawn for hk0 and Okl reflexions, just to see whether it is practical politics to extend the isomorphous replacement technique to 3-Å with our present methods." April-July 1957. (See C.61, C.61A for the phase diagrams referred to.)
- "Structure factors". Notes, calculations, tables and charts for various heavy atoms. Only one page dated March 1957.
- "F values". Data, calculations, phase angles, Kendrew's queries for checking.
- "Scaling". Calculations, radial distribution, correspondence from W.L. Bragg February 1957, summary by Kendrew of "Scaling investigations" April 1957.
- N.B. Work continues in next book.
- C.60 Type A heavy atom (Book XX). Work on 6-Å 3D Fourier synthesis (continuation of Book XIX, C.59). Index for each topic as follows:
- "z Fourier projection". Notes, calculations, phase circles, printouts. Some pages dated, March 1956 - June 1957.
- "3D Fourier synthesis of myoglobin - 6-Å". Tables, calculations and revisions (many by Kendrew), printouts. Includes collaborators' work. Various dates July 1957 - October 1958 and a later note on "Testing of myoglobin 7090 [IBM computer] Fourier routine" by C.L Coulter, October 1961.
- "Fourier synthesis including heavy atoms". Extensive tables and charts, Kendrew's notes on heavy atom peaks November 1957 - January 1958.
- C.61 Book XXI. Phase circle determinations, heavy atoms colour-coded, n.d. (1957, see C.59).

- C.61A Unnumbered Book XXII. a and c projection phase circles. Work by W. Hoppe, M.M. Bluhm, n.d., (1957 see C.59). All these were laboriously drawn by hand, before computerised methods had been introduced.
- C.62 Book XXIII. Co-ordinates of heavy atoms. Index and summary at front. Includes collaborators' work. Tables, calculations, printouts, contour maps, refinement programme. May-August 1958.
- Note The remainder of the sequence bears a title as well as a number on the spine, and these are used in the entries.
- C.63 "2-Å data processing" (Book XXIV). Data sheets and printouts, calculations and graphs. Includes work by Dickerson and others, and, at front of book, charts on "State of project" March, April 1959.
- C.64 "2-Å hol refinement" (Book XXV), with Dickerson's name on inside front cover. Much of the work is in his hand, including summaries of work, descriptions of programs, notes, calculations, graphs. Various dates November 1958, March-July 1959.
- C.65 "2-Å Gold. diff F. radiation" (Book XXVI). Work mainly by Dickerson. Graphs, calculations, data, contour maps, printout (dated April 1958). The last section on "radiation damage" is dated January 1958, January 1959 and includes a letter on the subject from Kendrew to D.C. Phillips June 1960.
- C.66 "Comparison program" (Book XXVII). Work by Dickerson. Statement of program, graphs, calculations, printouts for various heavy atoms. June-July 1959.
- C.67 "Scaling - met" (Book XXVIII). Printouts, calculations, by Dickerson and others, comparison of 6-Å and 2-Å data, most work checked by Kendrew. May-June 1959.
- C.68 "Scaling PCMS H_{am_2} " (Book XXIX). Printouts, calculations, graphs, by Dickerson and others. June 1959.

- C.69 "Scaling Au Double" (Book XXX). Printouts, calculations, graphs by Dickerson and others, with extensive checks and comments and a graph by Kendrew. May-June 1959.
- C.70 "Scaling - corrections" (Book XXXI). Calculations and graph, n.d.
- C.71 "Correlation results" (Book XXXII). Printouts (M. Rossmann's program), calculations, extensive electron density and contour maps, by Dickerson and others n.d.
- C.72 "Correlation results" (Book XXXIII). Extensive calculations, diagrams, in several hands including Dickerson's. Few pages dated, July 1959.
- C.73 " $2\text{-}\bar{A}$ - Least squares" (Book XXXIV). Printouts, (M. Rossmann's program), calculations by Dickerson and others, densitometer diagrams, scaling tests, charts, graphs. March-August 1959.
- C.74 "Phase refinement" (Book XXXV). Printouts, data, calculations, graphs, mainly by Dickerson, program routine by Strandberg. July 1959.
- C.75 " $2\text{-}\bar{A}$ Phase Refinements 3/8/59" (Book XXXVI). Programming for random sampling, printouts, calculations, mainly by Dickerson, some checking by Kendrew. August 1959.
- C.76 " $2\text{-}\bar{A}$ Myoglobin Phases 5 Int. Run (1) 1959" (Numbered in error Book XXXVI. See C.75). Mainly printouts with a very few notes. August 1959.
- C.77 " $2\text{-}\bar{A}$ Fourier F_{obs} F_{best} " (Book XXXVII). Mainly printouts (M. Rossmann's program) with annotations, on attempt to achieve finer resolution. At front of book are charts of progress, names of those involved, work being done at Royal Institution, August 1959.
- C.78 " $2\text{-}\bar{A}$ Fourier F_{best} sharp" (Book XXXVIII). Similar material, n.d. (August 1959).

- C.79 "6 and 5.5-Å Fourier (2-Å data)" (Book XXXIX). Mainly printouts (M. Rossmann's program) with some annotations. October 1959.

Note

This is the last book in Kendrew's numbered sequence. The remaining books C.80-C.100, in the same format of stiff-backed looseleaf binders and bearing a descriptive title on the spine, are presented in chronological order as far as possible. Some contain work similar or closely related to that in Kendrew's numbered sequence, and may overlap chronologically with it and with each other.

- C.80 "EDSAC: non current". Programs, tests, notes and calculations, printouts and checking for scaling factors and Lorenz corrections to be run on EDSAC II. Almost all the routines were written by R. Hart who was a principal collaborator in this work until he left the laboratory in August 1958. Calculations and notes by Dickerson and others, January-July 1958. At rear of book are 42pp. notes by Kendrew on a course of lectures "Programming for EDSAC II" by H.P.F. Swinnerton-Dyer September-October 1957.

- C.81 "EDSAC program Roger Hart". Programs and routines for refinement programme, phase determination, Lorenz-polarisation correction, by Hart, with some revisions by Dickerson and others. Some printouts dated February 1958. Also included are notes by A.L. Patterson on alternative method of calculating Lorenz corrections, March 1958.

- C.82 "Scaling Program". Instructions, routines, printouts, tests, checking, almost all by Dickerson, some by Strandberg and others. March-May 1959.

- C.83 "Correlation function Input program". Routines and tests, by Dickerson and Strandberg. July 1959.

- C.84 "7-10 August 1959". Work on phase refinement, random sampling using M. Rossmann's program. Calculations, notes, graphs, printouts, corrections and checking. Almost all by Dickerson, a little by Strandberg.

This was a particularly critical period of the research programme, when several important aspects were coming to a point and Dickerson (a principal collaborator) was about to return to America. See C.73-C.78 and also correspondence at C.234.

- C.85 "2-Å Myoglobin Phases 5 Int. Run (2) 1959" (See C.76). Mainly printouts, all checked, with a few notes. Some graphs, notes, comments by Kendrew. Some annotations by Dickerson and others, n.d. (August 1959).
- C.86 "M.T. Load Program. 2-Å Phase Program 1959". Detailed routines for EDSAC II, test printouts and checks, graphs. Almost all by Dickerson, a few later additions or revisions. Few pages only dated, June-September 1959.
- C.87 "2-Å Myoglobin 1959. Fourier Input Program". Routines, printouts, checks, notes, revisions. Routines devised and used August-November 1959 by Dickerson and others, modified August 1960 to allow for phase output by Strandberg and others.
- C.88 "Dickerson Aug. 60 Heavy atom adjustments". Loading procedures, routines for phase runs, printouts, checks, calculations, density charts, contour maps. Routines by Dickerson August 1960, with reference back to "2-Å Phase Program Aug 1959"; some notes and calculations by H.C. Watson, Fourier programs by Rossmann.
- C.89 "1.5-Å Myoglobin 1960. Absorption corrections". Detailed data, printouts, diagrams, charts, calibrations for myoglobin crystal (no. 145) in 3-D. This was collaborative work between H.C. Watson in Cambridge and D.C. Phillips at the Royal Institution and includes correspondence and data exchanged. Begins August 1960, but mainly December 1960 - June 1961. This work was complicated by the need to interchange EDSAC and Mercury tapes (see also C.90, C.92).
- C.90 "1.5-Å Myoglobin 1961 Absorption corrections". Similar material, with correspondence and data from Phillips to Watson, mainly on myoglobin crystal no. 145, but includes a little work on seal myoglobin and lysozyme. Work mainly by Phillips and Watson, but a little in other hands. July 1961 - May 1962.
- C.91 "2-Å Myoglobin phases. 5 Int. Run (4) Jan 1961". Printouts.
- C.92 "1.5-Å Myoglobin March 1961. Scaling and merging data". Continuing collaborative work between Phillips and Watson, including extensive comparisons, tests and merging between EDSAC and Mercury tapes. February-May 1961.

- C.93 "1.5-Å Myoglobin 1961. Refinement details". Graphs and plots, tables, calculations, notes, in several hands including Watson, C.L. Coulter. Various dates August 1961 - November 1963.
- C.94 "Refinement of Heavy Atom Parameters 1961 and 1961" (sic). Notes, calculations, routines, printouts, data runs, almost all by Watson. October 1960 - December 1962.
- C.95 "2-Å Myoglobin Phases 5 Int. Run (5) Feb '62". Printouts.
- C.96 "2-Å Myoglobin Phases 5 Int. Run (3) Aug '62". Checked printouts, a few notes.
- C.97 "2-Å Myoglobin Special Sections (1)". Calculations, tables, printouts (Rossmann's program) electron density and contour maps. Few pages dated, December 1960, January 1961.
- C.98 "2-Å Myoglobin Special Sections (2)". Similar material, mainly on helices. Earliest work November 1959, mainly April-July 1960.
- C.99 "2-Å Myoglobin Data Block layout". Printouts.
- C.100 "1.5-Å Myoglobin Data Block layout". Printouts.

Collaborators' notebooks

These are laboratory notebooks, presented in alphabetical order, of some (not all) of the collaborators in the myoglobin research. The work is sometimes preliminary to, or concurrent with, the material later incorporated in the main sequence, or kept as notes and data at C.190-C.195.

Information about the members of the team and the nature and duration of their participation in the work can be found in the "Staff" folders at C.210-C.238.

M.M. Bluhm

- C.101 "Bluhm - chemical work". Preparation and crystallisation of various types of myoglobin (horse, seal, blue, finback and sperm whale), chymotrypsinogen. 7 October 1952 - 16 February 1955.
- C.102 "Bluhm - diary". Laboratory diary 1953 (kept daily to 8 June, later more sporadically).

G. Bodo

- C.103 "Spectra etc.". Calculations and graphs. Few pages used. n.d.
- C.104 "Bodo - xtal growing 300-539". Detailed notes, calculations, diagrams on various types of myoglobin and attachment of heavy atoms. Entries run 3 May 1955 - 10 October 1957; there are a few entries November 1955 - January 1956 in the hand of J. Kraut, and some annotations and identifications by Dickerson. Last entry is a note by Dickerson 18 February 1958 when he was re-working some of the material. (See next book C.105.)

R.E. Dickerson

- C.105 "I Register of gold tubes (Bodo and Dintzis) II PCMS". Entries run 21 February - 10 March 1958 and are a re-working of the crystals with heavy atoms Au and PCMS made by Bodo and Dintzis 1955-57 with comments, diagrams etc. and a note on cover of material received from Royal Institution 11 March 1958.

C.106 "Photography Book I". Both ends of book used and paginated. Indexes of material received, numbering conventions. Tables, diagrams, calculations etc. 3 January - 26 September 1958.

C.107 "2-Å Photography of Myoglobin Book II". Similar material, indexed and paginated. 26 September 1958 - 14 July 1959.

H.M. Dintzis

C.108 Tables and calculations of photographs of myoglobin crystals and heavy atoms 19 September 1955 - 1 July 1956. The book is inscribed "Book I" but no later books survive.

J. Kraut

C.109 "Blue - porpoise". Preparations and experiments on blue whale and porpoise myoglobin. Few pages used. June-July (1956).

R.G. Parrish

C.110, C.111 Two notebooks sent by Parrish to Kendrew at his request for the present collection. In an accompanying note of October 1986 (attached in C.110) Parrish writes: "although the imidazole derivative crystallization experiments are covered in the present books, the resultant effect on isomorphous intensity changes is not mentioned. Also covered are various efforts toward insertion of iodine and other heavy atoms, none successful. Anyway, the period covered is Sept. 1952 to May 1954 during which time we did the species survey, identified the sperm whale crystals as preferred, showed that isomorphous derivatization (even without heavy atoms) could produce significant intensity changes and began the program to get heavy atoms into the structure."

Parrish published a collaborative paper with Kendrew and others on "Species specificity of myoglobin", *Nature*, 174, 1954, and a paper with Kendrew on "Imidazole complexes of myoglobin and the position of the haem group", *Nature*, 175, 1955.

P.J. Pauling

- C.111A Bulky looseleaf binder of collaborative work with Kendrew on finback whale myoglobin, related to their joint paper "The crystal structure of myoglobin II Finback whale myoglobin", *Proc. Roy. Soc.*, 237, 1956.

Data, graphs, contour maps, electron density charts, sub-divided into:

Intensity data

c projection Fourier

b projection Fourier

a projection Fourier

Origins and scaling

Error in film measurement

There are notes, revisions and checking by Kendrew, interspersed with Pauling's work; they are paginated but are allocated as to topic and are not in numerical order. The period covered is 20 August 1954 - 12 December 1955, not in chronological order.

B. Strandberg

- C.112 "Photography. Book I". Records, diagrams, graphs, n.d. (1958).
- C.113 "Photography. Book II". Similar material. Relates to work with Dickerson n.d. (1959).

H. Wyckoff

- C.114 "Wyckoff X-ray notes 1956". April-July.

Unidentified

- C.115 Notes on 3-D planes. Some notes in German. August-November 1957.
- C.116 Miscellaneous notes and records, mainly on smoothing, scaling and structure factors, some related to haemoglobin analysis. Various dates January 1956 - 1958.

Atomic co-ordinates/amino-acid sequencing

This is a series of stiff-backed looseleaf binders like those used for the main myoglobin programme, but unnumbered and usually untitled. They relate to a two-pronged analysis of the structure of the myoglobin molecule using organic chemical methods in conjunction with X-ray crystallography. The determination of the amino-acid sequence of myoglobin had been suggested as a timely research project by Kendrew as early as 1955 to Stanford Moore and W.B. Stein at the Rockefeller Institute for Medical Research New York (C.273), and from 1956 A.B. Edmundson pursued this research first in America and then from 1961 to 1964 at the MRC Unit in Cambridge (C.219). For the crystallographers, the achievement of the high 2-Å resolution and later the even finer 1.4-Å made it possible to identify many more side-chains than previously, and to assign spatial co-ordinates to many of the atoms in the molecule. By the time of his Nobel Lecture Kendrew was able to say: "From the results of the X-ray and chemical studies, today some 120 amino acid residues are known with almost complete certainty and many of the remaining 30 are known with a fair degree of probability" (*Science, art cit.* 1963).

Kendrew collaborated in papers on the amino-acid sequence of myoglobin (1961) and haemoglobin (1965) and also wrote on side-chain interactions (1962). With H.C. Watson, his chief collaborator on the atomic co-ordinate determination, he circulated lists, successively revised, of sequences (C.274) which were in constant demand (C.275-C.277). The full 1.4-Å resolution analyses, however, were not published; a collaborative paper "Progress with the 1.4-Å resolution myoglobin structure" was delivered by H.C. Watson at the Sixth International Congress of the International Union of Crystallography, Rome, 9-18 September 1963 and an abstract appears in the supplement to *Acta crystallogr.*, 16, 1963. A photocopy of the abstract is included by courtesy of D.C. Phillips at C.289.

The material covers a long period of time from June 1956 when Kendrew and Edmundson began work on the project to 1967 and the circulation of the lists of co-ordinates; there is also a little later work 1968, 1970. The content and timespan of each binder may also be very diverse even within the labelled sub-dividers. They include correspondence and work or results from colleagues and collaborators, in particular Edmundson and Watson. A high proportion, however, is in Kendrew's own hand and shows the considerable detailed work undertaken and his careful checking at all stages. See especially C.120-C.123, C.125.

- C.117 "Myoglobin structure old material". Miscellaneous material, sub-divided as follows:
- "Chemical data". Tables and notes by Kendrew, correspondence with A.B. Edmundson on peptide analysis; this is an interesting record of work in progress at the bench sometimes "bad news", sometimes "booming success", on one occasion "paydirt". March 1960 - May 1964.
- "S/C [side-chain] identification". Detailed notes and tables, drafts and revisions for lists. March 1960 - July 1964.
- "Interactions etc.". Tables, diagrams, notes. December 1960 - May 1962.
- "Sequence data". Annotated material and sequence data received from conferences December 1960, June 1961, correspondence and data from R. Hill March-August 1962.
- "Homology". Notes, correspondence with Watson, mainly on homology of haemoglobin and myoglobin and probably related to collaborative paper "Comparison between the amino-acid sequences of sperm whale myoglobin and of human haemoglobin" *Nature*, 190, 1961. December 1960 - July 1963.
- "Notes pre 6-Å Fourier". Early notes on heavy atom attachment in type A and also types B, D, C, F myoglobins. June 1956 - January 1958.
- "Interpretation of 6-Å Fourier". Notes and diagrams n.d.
- C.118 "Myoglobin structure current". Miscellaneous material, sub-divided as follows:
- "Bond lengths, models". Notes, charts, colour codes. Few pages dated, 1961.
- "General features". Notes and diagrams, some by Watson and others. May 1960 - September 1964.
- "Chemical data". Notes and charts.
- "S/C identification". Detailed notes and revision of tables, February 1962 to "Final allocation November 1964 153 residues".
- "Interactions etc". Detailed notes and charts, correspondence and data on leucines from D.C. Phillips 1961, and from other colleagues on configurations 1962.
- "Sequence data". Miscellaneous charts, October 1962 - March 1963.
- "Homology". Charts, data, correspondence. May 1964 - March 1968.

- C.119 "H.C. Watson. Myoglobin notebook". Miscellaneous material, sub-divided as follows:

At front of book, untitled - miscellaneous notes, data, electron density charts, contour maps, December 1959 - April 1960.

"Least squares". Notes and printouts June-September 1960 (not all by Watson and includes printout by Dickerson June 1959).

"Holes in Fourier". Notes and charts.

"Sequence data". Notes and charts, including material from Edmundson.

"Myoglobin co-ords". Charts (not by Watson).

"Complete myoglobin co-ordinates". Tables, electron density charts.

- C.120 Untitled. Notes by Kendrew for the 3-D co-ordinates of the 153 amino-acids in myoglobin, n.d., c.1961.

The notes were originally made in a small format notebook unlike any elsewhere in the collection; according to Kendrew (private communication July 1987) they were probably jotted down from a direct sight of the 2-Å model in the laboratory. The book was subsequently taken apart and each page stuck on to a separate sheet to fit into a standard looseleaf binder.

The notes are in three sections, setting out co-ordinates for ρ_2 , ρ_3 and ρ_4 . Within each section the co-ordinates are based on the eight helices (numbered A-H) of the 2-Å myoglobin molecule. Each section is separately paginated:

ρ_2	pp.1-53
ρ_3	pp.1-30
ρ_4	pp.1-13

- C.121 "2-Å Side-chains co-ordinates". Three sets of work, sub-divided as follows:

"Summary notes on S/Cs". Tables for identification of 151 amino-acids in helices A-H. All in Kendrew's hand.

"Notes on side-chains". Probably preliminary work for above. Notes on each amino-acid and likely identification, by Kendrew, with some later notes and corroboration by Watson.

"Co-ordinates". Tables and calculations.

C.122 "1.5-Å Side-chains".

This is a detailed examination of 152 amino-acids and the haem group, one to a page, the helices A-H being separated by sub-dividers.

The top half of each page gives the chemical identification, and the lower half has notes on the X-ray findings first at 2-Å and then with reworkings and modifications at 1.5-Å. The final identification is in upper right corner. A few notes have dates in April, May 1962.

At rear of book " ρ 4 co-ordinates plotted on 2-Å Fourier". 15pp. list and comments dated October 1965.

C.123 Untitled. Printouts of co-ordinates, many checked and annotated by Kendrew and with a front page list "Proposed changes in co-ordinates for Coulter least squares program" 1 March 1962.

At rear of book 14pp. charts and notes of "Co-ordinate revisions" 25 April 1962.

C.124 Untitled. Printouts of co-ordinates on EDSAC, with notes and checking in several hands but mainly by Watson. Electron density charts and contour maps. Few pages only dated 1962-64.

C.125 Untitled. Later work 1966-67, almost all in Kendrew's hand; includes letter from R. Diamond July 1966 on his listings of myoglobin co-ordinates and a little work by Watson. Work is mainly manuscript lists and tables of factors in myoglobin co-ordinates related to preparation and circulation of Kendrew's and Watson's "Myoglobin orthogonal coordinate and dihedral angle listing dated 1 April 1967" which was circulated 18 August 1967 with the warning that "further revisions will undoubtedly be required and the present set should not be regarded as final". A later revised version 8 October 1967 is also included and there is a manuscript note of material to be listed dated 1970. (See also C.274). Also included are manuscript lists of "Tabulations for papers", perhaps for other projected publications on co-ordinates.

Miscellaneous

These notebooks are so designated because they are more heterogeneous in content than those of the main myoglobin series or because they cover a wider timespan. C.126, C.127 nevertheless are part of the myoglobin research and include some of the most accessible explanatory material and correspondence. C.128, C.129 have more general reference.

C.126 "General notes". Miscellaneous notes, data, correspondence etc. by Kendrew and several collaborators relating to the myoglobin programme, earliest date 1955 but mainly 1957-58, sub-divided as follows:

"Exp." Notes and diagrams for camera settings for 3-D pictures, densitometer data (1955), several series of wedge tests (1958) annotated by Kendrew, comparison of Cambridge and Royal Institution results, correspondence or notes by Dintzis, P.J. Pauling, T. Deeley, D.C. Phillips, Dickerson.

"Theo." Notes and calculations on number of reflections required at various Angström resolutions (1958), phases, scaling by Wyckoff (1956) and others, electron density charts, contour maps, phase determination (1957 by D.M. Blow).

Untitled, at rear of book, project diary by Kendrew 24 April 1957 - 10 December 1958 intercalated with related correspondence and notes from or to collaborators and various charts on "State of project". Of special interest are his "Notes on the myoglobin programme" written for W.L. Bragg 27 April 1958. These outline the future programme, the probable timespan, the methods and equipment required and the division of labour between Cambridge and the Royal Institution. He writes: "Stage II will be a 3-dimensional Fourier synthesis with resolution 3 or 2-Å, obtained by the method of isomorphous replacement. Stage III will be a synthesis going as far out in reciprocal space as we can - probably to 1.5-Å - preferably by the heavy-atom method."

C.127 Untitled. Miscellaneous notes, data, correspondence etc. by Kendrew and collaborators. Earliest date 1958 but mainly 1960-61, sub-divided but not always labelled, as follows:

Untitled. Kendrew's notes on "Cochran's Fourier Transform lectures", manuscript notes October 1961, correspondence on computer programs from C.L. Coulter 1961.

Untitled. Brief note on visitors to Unit September 1962.

Untitled. Contour maps for 6-Å Fourier, correspondence on Fourier transform, notes on "American trip" by Perutz, lectures by Brenner, Antonini, and on Fortran 1960-61.

"Structure". Photographs of "Myoglobin 2-Å R1 model April 1960", of Fourier syntheses, and of helices. Electron density charts, haem group and special section diagrams with a letter from Watson on side-chains January 1961, miscellaneous notes by Kendrew some dated 1958.

"Amino acid comp." Notes and tables of various protein sequences 1958-61.

"Journal". Project diary 3 February 1959 - 10 July 1961, intercalated with correspondence and notes from or to collaborators and various charts on "State of project" (similar material to project diary at C.126). Mainly related to final stages of work and publication of paper on 2-Å model (*Nature*, 185, 1960), but also includes from 1 August 1960 plans to refine the resolution to 1.5-Å. Includes data or correspondence from Coulter, Dickerson, Phillips, L.H. Jensen.

C.128 "Conference notes and lectures".

This is a chronological sequence of material 1959-71, all in Kendrew's hand, consisting of his notes of papers, lectures, questions and discussions at meetings attended by him or by other members of the MRC Unit, talks and seminars given in the Unit by visitors or by staff members during its Open Days, and also of the papers given at the 1969 EMBO meeting at Konstanz on the scientific programme of the proposed European Molecular Biology Laboratory. The content, though primarily on protein structure, is thus not exclusively on myoglobin.

This item was a late addition to the collection and has been kept as an entity, though its contents are often an essential complement to Sections D (MRC Unit), F (EMBO), L (Lectures) and N (Visits and conferences). The work is sub-divided as follows:

1959-62

D. Davies	Polynucleotides	30 October 1959
Gierer	TMV	20 January 1960
Anfinsen	no title	n.d.

First International Symposium on poly- α -amino acids and polypeptides, Madison Wisconsin, 19-23 June 1961 (programme, participants, notes). See L.147

Gordon Conference on proteins, New Hampshire 26-30 June 1961 (programme, participants, 12pp.notes). See L.147, N.14.

Gurd	Chemical Studies of myoglobin	11 July 1960
Brenner	Replicon	n.d.
Krimm	Feather	18 February 1963
O'Brien	no title	25 February 1963
Brandén	no title	25 March 1963
Green	Lactoglobulin	13 May 1963
Luzzati	Synthetic polypeptides	11 February 1963
D. Blow	Chymotrypsin	28 May 1963

1963-65

Weizmann Conference, June 1963. See L.147, N.17.

Crickday		7 October 1963
Bonner	Regulation of chromosome activity	24 January 1964
Holland visit to laboratories, see also L.148		February 1964
Structural Studies Division, account of work in hand		12-13 October 1964
Perutz	Molecular interpretation of Bohr effect	4 February 1965
Klug	Turnip crinkle virus	25 February 1965

Conformation workshop, National Institutes of Health, Bethesda, 24-25 June 1965 (7 pp. notes). See L.148, N.19.

Gordon Conference on proteins, New Hampshire 28 June - 2 July 1965 (31pp. notes). See L.148, N.20.

Crick	Talk to lab.	12 October 1965
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1967-68

Blow	Travels in USA	17 August 1967
Perutz	no title	23 May 1968
McLachlan	Gordon Conference 1968	19 July 1968

Nobel Symposium on symmetry and function of biological systems at the macromolecular level, Stockholm, 26-29 August 1968 (23pp. notes). See L.148, N.29.

1969

Diamond	Real space refinement of myoglobin	8 July 1969
Clark	tRNA crystals	29 September 1969
EMBO	Konstanz discussion 27-29 November 1969 (notes on scientific part) (9pp. notes). See F.190-F.194.	
Crick	Chromosome structure	19 October 1971

C.129

Notes on the literature, mainly 1961-68, sub-divided as follows:

- Indexing
- Proteins - general
- Proteins - part[icular]
- Haemoglobin
- DNA
- Miscellaneous

NOTES AND DATA (Kendrew and collaborators)

These are more miscellaneous in character, and less rigorously dated and paginated than the documentation selected for preservation in the "official" sequence of notebooks, though the work is often concurrent and therefore follows a similar order. C.130-C.169 deal with research methods and techniques, species specificity and the quest for the material best suited to X-ray diffraction analysis; C.170-C.187 relate to the main myoglobin programme. The "collaborators' notes and data" at C.190-C.195 also contain material relative to the main programme, but not exclusively so in topic or date.

Preliminary workHorse haemoglobin and myoglobin

- C.130 Brief notes, electron density charts on haemoglobin.
- C.131 "Haemoglobin - Low resolution 3D Patterson (EDSAC)". Notes, calculations, printouts, December 1950 - January 1951.
- C.132 "Horse myoglobin. Papers on molecular shape". Diagrams, lattices, calculations. n.d. Includes a note from W.L. Bragg, February 1949.
- C.133 Horse myoglobin. Diagrams, lattices, ideas on structure, some headed "Pseudo-orthorhombic" and perhaps related to joint paper with I.F. Trotter "A pseudo-orthorhombic form of horse myoglobin", *Acta crystallogr.*, 7, 1954.
- C.134 "Horse myoglobin. Pepinsky machine". Correspondence and photographs of myoglobin Fourier syntheses by R. Pepinski.

Blue whale

- C.135 "Blue whale myoglobin in $(\text{NH}_4)_2\text{SO}_4$ ", a, b, c projections, Edsac sheets, calculations, density charts, all checked by Kendrew May 1952.
- C.136 Blue whale in phosphate, a, b, c Patterson. Similar material December 1952.

Penguin

- C.137 "Penguin imidazole orthorhombic". Printouts, density charts, contour maps, intensity calculations October 1953.
- C.138 Penguin a, b, c Patterson. Similar material n.d.

Carp

- C.139 "Carp non-principal projection". Diagram of "Intensity strip November 1952". Early X-ray diffraction picture.
- C.140 Carp myoglobin a, b, c projection. Printouts, density charts, lattices. Some dated July, September 1954.

Seal

- C.141 "Centred seal". Lattices A2, B' diagrams.
- C.142 "Centred seal b, c face diagonals". Printouts, density charts, diagram October 1954.
- C.143 "Wash seal a, c". Similar material October 1953.

- C.144 "Wash seal b". Similar material October 1953.
- C.145 "Wash seal monoclinic a". Similar material October 1953.
- C.146 "Monoclinic seal Lattice A". Similar material February, June 1954.
- C.147 "Seal myoglobin Lattice A' b patterson". Similar material n.d.
- C.148 "Seal 'Nodes and loops' ". Graphs, radial distribution and scaling charts, using above data.

Finback whale

This was the subject of extensive study 1950-54. Much of the work (C.149-C.160) is in Kendrew's own hand, and some is by M.M. Bluhm (C.161-C.164) and P.J. Pauling (C.165, C.166).

Work by Kendrew

- C.149 Printouts, contour maps, density sheets, calculations, lattices, graphs, ideas for structure etc., some dated November 1950, July 1951.
- C.150 "Fly's eye work Manchester 1952". Notes, graphs, lattices, photographs, some dated May 1952 using optical diffraction methods developed by H.S. Lipson. (See also C.203.)
- C.151 "Inequalities. 'Manual' application of Cochran's rule". Notes, graphs, calculations, adaptation for EDSAC program etc. (only one set dated 25 April 1953) based on paper by W. Cochran "A relation between the signs of structure factors" 1952, a draft of which is enclosed.
- C.152 "EDSAC Finback whale May 1953". Routines and tables, applying Cochran's rule. Includes 9pp. summary of results.

- C.153 "Fouriers of Finback. (EDSAC inequalities) May 1953". Similar material, continues to June 1953.
- C.154 "Finback whale 3-dimensional Patterson". Printouts (checked), density charts, contour maps, calculations etc., some dated February, April, July 1954.
- C.155 "Type F Inequalities". This is a substantial file of material, punched, paginated and with a summary of contents, of the same format and organisation as the stiff-backed binders but kept instead as loose papers in a folder. The material runs December 1953 to December 1954 and covers various attempts using Cochran's methods and other programmes to obtain good Fouriers for finback whale.
- C.156-C.160 Five folders of contour maps and printouts for Fouriers of finback, 1954, 1955.

Work by M.M. Bluhm

- C.161, C.162 Two folders of calculations and charts for scaling factors, camera setting, intensities etc. for 3-dimensional structure of finback whale. Few dates.
- C.163, C.164 Two folders of density sheets and contour maps.

Work by P.J. Pauling

This is work similar to that at C.111A on salt water changes in finback whale myoglobin, related to the joint paper in *Proc. Roy. Soc.*, 237, 1956.

- C.165 Calculations and notes on a, b, c projections, November 1954 - March 1955.
- C.166 Miscellaneous notes, calculations, contour maps etc., various dates August 1954 - March 1955.

Whale - Structure factors

Notes, calculations and diagrams, all by Kendrew. Early work on whale crystals (not all the "type A" finally selected) in attempt to explore research techniques and results.

- C.167 "Whale Patterson fitting". Various diagrams and graphs of crystals at different angles, early contour maps. The folder is dated 1948-49 but one of the sets of drawings is dated 3 May 1952.
- C.168 "Whale Structure Factors and Fourier's". Detailed calculations, graphs, tables of structure factors for various models. Most have a note by Kendrew summarising the results e.g. "not good enough to justify a Fourier", "no absolutely decisive improvement was obtained", "this looks pretty good" etc. Some sets of notes bear dates in February, March, May 1952.
- C.169 "Whale Series a-n, IVC, D. Structure factor calculations". Similar material, in the order described. Also includes a project diary of work 13 June - 9 July, no year given. Perhaps 1952.

Main Myoglobin programmeOrthorhombic sperm whale

- C.170 Notes and diagrams by Kendrew on "packing" and crystal lattices of Types A and B orthorhombic sperm whale, some dated March 1953.
- C.171 "Sperm orthorhombic met-imidazole". Notes, graphs, density sheets, contour maps, a, b, c projections, some by Kendrew, some by R.G. Parrish, related to joint paper in *Nature*, 175, 1955.
- C.172 "Sperm orthorhombic 'end-on' Fouriers". Work by Parrish and Kendrew n.d.
- C.173 "Sperm orthorhombic a Patterson", November 1952, January 1953.
- C.174 "Sperm orthorhombic b Patterson". Printouts, calculations, density sheets, n.d. With a later note 21 May 1955 by Kendrew "Because of inconsistencies in the ψ origins I have checked through the whole computation of the b projection from the photographs to the check totals of the Edsac. Everything seems to be in order."

Monoclinic sperm whale

- C.175 "Sperm monoclinic met-imidazole". Calculations, density sheets, contour maps, some dated June 1954. Work by Parrish and Kendrew.
- C.176 "Reflections on Wissenberg Patterns". Charts and notes by Bluhm February-April 1953.
- C.177 "Sections through 3-dim. Patterson of sperm monoclinic". Notes and calculations by Bluhm, only one page dated October 1953.

- C.178 Scaling factors and checks by Bluhm.
- C.179 "Sperm whale myoglobin. 3-dimensional synthesis". Notes, calculations, graphs, printouts (one dated 16 July 1953), including note on "Reconciliation of 3-dimensional results with 2-dimensional projections". Work almost all by Kendrew, a little by Bluhm.
- C.180 "End-on Fourier". Notes and calculations, almost all by Kendrew, a little by Bluhm. June 1953 and a later note November 1953.
- C.181-C.183 Three folders of calculations, density charts, printouts and checks for Pattersons.
- C.184 "Sperm whale myoglobin. 3-dimensional Patterson. EDSAC sheets". Large scale charts by Bluhm checked by Kendrew, numbered 1-12 and some additional, of values to be used on EDSAC tapes.
- C.185 "Sperm monoclinic EDSAC outputs. 3-D Patterson". Printouts and calculations, all checked and corrected by Kendrew.
- C.186 Miscellaneous calculations, density sheets, contour maps and projections, by Bluhm, some with Kendrew's checks and corrections dated October 1954.
- C.187 Work on radial distribution. Includes data on intensity distribution for haemoglobin, myoglobin and ribonuclease sent by V. Luzzati 1954 (see C.36), graphs, notes and calculations by Bluhm.
- C.188 Later work on radial distribution, charts, diagrams etc. in various hands n.d.
- C.189 "3-D Fourier a and special sections". Contour maps and diagrams, including haem group n.d.

Collaborators' notes and data

In alphabetical order

R.E. Dickerson and others

- C.190 Notes, calculations, preparation methods etc., mainly by Dickerson but also by others and relating to collaborative work with Royal Institution; includes notes on verso of letter from Kendrew to Phillips 12 May 1958 and an undated note from Dickerson to V. Shore. December 1957 - December 1958.

H.M. Dintzis

- C.191 "HgI₄ Difference syntheses". Notes, calculations, density charts, densitometer readings etc. 1955.

J. Kraut

- C.192 "Type F Joe Kraut's work 1955-56". Notes, scaling factors, tables, contour maps etc. Includes brief notes by Kendrew on Kraut's work on Type D and Type F. The material is in the standard format of the loose-leaf binders but was kept as loose pages.

D.C. Phillips

- C.193 Work on haem group. Extensive notes, narratives, graphs, printouts etc., paginated 1-121 but not in numerical order, some dated 1960.

H. Wyckoff

- C.194 "H. Wyckoff - miscellaneous notes". Includes densitometer tests, irradiation tests, 3M CsCl densitometer tests.

Unidentified

C.195

Work on isocyanide spectra 1954-55. File cover has a manuscript note in unidentified hand "Interesting early work on the combination of myoglobin with isocyanide".

Miscellaneous

- C.196 Correspondence, data, printouts, density sheets, contour maps, 1957, relating to checking 6-Å 3-dimensional Fourier synthesis obtained on EDSAC I against DEUCE computer at National Physical Laboratory. Includes EDSAC programs by D.W. Green, correspondence with J.S. Rollett July-October on 3-dimensional analysis, and a letter from Kendrew 7 December 1957 on 2-dimensional analysis explaining that "EDSAC 1 will be going off the air permanently any time now ... EDSAC 2 is at present in small pieces".
- C.197 "An examination of the helices in myoglobin". Manuscript draft for a paper so titled, with 6 tables and 3 figures, in the hand of H.C. Watson, n.d. but 1960 or later.
- Also included is a brief outline by Kendrew for the paper under the title "The helical segments of polypeptide in myoglobin" and a note of two major collaborative papers intended for the series on "Structure of myoglobin" in *Proc. Roy. Soc.* of which I-V had been published 1950-59. The two mentioned in the note are "VII a three-dimensional Fourier synthesis of sperm whale crystals at 2-Å resolution by Kendrew, Dickerson, Strandberg, Phillips and Shore" and "VIII Interpretation of a 2-Å Fourier by Kendrew, Phillips, Strandberg, Watson and ? Dickerson, Shore". These papers did not in fact appear and the work was published only in the shorter form of communications in *Nature*.
- C.198 Material on computer generated models for interpretation of three-dimensional syntheses. Mainly exchanges with M.O. Dayhoff on research proposal "Aids to interpretation of protein crystallography" 1962 (with comments by Watson and Bränden) and renewal 1965, publication of *Atlas of Protein Sequence & Structure*, later correspondence on probability research 1971.

MATERIALS AND APPARATUS

Supplies and specimens

Correspondence with whaling stations, shippers, fisheries, colleagues and individuals on the supply and transport of suitable samples of myoglobin, particularly of sperm whale but also of various other species. The earliest exchanges date from December 1952 when Kendrew and his team discovered the special suitability of sperm whale meat and no time was lost in trying to locate supplies; Perutz joined the initial quest by writing to a colleague in Peru, cables were sent to and from ships at sea and other members of the laboratory were despatched at various times to collect specimens from cold stores, overnight fish trains and airports.

C.199 1952-53.

C.200 1954.

C.201 1955-58.

C.202 1960-65 (much of this relates to the investigation of porpoise myoglobin by R.H. Kretsinger), 1972.

Optical diffractometer

C.203 Correspondence, drawings and notes on the "Fly's Eye" lamp, related to optical apparatus devised by H.S. Lipson whom Kendrew approached on the matter on the advice of W.L. Bragg. Also includes correspondence with commercial suppliers of high intensity light sources.

Examples of masks and "pantographs" on optical diffractometer are at C.308. See also C.150.

Microcamera

C.204 Drawings and diagrams by Kendrew and others.

Densitometer

C.205 "Scanning densitometers design data". Drawings, blueprints, correspondence with suppliers, paper (no author or date) on "flying-spot" densitometer, correspondence with M.H.F. Wilkins 1957, A.C.T. North 1958.

C.206 "Bluhm Densitometer". Correspondence with commercial firms, notes, calculations, graphs by Bluhm October-December 1953, information on photometer from F.H.C. Crick.

C.207 Correspondence with supplier and colleagues on microdensitometer 1957-59. Miscellaneous rules and scales for use on densitometer in Kendrew's laboratory.

Computer time

C.208 Use of time on IBM 7090 at AWRE Aldermaston. Correspondence 1959-61, routines and information on myoglobin work on 7090 by C.L. Coulter 1960-62.

C.209 Miscellaneous correspondence on use/hire of computer time on various machines and at various institutions 1959-67, especially 1960-61 when EDSAC 2 was no longer capable of the fast computing required.

COLLABORATORS AND STAFF

Correspondence and papers relating to doctoral, postdoctoral and other research posts with the protein crystallography team. Applications come from UK and Europe, but mainly from USA, funded from various grant-giving institutions and foundations; there are also some MRC staff members on long or short-term contracts.

The material may include applications and recommendations for work in team, arrangements for funding, supply or importation of equipment, publications, advanced degrees, visits of varying duration, research proposals, progress and results, exchanges of information, related correspondence with other colleagues etc. Some are brief exchanges, others extend over a considerable period and include news of subsequent career.

Individual files

- | | | |
|-------|--|------------|
| C.210 | Banaszak, L.J. | 1962-66 |
| | Work on guanidated myoglobin and GPDH. | |
| C.211 | Bluhm, M.M. and others | 1951-60 |
| | Bluhm was an MRC staff member, working as Scientific Assistant to Kendrew 1952-55. Includes a little correspondence 1951 when it had been hoped to make the appointment, and Kendrew's analysis and material for 1952 appointment. | |
| C.212 | Bodo, G and others | 1957-60 |
| | Correspondence conducted after Bodo had left MRC laboratory and returned to Austria, on myoglobin research, heavy atom attachment etc. | |
| C.213 | Brändén, C-I | 1962 |
| | Brändén spent a year as a temporary MRC staff member. Brief correspondence only, on arrangements. | |
| C.214 | Bretscher, P.A. and others | 1968, 1973 |

- C.215 Coulter, C.L. and others 1959-66
- Coulter worked 1960-62 on the 1.5-Å Fourier synthesis computed on IBM 7090, funded by US National Institutes of Health. Includes abstracts of papers given by Coulter at American Crystallographic Association meeting June 1962 on "Recent work on the structure of myoglobin" and "Refinement methods for protein structures" which discuss the work at 1.4-Å.
- C.216 Creighton, T.E. and others 1965-68
- C.217 Dickerson, R.E. and others 1957-68
- Dickerson worked at the laboratory, funded by US National Science Foundation, from January 1958 to 21 August 1959 and for a shorter visit July-August 1960. Correspondence on funding, joint and other publications, research plans and results, myoglobin co-ordinates etc.
- C.218 Dintzis, H.M. and others 1955-63
- Dintzis worked at the laboratory as a Rockefeller Fellow 1954-55, making important contributions to the isomorphous replacement work.
- C.219 Edmundson, A.B. and others 1959-71
- After some delays, Edmundson came to work in the laboratory on amino-acid sequencing, funded by US National Institutes of Health, from October 1960 to September 1964. Correspondence and material about special equipment provided for the work by the Rockefeller Foundation, and subsequently (February 1965) made over indefinitely to the laboratory, are also included.
- After returning to America, Edmundson developed an illness attributed to prolonged contact with solvents (in particular methyl-cellosolve) and was obliged to discontinue work on protein chemistry.
- C.220 Hart, R.G. 1957-58
- C.221 Hoppe, W. 1958-64
- Structure factors, phase circles, equipment, other research projects.

- C.222 Huxley, H.E. and others 1950-55

Research and recommendations, mainly related to Huxley's period at M.I.T. as Commonwealth Research Fellow, his return to the MRC Unit and provision of an electron microscope for his research.
- C.223 Jensen, L.H. and others 1959-62

Helices in 2-Å and 1.5-Å resolutions. See also C.127.
- C.224 Kraut, J. and others 1954-59
- C.225 Kretsinger, R.H. and others 1963-73

Research and joint publication, draft paper on "The structure of porpoise myoglobin".
- C.226 Levitt, M. and others 1967-70

Levitt held an MRC Training Scholarship at the laboratory from 1968 until the award of a Fellowship at Caius in 1970.
- C.227 Nobbs, C.L. 1963-71
- C.228 Parrish, R.G. and others 1951-56

Parrish was a Merck postdoctoral fellow at the laboratory 1952-54; correspondence is on funding and career, research programme and results.
- C.229 Pauling, P.J. and others 1951-56
- C.230 Pinkerton, M. 1955-61, 1969
- C.231 Schoenborn, B.P. and others 1964-69, 1974

Research, publications.

- C.232 Steinrauf, L.K. and others 1958-63, 1967
- C.233 Stockell, A. 1958-59
Work on papain.
- C.234 Strandberg, B.E. 1959-65
Correspondence July 1959 refers to crucial stage of 2-⁸Å resolution work and pressure to complete before R.E. Dickerson and Strandberg finished their stay at laboratory (see also C.84).
- C.235 Stryer, L. and others 1961-64
- C.236 Watson, H.C. 1959, 1964-68
Watson had an MRC staff appointment at the laboratory December 1959 - June 1968.
- C.237 Wheeler, J. 1959-62
Part time MRC staff member, working on EDSAC programming.
- C.238 Wyckoff, H.W. and others 1954-57, 1963
Kendrew's letter of 17 July 1955 includes a very clear summary of the current state of the myoglobin programme. Wyckoff's reports on his research are also included.

Chronological files

Shorter correspondence relating to applications to visit or work at the laboratory. Similar material to C.210-C.238 above, but less extensive.

C.239	1951.
C.240	1952-54.
C.241	1955-56.
C.242	1957.
C.243	1958-59.
C.244	1960.
C.245	1961.
C.246	1962.
C.247	1964, 1965, 1966.

CORRESPONDENCE

Aspects of myoglobin

C.248-C.272 below are the contents of Kendrew's bulky folders, sub-divided for ease of reference, with his own descriptive titles. The material for each topic, which may extend over very many years, is presented in chronological order. The content may have some degree of overlap with correspondence elsewhere e.g. on methods of preparation, exchange of specimens and results, comments on publications, but Kendrew's arrangement has been respected.

Myoglobin - biochemistry 1947-81

C.248	1947.
C.249	1950-54.
C.250	1955-57.
C.251	1958-59.
C.252	1960-62.
C.253	1964.
C.254	1965.
C.255	1972, 1979, 1981.

Myoglobin - Theory 1949-68

C.256 1949-53.

C.257 1958, 1965, 1968.

Myoglobin - electrical - magnetic 1953-70

C.258 1953, 1958.

C.259 1959.

C.260 1960-63.

C.261 1964, 1968, 1970.

Myoglobin - electron microscopy 1954-63

C.262 1954, 1958, 1961, 1962-63.

Includes samples of micrographs.

Myoglobin - helix content 1955-62

C.263 1955, 1957-58, 1962.

Heavy atoms 1957-66

C.264 1957-60, 1965, 1966.

Myoglobin - physical chemistry general 1958-77

- C.265 1958, 1961-63.
- C.266 1964-65.
- C.267 1968.
- C.268 1970, 1973, 1977.

Myoglobin - oxygen reaction 1960-74

- C.269 1960-62, 1966-67, 1970, 1972, 1974.

Myoglobin - 2-Å Fourier 1960-67

- C.270 1960-62, 1965, 1967. Mainly on helical structure and position of haem group.

Porphyrin structure 1961-66

- C.271 Correspondence and data 1961-66.
- C.272 Shorter correspondence 1954-75; requests for information on supplies, specimens, preparation methods, equipment etc.

Atomic co-ordinates/amino-acid sequencing

- C.273 Correspondence 1955-59 with US colleagues on collaborative work suggested by Kendrew 2 November 1955 for the chemical determination of the amino-acid sequence of myoglobin, to be undertaken by the Rockefeller Institute for Medical Research New York alongside the X-ray diffraction analysis in progress at the MRC Laboratory.

The correspondence is mainly with S. Moore and W.H. Stein at the Rockefeller Institute, and with A.B. Edmundson who was the first graduate student to work on the project, initially at the Rockefeller Institute, later at Brookhaven and eventually as a postdoctoral research fellow at the MRC Laboratory (C.219). Some correspondence with other colleagues is included.

The exchanges are of particular interest in chronicling the progress of the myoglobin project at a critical time.

- C.274 Kendrew's and Watson's tables of co-ordinates circulated April 1967, August 1967, revised October 1967. With miscellaneous lists of requests for tables, and chart of those supplied 1967-74.

- C.275 Correspondence from colleagues on sequencing research, some simple requests for Kendrew's results, others with more detailed exchanges on work in progress, publications, 1960-67.

Kendrew's letter to C. Levinthal of 15 February 1965 explains his reluctance to distribute the tables of co-ordinates prematurely.

- C.276, C.277 Shorter correspondence distributing or requesting tables of co-ordinates compiled by Kendrew and Watson in 1967 (C.274). Includes letters of thanks, information on research or educational projects, myoglobin model-building, requests to use or quote material.

C.276 1967-69.

C.277 1970-78.

PublicationsGeneral correspondence

General correspondence 1958-68 arising from publications on myoglobin by Kendrew and collaborators, received from colleagues, authors, editors and publishers. Includes letters of congratulation, requests for reprints and photographs, permission to quote or reproduce material, letters of thanks, and some scientific exchanges related to or arising from published results and continuing work on myoglobin.

C.278	1958.
C.279	1959.
C.280	1960 January-May.
C.281	1960 June-December.
C.282	1961.
C.283	1962 January-May.
C.284	1962 June-December.
C.285	1963 January-May.
C.286	1963 June-December.
C.287	1964, 1968.

Myoglobin papers

C.288

Correspondence August 1957 - January 1958 on the 6-Å resolution synthesis and its publication (with Bodo, Dintzis, Parrish, Wyckoff and Phillips) in *Nature*, **181**, 1958.

Kendrew's letter of 20 August, sent to Parrish, Bluhm, Dintzis, Bodo, Wyckoff and Kraut, is reproduced below for its historical interest, summary of the work and future plans:

CAVENDISH LABORATORY,
CAMBRIDGE

20 August, 1957

" Dear

To save repeating myself, this is a circular letter to tell you that we finally managed to do a 3-dimensional Fourier synthesis of myoglobin the other day, with a resolution of 6 Å. The phases were determined using 5 different isomorphous derivatives - mercury diammine, gold, PCMBs, mercury diammine + PCMBs, and gold + PCMBs - with an accuracy which I should estimate as $\pm 20^\circ$; 400 terms in all, of which 100 were h01's and therefore real. The calculation was done on EDSAC in 76 minutes using a 2-dimensional program of David Green's modified for the purpose; and as a double check it has since been repeated on DEUCE, the big machine at the National Physical Laboratory.

The Fourier shows much more than I personally ever hoped it would. First of all the main parts of the polypeptide chains are quite clear; and so is the iron atom, which gives a peak 50% higher than the chains and is the most prominent feature in the pattern. Its position checks up exactly with that of the iodine peak in the 2-dimensional difference Fourier of p-iodo-phenylhydroxylamine. The general shape of the molecule corresponds pretty well with what we have said in earlier papers, and its position in the unit cell is precisely what was suggested by Howard Dintzis's salt-water difference-Fourier. All the main features of the 2-dimensional Fourier of the protein are now interpretable, and its highest peak, incidentally, turns out to be the iron atom. The arrangement of the chains is complicated and our old term "quasi-parallel" is an over-simplification! Unfortunately when they turn corners the average electron density of the chains drops to near average so that at this resolution they nearly fade out, or at least the turns are not distinguishable from salt bridges, etc.: the consequence is that it may not be possible at this stage to string together the various segments into a unique sequence. Several of the segments are essentially parallel (though not straight), but others run at right angles and so to speak tie the bundle together round the outside. The haem group is not inside the molecule - in one sense it is definitely on the

outside, though in another one might say that it was buried in a cleft, though there is clear access for oxygen and other molecules.

Our plan is to extend the resolution to 3 Å. using the same techniques as hitherto, though the phase determination will not be so accurate. Maybe we can do this in 18 months or 2 years. (3,000 reflexions per derivative this time!). This should clear up a lot of the doubtful points. After that atomic resolution!

I thought you might like to have this advance information about the latest results which, it goes without saying, would not have been possible to achieve without the efforts you made when you were in the Unit. All good wishes from everyone here.

Why not come back for a while and help with the 3 Å stage?

All the best - "

Folder also includes a generous letter of congratulation from W.L. Bragg dated 17 August ("I feel I must write to say what a thrill it was to see your structure yesterday ... I did deeply appreciate your coming over so quickly to show it to me"), which suggests that "the other day" of Kendrew's letter, when the synthesis was actually completed, was 16 August.

Also included are letters to and from colleagues, and brief correspondence with *Nature* about publication.

C.289

Correspondence January-February 1960 on the 2-Å resolution synthesis and its publication. Bragg again writes enthusiastically ("I have been reading your paper and Perutz' with a real thrill ... the paper describing these results is all so fascinating and meaty that it would be a pity to cut any of it out"). *Nature* published the papers very rapidly, receiving the manuscripts in early January and publishing in the 13 February issue. Also includes a little correspondence with collaborators and colleagues.

Included here is the abstract of the paper "Progress with the 1.4-Å resolution myoglobin structure determination" by Watson, Kendrew, Coulter, Brändén, Phillips and Blake, presented at Sixth International Congress and Symposia of the International Union of Crystallography, Rome, 9-18 September 1963 (photocopy of supplement to *Acta crystallogr.*, 16, 1963, A 81, kindly provided by D.C. Phillips). C.L. Coulter also presented papers on the research in 1962 (see C.215) but there is no fully written-up record of the 1.4-Å work.

- C.290 Series (a)-(h) and caption for Figure 18 pp.94-95 of "Crystal structure of myoglobin V", with Bodo, Dintzis and Wyckoff, *Proc. Roy. Soc.* 253, 1959.

Miscellaneous captions for exhibits.

- C.291 Circulation list for Kendrew's publications c.1954-58.

Note

In July 1986 *Current Contents*, 29 no.29 featured the 2-Å paper (*Nature*, 185) as "This Week's Citation Classic" by which date it had been cited in 475 publications. The 6-Å paper (*Nature*, 181) had been cited 140 times and the amino-acid sequencing paper (*Nature*, 190) had been cited 405 times at the same date.

MODELS

Skeletal model

These were originally designed by Kendrew and made up in the Cavendish workshops and later (from 1958) in the MRC Unit's own workshops. By 1960 they were manufactured by Cambridge Repetition Engineers Ltd., several being sold to other laboratories mainly in US. They were frequently, though unofficially, known as Kendrew models. Correspondence with MRC and others August 1963 - December 1965, provides historical information on the matter.

- C.292 Correspondence with colleagues, Cambridge Repetition Engineers, MRC and others on supply of models 1960-70.

Ball-and-spoke model

Following many requests for models of the myoglobin molecule, Kendrew approached MRC in May 1965 with a view to commercial manufacture and sale. He suggested the services of A.A. Barker of Cambridge Engineering Laboratories who had a small private business of the kind. After various discussions with MRC and National Research Development Corporation (NRDC) it was agreed that Barker should be formally licensed by NRDC to produce the models. Letters to colleagues about the scheme were circulated in May 1966; orders were received and processed, and priorities established, by Kendrew and passed on to Barker.

- C.293 Preliminary correspondence and negotiations with MRC and NRDC, circular letters to colleagues May 1965 - May 1966.

- C.294-C.297 Correspondence and orders, periodical lists of orders and priorities 1966-71. 4 Folders.

Science Museum London

- C.298 Correspondence with museum staff about loan or gift of various models, advice on captions etc. Various dates 1958-77.

Correspondence

Correspondence with colleagues and manufacturers on methods, costs etc. of atomic model-building and scientific illustration.

- C.299 1953-58. With R.B. Corey, on "Pauling-Corey space-filling models", often referred to elsewhere in the correspondence.
- C.300 1957. With manufacturers of expanded polystyrene/plastics.
- C.301 1957-59.
- C.302 1961-62.
- C.303 1963.
- C.304 1965. Includes catalogue of British Biophysical Society Winter Meeting Exhibition of Molecular Models, and an earlier (September 1960) report of the Conference of the committee on atomic and molecular models of the Biophysics and Biophysical Chemistry Study Section of the US National Institutes of Health.
- C.305 1966-67.
- C.306 1969.
- C.307 Printed/duplicated information on model-building.

MISCELLANEOUS

Pantographs

- C.308 Masks and "pantographs" of finback whale myoglobin (End on)
taken 1952 with the so-called "fly's eye" optical diffractometer
based on the work of H.S. Lipson. See C.203.

SECTION D

MRC LABORATORY OF MOLECULAR BIOLOGY, CAMBRIDGE

D.1-D.39

INTRODUCTION

D.1-D.5

BUILDINGS

D.6-D.12

APPARATUS AND EQUIPMENT

D.13-D.32

STAFF

D.33-D.38

RESEARCH AND ADMINISTRATION

D.39

HISTORICAL

INTRODUCTION

This is the last and current title of the famous institution where most of the brilliant early research was conducted which gave Britain its historical lead in protein crystallography and molecular biology. Under its original name of Unit for the Study of the Molecular Structure of Biological Systems it was set up in Cambridge by the Medical Research Council from 1 October 1947 with a staff of two, M.F. Perutz and J.C. Kendrew, housed in the old Cavendish Laboratory in Free School Lane. The Unit expanded rapidly - by 1950 F.H.C. Crick and H.E. Huxley were already working there and J.D. Watson arrived in Michaelmas 1951 - and was renamed the Molecular Biology Research Unit in 1956. Although plans were put forward by Perutz, and accepted by the MRC, in 1958 for its expansion into a Laboratory of Molecular Biology with its own building, the work continued at the Cavendish in increasingly cramped conditions until 1962, when new quarters were opened by the Queen in the University Postgraduate Medical School on the New Addenbrooke's Hospital site. A further major extension was agreed in 1964.

M.F. Perutz was Chairman of the Laboratory until he reached retirement age in 1979, his successors being S. Brenner (until 1986) and A. Klug. Kendrew was Deputy Chairman and Director of the Division of Structural Studies until 1974 when he was seconded to EMBL. The records of his own research in Cambridge constitute Section C.

The fortieth anniversary of the first MRC Unit was marked in 1987 by various celebrations, gatherings, articles and TV programmes; information about some of these is at D.39.

BUILDINGS

Plans

- D.1 Architects' plans January, March 1960 for laboratory on Addenbrooke's site.
- D.2 Architects' plans June 1966 for extension.

Correspondence

Correspondence, memoranda, negotiations on extension to laboratory, mainly conducted by Perutz 1963-64 with MRC, but including research notes and ideas from colleagues and also a little later material.

- D.3 1963
- D.4 1964
- D.5 Miscellaneous later material 1965, 1967, memoranda and correspondence on possible accommodation for EMBL, or for European scientists, 1968.

APPARATUS AND EQUIPMENT

Much of the material deals with the laboratory's later needs for computer hard or software. Equipment for Kendrew's own research is documented in Section C.

Computers

- D.6 MRC Conferences on computer needs and access to computing facilities for staff of MRC Units, 1958, 1962.
- D.7 General correspondence, memoranda, estimates, notes of discussions, meetings and committees, in MRC laboratory and Cambridge University, with computer firms, colleagues and MRC officials, covering all aspects of computer policy and requirements, purchase, hire or collaborative use of machines 1961-69.
- Includes memoranda and notes from other members of laboratory, in particular D.M. Blow, U.W. Arndt, and also information and reports received from colleagues working elsewhere.
- D.8 Correspondence, memoranda, discussion notes etc. 1963-69 on Cambridge University Titan machine.
- D.9 Correspondence, memoranda, notes of meetings and discussions 1963-66 on purchase by MRC of Ferranti Argus 304 Computer (to process data from X-ray diffractometer, see D.11) at a cost of £140,000. Includes copy of letter by Perutz November 1966 complaining of poor performance of machine.
- D.10 Correspondence and papers 1963-67 on use of computer time at Atlas Computer Laboratory.

Other

- D.11 Correspondence, memoranda, discussion notes, costings etc. 1959-66 on purchase of Hilger & Watts/Ferranti diffractometer apparatus. Includes copy of complaint by Perutz on poor performance of Ferranti apparatus. See also D.9.
- D.12 Miscellaneous correspondence 1957-61 on Polaroid rapid processing camera for slide making.

STAFF

Computing Staff

- D.13 Tabulated information by Kendrew and others on requirements for computing staff for various members of laboratory. A few notes on those engaged.
- D.14 Correspondence with successful applicants for full or part time work as computing staff in laboratory 1957-62. Includes Kendrew's notes.
- D.15 Not used.

Research Staff

Applications to work in laboratory, earliest date 1962 but mainly 1969-73. Material includes correspondence, curricula vitae, recommendations and a log of correspondence (compiled in laboratory).

D.16	A	D.24	J
D.17	B	D.25	K
D.18	C(1)	D.26	L
D.19	C(2)	D.27	M
D.20	F	D.28	R
D.21	G	D.29	S
D.22	H	D.30	T
D.23	I	D.31	W
	D.32	Z	

RESEARCH AND ADMINISTRATION

- D.33 Miscellaneous administrative papers 1961, 1964-74. Includes agendas and minutes of laboratory Board meetings, requests for equipment, space allocation, lists of personnel and visitors, new proposals for research projects or sub-divisions in the laboratory, finance, a little correspondence.
- D.34 Miscellaneous research reports and proposals by members of laboratory:
- | | | |
|-------------------|------|----------------------|
| TMV | 1964 | K.C. Holmes, A. Klug |
| X-ray diffraction | n.d. | unsigned |
| Nucleic acid | 1965 | F. Sanger |
| Chymotrypsin | 1967 | D.M. Blow |
| Mass spectrometry | 1968 | F. Sanger |
| NMR | 1968 | A.D. McLachlan |
- D.35 Notices, applications etc. for symposia and study courses on the work of the laboratory 1967-73 and undated.
- D.36 Arrangements for MRC Subcommittee visit to Division of Structural Studies 9 May 1973. Members of the Subcommittee were J.A.B. Gray (Chairman), A.S.V. Burgen, A.F. Huxley, D.C. Phillips, R.D. Preston and P.M.B. Walker. Includes programme, timetable, synopses of talks accompanying demonstrations and other background information supplied to Subcommittee, report on visit and comments.
- D.37 Brief notes by Kendrew on various matters related to laboratory, including a breakdown of time spent in UK, at EMBL, on ICSU and other business trips for 1975.

- D.38 Structural Studies Committee Meetings 1-118, 10 February 1969 - 3 March 1975.

Includes agendas, minutes and some background papers and correspondence, dealing with all aspects of staffing, space allocation, apparatus and equipment requirements, visitors, financial estimates and allocations relating to the work of the Structural Studies Division.

N.B. For meetings 1-7 only the agendas survive.

HISTORICAL

- D.39 Miscellaneous items commemorating the fortieth anniversary of the laboratory in 1987.

SECTION E

CAMBRIDGE : UNIVERSITY AND COLLEGE

E.1-E.16

INTRODUCTION

CAMBRIDGE UNIVERSITY

E.1, E.2	Teaching and curriculum
E.3 -E.5	Committees
E.6	Electoral and Advisory Boards

PETERHOUSE

E.7 -E.10	Scholarship and entrance examinations
E.11-E.13	Supervision
E.14	Prizes
E.15, E.16	Mastership elections

INTRODUCTION

The material in this section deals with Kendrew's postwar career at Cambridge. Though by no means a complete record, it gives some picture of his involvement in university and college life.

For virtually the whole of this period, that is from the start of the MRC Unit on 1 October 1947, Kendrew was a full-time salaried member of the staff of the Medical Research Council and indeed remained so until his retirement from EMBL in 1982. His own position, like that of the MRC Unit itself, was thus somewhat ambivalent vis-à-vis the organisation of the university and its collegiate life, but like many of his colleagues he made a full contribution to the requirements of research, teaching and administration at university level, while his connection with Peterhouse gave him a valued link with college life.

Kendrew was elected to a Research Fellowship at Peterhouse from 1 July 1947 to 1953, and to a Supernumerary Fellowship from 1953 until he resigned in July 1975 on his secondment to Heidelberg; he was elected an Honorary Fellow in November 1975. Despite the intense pressure of his own research during the 1950s, together with his responsibilities for the protein crystallography section of the MRC Unit, he continued to be actively involved with many aspects of life at Peterhouse. He was Director of Studies in Natural Sciences 1950-56 and a College Lecturer in Natural Sciences 1956-67 and organised the selection and tuition of scholars and undergraduates with his accustomed efficiency; he was Steward from 1955 to 1959 and as a member of the Governing Body served on various committees. Official material relating to the latter is held in the College Archives.

Kendrew's annual reports to the Master of Peterhouse during the tenure of his Research Fellowship 1947-53 give succinct and interesting accounts of his developing research and of the early growth of the MRC Unit. They are included at C.27.

Information about Kendrew's appointments at Peterhouse is at R.8, R.9.

CAMBRIDGE UNIVERSITY

Teaching and curriculum

- E.1 Notes of graduate supervision fees paid to Kendrew 1950-68, kept as record. Names include H.E. Huxley, J.D. Watson, R.G. Parrish, P.J. Pauling, C.L. Nobbs, R.A. Crowther, P.A. Bretscher.
- E.2 Brief correspondence and papers 1959-60 on proposed "Half subject cell biology" in Part I of Natural Sciences Tripos, suggested by J.W.S. Pringle and J.A. Ramsay.

Committees

- E.3 Committee of the General Board on the long-term needs of scientific departments; the Chairman was W.A. Deer and the members were E.C. Bullard, J.B. Hutchinson and J.C. Kendrew. The report was submitted in October and published in December 1965 as no.4485 of the Cambridge University Reporter.

Copy of published report.

- E.4 Papers and brief correspondence 1968-70 on Committee of Management for Biophysical Chemistry and Colloid Science, set up after the discontinuation of the Department of Colloid Science in July 1968, to administer the funding, staff and research of the Department. The Chairman of the Committee was G.B.B.M. Sutherland.

- E.5 Visit of U.G.C. Biological Sciences Sub-Committee, 21 January 1970 "to learn as much as possible about the activities of the departments of biology and to discuss problems that may exist at Cambridge."

Correspondence and material prepared by the "Professorial Group" (Chairman A.S.V. Burgen, Secretary D.F. Barton) for discussion with Sub-Committee. M.F. Perutz was asked to join the group, but nominated Kendrew.

Electoral and Advisory Boards

E.6 Material relating to the following, on which Kendrew served, has been passed to Cambridge University Archives, University Library Cambridge (Ref: KEN. A-F):

- | | |
|------|---|
| 1969 | Advisory Committee on the Plummer Professorship of Biophysics |
| 1970 | Elector to the Directorship of the University Computing Service |
| 1974 | Elector to the Sir William Dunn Professorship of Biochemistry |
| 1976 | Elector to the Arthur Balfour Professorship of Genetics |
| 1986 | Advisory Committee on the Plummer Professorship of Physics |

PETERHOUSE

Scholarship and Entrance Examinations

These were held separately at the time in question. Examinations for candidates aiming at a scholarship or exhibition were held in December; examinations for those aiming for entrance as a commoner were held in March. Colleges held their scholarship examinations in small groups with papers set and marked in common; the relevant group here was known as the "King's group" and consisted of King's College, Peterhouse, Pembroke, Gonville and Caius, and Corpus Christi Colleges. Entrance examinations were usually organised by the individual colleges.

- E.7 Entrance scholarship and exhibition papers for King's group 1951, 1953-57, 1959, most with comments by Kendrew on the standard of questions set and analyses of performance, some with preliminary correspondence and drafts.
- E.8 Full performance tables of all candidates in King's group 1954-57, 1959.
- E.9 Peterhouse entrance examination papers, with notes and analyses of performance, 1950-59, 1962, 1963.
- E.10 Kendrew's notes on interviews with Scholarship candidates 1952, 1953, 1956, 1958, 1959.

Supervision

- E.11 Kendrew's notes on undergraduates supervised 1947-50.
- E.12 Miscellaneous reading lists, correspondence with or about Peterhouse undergraduates 1962-67.
- E.13 Correspondence on the supervision system at Cambridge, with W.B. Harland 1964, H. Butterfield (then Master of Peterhouse) 1965.

Prizes

- E.14 Correspondence, suggestions for titles etc. for college prizes, (Tait Prize 1949, Sohan Lal Bhatia Prize in Physiology 1963-66).

Mastership

- E.15 Correspondence and papers 1967-68.
- E.16 Correspondence and papers 1972-73.

EUROPEAN MOLECULAR BIOLOGY

INTRODUCTION TO SECTIONS F, G AND H

European collaboration in research and teaching in molecular biology was a cause to which many scientists devoted themselves from the early 1960s. Kendrew was closely involved with the movement from its first inception, holding major offices in committees, advisory boards and working groups, and, through his participation in many of the similar bodies of the UK scientific consultative establishment, playing some part in the direction of official opinion.

Though the detailed history of the movement is exceedingly complex, its outline is simple. It began with the formation of the European Molecular Biology Organisation (EMBO), set up after various preliminaries in February 1964. This was, and remains, a private organisation of scientists working in the field, with Statutes, a Council and an elected membership, aiming to promote research and teaching in Europe by long- and short-term fellowships, courses, summer schools, and collaborative research. Funds for these purposes were provided by small grants, and, from December 1965, by a major pump-priming grant from the Volkswagen Foundation for the three years 1966-68. The proven success of the EMBO programme over this period, and the helpful initiative shown from the earliest days by the Swiss Government, led to a series of intergovernmental meetings and eventually to an agreement to establish a European Molecular Biology Conference (EMBC); the agreement was reached in 1969 by thirteen West European states, their number increased by later admissions to seventeen. The members of the Conference are representatives of governments, not individual scientists, and its principal role is to agree a budget for the scientific programme drawn up by EMBO which is then entrusted with the administration and implementation thereof. In this way the primacy of EMBO's scientific aims is achieved relatively free from international bureaucracy.

While the fostering of European excellence in molecular biology by comparatively simple low-cost means such as fellowships and courses had not met with really serious opposition, it is clear from the very earliest documents that the establishment of a major research institute or laboratory had always

been part of the plan and that this project was especially dear to Kendrew himself. It was written into all the manifestos and proposals, a Laboratory Committee with Kendrew as chairman was in being from 1964, a proportion of the Volkswagen grant was earmarked for feasibility studies and the EMBC budget included from the first a provision for laboratory working-groups. It is equally clear that the laboratory project was regarded as highly controversial, by governments because of its high and continuing costs (especially as presented in its first and grandiose form), and by many scientists and members of EMBO itself who disliked and saw no necessity for the concept of a large international institution which might cream off gifted researchers from national centres of excellence. The Laboratory proposal had to be soft-pedalled at the intergovernmental meetings, the plans themselves were scaled down, in Britain many high-level debates continued to show reluctance to admit the necessity for such an institution, and not all the members of EMBC were able to afford a contribution to the cost. Nevertheless the tenacity of the proponents of the laboratory scheme was rewarded when in May 1973 the Agreement was signed by ten of the thirteen EMBC states establishing the European Molecular Biology Laboratory (EMBL). By that date a site had been agreed at Heidelberg, with temporary accommodation at other institutes in the town, plans for collaboration with the "outstations" at Hamburg and Grenoble which offered special facilities were well advanced and a Provisional Scientific Advisory Committee had been set up in October 1971 to establish a programme of research. In 1974 the Secretariat of EMBO as well as of EMBL moved to Heidelberg where they maintain separate offices under the same roof. The laboratory was formally opened in 1978.

The material relating to all these organisations which is preserved here is of historical interest for its content and also for its provenance. It consists of letters, memoranda, reports and drafts covering twenty years from the earliest informal discussions by groups of molecular biologists to 1982 when Kendrew's service as the first Director-General of the EMBL came to an end. The staple is Kendrew's own carefully-preserved accumulation of files: he was a founder member of EMBO, served on its Council 1963-71 and 1975-77 and as its Secretary-General 1969-74; he was Secretary-General of the EMBC 1970-74 and Project-Leader 1971-74 then Director-General of the EMBL. He was thus uniquely placed at or near the centre of the developing project. In addition, Professor Jeffries Wyman, also a founder member of EMBO, its Deputy Chairman and first Secretary-General 1963-69, has made over his own papers and correspondence on the subject for incorporation. There is also a considerable

amount of material of Max Perutz, the first Chairman of EMBO and a prime mover in the early meetings and the negotiations for the vital Volkswagen grant and the intergovernmental meetings; and there are letters, carbons or photocopies exchanged between most of the founder members of EMBO who were all leading scientists working for the encouragement of European collaborative research in the intervals of active laboratory life.

The early history of EMBO and of the "Swiss Initiative" leading eventually to EMBC are thus very well documented in almost every aspect by original material. The records of the early history of EMBL are unique because of Kendrew's special commitment to the project; they include the preparatory studies carried out under EMBO and EMBC and also the building, research programmes and administration of the laboratory itself. Some of the political dimension of the project as it affected Britain can be traced in the papers of the Royal Society's International Relations Committee, the Council for Scientific Policy and less extensively of the Medical Research Council. Developments in other European member states can only be glimpsed in correspondence with colleagues and there is no official intergovernmental material as such.

The abundance of material has made it expedient to present it in separate sections for the Organisation EMBO (Section F), the Conference EMBC (Section G) and the Laboratory EMBL (Section H), each of which has its own introduction and list of contents. It is of course acknowledged that this is in some ways an artificial distinction and that - especially with the earliest material - there is some overlap when correspondence may range over several topics and when meetings and membership of committees were arranged to coincide and remain interlinked in a careful system of checks and balances. Nevertheless it has a justification both in chronology and, later, in separate legal identities. The EMBO material remains primarily the continuing story of a private scientific organisation traceable from 1963; there is some overlap through scientists and scientific administrators in Switzerland leading to the political decision to establish EMBC: the first surviving document here is of July 1964. Both these organisations were obviously continuously involved with the laboratory project and it is much more difficult to assign a "starting date" for EMBL when scientific, political and administrative considerations were, sometimes uneasily, combined. The choice has been made of 1971, when Kendrew was appointed Project Leader, a Provisional Scientific Advisory Committee was set up to decide a research programme and a Building Committee

was established to determine site, specifications and choice of architect.

Every effort has been made throughout to avoid or minimise overlap and cross-references have been provided whenever they seemed useful.

The success of EMBO in weathering financial storms, bureaucratic takeovers and political indifference over so long a period, maintaining its own entity and developing to play a significant role in an intergovernmental institution such as EMBC and a major international facility such as EMBL is generally agreed to be largely due to the close network of distinguished scientists who knew and trusted each other as colleagues and friends. On a practical level this means that many of the early documents in all three sections are letters exchanged with varying degrees of informality. Many are in longhand, or have manuscript additions and afterthoughts. Not all are dated, including many from J. Wyman; not all are signed, including many of the carbon copies from M.F. Perutz; these have been assigned a place and provenance from their content. It should also be remembered that the MRC Unit at Cambridge was Kendrew's base until 1974 and that much of the work of EMBO, EMBC and EMBL emanated from there, as well as letters on the unmistakable pink copy paper apparently favoured there during the 1960s from the leading members of its staff (S. Brenner, H.E. Huxley, F.H.C. Crick, A. Klug in addition to Perutz and Kendrew) who were founder or very early members of EMBO and its committees.

SECTION F

EUROPEAN MOLECULAR BIOLOGY ORGANIZATION (EMBO)

F.1-F.232

INTRODUCTION

EARLY HISTORY

F.1 -F.9	Preliminary meetings and correspondence	1963
F.10-F.15	Formal constitution and statutes	
F.16-F.33	Relations with other organisations	
F.34-F.42	Policy document	
F.43-F.56	Funding	
F.57-F.60	Miscellaneous correspondence	

MEMBERSHIP

F.61-F.77	Nominations and elections	1963-82
F.78,F.79	Circulars and lists	1964-75

COUNCIL

F.80 -F.118A	Correspondence and meetings	1964-80
F.119-F.127	Membership and elections	1963-74
F.128,F.129	Minutes and circulars	1963-81

FUND COMMITTEE

F.130-F.132	Membership	1965-74
F.133-F.140	Correspondence and papers	1964-74
F.141-F.149	Fellowship applications	1964-74
F.150	Minutes	1965-73

COURSE COMMITTEE

F.151-F.153	Membership	1965-74
F.154-F.167	Correspondence and papers	1965-74
F.168	Minutes and circulars	1966-69

LABORATORY COMMITTEE

F.169-F.208	Meetings, correspondence and papers	1963-73
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ADMINISTRATION

F.209,F.210	Appointments	
F.211-F.215	Finance and accounts	
F.216-F.220	General administrative correspondence	

SYMPOSIUM COMMITTEE

F.221-F.228	Correspondence and papers	1974-81
F.229	Minutes	1974-80

MISCELLANEOUS

F.230,F.231	Press releases, articles, comments	1963-71
F.232	Annual reports	1966-81

INTRODUCTION

The earliest surviving documents (F.1) are dated January 1963. References in the correspondence, and Kendrew's later letter of 1971 included in the same folder, mention informal discussions in Geneva and Washington at the end of 1962 in which Kendrew, J.D. Watson, and V.F. Weisskopf took part and L. Szilard played a leading role. (Szilard's early involvement and strong encouragement of the project were subsequently commemorated in the Szilard Library at EMBL. See F.47, H.48, H.54, H.312). At this early stage, throughout and indeed considerably later than 1963, the possible establishment of a central organisation and institute in Switzerland on the model of CERN was envisaged. The project was often referred to as CERB (the biological equivalent of CERN); other names and acronyms were European Fundamental Biology Organisation (EFBO) and European Biological Organisation (EBO).

The crucial preliminary meeting, and the first attended by Perutz (later first Chairman of EMBO) was at Ravello in August 1963 (F.4-F.7). Here much of the future shape of the organisation was determined, notably the two purposes of funding research fellowships and courses and the establishment of a research institute. A provisional executive committee was appointed and met (F.8, F.9), suggestions for membership were requested (F.60, F.61) and the constituent Council meeting was held in February 1964 (F.80). This, like most of the early meetings, was held at CERN; links with Switzerland continued close through personal relationships with scientists (Weisskopf, E. Kellenberger and others) and the encouragement of the Swiss government.

The first Council meeting ushered in a period of great activity, all well documented: the drafting of a constitution (F.10-F.15), the formalisation of EMBO's aims (F.34-F.42) and the assuring of funds - EMBO is elective and there is no subscription or entrance fee. The funding problem was closely bound up with the problem of EMBO's relations with, or independence of, other organisations, some of which, it was thought, were too narrowly confined by national boundaries or limited scientific aims, while others such as the Council of Europe or UNESCO entailed the slower pace and political ramifications of international bureaucracy. Some of these negotiations are documented (F.16-F.33) through correspondence and reports and also through aide-memoires and notes of meetings or discussions for private circulation. In

the event EMBO kept its independence and launched its scientific programme thanks to a three-year grant from the Volkswagen Foundation (F.43-F.49) which, together with the diplomatic efforts of the Swiss government, saw it through to the signing of the intergovernmental agreement to provide financial support.

All these administrative and financial matters, and the continuing negotiations with the Swiss government, necessitated relatively frequent meetings of Council in 1964 and 1965 as well as private discussions or attendance at meetings which were reported to Council members by postal circular. The papers and correspondence for these early meetings are of considerable interest in tracing the growth of EMBO through the efforts and personal connections of its founder members.

Although the rules of EMBO prescribe that the Council should meet "not less than once a year, normally in January or February", this steady state was rarely achieved. The movement towards the establishment of the Conference and the protracted negotiations for the existence, scope, site and funding of the Laboratory all required special meetings, the setting-up of working groups and the preparation of reports and position papers. From 1966 the Council papers should be consulted in conjunction with those relating to the EMBC material in Section G.

EMBO's scientific programme was implemented through the Fund Committee which received and evaluated applications for short- and long-term fellowships and which met for the first time in November 1965; the Course Committee which first met formally in July 1966; and the Laboratory Committee which had its first meeting jointly with the World Health Organisation in May 1964. Full records of all these committees are preserved here from their founding documents up to 1974.

The records of the Laboratory Committee are of particular interest because of Kendrew's special involvement with it (he was its chairman from its inception until 1969) and because of the lukewarm and even hostile reception which the project encountered from scientists and politicians. It met less regularly than the other EMBO committees and its main task was to prepare proposals and costs for submission to EMBO members, to the Volkswagen Foundation, to the intergovernmental meetings and to the European Molecular Biology Conference. A major proposal devised in 1967 (F.171-F.182) was submitted to the second intergovernmental meeting of January 1968 where the

agreement was reached to provide, initially for five years, resources for the EMBO programme. The cost of this first laboratory scheme was considered excessive and an important meeting of EMBO members and other scientists was held in November 1969 at Konstanz; here the scientific programme was revised and working parties were set up for each of the specific activities agreed as most appropriate for an international laboratory (F.190-F.194). The revised proposal (F.195, F.196) was published in February 1970 and discussed at the first plenary session of EMBC in April 1970. It was accepted in principle and the Conference set up its own working parties in November 1970 to consider specific aspects of the laboratory; these are documented in Section G.

In addition to these three original committees, special EMBO committees were set up from time to time. Of these, the Symposium Committee is documented (F.221-F.229) from its inception in 1974 until its absorption in the Course Committee in 1980. The ad hoc Committee on rDNA which was set up by Council in January 1975 was established as a Standing Advisory Committee in January 1976. Its recommendation at its first meeting in February 1976 that a containment laboratory be set up within the framework of EMBL led to the development of the "P4" facility. All the material relating to the containment laboratory, including papers preceding and relative to the EMBO Committee, are in Section H.

EARLY HISTORY

PRELIMINARY MEETINGS AND CORRESPONDENCE

1963

F.1 Geneva 28 March

Correspondence and papers, January - March, on plans for proposed international laboratory and meeting held at CERN chaired by Weisskopf. Includes Kendrew's notes of costings, scientists to be approached. No agenda or note of discussions are included; those invited included J. Monod, C.H. Waddington, A. Engström, H. Friedrich-Freksa, M. Delbruck, E. Amaldi, A.A. Buzzati-Traverso, L. Cavalli-Sforza.

C.H. Waddington's letter of 11 March outlines many of the objections to the idea of a centralised laboratory which continued to be made throughout the ensuing decade.

Also included here is correspondence 1971 with a biographer of Szilard in which Kendrew outlines the early discussions and Szilard's part in them.

F.2, F.3 Geneva 28 June

F.2 Correspondence April - June on arrangements for meeting, choice of participants, matters for discussion.

F.3 Draft and final "Record of Discussion on Molecular Biology ...", papers presented at meeting (Kendrew's "Proposal for an international laboratory of molecular biology in Europe" CERB, Waddington's non-centralised "European Biological Organisation" EBO), comments by M. Delbruck.

F.4-F.7 Ravello 16-17 September

The meeting was held at the invitation of the Italian Physical Society during its summer course. The Kendrew and Waddington papers were further discussed and the EMBO was set up, together with a provisional executive committee (Chairman: Perutz), a Laboratory subcommittee (Chairman: Kendrew) and a "Federal Organization Subcommittee" (Chairman: Buzzati-Traverso).

- F.4 Correspondence February - August with organisers of meeting and colleagues; includes invitation, proposed participants, discussions of proposals.
- F.5 Correspondence July - August with Szilard and Waddington re draft proposals, and French representation at meeting.
- F.6 Correspondence October on Kendrew's draft summary of the meeting.
- F.7 Summary of proceedings of meeting, by Kendrew, 29 October, annotated agenda of meeting, lists of participants, comments on proposals, ms. notes by Kendrew.
- F.8, F.9 Provisional Executive Committee, Brussels 12 December
- This meeting was organised by Buzzati-Traverso who acted as chairman in the absence of Perutz. The expenses were defrayed by EURATOM.
- F.8 Correspondence October - December. Participation in EMBO of J. Wyman, French cancer research proposal, WHO proposal, invitations and nominations.
- F.9 Agenda of meeting, Wyman's account of meeting (there were no formal minutes), continuing correspondence December 1963 - January 1964.

In February 1964 the EMBO Council had its first meeting. See F.80-F.118 for papers and correspondence for that and subsequent meetings 1964-80.

FORMAL CONSTITUTION AND STATUTES

Drafts for a constitution and regulations were prepared by Kendrew, Perutz, Kellenberger and Wyman, and presented to the first EMBO Council in February 1964. Firms of international lawyers in Belgium and Switzerland were approached and further drafts drawn up. The Swiss firm was chosen at the Council meeting in July 1964.

- F.10 Correspondence on choice of lawyer.

- F.11 Manuscript notes and drafts, some dated January 1964, by Kendrew and others.
- F.12 Draft submitted by Belgian lawyers, with a little correspondence and comments, April - June 1964.
- F.13 Drafts drawn up by Swiss lawyers, with annotations and comments by Kendrew and Perutz, June - September 1964.
- F.14 Final versions of Rules and Statutes (English and French).
- F.15 Correspondence with members of EMBO and with Swiss lawyers re registration of EMBO in Switzerland (12 July 1964), drafts and amendments of constitution, February 1964 - September 1965.

RELATIONS WITH OTHER ORGANISATIONS

The movement towards scientific co-operation in the 1960s produced numerous initiatives, some private or semi-private, some national and some international. EMBO was involved with several of these which are documented in varying degrees of detail. They are presented, for convenience, in chronological order though in fact meetings and negotiations were often going forward concurrently, making the story a complex one.

Attention is also drawn (F.169, K.118 and K.119), to a similar initiative by the World Health Organisation to set up an international health research centre, to which reference is made in the correspondence.

F.16-F.26 UNESCO, ICRO, ILSI 1963-68

ICRO, the International Cell Research Organization, was founded in 1962 to serve as consultant to UNESCO's Cell Biology programme and was supported by UNESCO funds. Kendrew was proposed as "convenor" on its "Panel 1, Molecular Biology and Control Processes" (F.16).

ILSI, the International Life Sciences Institute, was set up by a group of Belgian and foreign scientists under the auspices of the Princesse Liliane Foundation. J. Brachet and P.B. Medawar were among those closely involved in the plan, whose scope and aims were very similar to those of EMBO. Its first meeting was in November 1963 (F.17).

The similarity in many respects between EMBO and ILSI led to consideration of a merger of interests via UNESCO which provided some administrative and financial assistance. Several meetings were held, and an "Expert Committee" was set up to prepare a "Study on the present needs for international cooperation in the basic biological sciences" (F.25). EMBO however preferred not to become absorbed into a global institution of such scale and to maintain its "European" links in the search for intergovernmental support.

F.16 May, September - December 1963.

F.17 Information about ILSI, constitution, governing board, programme, budget etc.

F.18 December 1963 - February 1964.

F.19 March - April 1964

Includes approach to UNESCO, notes of discussions in Belgium and London (April).

F.20 May - June 1964

Arrangements and notes of meetings Brussels 3 May, London 28 May, draft document by UNESCO, meeting of working group of "UNESCO Experts" in London 5 June.

F.21 July - September 1964

Includes extract from EMBO Council meeting (financed by UNESCO) affirming Council's "intention to maintain complete independence of UNESCO and other similar organisations in matters both of policy and of administration", meeting with EMBO (Perutz, Kendrew) and ILSI (Medawar, Theorell, de Duve) London 22 July at which Medawar reported readiness of ILSI to negotiate agreement with EMBO, and UNESCO Expert Committee was set up; correspondence, minutes etc.

F.22 November 1964 - January 1965

Meeting of UNESCO Expert Committee 19 October (official Minute and two separate private accounts by Wyman) and correspondence arising.

- F.23 March 1965
- Correspondence of Perutz with Brachet and with MRC; letter to Brachet sets out clearly the objections both to a clinically oriented scheme and to a broad international scheme; the letter to MRC on general aims of EMBO was written for MRC Sub-committee meeting. Also included is Perutz's report on the meeting (hostile to the laboratory) for EMBO Council members.
- F.24 April - October 1965
- Meeting of UNESCO Expert Committee 17 September and its report.
- F.25 1966
- Final copy of report, correspondence and comments from colleagues.
- F.26 1968
- F.27 CERN 1964
- Miscellaneous correspondence with F. Jacob, V.F. Weisskopf.
- F.28 French Cancer Research Proposal 1964
- Miscellaneous correspondence with F. Jacob, A. Haddow. See also F.8.
- F.29-F.32 COUNCIL OF EUROPE 1964-66
- The Council's Committee for Higher Education and Research had been concerned since 1963 with projects for combined research. Its Study Group included molecular biology for discussion at its meetings at The Hague June and Aarhus October 1964, Strasbourg March 1965 and March 1966. Further action was deemed unnecessary in view of the negotiations by the Swiss Government to convene an intergovernmental conference. See memo. at F.32.
- F.29 April - November 1964, correspondence and papers, meetings and discussions at The Hague and Aarhus.
- F.30 January 1965 - January 1966

- F.31 Correspondence January - June 1965 between Perutz and A. Frank on Interim Committee on Science to discuss "International Cooperation in Biology", including comments on meetings and EMBO affairs.
- F.32 Council of Europe "Note on Council of Europe action in the field of molecular biology" summarising negotiations.
- Reports of Interim Committee on "International Cooperation in Biology".
- F.33 EUROPEAN CELL BIOLOGY ORGANIZATION (ECBO) 1968-72
- Correspondence and papers re setting-up of ECBO, nominations of EMBO representatives at meetings (J. Brachet, M.G.P. Stoker), foundation meeting, statutes, comments by ECBO on Laboratory plans.
- See G.113 for later discussions on relations between EMBO and ECBO.

POLICY DOCUMENT

The "Document", made available in English, French and German, was published in April 1966 as a 36pp. booklet. It set out EMBO's history, philosophy and scientific programme of fellowships, advanced courses and study sessions, research grants, the case for a European laboratory of molecular biology, and financial estimates; the EMBO Statutes and Rules were also included. Drafts of the material had been prepared and agreed by June 1965 but publication of the booklet was timed to coincide with the formal announcement of the three-year grant (made in December 1965) from the Volkswagen Foundation which enabled the fellowship and teaching programme, and further studies of the laboratory project, to go ahead.

The booklet was an important element - hence the name "Policy Document" generally applied to it - in the Swiss Government's initiative to launch an intergovernmental meeting leading to the establishment of the European Molecular Biology Conference.

The document, a corporate version agreed by members of the EMBO Council, drew very largely on the early "Proposal for a European Organisation of Fundamental Biology" by Kendrew and C.H. Waddington of August 1963; other source materials were the "Draft Proposal for Operation and Activities of EMBO Fund" of March 1965 by A.A. Buzzati-Traverso (F.34) and "Policy for EMBO Research Grants" of May 1965 by J. Monod (F.35). The drafts were assembled and circulated by J. Wyman and the final version sent to Kendrew who supervised arrangements for translation and printing.

- F.34 Kendrew's and Waddington's paper, August 1963; Buzzati-Traverso's paper March 1965 (Perutz's copy with ms. corrections and comments); revised version by Wyman; Kendrew's copy, very heavily rewritten by him.
- F.35 Manuscript and typescript drafts for sections of the document, mainly by Wyman and Kendrew, but including J. Monod's draft contribution on policy on research grants.
- F.36 Later heavily corrected manuscript and typescript draft.
- F.37 Two duplicated typescript drafts with manuscript corrections (one in Perutz's hand).
- F.38 Papers and correspondence May - July 1965 on circulation of draft by Wyman to EMBO Council members 20 May, their comments and correspondence arising.
- F.39 Final draft with manuscript note by Wyman "Final document as sent to JCK end of June for printing. This (with version C. of Ch.4) was translated by Jacob and is to be printed". With a covering letter by Wyman, June 1965.
- F.40 Correspondence July 1965 - May 1966 on French translation, circulation of printed version etc. Kendrew's letter to Jacob of 10 August refers to the delay in publication at the request of the Volkswagen Foundation; his letter to Wyman 4 May 1966 mentions a possible site at Nice for the EMBO laboratory.
- F.41 Correspondence June 1965 - July 1966 re design and printing of booklet.
- F.42 Copy of booklet.

FUNDING

Several initiatives in the search for funding were made in 1964 after the first formal EMBO Council meeting. The most successful of these approaches in quantitative terms was to the Volkswagen Foundation which agreed a grant of DM.2,748,000 in December 1965 for three years 1966-68. This enabled the EMBO programme for fellowships and courses to prove its value. The negotiations and terms of the grant are well documented in the papers at F.43-F.49.

Although the VW grant was crucial, there were other smaller sums which came in betimes in 1964 and helped the infant EMBO to survive administratively and start its fellowship programme on a small scale. These usually resulted from the good offices of individual members of EMBO and are presented at F.50-F.54.

F.43-F.49 Volkswagen Foundation

F.43 February - March 1964

Mainly replies by EMBO Council to Perutz's circular giving estimates to put to VW Foundation; includes letter (photocopy) from H. Friedrich-Frekse with first suggestion of approach to VW.

F.44 March - September 1964

Includes note of meeting 22 March with VW representatives.

F.45 March - September 1965

Includes copy of original grant application sent to VW June 1965.

F.46 October - November 1965

Continuing negotiations, amended application.

F.47

November - December 1965

Papers and correspondence for special meeting with VW to discuss terms of application, 3 December. Includes Wyman's memorandum on meeting and his annotated papers and copy of letter from VW 10 December confirming grant. This covered four heads of expenditure: 1. Administrative costs; 2. Fellowships; 3. Courses and workshops; 4. Costs relating to studies and planning work as a basis for a decision in principle on the setting-up of a central laboratory.

N.B. Wyman's memorandum refers to information from R. Kerschner of VW that "Volkswagen's interest in EMBO was originally aroused by a telephone call from Szilard just after the Ravello meeting. It was this which led to the original Volkswagen approach to us."

F.48

1966

Mainly arrangements for administering grant.

F.49

1969-72

Later correspondence on final spending of VW grant. Included here is a copy of "EMBO Activities 1966-68. A report to the Volkswagen Foundation on the utilisation of the grant."

F.50

Research Council of Israel

1964-66

Various donations were made to the fellowship fund at the request of E. Katchalski.

F.51

Interpharma

1964

A donation of S.Fr.42,000 was made through the good offices of E. Kellenberger.

F.52

Amis de l'Université de Strasbourg

1964

A donation of \$1000 was made through the good offices of C. Sadron.

F.53

International Laboratory of Genetics and Biophysics

1964

Support for two fellowships, arranged by A.A. Buzzati-Traverso.

F.54	<u>Sweden</u>	1965
	Support for two EMBO fellowships (for 1966) arranged by A. Engström.	

F.55, F.56 Other miscellaneous approaches

F.55 Ford Foundation 1966

F.56	National Institutes of Health, Bethesda	1966-69
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MISCELLANEOUS CORRESPONDENCE

F.57, F.58 While every effort has been made to assign a specific place to correspondence and papers, a few escape classification usually because they deal with several topics in the affairs of EMBO, occasionally because they are peripheral to its main concerns. They are retained here in chronological order.

F.57 1964

F.58 1965

F.59, F.60 Requests for information about EMBO, from scientists, science
journalists and editors, some with suggestions for collaborative
research or for projects to be undertaken by EMBO.

F.59 1964. Mainly arising from press release and articles in *Nature*, *Science* etc. following Council meeting of February 1964.

F.60 1965-73. Similar material, but referring to EMBL as well as EMBO.

MEMBERSHIP

NOMINATIONS AND ELECTIONS

1963-82

After the Ravello meeting it was decided to invite some 100-200 European biologists to become members of EMBO. Perutz as Chairman of the Provisional Executive Committee asked for suggestions for membership from the founder members and leading scientists (F.61). These were presented for consideration at the Council meeting in February 1964 and invitations issued (F.62-F.68). With the formalisation of EMBO and the drawing-up of Statutes and Rules, the procedures for election of ordinary, associate and Council members were more closely established. The membership has powers of nomination and election and constitutes the General Assembly and supreme organ of EMBO. Should the General Assembly not be convened, members are consulted by post by Council; hence the importance especially in the early years of the circulars preserved at F.78.

- F.61 Perutz's circular letter 1 November 1963 requesting suggestions for membership, with replies from C.H. Waddington, E. Katchalski, L.L. Cavalli-Sforza, A. Engström, F. Jacob, C. Sadron, E. Kellenberger, F. Lipmann, A.A. Buzzati-Traverso, O. Maaloe, H. Friedrich-Frekxa, A.M. Liquori, G.N. Cohen, H. Chantrenne and others.
- F.62 Final lists of original membership compiled by Kendrew; copy of Perutz's letter of invitation to members, sent after first Council meeting.
- F.63-F.67 Letters of acceptance of membership, some with comments on EMBO programme (several hostile to laboratory) or including personal or scientific news.
- F.63 A-C
- F.64 D-J
- F.65 K-O
- F.66 P-S
- F.67 T-Z
- F.68 Letters 1964 declining membership.

- F.69 Election of Associate Members 1965-74.
- F.70-F.72 General correspondence on nominations, recommendations, ballots and elections for membership 1964-82.
- F.70 1964, 1966-68
- F.71 1969-70
- F.72 1971-75, 1981-82
- F.73 Letters of acceptance of membership, 1969-74.
- F.74-F.77 Papers and correspondence 1972-74 re new procedure for election aimed at enlarging membership of EMBO to include younger scientists working in new fields.
- F.74 Correspondence and drafts on new procedure prepared for discussion at Council meeting November 1972, circular to members and selected comments by them.
- F.75 Election of Nominating Committee 1972-73. The final membership was S. Brenner, M. Eigen, F. Jacob, G. Klein, M. Sela and the Chairman was N.K. Jerne.
- F.76 Correspondence with scientists requesting their consent to be nominated 1974, 1975.
- F.77 Correspondence 1974 with N.K. Jerne on work of Nominating Committee and other EMBO affairs.

CIRCULARS AND LISTS

- F.78 Miscellaneous circulars to EMBO members 1964-75.
- F.79 Membership lists.

COUNCIL

CORRESPONDENCE AND MEETINGS

1964-80

F.80

2 February 1964, Geneva

This was the first formal meeting of Council. Matters discussed included elections to membership, constitution, funding, relations with other organisations, registration.

Folder includes correspondence preceding and following meeting, press releases, minutes. Perutz's circular letter of 28 January discusses proposed name of organisation and feels that " 'Fundamental Biology' is presumptuous" and " 'Molecular Biology' might be better from that point of view".

F.81-F.83

12 July 1964

F.81

Comment by Council members April-May on proposal transmitted by F. Jacob that part of French Government's Cancer Fund might be channelled via EMBO to support research in French laboratories.

F.82

Agenda, circulars, arrangements, memoranda, minutes.

F.83

Correspondence with members June-July.

F.84, F.85

2 February 1965

F.84

Agenda, circulars, memoranda, minutes.

F.85

Correspondence, discussion notes, correspondence with members September 1964 - February 1965.

F.86-F.88

8-10 May 1965

F.86

Reports by Council members on developments in molecular biology, and attitudes to EMBO, in their countries.

- F.87 Circulars, memoranda, minutes, heavily-corrected draft minutes, draft note on "Further developments" (meeting with Swiss minister Burckhardt).
- F.88 Correspondence with members March-April.
- F.89, F.90 15 January 1966
- F.89 Agenda, memoranda, circulars, minutes.
- F.90 Correspondence with members and others July 1965 - January 1966.
- F.91, F.92 14 January 1967
- F.91 Agenda, arrangements, Perutz's notes, Wyman's notes of meeting, minutes.
- F.92 Correspondence June 1966 - May 1967 (elections to Council, Laboratory project, intergovernmental meeting).
- F.93-F.96 21 January 1968
- F.93 Agenda, memoranda, circulars, minutes.
- F.94 Perutz's circular on Draft Arrangements for Conference, and Council members' replies.
- F.95 Correspondence December 1967 - March 1968.
- F.96 Invitations, acceptances and arrangements.
- F.97-F.99 12 January 1969
- F.97 Agenda, circulars, minutes and correspondence re minutes.
- F.98 Correspondence October 1968 - February 1969.

F.99 Invitations, travel arrangements.

At this meeting Perutz and Wyman resigned as President and Secretary-General, being replaced by M. Eigen and Kendrew respectively.

F.100 1 June 1969

Meeting held in preparation for the Interim Conference of European Molecular Biology at CERN on 2 and 3 June.

Agenda, papers, minutes, correspondence, travel arrangements.

F.101 26 November 1969

Meeting held at Konstanz immediately preceding discussion meeting on laboratory plans. (See also F.190-F.194.)

Agenda, papers, minutes, correspondence, Israel membership.

F.102, F.103 17 January 1970

F.102 Agenda, papers (revised laboratory proposal, indicative scheme).

F.103 Correspondence, travel arrangements.

F.104 5 April 1970

Meeting held at CERN preceding meeting of EMBC 6-8 April.

Agenda, minutes, correspondence.

F.105 28 September 1970

Joint meeting with Laboratory Committee.

Agenda, circulars, minutes, travel arrangements. (See also F.197.)

F.106 25 & 28 November 1970

Agenda, circulars, minutes, travel arrangements, correspondence on setting up of Laboratory Working Groups. (See also G.65 *et seq.*)

- F.107 26 April 1971
- Emergency meeting of Council and Laboratory Committee to discuss choice of site.
- Agenda, circulars, memoranda, minutes, correspondence, travel arrangements.
- F.108 11 October 1971
- Agenda, circular re setting-up of Scientific Advisory Committee for laboratory, papers and proposals, correspondence.
- F.109 3 December 1971
- Agenda, circular, correspondence, travel arrangements.
- F.110 19-20 April 1972
- A joint meeting with the Provisional Scientific Advisory Committee, to discuss reductions in budget estimates for laboratory.
- Agenda, circulars, memoranda, papers, correspondence, minutes of meeting and of informal meeting 28 April 1972.
- F.111-F.113 4 November 1972
- Meeting preceding "Haarlass meeting" on research programme of laboratory. (See F.205-F.207.)
- F.111 Agenda, circulars, papers and proposals (A. Tiselius, A. Katchalski memorials), correspondence, minutes.
- F.112 Working party on programme and activities of EMBO after 1974 set up at November meeting; the members were N.K. Jerne, A. Engström, J. Wyman, R.K. Appleyard.
- Drafts November 1972 - May 1973 by several working party members (includes version heavily-corrected by Kendrew which became final text), correspondence re meetings and drafts.
- F.113 Kendrew's circular to EMBO members on draft report of working party, and replies April 1973

F.114 12 January 1973

Agenda, minutes, correspondence, travel arrangements.

F.115 4 May 1973

Agenda, papers and proposals, correspondence, minutes, travel arrangements.

F.116, F.117 12 February 1974

F.116 Agenda, memoranda, minutes of meeting and of informal meeting 20 October 1973, correspondence.

F.117 Travel arrangements and correspondence.

F.118 10 January 1975

This was the last meeting which Kendrew attended as Secretary-General, his successor being N.O. Kjeldgaard. Material includes set of papers (some annotated), correspondence on agenda items and on elections as officers of EMBO, Kendrew's letters to new and to retiring members of EMBO Committees.

N.B. At this meeting the Council discussed under Item 14 the matter of biohazards, the possible modifications to the Laboratory design to permit hybrid DNA research, and the setting-up of an *ad hoc* Committee on biohazards. See H.100-H.102, H.156-H.177.

F.118A Miscellaneous later correspondence and notes on EMBO Council matters 1975-80.

MEMBERSHIP AND ELECTIONS

F.119 Lists and charts of Council membership compiled by Kendrew, indicating duration of service on Council and type of membership (original member; elected; co-opted; invited) and extending 1963-90.

Early lists compiled by Wyman of "EFBO Executive Committee" (1963) and original Council.

F.129 Minutes of Council 1963-81.

FUND COMMITTEE

MEMBERSHIP

1965-74

F.130 Correspondence 1965-66 on original membership of Fund Committee: H. Chantrenne (Chairman), A.A. Buzzati-Traverso, J.A. Cohen, W. Hayes, H.T. Witt, A. Engström. C.H. Waddington was a co-opted member.

F.131 Membership 1969-70.

F.132 Membership 1971-74.

CORRESPONDENCE AND PAPERS

1964-74

The material consists of correspondence between members of the Fund Committee and the EMBO Secretariat, draft reports, budgets and financial estimates, memoranda and papers on meetings of the Committee, policy on fellowships, salary scales, press notifications.

F.133 December 1964 - June 1965

Correspondence mainly with A.A. Buzzati-Traverso re support for EMBO fellowships at his laboratory (Naples) and his "Draft proposal for operation and activities of EMBO fund".

Correspondence re appropriate salary scales.

F.134 August and December 1965

Papers and correspondence for and arising from first meeting held in Cambridge 8 November 1965. Includes policy paper, draft minutes and memoranda, notes on salary scales.

F.135 1966

F.136 1967

F.137 1968

F.138 1969-70

F.139 1971

F.140 1972-74

FELLOWSHIP APPLICATIONS

1964-74

Includes letters of application and enquiry, supporting documents, interview reports, recommendations.

F.141 1964-65

F.146 1970

F.142 1966

F.147 1971

F.143 1967

F.148 1972

F.144 1968

F.149 1973-74

F.145 1969

MINUTES

F.150 Minutes 1965-73.

COURSE COMMITTEE

The committee was sometimes known in early correspondence as the "Summer Schools Committee" or the "Committee on Courses". The EMBO "Policy Document" published in April 1966 referred to it as "Committee on Courses" and "Course Committee", the latter form being preferred as from the first formal meeting in July 1966.

MEMBERSHIP

1965-74

F.151 Correspondence 1965-66 on original membership of Course Committee. Included here is Kendrew's chart of membership and period of service 1964-71

F.152 Membership 1969-71.

F.153 Membership 1972-74. Includes co-operation with Course Committee of FEBS.

CORRESPONDENCE AND PAPERS

1965-74

The material deals with the organisation of EMBO summer schools and courses, applications for support, policy notes, collaboration with other organisations (ICRO, FEBS, NATO), information on international courses organised by EMBO and others.

F.154 March - December 1965

Arrangements for "ad hoc Meeting on Courses" held by EMBO Council 15 January 1966; includes draft proposals on policy drawn up by A. Tiselius (2 copies respectively annotated by M.F. Perutz and Kendrew), and note of meeting.

F.155 July - December 1965

EMBO support for "Course on Genetics and Physiology of Bacterial Viruses", Naples (Director: A.A. Buzzati-Traverso) met from Interpharma grant. Includes information on course.

- F.156 January - September 1966
- Relations and co-operation with International Cell Research Organisation (ICRO), Federation of European Biochemical Societies (FEBS), Experimental Biology and Medicine.
- F.157 March - December 1966
- Policy, meetings, course proposals. Includes R.K. Appleyard's paper on "The problem of EMBO courses".
- F.158 June - September 1966
- Proposed conference on spores.
- F.159 March 1966 - January 1967
- EMBO support for Oxford University Summer School on Molecular Biology and Biophysics.
- F.160 January - October 1967
- F.161 May 1968 - January 1969
- Immunology workshop by J. Oudin (cancelled).
- F.162 June 1968 - June 1969
- Course held in Greece (some political objections were raised).
- F.163 November 1968 - July 1969
- EMBO Lecturers scheme, proposed by W. Hayes and agreed by Council January 1969.
- F.164 1970-71

- F.165 December 1971 - October 1972
Includes letter from J. Wyman on future policy for EMBO courses
from 1975 and renewal of EMBC Agreement.
- F.166 October - November 1972
EMBO support for Aharon Katzir-Katchalsky Memorial Conference.
- F.167 1974
EEC Sponsored Courses.

MINUTES

- F.168 Minutes and circulars 1966-69.

LABORATORY COMMITTEE

MEETINGS, CORRESPONDENCE AND PAPERS

1963-73

F.169 1963-64

Correspondence and papers. Includes Kendrew's "Notes for the meeting on an International Laboratory of Molecular Biology to be held in Geneva under the sponsorship of WHO 1-2 May 1964" and his minutes of the meeting. The EMBO Laboratory Committee membership was L.L. Cavalli-Sforza, H. Chantrenne, A. Tissières and Kendrew (Chairman). See also K.118, K.119.

F.170 1965

"The case for a European Laboratory of Molecular Biology". Kendrew's draft 29 April 1965 prepared for committee and Council at request of Swiss government, with a few manuscript revisions by M.F. Perutz and J. Wyman.

F.171-F.182 Laboratory Proposal Document 1967

The document was prepared, after consultation with members of EMBO, for discussion at a meeting of the Laboratory Committee at Nice on 23 September. The material includes correspondence on the role of the laboratory, drafts and memoranda, notes of the meeting and of the preparation of the final version, which was submitted to the EMBC meeting in January 1968.

Several of the notes and documents are by M. Delauche who was seconded from EURATOM as an assistant on the laboratory project in 1967.

F.171-F.173 Correspondence with colleagues on research projects appropriate to a central laboratory, analysis of replies, notes of discussions and meetings, early drafts and comments preceding committee meeting.

F.171 April, May. Research proposals.

F.172 June. Includes notes of meetings and discussions, suggested draft prepared by R.K. Appleyard.

- F.173 July, August. Continuing correspondence, drafts and comments.
- F.174 Draft drawn up by Wyman and Kendrew for discussion at meeting. The draft quoted extensively from the original EMBO "Policy document" and envisaged a series of appendices to be written by individual scientists in support of the case for the laboratory. Three of these appendices, by J.A. Cohen, F.H.C. Crick and J. Monod are included in the folder. See also F.177, F.178, F.184.
- F.175 "Summary" of Nice meeting, J. Wyman's notes on meeting, notes, drafts, comments, September.
- F.176 Information on research programmes, laboratory costings and budgets for various European laboratories sent to Kendrew by colleagues in preparation for final draft proposal.
- F.177, F.178 Correspondence re appendices for document, some of which are included. October 1967 - January 1968.
- F.177 M. Delbruck, M. Eigen and N.K. Jerne (Appendix on "The complete solution to the Antibody Problem"), B. Hartley, F. Jacob (Appendix on "Control Systems").
- F.178 C. Levinthal, H.C. Longuet-Higgins (Appendix on "Organisms as self-organising systems"), V.F. Weisskopf ("The experience of CERN and the proposal for a European biology laboratory").
- F.179 Notes of conversations at Cambridge on research space and costings, November.
- F.180 Amended draft proposal for laboratory, 69pp, November.
- F.181 Correspondence November - December, mainly comments on draft.
- F.182 Version submitted to EMBC. (N.B. 10 "Annexes" are listed, but only 6-10 are present and there is a further unlisted Annex 11 by A. Katchalsky.)

F.183 1968

General correspondence on laboratory matters; includes letter from J. Wyman to O. Maaløe inviting him to become Chairman of committee in view of Kendrew's move to office of Secretary-General.

F.184-F.188 Committee meeting at Linton, Cambridge (Kendrew's home),
16 March 1969

F.184 Correspondence January - March. Includes note on "Teaching at the EMBO Laboratory" by A.A. Buzzati-Traverso intended as Appendix to proposal document.

F.185 Papers circulated for meeting, by Buzzati-Traverso, R.K. Appleyard, O. Maaløe and Kendrew, on revised laboratory proposal.

F.186 Memorandum and minutes of meeting, drafts and circulars March - June, including copy of U.K. delegation note on the proposed laboratory presented at Interim Conference, June.

F.187 Information on present and future plans for molecular biology in various European countries, assembled as a result of March meeting.

F.188 Arrangements for meetings in March and June.

F.189 Royal Society Discussion meeting, 21 October 1969

This was a special meeting to discuss "greater participation by U.K. in the European Molecular Biology Organisation and particularly in its proposed laboratory or laboratories". The material is included in this sequence because it signals the concern in the scientific world at the laboratory proposal, and immediately precedes the "Konstanz meeting" at which the scientific programme was debated and which is referred to in some of the papers.

Folder includes invitation, list of participants, papers by Kendrew, M.G.P. Stoker, S. Brenner, draft contribution by Kendrew, note by C.H. Waddington, Kendrew's note of speakers and their opinions, report (apparently pirated) of meeting published in *Nature*, 224.

F.190-F.194 The "Konstanz" meeting

This symposium "to discuss the present and future development of molecular biology with special reference to a European laboratory", was held at Konstanz 27-30 November 1969. Attendance was by invitation and was not confined to EMBO members. The Laboratory Committee met twice during the meeting, on 27 and 30 November and at the second meeting working groups were appointed (on subcellular structures, cell genetics, instrumentation and computation) to prepare a more specific scientific programme for a revised laboratory proposal document. At the same meeting Kendrew agreed "to take on the directorship, if the project proved to be good".

The success of the "Konstanz" meeting was such that it became a generic term for intensive research meetings of this kind; the similar occasion at Haarlass near Heidelberg in 1971 was referred to as "Konstanz II" (F.205-F.207) and there were plans for a "Konstanz III" (H.147).

See C.128, H.345 for Kendrew's notes on the meeting.

F.190 Circulars, invitations, lists of participants, agenda, papers circulated to participants, photograph taken at meeting.

F.191 Kendrew's notes for his opening remarks; "Notes on Embo meeting . . . " including the two meetings of the Laboratory committee, unsigned but by J. Wyman.

F.192 Working group on cell genetics.

Correspondence and notes, including comments on working group's report sent to S. Brenner (Convenor).

F.193 Working group on subcellular structures.

Circulars only.

F.194 Working group on instrumentation.

Correspondence, notes, draft report by H.E. Huxley (Convenor).

F.195, F.196 Revised Laboratory Proposal

F.195 Correspondence and circulars on meetings, preparation and circulation of document December 1969 - May 1970.

F.196 Copy of revised proposal 16 February 1970, submitted to Conference as CEBM 70/12E, 76pp., and also of Kendrew's "Summary of EMBO's new proposals for an international laboratory", 1 January 1970.

F.197 Correspondence and circulars June - September 1970 re meeting of Laboratory Committee as part of joint EMBO/EMBC meeting at The Hague, 28 September - 1 October. (See also F.105.) At this meeting the Sites Subcommittee of the Laboratory Committee was set up.

F.198-F.204 Sites Subcommittee

At its meeting at The Hague in September 1970 the EMBO Council appointed a sites subcommittee of the Laboratory Committee with O. Maaløe as Chairman; the members were H.E. Huxley, K.C. Holmes and C. Weissmann, with D.C. Phillips, A. Tissières and H. Zachau as consultants and M. Delauche as secretary. The subcommittee met and visited possible sites at Munich (October), CERN (November) and additional sites at Heidelberg, Karlsruhe and Hamburg (January - February 1971). Its "Report on a Selection of Sites in Germany", dated 22 February 1971, considered "that the case for the Heidelberg site is by far the strongest". Meanwhile the official Sites Committee of EMBC, set up by the Conference in November 1970, conducted its own programme of visits January - July 1971, and in its report of July 1971 also recommended the Heidelberg site. (See G.74-G.87.)

Also included is correspondence on various other possible sites for the laboratory which had been mooted, often for a considerable time. In particular, the idea of a site near Geneva like that of CERN had been an early favourite and was not easily abandoned. No records survive here of offers made by Italy and Austria, nor of a possible French site at Nice (though see F. Jacob's letter at F.202 and also F.40).

See G.87 for other, later suggestions.

F.198 Sites subcommittee: appointment, membership, correspondence, arrangements for meetings, notes and memoranda on sites visited, report. September 1970 - March 1971. See also G.78.

F.199-F.204 Other possible sites for laboratory

Greece 1966-70, 1976.

Offer made in 1966 and renewed in 1970 of accommodation in part of the "Greek Institute of Basic Biological Research - Alexander Fleming" founded by Amalia Fleming. Includes correspondence with members of EMBO Council, Greek colleagues and Lady Fleming (also a later letter 1976).

F.199 1966

F.200 1970, 1976

F.201 Cambridge, 1967-68.

Correspondence and memoranda.

F.202 Geneva/CERN, 1969-70.

Correspondence and memorandum.

F.203 Edinburgh, 1970.

F.204 Culham, 1970-71

F.205-F.207 "Second Konstanz meeting", 4-7 November 1972.

This was another meeting to discuss the scientific programme of the Laboratory; it was held at the Hotel Haarlass, Heidelberg, but was generally referred to as "Second Konstanz" because of the very successful first meeting (see F.190-F.194). The meeting was financed from \$15,000 remaining from the Volkswagen Foundation grant. It was larger than the previous meeting, and like it included invited guests as well as EMBO members.

F.205 Correspondence, circulars, suggestions for participants, draft and final lists. December 1971 - November 1972.

F.206 Programme, circulars, correspondence with speakers, Kendrew's notes on scientific sessions (18pp. ms.), manuscript notes on meeting in unidentified hand.

F.207 Arrangements, travel claims, accounts for meeting.

F.208

Membership of Laboratory Committee

Miscellaneous brief correspondence, lists of members etc.,
1967-73.

ADMINISTRATION

APPOINTMENTS - EXECUTIVE SECRETARY

F.209 Appointment of R.K. Appleyard (seconded part-time from EURATOM)
with effect from 1 August 1965.

Correspondence and negotiations July 1964 - August 1965.

F.210 Appointment of J. Tooze with effect from 1 June 1973.

Correspondence and negotiations, Kendrew's notes November 1972 -
June 1973.

FINANCE AND ACCOUNTS

F.211 Bank accounts in Brussels and Geneva 1964-68.

F.212 Financial estimates for EMBO activities 1969-71, prepared at
request of first EMBC meeting (April 1967) by R.K. Appleyard,
with correspondence arising with M.F. Perutz April-May 1967.

F.213 Revised draft as submitted to EMBO Council, with comments and
replies, June-July 1967.

F.214 Miscellaneous material on financial situation of EMBO, September
1967 - October 1968.

F.215 EMBO Accounts 1964, 1966-70, 1973-80.

GENERAL ADMINISTRATIVE CORRESPONDENCE

The correspondence consists mainly of exchanges 1965-73 between R.K. Appleyard and J. Wyman, M.F. Perutz and Kendrew.

- F.216 1965. Setting-up of EMBO office at Brussels, appointment of Price, Waterhouse as accountants.
- F.217 1966
- F.218 1967-68
- F.219 1969-70
- F.220 1971-73. Includes brief correspondence on Appleyard's resignation as Executive Secretary.

SYMPOSIUM COMMITTEE

This was set up by Council in February 1974 to organise a series of EMBO Symposia to be held annually in Heidelberg. One of the aims was to help to establish the reputation of the laboratory at Heidelberg as a major centre for research and the dissemination of leading research ideas. The symposia were at first organised privately by EMBO outside its general scientific programme under EMBC and therefore relied on independent finance and on fees. The first symposium was held in 1975, and the first in the laboratory itself, in May 1978, coincided with its formal opening.

At its meeting in January 1980 the EMBO Council agreed that the Symposium Standing Committee should be dissolved and its responsibilities assumed by the Course Committee; the symposia were thus incorporated in the general programme and supported through EMBC.

CORRESPONDENCE AND PAPERS

1974-81

- F.221 Setting-up and membership of Committee 1974.
- F.222-F.228 Organisation of symposia, fund-raising, Organising Committee meetings, lists of participants, programmes, notes and correspondence, press releases or articles.
- | | | |
|-------|------|--|
| F.222 | 1975 | Developmental Genetics |
| F.223 | 1976 | The Structure and Function of Biological Membranes |
| F.224 | 1977 | Molecular Aspects of Gene Function |
| F.225 | 1978 | Molecular Neurobiology |
| F.226 | 1979 | Nucleic Acid - Protein Interactions |
| F.227 | 1980 | Molecular Biologists Look at Green Plants |
| F.228 | 1981 | Ribosome Structure and Function |

MINUTES

- F.229 Minutes of Standing Symposium Committee 1974-80.

MISCELLANEOUS

- F.230 Correspondence mainly with press 1963-71 on articles and information about EMBO, EMBC and EMBL. Includes some transcripts and manuscripts.
- F.231 Press cuttings, releases, comments 1964-71.
- F.232 EMBO Annual Reports 1966-81.

Catalogue of the papers and correspondence of

Sir John Cowdery Kendrew FRS

(b. 1917)

VOLUME II

Sections G – K

by Jeannine Alton
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SECTION G EUROPEAN MOLECULAR BIOLOGY CONFERENCE (EMBC)

G.1-G.150

INTRODUCTION

EARLY HISTORY

G.1 -G.13	"Swiss Initiative" 1964-67
G.14-G.28	Intergovernmental meetings and negotiations 1967-69
G.29-G.35	Signing and ratification of Agreement 1969-70

GENERAL CORRESPONDENCE AND PAPERS

G.36-G.55	1969-79
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MEMBERSHIP

G.56-G.64	1968-76
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SUBCOMMITTEES AND WORKING GROUPS

G.65	Laboratory Working Group I	Role of the laboratory
G.66-G.73	Laboratory Working Group II	Organisation, structure, administration
G.74-G.87	Laboratory Working Group III	Site of the laboratory
G.88-G.91	Laboratory Working Group IV	Financial aspects
G.92-G.102	Steering Group of Laboratory Working Groups	
G.103-G.106	Enlarged legal sub-group	
G.107-G.114	"Andres" Working Group on future of Conference	

CONFERENCE AND COMMITTEE PAPERS

G.115-G.150	1967-81
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INTRODUCTION

The material here is of special interest in combining the small-scale private exchanges between individual scientists and colleagues with major démarches on an international level, and in showing EMBO members moving willy-nilly into politics and diplomacy and contriving on the whole to carry the day for their scientific causes. The papers on "Early History" are an obvious example, but EMBO's voice continued to be strongly heard at Conference meetings through its own delegation and through national delegations which normally included at least one EMBO member.

The term "Swiss Initiative" is that used in official references and in correspondence for the early moves towards international recognition for EMBO, and rightly so. The Swiss Government had given active help from the beginning (G.1), especially as a biological research institute similar to CERN and possibly sited near it was actively considered. Early encouragement and help came from J. Burckhardt and his successor E. Thalmann of the Swiss Foreign Office, and the first President of the Conference was H. Voirier of the International Organisations Division of the Political Department. CERN itself offered accommodation and administrative help with meetings, including in due course the signing ceremony. The negotiations, even so, were not smooth. The timing of the first approaches to governments had to be delayed during negotiations with the Volkswagen Foundation over the terms of its grant to EMBO (G.3). Membership of the Conference also caused problems. The "Swiss Initiative" was limited to members of CERN, thus excluding Israel despite her active participation in and financial support for EMBO; M.F. Perutz, Chairman of EMBO, was particularly reluctant to accept this as other than a temporary political expedient (G.4, G.11, G.21, G.22) and Israel was elected to membership at the first official Conference (G.36). The Belgian Government declined to participate but eventually agreed to do so via its Fonds National de la Recherche Scientifique (G.5, G.28, G.31). A further unexpected delay came from Germany and its demand that German be recognised as an official Conference language; the consequent protracted negotiations endangered the whole project before an amicable solution was reached (G.25). Objections of a different order affected the scope of the meetings. Support for the laboratory proposal was lacking and the discussion at the first meeting was to concentrate on the "Foundation" i.e. financial support for the fellowships and courses (G.8, G.9). In the event, however, EMBO was asked to continue and report on

its study for a European laboratory (G.17). Political lobbying was a regular feature not only by EMBO members in general (G.7) but especially in Britain where the attitudes to the laboratory and to the need for a new intergovernmental organisation were hostile (G.15, G.22-G.24). Nevertheless two meetings were held and the Conference Agreement was signed on 13 February 1969 (G.29, G.30).

The later papers in this Section deal mainly with the continuing negotiations over the laboratory project - complicated not only by international legal requirements and terminology for the Agreement document but by the problems of fluctuating exchange rates and the inflation of the early 1970s - and the self-appraisal required to ensure continuation of the Conference beyond 1974 and then on to 1988. Committee papers 1967-81 have been retained.

The presentation rests essentially on Kendrew's own files with some amalgamation, discarding of duplicates and division of bulky folders into more manageable units. The material is often complemented by the papers of the EMBO Council and Laboratory Committee in Section F.

EARLY HISTORY

"SWISS INITIATIVE"

1964-67

G.1 July - December 1964

Includes carbon of E. Kellenberger's letter of 4 July to Perutz (original at F.83) outlining his "activities" with Swiss authorities and the likelihood of "active help by Switzerland"; also offer of site for laboratory (Centre européen de biologie moléculaire) in Canton de Vaud; continuing correspondence and papers aiming at intergovernmental meeting.

G.2 February - June 1965

Correspondence, notes of meetings and telephone conversations, appointment by EMBO Council of committee to act in matters of negotiation with governments (Engström, Kellenberger, Kendrew, Wyman), preparation of "policy document" etc. Copy of letter from J. Wyman 6 February mentions Kendrew as "first choice for eventual Director" (of any agreed laboratory or institute).

G.3 July - December 1965

Delays over publication of policy document (and hence of Swiss initiative) during negotiations with Volkswagen Foundation, J. Wyman's "Memorandum of conversations at the Swiss Ministry of Foreign Affairs 22 November", decision to embark on organisation of intergovernmental meeting (limited initially to members of CERN and therefore excluding Israel at that stage. See G.4).

G.4 Correspondence January - April 1966 mainly with E. Katchalski re non-participation of Israel in proposed conference. Perutz in particular was reluctant to accept this. See also G.11.

G.5 Correspondence November 1965 - June 1966 with J. Brachet on EMBO affairs and Belgian participation.

G.6 January - March 1966

Correspondence, Wyman's "Notes on discussions at Swiss Foreign Ministry January 17", letter 31 March announcing Swiss "sondage" of CERN members on proposed conference.

G.7 March - July 1966

Correspondence from EMBO Council members and others in reply to circular of 30 March requesting active support for meeting among national representatives.

G.8 May - September 1966

Correspondence and papers on replies to Swiss initiative, use of EMBO not UNESCO proposals as basis of discussion, analysis of governmental attitudes, request to postpone laboratory proposal "because it lacks the support necessary to form a basis of discussion".

G.9 September - October 1966

Mainly replies from EMBO Council members to Perutz's circular of 29 September on limitation of conference discussion to "Foundation" "leaving it to the discretion of the meeting to consider other possible further developments". All members approved.

G.10 October - December 1966

Correspondence and papers, including Swiss "Aide-mémoire" on proposed conference, Wyman's "Memorandum regarding EMBO developments during the summer", note on UNESCO discussion of Swiss initiative.

G.11 Replies by EMBO Council members to Perutz's circular of 24 January 1967 on membership of conference. The terms of the circular were:

"Council of EMBO, while appreciating the political difficulties facing the Swiss Government with regard to the inclusion of Israel at the forthcoming conference, nevertheless regards it as essential that Israel be asked to participate fully in any scientific activities which may be decided upon."

G.12 January 1967

Wyman's "Notes on discussions at the Swiss Foreign Office in Berne, held on January 13, 1967, and on the [EMBO] Council meeting held in Geneva (CERN) on January 14, 1967", notes and correspondence on national representatives at conference, nomination of Kendrew as Secretary-General for conference.

- G.13 February 1967
 Arrangements for conference.

INTERGOVERNMENTAL MEETINGS AND NEGOTIATIONS

1967-70

- G.14-G.20 First intergovernmental meeting, at CERN, 4-6 April 1967
- G.14 Documents circulated by Swiss Government, including their delegation paper "Récapitulation des efforts de collaboration internationale entrepris en matière de biologie moléculaire ... "
- G.15 March 1967

 Perutz's correspondence with colleagues and officials in Britain, sending EMBO report and trying to enlist U.K. support at conference.
- G.16 March 1967

 Arrangements for meetings preceding conference, correspondence.
- G.17 April 1967

 Includes Wyman's "Notes on EMBO Conference", correspondence with members of EMBO and officials on successful outcome, press releases and conference "Communication". This summarises Conference decisions to hold a second meeting (to be convened by Swiss Government), set up Working Group to prepare a draft "Arrangement" (later "Agreement") and invite EMBO to submit a financial plan and a laboratory proposal.
- G.18 May - July 1967

 Correspondence and papers, including arrangements and drafts for Working Group meeting 6-8 June
- G.19 August - September 1967

 Mainly on proposals for Conference Secretariat, and "Arrangement"; includes Appleyard's notes on discussions and on second meeting of Working Group 12-14 September.

- G.20 Various drafts of "Arrangement" some with corrections by Appleyard and Perutz, copy of Final Report of Working Group.
- G.21-G.28 Second Intergovernmental meeting, at CERN, 22-25 January 1968
- It was hoped that the Agreement could be signed at the Conference, but various problems arose over funding arrangements, the length of time to be covered by any agreement, and the German demand for the recognition of German as an official language of the Conference. As a result the signing ceremony did not take place until February 1969 and considerable activity was required to ensure interim financing between the ending of the Volkswagen Foundation grant and the start of government contributions.
- G.21 September - December 1967
- Correspondence on arrangements for Conference, Israel attendance.
- G.22 Correspondence, discussion notes etc. on likely reactions to funding, Israel membership, Conference Secretariat, draft "Arrangement" etc. by France, Germany, U.K.
- G.23 January - March 1968
- Correspondence, notes and papers. Includes Wyman's "Comments on EMBO Conference", full text of "Intervention by the British Delegation", Perutz's manuscript notes for speech opposing U.K. alternative proposals, Conference papers relating to U.K. comments and proposals, other miscellaneous correspondence.
- G.24 February 1968
- Correspondence on attempts to mobilise political interest in EMBO projects, especially in U.K.
- G.25 Correspondence, notes and circulars February - October 1968 on the German demand for the recognition of German as an official Conference language. This problem led to the postponement of the signature of the Agreement (scheduled for May 1968) and endangered the whole EMBO project. After correspondence and negotiation the solution was accepted that, as at CERN, simultaneous translation should be provided at meetings, and Conference records should be circulated in English, French and German.

G.26 June-December 1968

Correspondence, memoranda etc. mainly on financial situation and arrangements for interim payments to EMBO.

G.27 September 1968 - March 1969

Correspondence etc. on visit to Greece by J. Wyman to encourage contacts with Greek colleagues and Greek participation in EMBO and EMBC. Includes suggestions for EMBO activities by Greek scientists.

G.28 October - November 1968

Correspondence about Belgian signature of Agreement.

SIGNING AND RATIFICATION OF AGREEMENT

1969-70

G.29 Arrangements for meetings and signing ceremony (at CERN, 13 February).

G.30 Copy of Agreement, Swiss Government ratification etc.

G.31 Correspondence February - November 1969 on Belgian participation in Conference via Fonds National de la Recherche Scientifique.

G.32 Arrangements for Interim Conference (held at CERN 2-3 June) to cover EMBO budget and programme while awaiting ratification of Agreement by signatory states.

G.33, G.34 Mainly financial arrangements, requests for payment, acknowledgments of subscriptions by EMBC member countries.

G.33 January - March 1969

G.34 June - August 1969

G.35 Correspondence October 1969 - April 1970, mainly on ratification. Includes formal notification of coming into force of Agreement from 2 April 1970.

GENERAL CORRESPONDENCE AND PAPERS

1969-70

- G.36 Arrangements for first plenary session of Conference, at CERN, 6-8 April 1970. Includes draft agenda, correspondence, letters of thanks, press release. At this meeting H. Voirier was elected President, A. Alline and C. Zelle were elected Vice-Presidents, and Kendrew was appointed Secretary-General of the Conference for three years. The revised laboratory proposal (see F.195, F.196) was favourably received and a Study Group was set up to meet in September (G.37) and report to Conference at its November meeting. Full membership of EMBC for Israel was unanimously approved, a special clause being included in the Agreement (Art.III.2) that "the Conference may . . . permit other European States, as well as States which have made an important contribution to the work of EMBO from its foundation, to become Members by acceding to this Agreement after it has come into force". In his letter of 10 April to E. Vallotton Kendrew describes the meeting as "absolutely, in all respects, an enormous success and in addition it was one of the most friendly international meetings I have ever attended."
- G.37 Correspondence, circulars, nominations and lists of participants, arrangements for meetings at the Hague 29 September - 30 October. Meetings include those of EMBO Council and Laboratory Committee, of EMBC Study Group on laboratory and *ad hoc* Finance Committee, and meeting of EMBO with representatives of national scientific institutions.
- G.38 Correspondence and papers mainly on financial matters, contributions, *ad hoc* Finance Committee etc. April 1970 - February 1971.

1971

- G.39 General correspondence on EMBC affairs, meetings of Finance Committee and Conference, discussion of laboratory, draft agreement etc. Kendrew was appointed laboratory Project Leader at the Conference meeting in October 1971.
- G.40 Correspondence March - December on extension of H. Voirier's service as President of Conference.

1972

- G.41 Correspondence April - August, on delay in payment of financial contribution from Italy.
- G.42 Choice of officers of EMBC.
- G.43 Kendrew's notes and memos for and of meetings of Finance Committee 27 June and 5 December and of extraordinary session of Conference 28 June.

1973

Much of this material relates to meetings of the Conference "Bureau", the signing of the laboratory agreement, Conference officials, and the Working Group on the continuation of the EMBC Agreement after 1974. This was the "Andres" Working Group, see G.107-G.114. Several of the folders include Kendrew's notes on matters under discussion.

- G.44 January - February. Papers, correspondence, Kendrew's notes, compte-rendu for Bureau meeting 20 February. Includes letter from A. Rörsch proposing working group on continuation and possible expansion of EMBC, which led to setting up of "Andres" Working Group. See G.107-G.111.
- G.45 June. Election of officers of Bureau and of Laboratory Council, correspondence of President (H. Voirier) with Conference representatives.
- G.46 February - July. Arrangements for Conference, Bureau, Laboratory Council meetings, retirement of H. Voirier as President (successor: P. Fasella). Includes farewell exchange of letters between Voirier and Kendrew.
- G.47 July - September. Correspondence on Conference and Bureau proceedings, Andres Working Group meeting, Greek offer for meeting to be held in Greece.
- G.48 September. Arrangements, correspondence, Kendrew's manuscript notes, minutes for Bureau meeting 25 September.

G.49 October - November. Correspondence, agenda for Bureau meeting
5 December.

G.50 November - December. Correspondence on Conference meeting,
Kendrew's manuscript notes and official papers on Finance
Committee meeting 5 December at which financial problems of the
laboratory, assessment of contributions and exchange rates and
losses were discussed.

1974

G.51 Correspondence, papers, Kendrew's manuscript notes December 1973
- March 1974 on informal EMBC meeting, mainly on financial
matters and exchange fluctuations, held at Heidelberg 30 April.

G.52 July - July. Correspondence, papers, Kendrew's manuscript
notes, for Bureau meeting 3 July and Conference 4 July, mainly
on nomination of officers of EMBL Council and relationship with
EMBC.

G.53 July - December

1975

G.54 Includes letter from A. Rörsch on Kendrew's resignation as
Secretary-General of EMBO and EMBC.

1978-79

G.55 Mainly on continuation of EMBC support to 1988, including copy
of document on case for continuation.

G.64 Yugoslavia 1973

SUBCOMMITTEES AND WORKING GROUPS

At its meeting in November 1970 the Conference set up four Working Groups to study the laboratory proposals, their membership consisting of national delegates and two EMBO consultants for each group. Their task was to study respectively the role, the organisation, structure and administration, the site, and the financial aspects of the laboratory. There was in addition a Steering Group of the Working Groups to co-ordinate their work and to prepare a report. Kendrew's list of the national and EMBO members of all the groups is included at G.92.

Laboratory Working Group I. Role of the laboratory

Chairman: J.F. Embling

- G.65 Correspondence, draft papers and memoranda, Report of group (January 1971).

Laboratory Working Group II. Organisation, structure and administration

Chairman: C. Zelle

The work of this Group proved particularly arduous and many drafts of the "Agreement" were required. The material should be consulted in conjunction with that of the "Legal Sub-group" (G.103-G.106).

For drafts of the "Headquarters Agreement" establishing the laboratory in Germany see H.7, H.8.

- G.66 December 1970 - January 1971. Correspondence, memoranda, agenda and minutes of first meeting 28 January, comments by E.C. Appleyard.
- G.67 March 1971. Drafts, memoranda, comments, summary record of second meeting 15 March, draft agreement of 19 February (both with manuscript revisions by Kendrew).
- G.68 April - May. Third meeting 11 May, draft agreement of 20 April.

- G.69 May - June. Fourth meeting 8 July. Includes revised draft of 25 May with manuscript revisions by Kendrew, summary record of 11 May meeting, draft summary report of working group, correspondence.
- G.70 July - August. Correspondence, memoranda for fifth meeting 3-4 August. Includes summary record of 8 July meeting, revised draft of 9 July with manuscript revisions by Kendrew, summary report of working group, miscellaneous manuscript notes.
- G.71 Comments by EMBC members on revised draft agreement of 4 August (included in folder) as requested following extraordinary session of Conference on 13-14 October.
- G.72 Later revised drafts 22 November, 3 December.
- G.73 Summary records of meetings of enlarged working group 2 and 5 May 1972.

Laboratory Working Group III. Site of the laboratory

Chairman: A. Rörsh

The working group began by establishing criteria for the choice of site (G.74) and, at its first meeting in January 1971 (G.75) considered the report of the EMBO Sites Subcommittee of the Laboratory Committee. It also visited the two sites near Munich already visited by the EMBO Subcommittee and, after some uncertainties about the availability of the Heidelberg site and attempts to revive the connection with CERN, a major visit was made to Heidelberg in July (G.81-G.86) after which the Group's report recommended acceptance of the site. The report was accepted by the Conference in October.

See F.198-F.204 for material relating to the work and recommendations of the EMBO Sites Subcommittee.

- G.74 August 1970 - January 1971. Correspondence, memoranda and working group's report on criteria for site.
- G.75 January 1971. Papers for first meeting 3-4 January, including EMBO sites report, memo on report by O. Maaløe (EMBO Subcommittee chairman), comments by A. Rörsh (EMBC working group chairman), Interim Report of working group.

- G.76 February - April. Papers for second meeting and visits to two sites near Munich (Garching and Martinsried), programme of visits and meetings, list of participants, second Interim Report of working group, correspondence.
- G.77 Official offers by Federal Republic of Germany of sites for laboratory at Munich-Garching and Munich-Martinsried, details of sites, maps etc.
- G.78 February - April. Correspondence and papers on visit to Heidelberg 1 April. This was by a "Second Working Party" arranged by EMBO Council and its interim report (by N.K. Jerne) confirmed the previous report in recommending Heidelberg as preferred site. It was hoped that this would "give the German Federal authorities the opportunity to make an additional site offer apart from the ones in the Munchen area", as proved to be the case. H. Voirier, A. Rörsch and O. Brieskorn attended as observers for EMBC. Folder includes Kendrew's notes, correspondence, copy of Jerne's Interim Report.
- G.79 Personal report by A. Rörsch on the Munich and Heidelberg sites, 15 April.
- G.80 April - May. Correspondence on meeting at CERN on possible site for laboratory adjacent to CERN (not successful); also included is Kendrew's letter to C. Zelle on possibility of official offer by Germany of Heidelberg site.
- G.81 April - June. Correspondence on EMBC working group's visit to Heidelberg 12-14 July. Includes information on official offer of site, list of participants.
- G.82 July. Correspondence with H.E. Huxley on his objections to the Heidelberg site (sent too late to be considered at meeting).
- G.83 Summary record of working group meeting at Heidelberg, report on sites.
- G.84-G.86 Three folders of material on Heidelberg, proposed site, facilities, official offer etc.

G.87 Late suggestions for sites October - November 1971.

Laboratory Working Group IV. Financial aspects

Chairman: A. Alline

- G.88 Summary record of first meeting 25 February 1971, correspondence on U.K. contribution, memoranda, summary record of second meeting 4 May, Interim report of working group after third meeting 22 June.
- G.89 January - March 1972. Correspondence and papers on membership and meeting of enlarged working group 15-16 February. Includes Kendrew's manuscript notes, statement of U.K. position, minutes of meeting.
- G.90 October 1972. Drafts for working group on financial rules and on "literary, scientific and industrial property".
- G.91 1973. Drafts and revisions suggested by national delegations, prepared for meetings 27-28 March. Includes substantial revisions by Kendrew in French and English versions.

Steering Group of Laboratory Working Groups

The Chairman of this co-ordinating committee was H. Voirier and the Secretary was Kendrew. The members were the chairmen of the four working groups: J.F. Embling, C. Zelle, A. Rörsh and A. Alline.

- G.92 Kendrew's lists of membership, EMBO consultants and duties of working groups and steering group.
- G.93 November 1970 - January 1971. Notes of first informal meeting of Steering Group 27 November, timetabling of meetings, nomination of national representatives.
- G.94 Agenda and minutes of first meeting 21 April, correspondence on site for laboratory, interim progress report.

- G.95 July - August. Correspondence, papers, reports and minutes for meeting 4 August.
- G.96 December 1971 - March 1972. Correspondence, notes, reports and minutes for meetings 15-16 February and 24 March 1972. Includes Kendrew's manuscript notes, and memoranda on scientific programme and financial problems of laboratory by Kendrew and A. Rörsch.
- G.97 Papers, Kendrew's notes for meeting 21 April.
- G.98 Papers, Kendrew's notes, minutes for meetings 21 April, 24 May, 27 and 29 June.
- G.99 August - September. Correspondence, papers, minutes for meeting 5 September.
- G.100 October. Correspondence and memoranda for meeting 7 November during Haarlass "Second Konstanz" meeting.
- G.101 Papers for meeting 7 November.
- G.102 Kendrew's manuscript notes, minutes of meeting 7 November, report of Steering Group's activities.

Enlarged legal sub-group

This was set up by the Conference at its extraordinary session 13-14 October 1971, to examine amendments to the laboratory "Agreement" and to prepare an agreed text for signature.

The material includes arrangements for meetings, notes of meetings, memoranda, texts and revisions of "Agreement", correspondence.

- G.103 1971. Meeting 18-19 November.
- G.104 1972. Meetings 13-14 January, 24-25 February.

G.105 1972. Meetings 21-22 April, 16 May, 9 June, 22-24 July,
25-26 September.

G.106 1973. Meetings 27-28 March, 2-3 July.

"Andres" Working Group on future of Conference

The Working Group was set up following an initiative on behalf of the Dutch delegation by A. Rörsch. An *ad hoc* working group met informally in May 1973 after the signing ceremony of the laboratory Agreement. The terms of reference of the working group were to consider the future of the Conference Agreement and whether it should be continued without change, amended or discontinued. Much of the discussion bore on the "scientific philosophy" of EMBC and how far its scope might be expanded to include other research areas such as Brain and Behaviour (EBBO), Cell Biology (ECBO) and Cancer Research (EORTC). Material relating to these projects, which were not accepted for affiliation with EMBC, is included at G.112-G.114.

The Chairman was E. Andres, and the working group is regularly referred to as the "Andres Working Group". See also G.44, G.47.

G.107 Preliminary material January - May 1973. Includes copy of A. Rörsch's letter (original at G.44), negotiations, arrangements for informal meeting in May, terms of reference, Kendrew's manuscript notes of meeting.

G.108 May - June 1973. Correspondence on draft terms of reference, report of working group on Brain and Behaviour (for consideration by Andres group at first meeting 2 July).

G.109 July - October 1973. Correspondence and papers for second meeting 26-28 September. Includes Kendrew's manuscript notes, papers by A. Rörsch "On the philosophy of the enlargement of the scope of EMBC" and B.H. Flowers on "Science and Europe".

G.110 Agenda and Kendrew's notes for third meeting 24-26 October.

G.111 Minutes of Group meetings, reports to Conference, drafts and final text of Conference resolution to prolong Agreement for a further five years (to 1977).

- G.112 European Training Program in Brain and Behaviour Research. Correspondence and papers. October 1971 - December 1973 on proposal to affiliate with EMBC.
- G.113 European Cell Biology Organisation (ECBO). Correspondence and papers February 1973 - January 1975 on proposal to affiliate with EMBC, including formal application, and on relations with EMBO.
- G.114 European Organization for Research on Treatment of Cancer (EORTC). Correspondence and papers March 1972 - December 1973 on request for financial support from EMBC.

CONFERENCE AND COMMITTEE PAPERS

The English text has been retained except in a very few cases where only the French or German versions survive.

Some of the documents have notes or revisions by Kendrew.

- G.115 First intergovernmental meeting 4-6 April 1967.
- G.116 Conference working group 6-8 June 1967.
- G.117 Conference working group 12-13 September 1967.
- G.118 Second intergovernmental meeting 22-25 January 1968.
- G.119 Ceremony of signing Agreement 13 February 1968.
- G.120 Interim Conference 2-3 June 1969.
- G.121 First Plenary Conference 6-8 April 1970.
- G.122 Ordinary Session 26-27 November 1970.
- G.123 *Ad hoc* Finance Committee 1970.
- G.124 Extraordinary Session 13-14 October 1971.
- G.125 Ordinary Session 2-3 December 1971.
- G.126 Finance Committee 1971.

- G.127 Extraordinary Session 28-29 June 1972.
- G.128 Ordinary Session 6-7 December 1972.
- G.129 Finance Committee 1972.
- G.130 Ceremony of signature of Agreement establishing Laboratory
10-11 May 1973.
- G.131 Ordinary Session and Finance Committee 4-5 July 1973.
- G.132 Ordinary Session and Finance Committee 5-7 December 1973.
- G.133 Ordinary Session 3-5 July 1974.
- G.134 Finance Committee 3 July 1974.
- G.135 Ordinary Session and Finance Committee 11-12 December 1974.
- G.136 Ordinary Session and Finance Committee 2-3 July 1975.
- G.137 Ordinary Session and Finance Committee 25-26 November 1975.
- G.138 Ordinary Session and Finance Committee 28-29 June 1976.
- G.139 Ordinary Session and Finance Committee 22-23 November 1976.
- G.140 Ordinary Session and Finance Committee 4-5 July 1977.
- G.141 Ordinary Session and Finance Committee 5-6 December 1977.

- G.142 Ordinary Session and Finance Committee 8-9 May 1978.

- G.143 Plenary Working Party to consider prolongation of Agreement
10-11 October 1978.

- G.144 Ordinary Session and Finance Committee 10-12 December 1978.

- G.145 Ordinary Session and Finance Committee 28-29 May 1979.

- G.146 Ordinary Session and Finance Committee 19 November 1979.

- G.147 Ordinary Session and Finance Committee 10 June 1980.

- G.148 Ordinary Session and Finance Committee 25 November 1980.

- G.149 Ordinary Session and Finance Committee 2 June 1981.

- G.150 Ordinary Session and Finance Committee 8 December 1981.

SECTION H EUROPEAN MOLECULAR BIOLOGY LABORATORY (EMBL)

H.1-H.417

INTRODUCTION

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H.368, H.369 Personal correspondence
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INTRODUCTION

The year 1971 can reasonably be taken to mark the official start of EMBL since it saw the appointment of Kendrew as Project Leader and the setting up of a Building Committee and of a Provisional Scientific Advisory Committee. Many of the early planning documents in this section nevertheless go back to 1967, as does some of the political and policy material. There is also, obviously, an inevitable overlap with material involving EMBO (Section F) and EMBC (Section G); examples of such are the original proposals for the Laboratory, the working group on choice of site (predecessor of the Building Committee), the Konstanz meeting on the research programme and the subsequent working parties. Many of the EMBL working groups and committees were a continuation of those first set up by EMBO. Kendrew himself took up residence in Heidelberg only from January 1975. That said, it remains the case that the papers in this Section can be seen to be geared to the Laboratory.

As with the material on EMBO and EMBC, one of the chief sources of interest is the evidence of long-term planning and thought afforded by the early date of many of the documents and letters on all aspects of the Laboratory history; one could mention the setting up of the Scientific Advisory and specialist Committees, the negotiations regarding the establishment of the outstations at Hamburg and Grenoble, the administrative structure, plans and costings of the building.

The very considerable elaboration of the latter are attributable not only to Kendrew's determination to achieve the highest standards of equipment and function but to the historical coincidence of the building of the Laboratory with a period of high and often unpredictable global inflation due primarily to the rise in oil prices. This was an unexpected factor which required several budget revisions and cost-cutting exercises, and which continued as a permanent problem with the varying inflation rates of EMBC member states affecting their relative contributions and also the comparative salary rates for EMBL staff. It was a considerable achievement to have had the building finished to schedule and to budget and incorporating the additional Containment Facility for genetic research.

The concept of the Laboratory had always been crucial to Kendrew. He espoused it from the first informal discussions in 1962 in which Szilard seems to have played an initiatory part, and fostered it with skill through the many vicissitudes of the ensuing decade. His own extensive notes, charts, schedules, discussion memoranda and the like (*passim* but especially at H.345-H.358) are of special interest in this respect, usually antedating the official documents by a matter of years and showing great foresight in anticipating areas where scientific or political developments were to be encouraged, forestalled or answered. Almost all aspects of the history of the Laboratory may be complemented by reference to these notes.

Kendrew's role as Project Leader and Director-General was an active one. He followed the construction of the Laboratory very closely, supervising its physical growth and refurbishment, its inauguration and harmonious relationship with the local community, in surprising detail (H.47-H.49, H.51). Even before this stage, when small research groups were operating in temporary accommodation, Kendrew was very directly involved in planning the administrative structure, and his hand can literally be seen in early drafts for its funding, in documents at all levels from the various scientific and administrative committees as and when they were set up to the constitution of the staff association, in travel claim and leave forms, and in the handsome stationery (H.305, H.308, H.325, H.332). The carbon copies of the Director-General's correspondence at H.370-H.377 are also of interest as a running tally (probably by no means complete) of the routine workload.

AGREEMENTS

LABORATORY AGREEMENT

This was the agreement establishing the European Molecular Biology Laboratory, signed on 10 May 1973 by ten countries (Austria, Denmark, France, Federal Republic of Germany, Israel, Italy, Netherlands, Sweden, Switzerland, United Kingdom).

The material deals with last-minute negotiations, mainly involving delays in Italy's decision to contribute, and with the signing ceremony itself. For earlier work on the agreement, see G.66-G.72.

- H.1 April 1972 - January 1973. Agreements to participate, delays and last-minute snags. The signing ceremony was proposed for 19 February 1973 but postponed because of Italian uncertainty.
- H.2 October 1972 - March 1973. Correspondence, calculations etc. on Italian contribution and participation.
- H.3 Drafts and final text of letter to Foreign Ministries informing them of Italian decision to participate. Sent 19 March 1973.
- H.4 Signing ceremony at CERN, 10 May. Arrangements, speeches, press release.
- H.5 Arrangements for meeting of Working Group on future of EMBC on 10-11 May after ceremony. See G.107-G.111.
- H.6 Design and text of agreement.

HEADQUARTERS AGREEMENT

This was signed between the Federal Republic of Germany and EMBL on 10 December 1974 at Bonn, Kendrew signing on behalf of the Laboratory.

H.7 Drafts and revisions of agreement, February, November 1971, January, May 1972, July 1973.

H.8 Correspondence and last-minute alterations to agreement, arrangements for signing ceremony, Kendrew's speech (German and English versions), text of agreement, a little later correspondence on implementation of agreement.

THE BUILDING OF THE LABORATORY

TEMPORARY ACCOMMODATION IN HEIDELBERG

Deutsches Krebsforschungszentrum (DKFZ)

- H.9 Correspondence, estimates, discussion notes etc. September 1971 - July 1978, for laboratory space in newly-built Cancer Research Centre, and a little later correspondence on DKFZ affairs. See also 0.19.

Max-Planck-Institut für Kernphysik (MPIK)

- H.10 Correspondence, plans, discussion notes etc. March 1972 - May 1976.

Biochimie

- H.11 Correspondence, plans, discussion notes March 1974 - September 1975 for accommodation in old university biochemistry building.

Miscellaneous

- H.12 Shorter correspondence 1973 on possible collaboration, outstations etc.

EARLY PLANNING AND COSTING

- H.13 1967-71. Correspondence and memos. Includes material about possible sites and projects for laboratory, Royal Society discussion meetings, Konstanz meeting, revised laboratory proposals, possible recruits for EMBL, attitudes to EMBL in Netherlands, Germany, UK.

- H.14 Notes, calculations, correspondence and memos. on laboratory costings, comparison with other laboratory staff levels and salaries etc. 1969-70.
- H.15 March-April 1971. Correspondence and notes on costings, including calculations by H.E. Huxley and other MRC Cambridge colleagues, used as basis by Kendrew in preparing reply to EMBC Working Group on Finance.
- H.16 October-November 1971. Similar material with extensive notes and calculations by Kendrew, mainly prepared for EMBL Scientific Advisory Committee meeting.
- H.17 February-March 1972. Extensive notes, calculations, discussions with colleagues S. Brenner, A. Klug, U.W. Arndt for preparation of revised budget (also used for Building Committee see H.23).
- H.18 May-November 1972. Revised budget (May) and later calculations.
- H.19 1973. Correspondence and papers on cost variation, inflation factor etc. as affecting EMBL.
- H.20 1973. Requests sent to member countries for subscriptions to EMBL.

BUILDING COMMITTEE

This was set up by EMBC in December 1971 under the Chairmanship of A. Rörsch. It drafted a programme of requirements and a time schedule which were sent to four selected architects in October 1972. Proposals were submitted in October 1973 and a jury and technical committee were formed to judge the four projects. In November 1973 the partnership of Lange, Mitzlaff, Böhm and Müller, of Mannheim, were awarded the first prize.

- H.21 Preliminary correspondence, membership invitations, correspondence and meetings January, March 1972, notes on laboratories visited.

- H.22 April 1972. Organisation procedures for international competitions.
- H.23 Information from colleagues about laboratory design, meeting at Göttingen July 1972.
- H.24 Drafts and revisions of information document to be circulated to architects (drafted by Rörsch, revised by Kendrew).
- H.25 Maps of site.
- H.26 August-September 1972. Correspondence, meeting at Frankfurt, report on visit to colleague's laboratory, draft letter to architects.
- H.27 Miscellaneous correspondence on suggestions for architects or advisers to committee; late or unsuccessful applications to submit plans or be included in competition 1972-73.
- H.28 October 1972 - January 1973. Invitations to architects, acceptances, proposed meeting of committee and architects postponed from 9 November to 9 December and eventually to 12 May 1973 because of delays in signing Laboratory Agreement.
- H.29 Meeting at Heidelberg 12 May 1973 of committee and architects. Kendrew's notes and revisions of minutes.
- H.30 May-June 1973. Correspondence and arrangements for meeting at Heidelberg 15 June of committee and local representatives. Further information on site requirements for architects.
- H.31 May-July 1973. Meeting with architects, Heidelberg 6 July, last meeting of Building Committee, questions from architects and replies.
- H.32 Vorprüfungs committee. Met 23 October, 14 November.

H.33 Meeting of Jury 16-17 November 1973, correspondence with jury members and with competing architects, jury's report.

H.34 Photographs of models of buildings submitted to jury.

ARCHITECTS, TENDERS, PLANS

H.35 Meetings, discussions, correspondence 1973-74 with architects, city authorities, colleagues leading up to contract.

H.36 Papers and correspondence 1973-75 on heating system. The original plans envisaged heating by pipeline from a plant operated by Stadtwerke Heidelberg. The Laboratory eventually had an independent gas heating system. The ensuing delays and alterations led to a rise in costs.

H.37 Correspondence, notes, plans, calculations relating to animal house 1973-81. Mainly on early designs and requirements, but includes some later material on organisation and running of animal house.

H.38 Correspondence and papers on Laboratory Planning Group set up by Kendrew to discuss technical problems likely to arise during planning. Notes of meeting 5 July 1974.

H.39 Correspondence, notes, plans, calculations etc. on planning, 1974, mainly on costings and attempts to reduce them in response to concern expressed by Finance Committee. Includes documents by architects, colleagues, Kendrew's notes etc.

H.40 Miscellaneous plans with modifications and revisions for layout and space allocation, mainly 1974, 1975, related to H.39.

H.41 Award of tender for civil engineering works of EMBL building; correspondence, official proposal as put to and accepted by members of Finance Committee 1975.

- H.42 Later Finance Committee papers on tenders and costs, including final "Report on Construction . . . and Expenditure 1980".
- H.43 Expert working group, appointed to supervise and comment on progress of construction; correspondence 1975-79, mainly with C. Groscurin about P4 installation. Includes final report of working group.
- H.44 Arrangements for move to new building, minor snags and problems etc. 1977-79.
- H.45 Architect's first plans December 1974.
- H.46 Revised plans January 1975, March 1975.

FURNISHING AND INTERIOR DESIGN

This material is of interest in demonstrating Kendrew's meticulous care for what others might consider matters of minor importance but which he rightly saw as creating a harmonious ambience and a powerful contribution to the laboratory's smooth working. His chief consultants were the Design Research Unit then headed by Sir Mischa Black, working in conjunction with the architects and a small committee from the laboratory, but it is very clear that he took an active personal part in decisions. His memorandum of 12 April 1976 which begins "As you know, I attach great importance to problems of aesthetics and design in the laboratory", indicates the range of his preoccupations in this regard: they include internal and external lighting, floor coverings, sanitary fittings, wall and door colours, furniture and fittings for canteen, library and seminar rooms, direction signs and lettering, stationery, landscaping, soft furnishings, china and cutlery, reading lamps, notice boards and ash-trays.

- H.47 Correspondence, memoranda, notes of meetings, visits and costs etc. mainly 1976-78 but a little later material to 1980, with Design Research Unit and others.

- H.48 Notes, designs, correspondence 1975-80 on all aspects of stationery and graphic design, including letter head, application forms, covers for annual and research reports, manuals and brochures. Also includes correspondence with Gertrud Szilard and others on bookplate for the Leo Szilard Library approved by EMBL Council in December 1978 as official name of library in commemoration of Szilard's support in early days of EMBO. Kendrew's speech at the opening of the laboratory (H.54) had referred to Szilard's creative role and his own wish to perpetuate it. Here also Kendrew was personally active in designing or approving items.
- H.49 Miscellaneous catalogues of supplies and equipment referred to in correspondence.

INAUGURATION

The formal opening of the new building was originally planned for 8 May 1978, then brought forward to 5 May in order that the President of West Germany, Dr Scheel, could perform the official ceremony. In the event the State Visit of President Brezhnev prevented his attending and the Laboratory was opened by the Minister for Research and Technology. Guests included delegates and government representatives of EMBL and EMBC member states, representatives of the West German Bund and Land, of the City and University of Heidelberg and of the Max-Planck Institutes, as well as present and former members of the Council and Scientific Advisory Committee of EMBL, and some early members of EMBO.

The inauguration programme of events included official speeches and lunch, scientific colloquia, tours of the Laboratory and its research groups, and an evening reception.

- H.50 Preliminary arrangements, meetings of the inauguration committee, guest lists and revisions.
- H.51 Arrangements for special commemorative postmark, artwork for stationery and printed items, press coverage and releases.
- H.52 Correspondence on official invitations, acceptances and refusals, Kendrew's official letters of thanks.

- H.53 Correspondence with colleagues on arrangements for talks at scientific seminar to be given as part of opening ceremony.
- H.54 Correspondence with colleagues about opening ceremony, including invitations to speak, letters and cables of good wishes, regrets at inability to attend etc., some with recollections. Includes draft speeches by Kendrew and E.C. Slater, message from West German President.
- H.55 Folder of material designed by Design Research Unit for guests at ceremony.

RESEARCH COMMITTEES AND WORKING GROUPS

These constitute the main arteries for the scientific activities of the Laboratory, and in chronological terms antedate it. In preparation for the Extraordinary Meeting of EMBC scheduled for October 1971, Kendrew was authorised by the President, H. Vourier, to consult members of the EMBO Council and representatives of national institutions of EMBC members about suitable nominations for a "shadow" (later called provisional) Scientific Advisory Committee (H.56). This first met in October 1971 under the chairmanship of N.K. Jerne, and continued to meet and to advise the EMBC delegates and the EMBL Project Leader (Kendrew) until the coming into force of the Agreement and the formal inception of the SAC in 1974.

The SAC and its specialist Working Groups on Computer Policy, Nuclear Magnetic Resonance and Recombinant DNA had periodical meetings but also maintained regular contact by correspondence and telephone. Its activity included scientific policy, choice of field of research, appointments to the Laboratory and to the SAC, visits to the laboratories and outstations, consideration of reports by staff members or working groups, and any special projects. Great attention was paid to the selection and recruitment of staff members; much of the early correspondence is concerned with recommendations and suggestions for the first appointments, and this continued to be an important regular component of the agenda for SAC meetings.

Once the scientific life of the Laboratory began in 1975 the purchase of equipment led to the creation of the Scientific Purchases Committee, whose documentation (H.103-H.140) is of interest in including the "justifications" for items of equipment requested by members of the scientific staff and submitted for evaluation.

An important source of information for the SAC and the Director-General on current and developing fields of research were small workshops or discussion meetings attended, by invitation, by leading workers in specific topics (H.141-H.151).

Various specialist *ad hoc* committees were set up from time to time to advise on matters of concern to the research groups of the Laboratory. They are listed under the appropriate Research Division or Outstation.

PROVISIONAL SCIENTIFIC ADVISORY COMMITTEE (PSAC)

Membership

- H.56 Founding documents August-October 1971. Includes letter of authorisation from H. Voirier, Kendrew's letters to EMBO and EMBC members and their recommendations, statistical lists of nominations, first membership.
- H.57 October 1971 - September 1973. Invitations to serve on PSAC, acceptances, some reference to meetings on 31 October, 4 December 1971, suggestions for membership.
- H.58 Correspondence October 1973 - March 1974 with PSAC members on European laboratories significantly involved in molecular biology.
- H.59 Correspondence March and July 1974 with PSAC members on changeover to formal Scientific Advisory Committee and changes in membership. Thirteen of the original fifteen members continued to serve on the SAC.

Meetings

This material varies in extent and may include agenda and minutes, Kendrew's notes made at the meeting or in preparation for it, correspondence with committee members or others, suggestions or recommendations for appointments, matters arising from meeting.

- H.60 1st informal meeting 31 October 1971.
- H.61 2nd meeting 4 December 1971.
- H.62 3rd meeting 19-20 April 1972 jointly with EMBO Council.

- H.63 4th meeting 3, 7, 8 November 1972, during Haarlass ("Second Konstanz") meeting.
- H.64 5th meeting 14 June 1973.
- H.65 Informal meeting 23 October 1973.
- H.66 6th meeting 11 February 1974.
- H.67 7th meeting 21 June 1974 (last meeting).
- H.68 Miscellaneous notes by Kendrew on possible appointments.

SCIENTIFIC ADVISORY COMMITTEE (SAC)

Membership

Official and personal correspondence on nominations and service, Kendrew's notes and lists of candidates and members.

- H.69 1975. Includes charts of committee members and attendance 1971-84.
- H.70 1976.
- H.71 1977.
- H.72 1978.
- H.73 1979.

H.74 1980.

H.75 1981.

H.76 1982.

Meetings

These files cover SAC meetings from the first on 14 December 1974 to preparations for the 19th to be held in May 1982 after Kendrew had left the Laboratory. They include agenda, minutes and notes on meetings, Kendrew's own notes made in preparation for or at meetings, background papers, reports and submissions for the committee, applications, recommendations and decisions on staff appointments, space allocations, budget and buildings, policy and projects, correspondence with members or others on all aspects of SAC work.

H.77 1st meeting, 14 December 1974.

H.78 2nd meeting, 3-4 May 1975.

H.79 3rd meeting, 1 July 1975.

H.80 4th meeting, 23-24 November 1975.

H.81 5th meeting, 2-3 May 1976.

H.82 6th meeting, 30-31 July 1976 at DESY outstation, Hamburg.

H.83 7th meeting, 28-29 October 1976.

H.84 8th meeting, 18-19 March 1977 at ILL outstation, Grenoble.

- H.85 9th meeting, 1-2 July 1977.
- H.86 10th meeting, 25-26 November 1977.
- H.87 11th meeting, 21-22 April 1978 at DESY outstation, Hamburg.
- H.88 12th meeting, 10-11 July 1978.
- H.89 13th meeting, 18-19 January 1979.
- H.90 14th meeting, 23-24 November 1979, at ILL outstation, Grenoble.
- H.91 15th meeting, 25-26 April 1980.
- H.92 16th meeting, 1-2 November 1980.
- H.93 17th meeting, 12-13 April 1981, at Grenoble.
- H.94 18th meeting, 3-4 October 1981, and brief correspondence
concerning 19th meeting 3-4 May 1982.

Correspondence

Correspondence with individual scientists or consultants to SAC.

- H.95 G. Bernardi 1975-76.
- H.96 L.C.M. De Maeyer 1976-81.
- H.97 H. Harris 1975-76.

NUCLEAR MAGNETIC RESONANCE (NMR) WORKING GROUP

- H.98 Correspondence, memoranda and papers mainly 1971-76 and a little later material 1981. Includes A. Klug's first report (February 1974) on "the desirability and feasibility of developing a high field NMR spectrometer at EMBL" and comments by others, later report of Working Group on future developments of NMR at EMBL (September 1975), staff appointments, other NMR research projects at EMBL and elsewhere.

No NMR spectrometer was acquired by EMBL at this time, in part because delays in starting the laboratory led to R. Freeman, whom it had been hoped to recruit, taking up an appointment elsewhere.

COMPUTER POLICY WORKING GROUP

- H.99 Correspondence, memoranda and papers 1972-76 on computer policy especially in the area of computer graphics and other advanced computer applications. Includes Working Group meetings and reports, staff appointments etc. With the appointment of R.F. Herzog as Head of Computing in 1976, the formal work of the Working Group came to an end.

RECOMBINANT DNA (rDNA) COMMITTEE

Concern about potential biohazards in molecular biological research was widely voiced during the early 1970s. A circular letter was sent to Kendrew in June 1974 by C. Weissmann (a co-signatory) for consideration by EMBO Council and by the PSAC and recommending that "these problems be urgently and carefully considered by appropriate EMBO bodies, both in regard to security recommendations and to providing appropriate special risk laboratories within the framework of EMBO, for instance at the Heidelberg laboratory" (H.100). An Asilomar conference on rDNA was held in February 1975, attended by a five-man EMBO delegation and an *ad hoc* EMBO committee was set up by Council in January 1975 (Chairman: C. Weissmann). See also F.118. The report to EMBC on the Asilomar conference recommended that "a containment laboratory meeting the most stringent specifications . . . should be built within the European Molecular Biology Laboratory." For material on the building, equipment and use of the containment laboratory, see H.156-H.177.

- H.100 Correspondence and papers June-December 1974.

- H.101 Correspondence and papers January 1975 - February 1976.
- H.102 Reports and minutes of the EMBO *ad hoc* and Standing Advisory Committees 1975-80.

SCIENTIFIC PURCHASES COMMITTEE

(from 19 March 1980 PURCHASES COMMITTEE)

This had its first meeting on 16 July 1976, its function being to co-ordinate purchase requests for equipment made by the various scientific groups. Its membership consisted of the Director-General (Chairman), Heads of Divisions, Heads of the Outstations, and the Heads of the Administration and Purchasing Sections.

The material includes minutes, detailed agendas, proposals and "justifications" for purchases of equipment and comments thereon, and some correspondence or discussion notes with members of the committee, scientific and administrative staff. Many of the documents have Kendrew's annotations and calculations.

It should be noted that early versions of proposals for equipment for the outstations at Hamburg and Grenoble, prior to their referral to the committee, may be found in the related outstation files.

- H.103 Meetings 16 July, 23 September, 21 October 1976.
- Included here is draft "Procedure for ordering scientific equipment", with Kendrew's revisions.
- H.104 3 May 1977.
- H.105 4 August 1977.
- H.106 29 September 1977.
- H.107 24 November 1977.

- H.108 14 December 1977 (informal).
- H.109 27 April 1978.
- H.110 30 May 1978.
- H.111 2 August 1978.
- H.112 4 October 1978.
- H.113 16 October 1978.
- H.114 15 November 1978.
- H.115 7 December 1978.
- H.116 28 February 1979.
- H.117 17 May 1979.
- H.118 11 July 1979.
- H.119 12 September 1979.
- H.120 7 November 1979.
- H.121 13 December 1979.
- H.122 15 February 1980. Six sub-groups were set up at this meeting,
to advise on specialist items of equipment.

- H.123 19 March 1980. The Committee was henceforward called "Purchases Committee".
- H.124 19 May 1980.
- H.125 3 July 1980.
- H.126 17 July 1980. Special Purchases Committee meeting to deal with requests for equipment and construction work in the new HASYLAB (Hamburg Synchrotron Radiation Laboratory) at Hamburg outstation.
- H.127 18 September 1980.
- H.128 23 October 1980.
- H.129 27 November 1980.
- H.130 16 December 1980.
- H.131 20 February 1981.
- H.132 2 April 1981.
- H.133 6 May 1981.
- H.134 30 June 1981.
- H.135 10 July 1981. Extraordinary meeting.
- H.136 8 September 1981.

- H.137 13 October 1981.
- H.138 3 December 1981.
- H.139 22 February 1982.
- H.140 Lists of equipment ordered 1975-80.

WORKSHOPS

These were small gatherings of specialists, meeting informally and by invitation to discuss a specific existing or proposed research topic. They were sometimes suggested by the PSAC or SAC as a means of clarifying the state of research and the appropriate level of involvement of EMBL; some were timed to coincide with meetings of the committee, whose members were in any case invited. They had an important function, in the early days in determining the EMBL research programme and subsequently in monitoring and diffusing information about its progress, and are therefore included here as an aspect of its committees and working groups.

For additional information on workshops retained with material on research projects, or held at DESY and ILL outstations, see H.201, H.224-228, H.257.

- H.141 Membrane Workshop 18-22 October 1973.
- Correspondence, invitations, arrangements, lists of those invited, programmes, Kendrew's notes of papers and discussions, November 1972 - November 1973.
- H.142 Detector Workshop "Optics and detectors for diffraction studies of biological systems", 17 October 1973.
- Correspondence, list of participants, Kendrew's manuscript notes of papers, June-October 1973. See also H.145 for a later meeting on detectors.
- H.143 Proposed workshop on ribosome structure research by neutron diffraction, planned for June 1974 but postponed. See H.146.
- Correspondence, lists of participants.

- H.144 Workshop on Cell Separation Techniques, 8-9 June 1976.

Correspondence, invitations and replies, lists of participants, programme, Kendrew's notes.
- H.145 Meeting on "Area Detectors for X-rays", 4 May 1977. Proposal and brief correspondence only.
- H.146 Workshop on "Ribosome structure research by neutron and X-ray scattering", 16 January 1979.

Correspondence, invitations and replies, programme, Kendrew's notes.
- H.147 Proposed meeting on role of EMBL and responsibilities of the Director-General in the 1980s, referred to as "Konstanz III" on the model of earlier discussion meetings on the subject in 1969 and 1971. The proposal, put forward by D.L.D. Caspar and H. Buc, was discussed at the SAC meeting of April 1981. See also H.365.
- H.148 Workshop on "Pressure in Biology", 9-11 April 1981.

Correspondence, programme, list of participants, report of discussions.
- H.149 Workshop on "Computing and DNA sequences", 27-28 April 1981. See also H.180.

Programme, list of participants, notes.
- H.150 Workshop on "Biological structures", 23-24 September 1981.

Correspondence, programme, list of participants, reports of discussions. This, and the workshop on developmental biology (H.151) were organised by L. Philipson to help identify possible areas of future research at EMBL.
- H.151 Workshop on "Developmental biology", 19-20 October 1981.

Correspondence, programme, list of participants, reports of discussions.

RESEARCH DIVISIONS - HEIDELBERG

CELL BIOLOGY

Projects and staff

- H.152 Correspondence with colleagues 1970-73 on suggestions for projects and scope of work to be undertaken by Cell Biology Division.
- H.153 Notes and suggestions on appointments 1975-76.
- H.154 Membrane Group staffing 1975-76.
- H.155 Neurobiology Group staffing and space 1974-76.

CONTAINMENT FACILITY

Following the recommendation of the *ad hoc* EMBO committee on rDNA, the Council of EMBL decided at its meeting on 27 November 1975 that research on rDNA should be carried out at the Laboratory. The original plan for cell biology was modified and a new special laboratory was constructed to house the high-risk facilities which conformed to the stringent specifications (later somewhat relaxed) of the German authorities of the Zentrale Kommission für biologische Sicherheit (ZKBS). H.M. Darlow of the Microbiological Research Establishment, Porton, was adviser on equipment, and the architects were KA-Planungs GMBH.

Building and equipment

- H.156 Correspondence and papers 1974-77 on all aspects of building: advice from colleagues, proposed use of Porton facilities, costings, planning and space allocation, working group meetings, equipment.

- H.157 Architect's plans 1976.
- H.158 Correspondence and papers 1977 on German guidelines for rDNA research.
- H.159 Correspondence and papers 1978-79 on changes to high-risk laboratory required to conform with German guidelines, and on insurance.
- H.160 Correspondence and papers 1976-80 on equipment, especially safety cabinets, filters, fermentors.

Committees

When the building, equipment and testing of the facility neared completion and applications to use it could be envisaged, Kendrew set up two committees: the Priorities Committee (Chairman: K. Murray) to recommend applications and the appropriate containment level, generally working by postal consultation, and the Safety Committee (Chairman: Kendrew) with a local membership, to work out house guidelines and act as liaison body with ZKBS. Invitations were sent out in January 1978.

Priorities Committee

- H.161 Ideas for membership, invitations and replies. Draft proformas for research projects and committee assessments.
- H.162 Correspondence 1977-80 on applications to use P4 (high-risk) facility.

Safety Committee

- H.163 Ideas for membership, invitations and acceptances

- H.164 First meeting 7 February 1978.
- H.165 5 July 1978.
- H.166 1 September 1978.
- H.167 8 December 1978.
- H.168 26 February 1979.
- H.169 Not used.
- H.170 19 June 1979.
- H.171 14 February 1980.
- H.172 21 May 1980.
- H.173 12 December 1980.
- H.174 13 May 1981 (notice only; meeting not held).
September 1981 (correspondence only).

Miscellaneous

- H.175 Requests to visit containment facility or to receive
information, from universities, architects, official delegations
1976-79.
- H.176 Correspondence and reports on training courses in biological
safety measures at EMBL 1978-80.

- H.177 Miscellaneous correspondence: sale of enzymes 1976; MRE Porton 1977; staff 1977, 1978.

BIOLOGICAL STRUCTURES DIVISION

- H.178 General correspondence, notes and papers 1974-81 on affairs of the division, purchase of electron microscopes and other equipment, staff and space, research projects and visitors. See also H.190-H.192 for material on the STEM (Scanning Transmission Electron Microscope).
- H.179 Correspondence 1976-77 on suggestions for research projects and staffing.
- H.180 Correspondence, notes and papers 1978-82 on nucleotide sequencing. Includes programmes and reports on EMBL Workshops on computing and DNA sequences April 1980 and April 1981 (see H.149) and similar workshops and projects in USA. The work at EMBL was in the charge of G. Hamm under the guidance of K. Murray and the Nucleotide Sequence Data Library became available in March 1982. Folder includes first newsletter and release of the data base.
- H.181 Invitations and acceptances for membership of STEM Priorities Committee, July-August 1979.
- H.182 Reports and comments on the future of the Structures Division 1980.

INSTRUMENTATION DIVISION

A strong Instrumentation Division had always been an important part of proposals and policy for the Laboratory, and L. de Maeyer was appointed first Head of the Division in 1976. The work of the Division had to remain on a relatively low level during the period of temporary accommodation, but with the completion of the permanent building it was envisaged that nearly half of the whole activity of the Laboratory would eventually be devoted to instrumentation development. To advise on the research and development programme of the Division an Instrumentation Policy Planning Committee (IPPC) was set up in July 1978 (H.184-H.189).

The plans for the future direction of the laboratory after 1982 (see H.265) affected the Instrumentation Division. The changes were described in the EMBL Annual Report 1982 as follows:

"The change of directors at EMBL led to the formulation of a new scientific programme for the next 5-year period which was unanimously accepted by our Council in June 1982. This programme which is discussed later in this report has led to some changes both in the emphasis and the organization of the scientific effort. EMBL is now concentrating on three basic research areas: differentiation, cell biology and structures. Development of technology will be integrated into these basic research programmes as much as possible. The old instrumentation division has therefore been divided into four units so that all supportive technology from mathematics to biology can be associated with the appropriate scientific groups."

The four units were: physical instrumentation, biochemical instrumentation, biological instrumentation, computing and applied mathematics; in 1987 the last two of these were combined as "biocomputing".

- H.183 General correspondence 1976-81 on affairs of the Division: appointments, space and staff allocation, purchases of equipment, projects, visitors, meetings.

Instrumentation Policy Planning Committee (IPPC)

- H.184 Membership: suggestions, invitations and acceptances for full and corresponding members 1978-79.
- H.185 1st meeting 17 January 1979.
- H.186 2nd meeting 6 July 1979, at DESY, Hamburg.
- H.187 3rd meeting, 7-8 December 1979.
- H.188 4th meeting 30-31 October 1980.
- H.189 5th meeting 27-28 January 1982 (chaired by Kendrew). Includes correspondence and papers on proposed "white-beam" camera, preceding and following meeting.

Electron Microscopy

Correspondence, papers, research proposals mainly relating to purchase, installation and use of STEM (Scanning Transmission Electron Microscope) and other electron microscopes.

- H.190 Reports and information on STEM from other users 1974: E. Kellenberger (Basle), A. Rörsh (Leiden).
- H.191 Notes, correspondence and papers on STEM projects, specification and tenders for STEM at EMBL 1974-75.
- H.192 Later correspondence and papers on STEM and other electron microscopes, research projects, meeting of European STEM Users at EMBL etc. 1978-81.

Computer Group

General correspondence on affairs of the Group: appointments, space and facilities, purchase and installation of machines, budgets, research proposals.

The first Head of Computing was R.F. Herzog and the material includes plans, reports and newsletters circulated by him both for the Heidelberg Laboratory and for the Hamburg and Grenoble outstations. See H.99 for Computer Policy Working Group.

- H.193 1975-76. Selection, tenders, installation of first equipment (NORD), early newsletters.
- H.194 1977.
- H.195 1978. Includes Herzog's report of December 1978 which he entitled "The collapse of the EMBL Computer Group", and comments thereon.

H.196 1977-81. Mainly on negotiations and agreement for EMBL to use Electronic Data Processing (EDP) facility at Max-Planck-Institut für Kernphysik.

H.197 1979-81.

Computational Resources Committee

This was established in 1979 "to discuss the policy of the Laboratory for satisfying in-house computational needs"; the first meeting was 23-24 March (Chairman: S. Brenner).

H.198 Papers, memoranda, Kendrew's manuscript notes, minutes of meetings etc. February 1979 - October 1980 on all matters affecting the organisation and future of the group; includes deliberations over the choice of a midi-computer system for which a separate Computer Planning Group was set up on 10 July 1980 whose minutes are also included. There are also reports and submissions by various other sub-groups on computing needs and organisation.

Computer Users' Group

H.199 Minutes of meetings 1-10 (8 August 1979 - 13 February 1981), memoranda.

Research proposals and projects

H.200 High voltage electron microscopy (not taken up at EMBL). Correspondence 1973-75.

H.201 Detectors.

Correspondence and papers 1975-81 on various types of detectors, including the "position-sensitive detector" developed for research programmes at DESY and ILL and on behalf of other European laboratories; much of this work was done by A. Gabriel. Folder includes patent applied for, information on workshops held on detectors, reports on research going forward elsewhere, collaboration with other laboratories. See also H.142, H.145.

H.202

Cell sorters.

Correspondence and papers 1976-78. See also H.144.

OUTSTATION AT DEUTSCHES ELEKTRONEN SYNCHROTRON (DESY) - HAMBURG

Provision for a synchrotron radiation facility, to be incorporated into the storage ring project of the Deutsches Elektronen Synchrotron (DESY) at Hamburg, had been included in the revised Laboratory proposal of 1970, with the aim of making available an intense source of x-rays for diffraction experiments in molecular biology. It consisted of two "bunkers", the B-bunker later called Bunker II, to be built first, on the synchrotron, and the A-bunker later called Bunker IV, the larger of the two and the permanent outstation headquarters, on the storage ring. The DESY synchrotron had come into operation in 1964 and the double storage ring system (DORIS) was in use from 1974.

Much of the early correspondence is with K.C. Holmes, then Professor (later Director) of Biophysics at the Max-Planck-Institute for Medical Research, who supervised some of the preliminary research at DESY, acted as EMBL "Gruppenspracher" and as acting part-time head of the outstation until the appointment of H.B. Stuhrmann from October 1976. See H.205 for Kendrew's reference to the early history of the outstation in his speech at the signing of the EMBL/DESY Agreement.

A regular user of the DESY facility was H.E. Huxley who, among others, contributed memoranda and letters on its development and suggestions for changes or improvements.

Early History

- H.203 Correspondence, notes and memoranda 1970; early approaches to DESY (letter drafted by Holmes), arrangements for preliminary experiments, copy of proposal for facility.
- H.204 Correspondence, notes and memoranda 1971; building, research, finance, staff contracts, early operating tests on DORIS.
- H.205 Correspondence, drafts, text, arrangements for ceremony of signature of Agreement between EMBL and DESY (signed 21 April 1975). Kendrew's speech at ceremony included reference to work of K.C. Holmes and others in getting the project started.

Relations with DESY

General correspondence and papers on the development of DESY and the EMBL facility.

- H.206 1977-78. Modification of DORIS into a part-time dedicated source, and EMBL access to beam time.
- H.207 1979-80. Development and inauguration of Positron Electron Tandem Ring Accelerator (PETRA), construction of new Hamburg Synchrotron Radiation Laboratory (HASYLAB) inaugurated January 1981, EMBL beam time.
- H.208 1979-81. Use of DESY IBM computer centre by EMBL workers.
- H.209 1981. Correspondence and memoranda on EMBL beam time.
- H.210 Miscellaneous shorter correspondence.

DESY Committees

- H.211 Extended Research Committee (Forschungskollegium). Kendrew was invited to serve for three years from June 1974, the first meeting of the committee scheduled to follow the inauguration of DORIS. The committee was dissolved in December 1976, when an Extended Scientific Council and a PETRA Research Committee were set up.
- Correspondence, minutes, notes.
- H.212 Scientific Council (Wissenschaftlicher Rat) (Extended Scientific Council from January 1977). Kendrew was invited to serve in May 1976 and was a member until 1980.
- Correspondence, agenda and minutes, material relating to the development of PETRA.

- H.213 PETRA Research Committee. Minutes of meetings 1-3, 7-11 and 1st combined meeting with DESY Research Committee 1976-79.

Staff

- H.214 1972-76. Build-up of staff, appointments, attendance at conferences etc., up to 1 October 1976 when H. Stuhmann became first full-time head of the outstation for a period of five years. From 1 October 1981 J. Bordas and M.H.J. Koch were appointed joint heads for a two-year period.
- H.215 1977-81.
- H.216 Appointment 1976.
- H.217 Appointment 1979 (at ILL Grenoble as well as at DESY).

Equipment

Notes, memoranda, reports, equipment proposals and assessments, research proposals requiring equipment, correspondence 1972-82. Much of the material deals with the planning and purchase of computer equipment for DESY and should be consulted in conjunction with related material in the Instrumentation Division Computer Group, and the Scientific Purchases Committee.

- H.218 1972-76.
- H.219 1977.
- H.220 1978-82.

Research

- H.221 Priorities Committee, set up in 1973 to evaluate applications to use DESY facility; the members then were A. Engström, K.C. Holmes, H.E. Huxley, J.C. Kendrew, V. Luzzati and the work was mainly conducted by correspondence.
- Correspondence and papers 1973-81, including invitations, acceptances, lists of research projects 1976-79 with date of submission, name of proposer, title and remarks on state of project.
- H.222 Correspondence, reports and papers 1971-81 on synchrotron radiation research and facilities at other laboratories: Laboratoire pour l'Utilisation du Rayonnement Electromagnétique (LURE) Paris; Synchrotron Radiation Source (SRS) Daresbury; Institute of High Energy Physics, Novosibirsk; proposed European Synchrotron Radiation Facility (ESRF).
- H.223 Miscellaneous reports on equipment and research at DESY 1975-78.
- H.224-H.228 Workshops and meetings at DESY.
- H.224 "Diskussionstagung" on problems in neutron and synchrotron radiation research, 7 December 1976. Invitation, abstract, note of discussions.
- H.225 Plan for workshop on "X-ray and neutron scattering by biological macromolecules", March 1978.
- H.226 "The use of X-ray synchrotron radiation in molecular biology", 23-25 October 1978.
- Programme, invitations, costing.
- H.227 "X-ray and neutron scattering of biological structures", 24-28 September 1979.
- Programme, lists of participants and abstracts.

- H.228 "X-ray position sensitive detectors and energy discriminating detectors", 17-21 November 1980.
Programme, lists of participants and abstracts.
- H.229-H.237 Correspondence, reports and papers, research proposals from members of DESY staff or from visiting scientists, reports on research or on facilities at DESY, requests to use equipment or work for long or short term periods etc.
- H.229 1972, 1974.
- H.230 1975.
- H.231 1976.
- H.232 1977.
- H.233 1978-79. Project on time-resolved fluorescence.
- H.234 1978.
- H.235 1979.
- H.236 1980.
- H.237 1981-82.

OUTSTATION AT INSTITUT MAX VON LAUE-PAUL LANGEVIN (ILL) - GRENOBLE

The proposal to establish an outstation at Grenoble placed before the European Molecular Biology Conference in October 1971 was based on the importance of neutron diffraction for research in molecular biology; this had first revealed its potential as a result of the commissioning of the high flux reactor at Brookhaven National Laboratory, New York. The development of the reactor at the Institut Max Von Laue-Paul Langevin (ILL) at Grenoble provided an even higher neutron flux which it was desired to make available to European biologists in close connection with the main EMBL at Heidelberg.

The earliest papers preserved here date from June 1971 and form a sequence of correspondence, notes, memoranda and minutes covering the protracted negotiations which are concerned with the basic principle of collaboration between EMBL and ILL (fairly rapidly agreed), delays over the signing of the Laboratory Agreement, budgetary constraints, difficulties over accommodation and buildings for EMBL outstation workers and adequate access for them to ILL facilities, and the political and financial dimensions involved in the UK decision to participate in the ILL project. For these reasons the "early history" covers a somewhat longer period than that of the DESY outstation at Hamburg, the formal Agreement between EMBL and ILL being signed on 18 March 1977.

For several years the EMBL outstation was housed in rented laboratories at the Centre d'Etudes Nucléaires de Grenoble (CENG) although it had been agreed in principle that EMBL would eventually have its own building; the preferred solution was a shared building with ILL for which a formal contract was signed on 13 December 1979. Work started in November 1980 and was completed in the spring of 1982.

During the early negotiations, Kendrew consulted B.P. Schoenborn who had obtained the first important neutron diffraction results at Brookhaven and who, he hoped, might in due course direct the EMBL outstation should the project come to fruition. In the event Schoenborn remained at Brookhaven and the first head of the Grenoble facility was A. Miller, for five years from 1 September 1975 to 31 August 1980; he was succeeded by B. Jacrot who had been associated with EMBL at ILL from the beginning as Senior Scientist in charge of the Biology Group.

Early History

- H.238 Correspondence, notes and memoranda 1971; early approaches to B.P. Schoenborn, B. Jacrot, and others, drafts and final version of proposal for outstation for submission to EMBC, visits to Grenoble, favourable view of collaboration with EMBL expressed by ILL Steering Committee.
- H.239 Continuing negotiations, visits and correspondence 1972; includes Kendrew's formal letter 13 October outlining proposals for EMBL establishment at ILL, his notes of meetings and discussions etc.
- H.240 Continuing negotiations etc. 1973, formal letter from ILL 17 April on terms of collaboration and drafts for document for agreement by EMBL and ILL Committees, problem of accommodation.
- H.241 Correspondence 1973 on possible accommodation for EMBL at chemistry building of Institut des Sciences Nucléaires, Université de Grenoble.
- H.242 Continuing negotiations, notes of meetings and discussions 1974, largely concerned with problem of accommodation and access to ILL for EMBL workers. No laboratory accommodation within ILL was made available.
- H.243 Correspondence, notes, minutes etc. re accommodation for EMBL at Centre d'Etudes Nucléaires de Grenoble (CENG) in the Laboratoire de Moyenne Activité (LMA). Mainly 1973-74, but also a little later correspondence on CENG matters including Kendrew's letter of thanks December 1981 when EMBL moved into its new laboratories.
- H.244 Correspondence 1974 with CERN on store and workshop facilities made available for EMBL during early days.
- H.245 Correspondence, drafts, revisions, text for Headquarters Agreement between French Government and EMBL relating to privileges and immunities of EMBL "in France", signed 3 March 1976.

- H.246 Correspondence, text for Agreement between ILL and EMBL, signed 18 March 1977.

ILL-EMBL Building

- H.247 Correspondence, notes, plans, reports, minutes etc. 1976-81 on shared building constructed during "deuxième souffle" building programme of ILL. The joint construction project was put before the EMBL Finance Committee on 24 November 1978 and approved in principle by EMBL Council on 30 May 1979; the contract was signed on 13 December 1979.

ILL Scientific Council

Kendrew served as an "observer" on Sub-committee 8 (Biochemistry) of the ILL Scientific Council from 1975. Material includes minutes of meetings, lists of research proposals and a little correspondence.

- H.248 1975.

- H.249 1976.

- H.250 1977.

- H.251 1978.

- H.252 1979.

- H.253 1980.

- H.254 1981.

Staff

- H.255 Correspondence and papers 1972-82 on appointments, recruitment, attendance at courses and conferences, salary scales, lists of staff complement and research interests.

See also H.217.

Equipment

- H.256 Correspondence, plans of laboratory space, lists of requirements and cost estimates 1974-81 including computer planning and selection.

Research

- H.257 Deuteration facility. Correspondence and papers 1977-81 on informal workshop on deuteration methods 18 July 1977 to discuss the proposed facility (to prepare selectively deuterated biological specimens for neutron diffraction and scattering studies) and on supplies of "heavy water" (D₂O) required for work.
- H.258 Proposal for Small Angle Neutron Scattering facility, to be developed jointly by EMBL and Risø National Laboratory (RNL) Denmark. Correspondence, assessments, papers 1978-80. See also H.87.
- H.259 1979-80. Alfalfa mosaic virus.
- H.260 1980. Neutron spallation.
- H.261 1981. Influenza B virus.
- H.262 Miscellaneous reports and notices on facilities available and research in progress at outstation 1976, n.d.

RESEARCH PROGRAMMES

Copies of periodic "Scientific program and indicative scheme" for EMBL.

- H.263 1975, with some correspondence and comments.
- H.264 1980-83, with drafts, notes, correspondence and comments 1978-80.
- H.265 1983-87, with notes of meetings of Senior Scientists of EMBL September 1981 - January 1982 to discuss and draw up plans for future scientific programme with L. Philipson. See introductory note to Instrumentation Division.

SEMINARS, LECTURES, COURSES

SEMINARS

Correspondence with visiting speakers, arrangements and notices for seminars. Internal seminars were also held, the first being on 23 September 1975.

H.266 1975.

H.267 1976.

H.268 1977.

H.269 1978.

H.270 1979.

H.271 1980.

H.272 1981.

H.273 "Heads of Groups" meetings, informal discussions and talks to acquaint staff with the work going forward in the various EMBL research groups under the heading "What is going on at EMBL" 1977-80.

LECTURES

A lecture programme was started in 1978, given by distinguished visiting speakers and intended for a wider scientific audience than the specialist seminars; the inaugural lecture was given on 15 November by A. Gierer. Material includes invitations, correspondence, arrangements and notices.

H.274 1978.

H.275 1979.

H.276 1980.

H.277 1981.

H.278 1982.

H.279 Kendrew's lists and notes of possible lecturers, letters of invitation declined or postponed, suggestions by others for lecturers or topics etc.

COURSES

H.280 Miscellaneous information, programmes, schedules etc. of courses and summer schools at EMBL.

VISITORS AND STAFF

VISITORS

These are requests to visit the laboratory: from scientists writing on their own behalf about research projects, or in a representative capacity on behalf of institutions or departments interested in laboratory organisation, teaching or research programmes; from government departments or embassies interested in setting up laboratories or in the workings of an international institution; from delegations or representatives of EMBL member states or elsewhere. Some of the exchanges are brief, others include information on proposed research and building plans on national and international levels, comments on EMBL organisation, letters of thanks and the like.

General correspondence

H.281	1974-76.
H.282	1977.
H.283	1978.
H.284	1979.
H.285	1980.
H.286	1981-82.

Official visits and delegations

H.287	1975-79.
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- H.288 1979. Visit by Visiting Subcommittee, Medical Research Council 13 February 1979. Correspondence and papers. For the Council's letter to Kendrew reporting on their visit, see J.98.
- H.289 1980-81.
- H.290 Official German visits 1976-80.
- H.291 Miscellaneous correspondence and arrangements for exchanges with Chinese scientists 1979-82, mainly for visits by Chinese but a few visits to China by members of EMBL staff.

STAFF

The following material relates mainly to early recruitment of scientific staff. Some correspondence and material relating to appointments of scientists at EMBL remain in Kendrew's hands. Material relating to administrative staff appointments is at H.334-H.344.

- H.292 Information and newsletters circulated by Kendrew to members of EMBO asking for help in recruiting suitable staff, job descriptions, with some replies and suggestions, various dates 1975-78.
- H.293 Notes, drafts, tables on build-up of EMBL staff and distribution of nationalities, 1975-80.
- H.294 Miscellaneous correspondence etc. on technical staff.
- H.295 Correspondence and papers on postdoctoral fellowships, suggestions for possible projects submitted by EMBL senior scientists, circular to members of EMBO and correspondence arising 1976-82.
- H.296 Correspondence on short secondments, "stages" or sandwich courses at EMBL 1977-81.

MEMBERSHIP

Correspondence and papers with member states on their membership of EMBL, and with others on possibility of their joining. In alphabetical order.

- H.297 Denmark. Working Party of Danish research councils to study Denmark's continuing participation in EMBL. Correspondence, copy of report and English translation, press comment 1979-80.
- H.298 Finland. Brief correspondence only, 1982, on possibility of Finnish membership.
- H.299 France. Ratification of Agreement 1977, correspondence 1978.
- H.300 Greece. Brief correspondence only, 1978, on possible membership.
- H.301 Israel. Adjustment of contribution 1979.
- H.302 Italy. Ratification of Agreement 1976, correspondence on Italian involvement in EMBL 1981.
- H.303 Norway. Visit to EMBL by Norwegian Research Council and possible membership 1974, 1976-77.
- H.304 USSR. Correspondence on costs of possible membership 1977.

ADMINISTRATION

ORGANISATION AND PLANNING

- H.305 Early drafts and memoranda on various aspects of Laboratory organisation: working hours, travel and subsistence regulations (and later revisions), leave records, visiting workers and fellows, almost all with Kendrew's revisions and corrections, various dates 1973-81.
- H.306 Correspondence on conditions of appointment and dismissal of senior staff and the grant of indefinite contracts 1976-77, notes on administrative staff requirements
- H.307 Space allocation in EMBL, including estimates by staff members for their requirements in the new laboratory 1977 and later plans for laboratory and "denkzimmer" space 1979-81.
- H.308 Papers and correspondence 1974-75 on drafting of staff rules and regulations, with manuscript notes and comments by Kendrew and others.
- H.309 Proposed revision of rules of administrative procedure drawn up March 1982 for implementation by L. Philipson as Director-General.
- H.310 Correspondence and papers 1975-79 on the employment of the EMBO/EMBC secretariat staff as staff members of EMBL.
- H.311 Information about EMBL; includes information folders prepared for all personnel appointed to laboratory, and dossier of essential documents - Headquarters and Outstation agreements, financial and staff regulations, Council, SAC etc.

COMMITTEES

Library

The library was regarded by Kendrew as an essential part of the laboratory from the beginning and a librarian (Mrs M. Holmes) was in place from 1975. When the Library Committee was set up in 1976 he took the view (note of 16 November 1976) that the library belonged to the scientific operation of the laboratory and not to the administration, and, since it did not belong specifically to any one of the divisions, that it should come directly under the Director-General.

- H.312 Miscellaneous papers and correspondence 1974-80 mainly relating to start of Library and Committee and to its naming after Leo Szilard. See also H.48.

Standing Advisory Committee

This was set up in 1977 in accordance with Staff Regulations to "advise the Director-General on general questions concerning the personnel . . . ", with two representatives elected by the staff and two nominated by the Director-General. The committee met for the first time on 31 May 1977.

- H.313 Setting-up of committee, minutes of meetings 1977-79.

Laboratory Safety Committee

Set up August 1978.

- H.314 Papers and minutes 1978-81.

Joint Advisory Appeals Board

Set up in accordance with Staff Regulations in September 1979.

- H.315 Papers 1978-81. Also included is brief correspondence with International Labour Office (ILO) on EMBL acceptance of ILO Administrative Tribunal in respect of staff complaints.

Heads of Section meetings

- H.316 Notices of informal meetings instituted by Kendrew from August 1978 for heads of sections in administration to discuss any topic of general interest or concern.

Building Maintenance

Set up in August 1978 under Kendrew's chairmanship.

- H.317 Papers and correspondence 1978-81.

Canteen

A provisional Canteen Committee was set up in September 1977 for the move into the new building and replaced by a new committee with "regional representatives" which met for the first time on 22 June 1978.

- H.318 Papers, correspondence, minutes 1977-82.

FINANCE

Conditions of contracts with EMBL

- H.319 Papers, correspondence, drafts and minutes 1976-77 mainly relating to Working Group set up 26 February 1976 (Chairman: P. Fasella) to examine subject.

Internal financial rules and regulations

- H.320 Drafts, correspondence and comments, Kendrew's manuscript notes 1977-78, proposed revision 1980.

Internal Audit

The Internal Auditor was appointed by the Director-General and reported quarterly to him. His reports and findings on the administration of the laboratory and its outstations were made available to those concerned and to the External Auditors appointed by the Council. During the period covered here the Internal Auditor was J. Willert, appointed after the meeting of the Finance Committee in November 1979, and the External Auditors with whom some correspondence is included were the Danish firm Rigsrevisionen. The official Audits and Director-General's comments thereon are included in the papers of the EMBL Finance Committee at H.378-H.417.

- H.321 Papers, correspondence, reports of Internal Auditor and comments of members of laboratory staff involved, drafts of reports of External Auditors and correspondence arising, August 1979 - December 1981.

Salaries

- H.322 Miscellaneous correspondence and memoranda on fixing, adjustment and review of EMBL salary scales with special reference to inflation rates and comparability in Germany and France (Grenoble outstation), and with other international organisations, June 1975 - May 1981 when a "Working Group on the EMBL System of Remuneration" was set up. (See H.323 and H.326.)

- H.323 Papers and correspondence of Working Group on EMBL salaries (Chairman: C.A. Ladage) June-November 1981.
- H.324 Papers and correspondence on Working Group set up to study possible adoption by EMBL of Co-ordinated Organisations' remuneration system March 1977 - May 1980.

STAFF ASSOCIATION

Moves to initiate a staff association began in April 1976 and a Pilot Committee was formed in June to draft statutes (Chairman: N. Strausfeld). This proved a protracted matter, first because the proposed draft was unsatisfactory and was extensively revised by Kendrew when submitted for his scrutiny, and later because of the association's possible affiliation to the German Trades Union Congress with difficulties arising for the international status of EMBL. After considerable comment and re-drafting, the statutes were formally accepted by Kendrew in May 1978 and a Committee elected in September.

- H.325 Early papers, drafts and correspondence on Statutes April 1976 - September 1978.
- H.326 Papers, memoranda, correspondence with Staff Association (Chairman: J. Dubochet) on various EMBL affairs but mainly appointment and contracts, salary scales, membership of Co-ordinated Organisations etc. and including papers and representations made to Working Groups (see also H.322, H.324) 1978-80.

MISCELLANEOUS

- H.327 Education, lodging and housing.
- H.328 Relations with City of Heidelberg and local community 1973-82, including material prepared for Open Day May 1979 and Kendrew's speech at the "topping-off ceremony" of the Laboratory in October 1976.

- H.329 University of Heidelberg. Kendrew's letters 1976, 1980 on research and appointments and the maintenance of Heidelberg as a leading European centre of research.
- H.330 Patents 1978-82.
- H.331 Shorter correspondence and memoranda 1976-81.
- H.332 Annual reports. Kendrew's notes on circulation and content, correspondence and notices to staff asking for contributions and a few drafts for early reports. Schedules, some letters of thanks and congratulation or requests for copies. Various dates 1975-81.
- H.333 Press and publicity 1972-87. Includes press releases, press-cuttings, arrangements or requests for articles, comments, interviews, visits by journalists, radio and film units, some drafts, transcripts, photographs.

APPOINTMENTS

Members of administrative staff

Correspondence, contract, references, future career etc. In alphabetical order.

- H.334 Bach, B.L.V. 1975-78.
- H.335 Beer, O. 1974-82.
- H.336 Gale, D.S. 1976-82.
- H.337 Giorgio-Alberti, G. 1974.

H.338	Guggenbühl, D.	1973-74.
H.339	Heckl, K.W.	n.d.
H.340	Leenart, G.C.	1970-73
H.341	Pasquill, J.	1980-82.

Applications and recruitment

Includes correspondence with colleagues on recommendations, Kendrew's notes, schedules for interviews, assessments, general affairs of EMBL.

H.342	Possible appointments at EMBL 1973.
H.343	Similar, including Head of Administration 1974-75.
H.344	Head of Administration (not filled) 1978.

DIRECTOR-GENERAL'S NOTES AND CORRESPONDENCE

NOTES

These are the contents of loose-leaf binders of varying format; they are manuscript notes, usually dated, on all topics relating to the scientific programme, appointments and building of EMBL. They include Kendrew's own ideas, lists and schedules, notes of discussions with others, suggestions made at conferences, subjects raised or to be raised at EMBO, EMBC or EMBL meetings, timetables and deadlines, staff and space allocation etc. They often antedate or complement more formal material as well as indicating the intense dedication Kendrew brought to the laboratory project.

- H.345 Small format notes. Includes lists of names in various research fields suggested 1967 and at Konstanz and Haarlass meetings 1969 and 1971, memberships of working groups and committees, notes of discussions on building, staff, equipment 1971-73.
- H.346 Small format notes. Appointments and projects at DESY, Cell Biology, other miscellaneous notes 1975-77.
- H.347 Small format notes. Charts of laboratory staff by grade, division etc. with manuscript note "Superseded January 1981".
- H.348 Similar, more extensive charts, including DESY and ILL.
- H.349 Small format notes. Lists of members of EMBL committees.
- H.350 Small format notes. Dinners and guests at EMBL.
- H.351 A4 format notes. Appointments and research, costings and estimates for equipment and personnel, discussion and telephone notes 1973-74.

H.352 A4 format notes. Charts, lists etc. on staff and space allocation at EMBL.

Notes and correspondence on specific projects and appointments

H.353 rDNA 1976-77.

H.354 Neurobiology 1977-80.

H.355 Membranes 1979.

H.356 X-rays 1976-1979.

H.357 Electron microscopy 1973-76.

H.358 Instrumentation 1974, 1978.

KENDREW'S APPOINTMENTS AND CAREER AT EMBL

Project Leader

The appointment was authorised by EMBC on 15 October 1971 and took effect from 28 June 1972.

H.359 Correspondence and papers August-December 1971; includes formal resolution, offer of post, salary and conditions etc.

Director-General

The Council of EMBL decided at its session of 10-11 October 1974 to invite "the present Project Leader to assume the duties of the Director-General". After various negotiations over salary, terms of service, pension rights etc. involving EMBL Council and MRC, the contract was agreed for an appointment of three years with the possibility of a renewal for two periods of two years, with effect from 1 January 1975.

- H.360 Correspondence and papers, negotiations, contract, with EMBL August 1974 - April 1975.
- H.361 Similar material, negotiations on secondment from MRC July 1974 - July 1975.
- H.362 Diplomatic status, privileges and immunities of Director-General of EMBL.
- H.363 Extension of contract 1977.
- H.364 Extension of contract 1979 (to January 1981) and 1981 (to March 1982), leaving settlement at EMBL, pension rights at MRC etc. October 1979 - October 1981.
- H.365 Papers and correspondence regarding Kendrew's retirement and the appointment of his successor (L. Philipson, with effect from 1 April 1982) December 1977 - June 1982. Includes discussion notes and representations, report of Search Committee, possible "Konstanz" meeting on future direction of EMBL etc. See H.344 for a little related correspondence.
- H.366 Earlier correspondence and papers January 1974 - January 1975 on research plans of L. Philipson.
- H.367 Arrangements for leaving Heidelberg, farewell parties, letters of thanks and good wishes, some with reminiscences.

PERSONAL CORRESPONDENCE

H.368 Kendrew's address lists, personal correspondence at EMBL 1974-81.

H.369 Miscellaneous shorter personal correspondence 1976-82.

DIRECTOR-GENERAL'S CORRESPONDENCE

Carbon copies of Kendrew's letters and telexes on all affairs of EMBL: committees, appointments, research, visitors etc. Includes a little "personal" material relating to meetings, committees and conferences of other organisations with which Kendrew was involved, invitations to academic and social occasions.

H.370 1975.

H.371 1976.

H.372 1977.

H.373 1978.

H.374 1979.

H.375 1980.

H.376 1981.

H.377 1982.

FINANCE COMMITTEE AND COUNCIL MINUTES

The material includes full sets of papers presented at the meetings, some with annotations by Kendrew, and may also include correspondence preceding or arising from meetings, or Kendrew's manuscript notes of proceedings.

- H.378 Correspondence, notes, summaries of informal meetings of members of EMBL and EMBC Councils, 1975, 1976, 1977.
- H.379 Provisional Laboratory Council 5 July 1974. (Notice and agenda only.)
- H.380 Finance Committee (first meeting) 10 October 1974.
- H.381 Council (first meeting) 10-11 October 1974.
- H.382 Finance Committee 23 May 1975.
- H.383 Finance Committee 2-3 July 1975.
- H.384 Council 3-4 July 1975.
- H.385 Finance Committee 21 October 1975.
- H.386 Finance Committee 25-26 November 1975.
- H.387 Council 27 November 1975.
- H.388 Finance Committee 26 February 1976.

- H.389 Finance Committee 28-29 June 1976.
- H.390 Council 30 June 1976.
- H.391 Finance Committee 22-23 November 1976.
- H.392 Council 24 November 1976.
- H.393 Finance Committee 1 March 1977.
- H.394 Finance Committee 4-5 July 1977.
- H.395 Council 6 July 1977.
- H.396 Finance Committee 5-6 December 1977.
- H.397 Council 7 December 1977.
- H.398 Finance Committee 8-9 May 1978.
- H.399 Council 10 May 1978.
- H.400 Finance Committee 9 October 1978.
- H.401 Finance Committee 11-12 December 1978.
- H.402 Council 11-13 December 1978.
- H.403 Finance Committee 23 February 1979.

- H.404 Finance Committee 29-30 May 1979.
- H.405 Council 30-31 May 1979.
- H.406 Finance Committee 19-20 November 1979.
- H.407 Council 21 November 1979.
- H.408 Finance Committee 3 March 1980.
- H.409 Finance Committee 10-11 June 1980.
- H.410 Council 11 June 1980.
- H.411 Finance Committee 24 November 1980.
- H.412 Council 25 November 1980.
- H.413 Finance Committee 16 March 1981.
- H.414 Finance Committee 3 June 1981.
- H.415 Council 3 June 1981.
- H.416 Finance Committee 8-9 December 1981.
- H.417 Council 9 December 1981.

SECTION J

UK SOCIETIES, ORGANISATIONS, CONSULTANCIES

J.1-J.176

J.1

BRISTOL UNIVERSITY

J.2-.J.12

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (BAAS)

J.13, J.14

BRITISH BIOPHYSICAL SOCIETY

J.15

BRITISH BROADCASTING CORPORATION SCIENCE CONSULTATIVE GROUP

J.16

BRITISH COUNCIL

J.17

BRITISH MUSEUM

J.18

CAMPAIGN FOR BETTER BROADCASTING

J.19

CIBA FOUNDATION

J.20, J.21

COMMONWEALTH SCIENCE COUNCIL (CSC)

J.22-J.66	COUNCIL FOR SCIENTIFIC POLICY (CSP)
J.67-J.69	DESIGN RESEARCH UNIT
J.70-J.94	HIGH ENERGY PARTICLE PHYSICS REVIEW GROUP (HEPP)
J.95	IMPERIAL CHEMICAL INDUSTRIES LTD. (ICI)
J.96-J.98	MEDICAL RESEARCH COUNCIL (MRC)
J.99-J.103	MINISTRY OF DEFENCE
J.104-J.111	MINISTRY OF OVERSEAS DEVELOPMENT
J.112-J.116	QUEEN ELIZABETH HOUSE OXFORD
J.117-J.123	ROYAL INSTITUTION
J.124-J.176	ROYAL SOCIETY

BRISTOL UNIVERSITY

1982

Special Committee of Court 1982

J.1 Correspondence, papers, memoranda, submissions, reports etc. for Special Committee of the University Court set up to consider the future of the Department of Architecture. Kendrew was Chairman.

Material includes arrangements for and minutes of Committee's meeting on 26-27 June, drafts, comments and amendments on its report, note of second meeting 29 July, redrafts of report, correspondence with D.C. Hodgkin (Chancellor, Bristol University), submissions and representations from architects, schools of architecture, local societies and other interested parties, correspondence and papers following Committee's report. May-November 1982.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE (BAAS)

1965-66, 1972-76

Apart from a little earlier correspondence about lectures (J.2), most of the material relates to 1972-74 when Kendrew was most deeply involved with the BAAS. In March 1972 he accepted the invitation of the then President (Sir Vivian Fuchs) to allow his name to go forward as President-Elect in 1972-73 and President in 1973-74. He was installed at the Annual Meeting in 1973 at Canterbury and gave the Presidential Address at the 1974 Annual Meeting at Stirling. He was also invited, but declined, to accept the Presidency of Section X (General) in 1972-73.

The principal officials of the BAAS during Kendrew's period of office, with whom much of the correspondence is exchanged, were M. Pyke (Secretary and Chairman of Council), A.M. Hughes, R.P. Saville (Assistant Secretaries).

The material deals with the general affairs of the BAAS, staff and appointments, as well as requests to Kendrew to lecture and advise.

J.2 1965-66

Correspondence re Kendrew's lectures for BAAS in Northern Ireland (first Hans Sloane Memorial Lecture) and Harrogate. See L.148 for notes for Hans Sloane Lecture.

J.3 1972

Nomination as President-Elect, election to Council, British Association Publications Committee.

J.4 1973 January-August

Miscellaneous requests to lecture, join Study Groups; arrangements for Annual Meeting at Canterbury and interview for Southern Television.

J.5 1973 September-December

Appointments, staffing, funding, organisation.

- J.6 1973 September-December
- General correspondence on affairs of BAAS, formation of British Association Student Section (BASS) etc.
- J.7 1974 January-July
- Appointments, organisation, funding, BAAS film and television awards, proposed BAAS working parties on nutritional relief, energy crisis, science policy research.

136th Annual Meeting at Stirling, 2-7 September 1974

- J.8 Organisation and arrangements December 1972 - October 1974. Includes preliminary meetings and discussions with BAAS and with University, visit and "Launching Meeting" at Stirling January 1973, later planning visit to Stirling November 1973, draft programmes, budget etc.
- Printed programme of meeting, schedule of President's and officers' engagements.
- J.9 Arrangements for Inaugural Meeting and conferment of honorary doctorates on President and others.
- J.10 Invitations to speak, open sessions etc. during Stirling meeting. See also L.92.
- J.11 Kendrew's Presidential Address: "Science and the Challenge of the Time".
- 16pp. manuscript draft; 16pp. typescript version; miscellaneous manuscript notes, some with dates in July, August 1974.
- J.12 1974-76
- Appointments, requests to lecture. See L.149 for lectures and talks by Kendrew in 1974, including the Stirling meeting.

BRITISH BIOPHYSICAL SOCIETY (BBS)

1959-81

See also:-

INTERNATIONAL UNION OF PURE AND APPLIED BIOPHYSICS (IUPAB) K.46-K.52

ROYAL SOCIETY BRITISH NATIONAL COMMITTEE FOR BIOPHYSICS J.127-J.134

The first steps towards the foundation of the Society were taken at a joint meeting on 6 March 1959 of the Biophysics and Biophysical Chemistry Sub-committee of the Faraday Society and the International Biophysics Organising Committee (Kendrew attended as a member of the latter). At the meeting it was resolved that the Sub-committee should be re-constituted as a full Committee of Council of the Faraday Society (not a Sub-committee of the Colloid and Biophysics Committee). A working party was set up and met for the first time on 4 February 1960 (Chairman: J.A.V. Butler), when it was proposed that a new Society be formed under the name "The Biophysical Society of Great Britain". Butler continued as Chairman, and Kendrew became the first Honorary Secretary of the Steering Committee (formed from the Working Party). The Steering Committee held 13 meetings between 4 May 1960 (when the name British Biophysical Society was adopted) and 12 December 1961 which was also the first Annual General Meeting. At this latter meeting the Society's rules were approved, and the first formal Committee meeting was held on 21 February 1962. Kendrew continued as Honorary Secretary until December 1962, his successor being D.D. Eley. He served on the Committee 1963-65 and was elected Chairman in 1964 until February 1965 when he resigned because of pressure of other commitments, being succeeded by M.H.F. Wilkins.

J.13 Minutes and committee papers 1959-66.

Includes Working Party and Steering Committee meetings 1-13, early bulletins and newsletters, draft rules, Committee meetings 1-16.

J.14 Correspondence on various affairs of the Society 1963-81.

Includes correspondence 1964 on possibility of abstracts of BBS papers being published in *Journal of Molecular Biology*, and correspondence 1980-81 on 21st anniversary meeting at Leeds, with a short account of the formation of BBS written by P.M. Harrison (Chairman, 1981).

BRITISH BROADCASTING CORPORATION SCIENCE CONSULTATIVE GROUP

1964-67

J.15 The Group was set up in 1964 "to advise on the general nature of programmes on science" as a consequence of the Pilkington Committee, and had its first meeting on 29 May under the Chairmanship of Sir Alexander Haddow. Kendrew served from the inception of the Group until December 1967.

Folder includes correspondence with colleagues and BBC officials, minutes and background papers, ideas and comments on programmes.

BRITISH COUNCIL

1974-76

J.16 Sub-committee on Interchange with France. Kendrew was Royal Society representative from 1974.

Brief correspondence and information only, 1974-76.

Kendrew also served on the Scientific Advisory Committee from its first meeting November 1982 for three years (renewed October 1985).

BRITISH MUSEUM

1974-79

Kendrew served as a Trustee of the British Museum at the nomination of the President of the Royal Society (A.L. Hodgkin) for five years from April 1974.

J.17 Brief correspondence only, mainly letters of invitation to serve and of thanks at end of period.

CAMPAIGN FOR BETTER BROADCASTING

1969

This was a pressure group launched in September 1969 to draw attention to the proposals set out in the BBC report "Broadcasting in the '70s". Kendrew was one of the signatories of the first public letter circulated by the group.

J.18

Correspondence with secretary of the campaign (N.R. Jones), Director-General of BBC, arrangements for meetings, memoranda, background material etc.

CIBA FOUNDATION

1965

Working Party on International Research Centres

Kendrew was a member of the working party and contributed information and publications concerning international organisations. The first meeting was on 25 March 1965. Because of his involvement with the Council for Scientific Policy (q.v.), however, he felt that it was difficult for him to take an active part and in July he suggested to the organiser that "you had better count me out of the exercise".

J.19

Mainly correspondence about meetings, but includes Kendrew's list of publications dealing with international organisations, and a copy of L. Kowarski's paper "An account of the origins and beginnings of CERN" (1961).

COMMONWEALTH SCIENCE COUNCIL (CSC)

1983-84

In August 1983 Kendrew was invited to chair a Task Force of the Commonwealth Science Council (CSC) on "An Expanded Programme of Scientific Co-operation in the Commonwealth". The Task Force, later called an "Expert Group", met in London in October 1983, and in April and May 1984 and its report was published in August 1984 under the title "Science for Technology for Development". The Secretary of the Group, and of the CSC, was J.I. Furtado with whom much of the correspondence is exchanged.

J.20 Notes and committee papers:

First meeting, 24-25 October 1983.

Agenda, "Tentative priority", notes of meeting, Kendrew's notes.

Second meeting, 2-5 April 1984.

Agenda, notes of meeting.

Third meeting, 28-29 May 1984.

Draft report, with some annotations by Kendrew.

J.21 Correspondence and papers August 1983 - June 1985.

Includes invitation to serve, composition of group, terms of reference, arrangements for meetings, schedule of work, costings of projects, draft report and comments by group members, presentation of report at CSC Biennial meeting, Ottawa, errata and correspondence arising.

COUNCIL FOR SCIENTIFIC POLICY (CSP)

1964-72

The Council was set up in 1965 by the Department of Education and Science (DES) as a result of the Committee of Enquiry into the Organisation of Civil Science HMSO Cmnd 2171, 1963 (the Trend Report). Its purpose was "to advise the Secretary of State for Education and Science in the exercise of his responsibilities for the formulation and execution of Government scientific policy". It originally had fourteen members drawn from the universities and industry, with assessors from the Research Councils and the University Grants Committee, and was serviced by the DES.

The CSP began its activities in January 1965, working primarily through *ad hoc* working groups and committees, some being joint or collaborative, and its two Standing Committees, on International Scientific Relations and on Human Resources in Science and Technology.

Kendrew was a member of CSP from its inception, his terms of service being periodically renewed until the work of CSP came to an end in 1972. The first Chairman was Sir Harrie Massey, succeeded from January 1970 by F.S. (later Lord) Dainton. Kendrew was Deputy Chairman from 1969, and Chairman of the Standing Committee on International Scientific Relations (ISR); he chaired or was a member of many of CSP's working groups, as itemised at J.27-J.66.

Many of the projects on which CSP was asked to advise involved international co-operation in various fields, including molecular biology. The EMBO/EMBC/EMBL organisations and proposals were thus under frequent discussion as well as being the subject of specific working groups.

COUNCIL

Appointment and membership

J.22 Correspondence and papers 1964-72, mainly with successive Secretaries of State for Education & Science, on Kendrew's appointment (1964) and renewals of service 1967, 1972, membership of CSP, information on meetings; also included are miscellaneous travel claims for meetings and overseas visits 1966-70.

Correspondence and papers on CSP affairs

- J.23 1965. Mainly correspondence and memoranda on EMBO; a little material on UGC and nuclear physics.
- J.24 1966-69. Includes material on visit of Canadian Senate Committee on Science Policy to London September 1969; CSP visit to North Africa; letter on CERN 300 GeV accelerator.
- J.25 1970. Visits and conferences.

Overseas visits

Official visits by CSP delegations of which Kendrew was a member. Includes information, notes of discussions, participants from CSP and host countries.

- J.26 Holland, 2-3 March 1967.
- Germany, 9-11 May 1967 (and also visit by Wissenschaftsrat to London 24-25 April).
- Italy (proposed visit 3-4 October 1968).
- Sweden, 13-15 April 1970.
- France, 4-6 November 1970.

COMMITTEES AND WORKING GROUPS

This material relates to the committees and working groups of which Kendrew was a member or chairman, and is presented in chronological order.

Advisory Group on Fundamental Research 1965

This was set up on 23 July 1965 with D.H.R. Barton as chairman and B.H. Flowers and Kendrew as members, to consider the OECD draft report on "Fundamental research in the policy of government".

- J.27 Correspondence and papers July-August 1965. Includes copy of OECD report, comments by Science Research Council, Kendrew's comments prepared for Advisory Group.

Location of Research Councils 1965

- J.28 Papers and correspondence on economic costs in travel, man-hours etc. involved if headquarters of Research Councils were moved out of London to e.g. Manchester or Edinburgh. Correspondence is principally with M.M. Swann, whose draft report is included, with comments by Kendrew.

Biology Review 1965

The starting-point for this seems to have been a memorandum of February 1965 by M.M. Swann on "The pattern of research in Britain: the need for a synoptic view". Pilot surveys were set up by the CSP to deal with biological research in or near Edinburgh (organised by Swann) and in or near Cambridge (organised by Kendrew and N.M.V. Rothschild). Much of the material relates to the determination of categories and the organisation of the statistics. The result was published as CSP(BR)(65)1 a copy of which is retained at J.32.

- J.29 M.M. Swann's memorandum February 1965, categories proposed at Edinburgh and by CSP, CSP account of project.

- J.30 Correspondence, mainly with Rothschild, on questionnaire for Cambridge departments and on processing the results.
- J.31 Correspondence and papers on the Cambridge survey, replies to questionnaire from colleagues.
- J.32 Copy of report.

Working group on molecular biology 1965-68

Kendrew was the Chairman of the group, which was set up, after some preliminary correspondence, in April 1966 "to enquire into the present position of, and future plans for, teaching, recruitment and research in molecular biology in the United Kingdom".

The group held 14 formal meetings and considered evidence from individuals and organisations. Its report was submitted for consideration by the Council at its meeting on 9 February 1968, and published in July 1968 (HMSO Cmd 3765).

Membership of the group was: J.L. Gowans, W. Hayes, H.L. Kornberg, A. Neuberger, M.G.P. Stoker, M.M. Swann, M.H.F. Wilkins.

Official papers

- J.33 Minutes and notes of working group meetings 26 April 1966 - 16 January 1968.
- J.34 Working group papers CSP(MB)(66)1 - CSP(MB)(68)2. Includes drafts for report, with comments and amendments by Kendrew and working group members.

General correspondence and papers

- J.35 Preliminary correspondence on setting up and membership of working group December 1965 - March 1966.

- J.36 May-August 1966. Arrangements for literature search, lists of papers published and reports of research in progress in molecular biology at various UK universities and institutions (Sheffield, Leicester, King's College London, Chester Beatty Research Institute, University College London, University Chemical Laboratory Cambridge).
- J.37 June-November 1966. Definition of "molecular biology"; developmental biology; applied biology.
- J.38 February-November 1967. Drafts, comments and notes on the problems of defining "centres of excellence" (later called "focal centres") and their possible staff.
- J.39 February 1967 - January 1968. Includes correspondence and papers from H. Himsworth.
- J.40 February 1967 - May 1968. Early drafts and comments for report, revisions, arrangements for publication (includes Kendrew's corrected proof of HMSO report).
- J.41 Press comments and correspondence arising. Includes note from J.D. Bernal ("Sage") objecting on historical grounds to use of term "biology at the molecular level" instead of "molecular biology".

Standing Committee on International Scientific Relations (ISR)

A Working Party on International Scientific Relations was set up by Council on 7 January 1966. The Chairman was Sir Harrie Massey and the members were Kendrew, P.M.S. Blackett, H.W. Thompson, D.C. Martin, J. McAdam Clark, R.I. Michaels and Sir Frank Turnbull. In a note of 16 March, the Chairman proposed a standing Working Group with a representative membership from the CSP, the Department of Education & Science, the Foreign Office, Royal Society, Science Research Council and the Ministry of Technology. Kendrew continued as a member of the Standing Committee thus formed, and was its Chairman 1970-72.

Minutes

- J.42 Setting-up papers 1966, Minutes of meetings 3-6 1967, 1-2 1968, 2-3 1970.

Background papers

Miscellaneous papers, reports etc. on all aspects of international scientific collaboration, scientific policy in UK and elsewhere, some dealing specifically with European molecular biology. Circulated by CSP to members of ISR Standing Committee.

- J.43 1966. CSP(ISR) 6, 7, 10, 14, 16, 17, 19-21.

- J.44 1967. CSP(ISR) 1-5, 7-15.

- J.45 1968. CSP(ISR) 1, 2

- J.46 1969. CSP(ISR) 1-3, 5-9.

- J.47 1970. CSP(ISR) 2-4, 12-18.

Also included here is the report of the Working Group on Scientific Interchange CSP(SI) set up by the Standing Committee in July 1969 (Kendrew was a member), not otherwise documented.

- J.48 1971. CSP(ISR) 1-12, 14, 15.

- J.49 1972. CSP(ISR) 9, 12.

CSP 36, 44.

Working Party on the Proposed European Laboratory for Molecular Biology

The Working Group was created on an initiative of Sir Harrie Massey, Chairman of CSP (J.50) and formally set up on 6 December 1968 "to consider what should be the UK attitude to the EMBO proposal for a European laboratory; and to report to the Council for Scientific Policy". The Chairman was Sir Harrie Massey and the members were J.B. Adams, J. Baddiley, J.H. Humphrey, A. Neuberger, M.G.P. Stoker and H.W. Thompson; Kendrew was an "assessor", and there were assessors from the Medical Research Council and the Science Research Council. The Working Party's report (March 1970) recommended UK participation subject to further examination of the scientific programme, costing and site, and the report was accepted by the Council at its meeting on 20 March. In December 1971 a Working Group was set up with S.L. Bragg as Chairman and J.G. Collingwood, P.B. Hirsch, R.R. Porter and M.G.P. Stoker as members "to consider the UK contribution to a European Molecular Biology Laboratory in the light of (i) the proposed scientific programme and (ii) the revised cost estimates; and to report to the CSP". Its report indicated support for the laboratory, subject to a reduction in costs and this was accepted by the Council at its meeting in January 1972. After subsequent further discussions on costings and research, the Council finally submitted to the Secretary of State in May its recommendation that the UK should take part in the establishment of the Heidelberg laboratory and its outstations at Hamburg and Grenoble.

Correspondence

- J.50 1968-71. Includes letter from Sir Harrie Massey February 1968 suggesting setting-up of Working Party, miscellaneous later correspondence 1969-71.
- J.51 Notes, correspondence and memoranda on the Bragg Working Group and meetings and decisions of CSP January-May 1972.

Minutes

- J.52 Working Party Meetings December 1968 - July 1970.

Background Papers

- J.53 1968. CSP(EB) 1-6.
- J.54 1969. CSP(EB) 1-5.
- J.55 1970. CSP(EB) 1, 3-8.

Council Minutes and Papers

- J.56 Minutes and papers March 1970 - May 1972 covering reception of Working Party report, setting up and work of Bragg Working Group, final deliberations and recommendations.

Miscellaneous

- J.57 A collection of CSP papers 1965-69 on international scientific organisations, with special reference to life sciences, biology and molecular biology, EMBO and EMBL and similar matters of special interest to Kendrew.

Working Group on research organisation ("Dainton Report")

The Working Group was set up in October 1970 under the Chairmanship of F.S. Dainton "to advise the Secretary of State, through the Council for Scientific Policy, on the most effective arrangements for organising and supporting pure and applied scientific research and postgraduate training". The other members were T.L. Cottrell, Kendrew, P.E. Kent and A.W. Merrison. The report of the Working Group was submitted in May 1971; among its recommendations were the retention of the Research Councils and the replacement of the CSP by a new advisory body responsible to the Secretary of State (now the Advisory Board for the Research Councils).

In 1971 the Government commissioned a report from Lord Rothschild, Head of the Central Policy Review Staff, on Government research and development; this was submitted in October 1971 and recommended the "application of customer-contractor principle to all applied research and development". The two reports, by Rothschild and Dainton, were published

together in November 1971 as a Green Paper "A Framework for Government Research and Development" (Cmnd.4814). In an introductory memorandum, the Government, while welcoming the recommendations of both reports, announced its intention "to allow time for wide public debate and to discuss the issues involved with the scientific community".

See Preparatory Group : Green Paper J.65, J.66.

J.58 Minutes and notes of meetings November 1970 - April 1971.

J.59 Drafts of report, some heavily revised and corrected by Kendrew and Dainton; comments and submissions by Research Councils and by individuals. Some manuscript notes by Kendrew. A copy of Cmnd.4814 is included here for reference.

Working Group on high flux neutron research

The Working Group was set up on 4 June 1971. The Chairman was A.W. Merrison and the members were P.B. Hirsch, Kendrew and R.G. West. The original terms of reference were "to examine the effect on the science budget of the proposals for high flux neutron beam research contained in the Science Research Council's Forward Look; and to report to the Council". These were later broadened (September 1971) "to consider the future provision required for high flux neutron beam research, with regard particularly to the relative costs, advantages, and implications for the future of the alternative courses of building a UK reactor or of taking a full share in the European reactor programme; and to advise the Council on these and any other relevant aspects".

After several meetings June 1971 - January 1972 the Working Group was unable to reach a consensus and confined its report to Council to the terms of its original remit on financial feasibility.

Correspondence

J.60 Correspondence and notes 1971-72 on Working Group.

J.61 Earlier correspondence with colleagues on high-flux neutron sources and neutron diffraction research 1965-70.

Minutes

J.62 Working Group meetings June 1971 - January 1972.

Background papers

J.63 Papers, submissions, drafts 1971-72.

Tripartite meetings on international science

This was a series of informal meetings between France, Germany and Britain which Kendrew attended in his capacity as Chairman of the CSP International Relations Committee. Meetings were held in July and October 1971, March and July 1972. The meetings discussed various fields of research suitable for collaborative effort; they included EMBL, the Brain and Behaviour research programme, the High Flux Reactor project at Grenoble, astronomy etc.

J.64 Correspondence, notes of meetings, background papers 1971-72.

Preparatory Group : Green Paper

Dainton and Kendrew were CSP representatives at a meeting in November 1971 to arrange for the views of Research Councils and the CSP on the Green Paper to be assembled and submitted. The Preparatory Group's terms of reference were "to advise the CSP on the formulation of views on the Green Paper (Cmnd.4814) in general and the application of the customer/contractor principle to the Research Councils in particular". Its members were F.S. Dainton (Chairman), A.H. Bunting, T.L. Cottrell, Kendrew, P.E. Kent, A.W. Merrison, M.G.P. Stoker. After meetings and submissions by the Group and the Research Councils, a meeting of representatives with the Lord Privy Seal and the Secretary of State was held in March 1972. The Government White Paper (Cmnd.5046) presented in July 1972 took note of these and many other representations and reports. Many of the Dainton Report's recommendations were accepted, including the reconstitution of the CSP to form a new advisory body.

- J.65 Minutes and notes of meetings by the Preparatory Group, the Research Councils and others, submissions and comments, evidence given by Rothschild to Select Committee on Science and Technology, meeting with Lord Privy Seal etc., some annotated by Kendrew. Includes a little correspondence and a copy of Cmnd.5046.
- J.66 Press comments, memoranda and submissions on the "Rothschild Report", some circulated officially to the Preparatory Group, others assembled by Kendrew.

DESIGN RESEARCH UNIT

1945-51

In September 1945 Kendrew was approached by J.R.M. Brumwell with a view to his acting as scientific adviser to the Design Research Unit (a design company set up by Herbert Read in which Mischa Black was a Senior Partner). He contributed ideas and reports on possible new developments and devices resulting from scientific advances. The correspondence, which runs from September 1945 to July 1951, is almost entirely conducted with Brumwell.

- J.67 1945-46. Correspondence and papers. Includes "Suggestions for future design" contributed by Kendrew for an exhibition by the Council of Industrial Design.
- J.68 December 1948 - July 1951. Mainly relating to a project on man-made fibres and fabrics for Courtaulds. Kendrew contributed a general scheme on the theme of molecular engineering and a series of 15 specific topics. (See J.69 below).
- J.69 Ideas and drafts submitted by Kendrew January-December 1949.

HIGH ENERGY PARTICLE PHYSICS REVIEW GROUP (HEPP)

1983-85

The review group was commissioned jointly by the Advisory Board for the Research Councils (ABRC) and the Science and Engineering Research Council (SERC). Kendrew was chairman of the Group, whose terms of reference were:

- "(i) to review UK participation in the study of high-energy particle physics, with particular reference to that necessarily carried out under international auspices;
- (ii) to consider possible future involvement, the role and extent of international collaboration, and the implications of reallocation of the resources in whole or in part to other areas of science."

The formation of the review group was announced by the Secretary of State for Education and Science (Sir Keith Joseph) on 22 March 1984. Two meetings of the HEPP Support Group were held on 9 April and 23 November 1984 and the Review Group itself had fifteen meetings (19 April 1984 - 14 May 1985) in various locations, and considered written submissions. The report, published in June 1985, recommended that Britain should remain a member of CERN until 1989 but subsequently only if significantly lower costs could be achieved.

The material constitutes a full record of the activities of the review group, including preliminary discussions, chairman's notes and briefings, minutes and papers of meetings, drafts and amendments of the report, submissions of evidence, correspondence with colleagues and officials throughout the period of the enquiry and following the publication of the report, press comment in UK and abroad (not all favourable) etc. Many documents bear Kendrew's notes, comments and annotations.

Correspondence and papers

A chronological sequence of letters, memoranda, submissions and material sent to Kendrew by members of the general public, scientific colleagues, members of the review group, in particular E.A. Ash (member) and C.H. Llewellyn-Smith (scientific consultant).

J.70

December 1983 - March 1984.

Early discussions, membership, terms of reference, formal announcement, foreign reactions.

J.71 29 March - June 1984.

J.72 July-December 1984.

J.73 January, February 1985.

J.74 March-November 1985.

Includes final comments on draft report, arrangements for publication, press conference, Kendrew's address to Parliamentary and Scientific Committee, correspondence and comment arising from publication.

Meetings and visits

J.75 HEPP Support Group meetings 9 April, 23 November 1984.

Index of HEPP (84) papers.
Meetings 1-3 April-June 1984.

J.76 Fourth meeting July 1984.

J.77 Fifth meeting September 1984.

J.78 Visit to CERN October 1984.

J.79 Sixth meeting October 1984.

J.80 Seventh meeting November 1984.

J.81 Eighth meeting December 1984.

J.82 Index of HEPP (85) papers.
Ninth meeting January 1985.

- J.83 Tenth meeting January 1985.
- J.84 Visit to Hamburg and Bonn January-February 1985.
- J.85 Eleventh meeting February 1985.
- J.86 Twelfth meeting March 1985.
- J.87 Thirteenth meeting April 1985.
- J.88 Fourteenth and fifteenth meetings May 1985.
- J.89 Submitted evidence on HEPP (Cambridge, Stanford Universities).

Press and broadcast comments : articles, editorials,
correspondence, transcripts. Circulated periodically
by Secretariat

- J.90 December 1983 - April 1984.
- J.91 July-November 1984.
- J.92 April-May 1985.
Press release, arrangements for Press conference, June 1985.
- J.93 June 1985 (post-publication comment).
- J.94 June 1985 - February 1987.

IMPERIAL CHEMICAL INDUSTRIES LTD. (ICI)

1950

- J.95 Brief correspondence etc. on drawings of cells made by Kendrew for a film strip on salt, produced for schools by ICI, 1950.

MEDICAL RESEARCH COUNCIL (MRC)

1964-82

Kendrew was a member of the MRC staff from the opening of the original "Unit for the Study of the Molecular Structure of Biological Systems" in 1947 until he retired, after secondment to EMBL, in 1982. The material here is thus only a small fraction of the work done under MRC auspices. See also sections C and D.

- J.96 Papers, correspondence, survey reports, meetings on high speed centrifuges and their applications in biological research 1964-68.
- J.97 MRC Subcommittee visit to Laboratory of Molecular Biophysics Oxford, March 1971. Arrangements, schedule, presentations, Kendrew's comments (very favourable) on the work of the laboratory.
- J.98 Letter following MRC Subcommittee visit to EMBL in February 1979, with comments on research programme and progress, May 1979. See also H.288.
- Letter from Secretary (J.L. Gowans) on Kendrew's retirement from MRC staff, April 1982.

MINISTRY OF DEFENCE

1960-74

In April 1960 Kendrew was asked by S. Zuckerman, then Chief Scientific Adviser to the Minister, to accept a post as part-time Scientific Adviser for two days a week, and after various negotiations this was agreed in April 1961. In 1963 he resigned the appointment in order to devote more time to his scientific research, while continuing to serve as an independent member on panels and committees such as the Defence Research Committee.

Throughout this period Kendrew remained a member of staff of the Medical Research Council and was therefore deemed by the Treasury to be in government employment and hence not eligible for fees (other than expenses) for his work for the Ministry even though the latter was unconnected with his scientific specialism. Kendrew felt that this created a situation not only anomalous but inequitable vis-à-vis University colleagues involved in similar work, and attempted to argue the case, but without success, the Treasury decision being termed by a colleague in the Ministry "a deplorable piece of jiggery-pokery" (J.100).

- J.99 1960-61. Correspondence including Kendrew's appointment, negotiations with Ministry and MRC.
1963. Correspondence including Kendrew's decision to resign his part-time appointment with effect from 31 December.
- J.100 1964-65. Correspondence on Kendrew's eligibility for fees for his work for the Ministry.
- Included here are Kendrew's notes of meetings and travel for the Ministry 1960-67 (compiled for expenses).
- J.101 General correspondence, arrangements for meetings, Defence Research Committee etc. 1964-68.
- J.102 Correspondence and suggestions about European scientific advances suitable for inclusion in a "Time Capsule" 1964-65.
- J.103 General correspondence, including Kendrew's appointment to Defence Advisory Council and Chairmanship of its Undersea Warfare Board (March 1969), various committee and Board meetings 1969-72, letter of thanks at end of Chairmanship of Council 1974.

MINISTRY OF OVERSEAS DEVELOPMENT

1976-84

United Kingdom National Commission for UNESCO

The functions of the Commission were to advise the Government on all aspects of UNESCO's work, to assist UNESCO in formulation, planning and execution of projects and to promote understanding in the UK of UNESCO's aims and activities. It had five Advisory Committees, dealing with communication, culture, education, natural sciences and social sciences; their chairmen, together with the Commission's *ex-officio* members, formed the Co-ordinating Council. The chairmen were appointed by the Minister for Overseas Development, chairman of the Commission.

Kendrew attended meetings of the Commission in his capacity as chairman of the Royal Society UNESCO Committee (q.v.). He was chairman of the Natural Sciences Advisory Committee and hence of the Co-ordinating Council.

The material includes correspondence and papers on the organisation and structure of the Commission, briefings for or accounts of meetings and the biennial General Conference, UK applications for funding under the "Participation Programme" of UNESCO, and aspects of UK policy towards UNESCO.

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|-------|---|
| J.104 | 1976. |
| J.105 | 1977. |
| J.106 | 1978. Includes renewal of Kendrew's appointments. |
| J.107 | 1979. |
| J.108 | 1980, 1981. |
| J.109 | 1982. |
| J.110 | 1983. |

- J.111 1984. Includes material on UK policy towards UNESCO, and letter of thanks on Kendrew's retirement from Commission.

QUEEN ELIZABETH HOUSE OXFORD (QEH)

1982-86

Queen Elizabeth House was an independent foundation established by Royal Charter in 1951 to encourage Commonwealth studies and visits by members of the Commonwealth, and to provide links with the University of Oxford, members of the Governing Body being appointed by Her Majesty's Government and by the university. In 1983 the Overseas Development Administration announced its intention to withdraw its financial support after March 1984, and various possibilities were discussed for the future activities and funding of QEH. A committee was set up by the university in March 1983 at the request of the Governing Body to consider the future of QEH and an agreed plan was evolved to merge QEH with the two University Institutes of Agricultural Economics and Commonwealth Studies to create a centre for development and international studies and agricultural economics.

Kendrew was co-opted as a member of the Governing Body of QEH in December 1982, his appointment being renewed in June 1986 until July 1987 when he retired as President of St. John's. At this time the President of the Governing Body was Lord Trend (later succeeded by Sir Zelman Cowen) and the Warden of QEH was A. Hazlewood. The early period of Kendrew's service coincided with the difficult transitional phase in QEH's affairs. He chaired a Working Party set up by the Governing Body in November 1983 to conduct a financial review and make suggestions for future activities in the light of the proposed merger.

The material includes letters and memoranda addressed to Kendrew personally, and relevant committee and discussion papers. Other committee and background papers are held in the Archives of the University.

- J.112 December 1982 - June 1983.

- J.113 July 1983 - February 1984.

J.114 Reports January, February 1984.

J.115 February-June 1984.

J.116 October 1984 - June 1986. Including material on participation
of United Nations University in Refugee Studies Programme at
QEH.

ROYAL INSTITUTION

1954-68

Kendrew was a Reader at the Davy Faraday Research Laboratory 1954-68. At this time the Fullerian Professor of Chemistry and Director of the Royal Institution was Sir Lawrence Bragg who had been Cavendish Professor of Experimental Physics at Cambridge 1938-53 and thus head of the Cavendish Laboratory during the early years of molecular research there including the work on DNA by Watson and Crick, and the start of the MRC Unit and the protein analysis by Perutz and Kendrew.

On his move to London, Bragg was much concerned to launch a productive research programme at the Davy Faraday Laboratory and made strenuous efforts during 1954 and 1955 to persuade Kendrew to move there, preferably full-time, to head a protein group. He made several approaches to Kendrew and also to MRC. Kendrew, however, preferred to remain based in Cambridge as an MRC staff member, and maintaining his college connection. Instead he accepted a Readership and conducted a close collaborative research programme on protein analysis (in which Bragg as a crystallographer had a particular interest), principally with D.C. Phillips and his team. There was frequent interchange of visits, specimens, data and results between the London and Cambridge laboratories, culminating in joint publications. The correspondence on research projects and progress preserved here should be consulted in conjunction with the much fuller complementary documentation in Section C.

- J.117 Correspondence with Bragg and with MRC on Kendrew's possible appointment at Royal Institution May 1954 - March 1955. Includes his formal appointment as Reader (letter of 22 July 1954).

Also included here are miscellaneous notes of visits and expenses, and renewals of appointment 1954-68.

- J.118 Correspondence, principally with Bragg, on research projects and appointments (including that of D.C. Phillips) 1954-58.

- J.119 Correspondence 1958-59. Includes note by Phillips of equipment and staffing requirements, note on protein analysis research submitted to United States National Institutes of Health, letter of thanks (10 February 1959) from H. Spencer Jones to Kendrew for his help in obtaining research grant from NIH for the Institution (Kendrew's reply refers to the results achieved by the collaborative work), other possible X-ray analysis projects etc.

- J.120 Correspondence 1960-65, on research projects and appointments. Includes 3pp. notes by Bragg on "The determination of the atomic structure of biological molecules by X-ray analysis", with a manuscript headnote by Kendrew "Notes of a lecture to be delivered by W.L. Bragg at Lindau, 1965 (never given!)".
- J.121 Correspondence 1954-66 with H. Scouloudi on various aspects of research and publications on seal myoglobin.
- J.122 Correspondence 1959, 1961 on β -lactoglobulin.
- J.123 Correspondence 1963-65 with Phillips on his successful research on lysozyme and on his move from the Institution to Oxford to set up the Laboratory of Molecular Biophysics.

ROYAL SOCIETY

1949-1986

Kendrew was elected to the Fellowship of the Society in 1960 and served on its Council 1965-67. He served on many of its committees and sub-committees both before and after his election; these are presented in chronological order.

COMMITTEES AND SUB-COMMITTEES

Classification Sub-committee

This was a sub-committee of the Royal Society Information Services Committee and was set up in May 1949 "to formulate what scientists really require of a classification".

Kendrew served from the inception of the sub-committee; the chairman was J.D. Bernal.

Meetings were held in June 1949 and an interim report was prepared in October; a further meeting was held in March 1950 and a report by Bernal was presented to the Information Services Committee in October. Later discussions led to the formation of a Classification Research Group in 1952 whose first Bulletin (ed. B.C. Vickery) appeared in November 1956, drawing on some of the papers of the Classification Sub-committee.

- J.124 Correspondence and papers 1949-56. Includes invitation to serve, Kendrew's paper contributed to the discussion, brief correspondence on other papers and contributions, final report, copy of Research Group Bulletin.

Sub-committee on Research into the use of Scientific Literature

This was a sub-committee of the Royal Society Information Services Committee and was set up in January 1950 "to advise on the form of a questionnaire to be sent to scientists and on the conduct of the enquiry".

Kendrew served from the inception of the sub-committee; the chairman was D.J. Urquhart (Department of Scientific and Industrial Research).

Meetings were held on 28 February, 9 June 1950 and 19 June 1951, when "it was agreed that there was no action which the Sub-Committee could take at the present time".

- J.125 Correspondence and papers 1950-51. Includes invitation to serve, draft questionnaire, brief correspondence, DSIR bulletin on "Unanswered Questions".

Ad hoc Biological Research Committee

The committee was set up in November 1960 "to report to Council on possible developments in research in the United Kingdom in biology and related (borderline) fields". Kendrew served on the committee from its inception.

The committee held seven meetings in the course of 1961 and presented its report on 23 November.

- J.126 Correspondence and papers 1960-61. Includes invitation to serve, Kendrew's notes on papers prepared for committee, copy of his letter to H.W. Florey (President) on current developments in biological research in USA.

British National Committee for Biophysics

At an International Biophysics Conference held in Cambridge in July 1959, plans were made for an International Congress on Pure and Applied Biophysics to be held in Stockholm 30 July - 5 August 1961 under the Presidency of Sir Gordon Sutherland. The General Assembly at the Stockholm meeting approved Statutes for an International Organisation for Pure and Applied Biophysics which required that in each member country "a National Committee on Biophysics shall be formed".

The Provisional British National Committee was set up by the Royal Society in June 1962, Kendrew being one of the four members representing the British Biophysical Society (J.13, J.14); he was also appointed a member of the Special Commission on Molecular Biophysics at the meeting of the International Organisation in Vienna in April 1962. The Provisional Committee met at the Royal Society on 6 July 1962 under the Chairmanship of A.V. Hill and resolved to apply "for adherence on behalf of the United Kingdom to the International Organisation for Pure and Applied Biophysics"; the application was formally approved by the Council of IOPAB in November 1963.

At the Second General Assembly of IOPAB in Paris in June 1964 Kendrew was elected Vice-President and served in that capacity on the Provisional British National Committee from June 1964. The Assembly also decided to apply for membership of ICSU and this was approved at the ICSU General Assembly in Bombay in January 1966; henceforth the International Organisation was known as the International Union of Pure and Applied Biophysics (IUPAB) (K.46-K.52) and the Provisional British National Committee was established as the British National Committee for Biophysics.

In December 1966 the Council of the Royal Society appointed Kendrew as a representative to serve on the British National Committee and to be its Chairman for six years from 1 January 1967; the first meeting of the Committee under his chairmanship was on 25 November 1968.

Kendrew was elected President of IUPAB at the General Assembly at Boston in August 1969, and became Honorary Vice-President 1972-75. He was succeeded as Chairman of the British National Committee from 1 January 1973 by D.C. Phillips but remained an *ex officio* member as Honorary Vice-President of IUPAB until 1975.

The material is presented as a chronological sequence and includes only those matters in which Kendrew was especially involved.

- J.127 1962. Background papers and minutes of first meeting of Provisional British National Committee.
- J.128 1963. Correspondence and papers re UK participants in IOPAB Symposium on Macromolecules; draft constitution of IOPAB Commission on Molecular Biophysics etc.
- J.129 1965-67. Travel grants; Kendrew's letter of appointment 16 December 1966 as Royal Society representative and Chairman of Committee, and *ex officio* member of British National Committee for International Council of Scientific Unions; meetings and symposia; nominations to IUPAB Committee on Education.
- J.130 1968. *Quarterly Reviews of Biophysics* (journal published for IUPAB by Cambridge University Press; Kendrew served on the Editorial Board); paper by N.W. Pirie on "Biochemical Research in the International Biological Program"; travel grants; draft and agreed agenda and minutes of Committee meeting 25 November; memorandum by A.R. Peacocke on "Physical Biochemistry in the United Kingdom".

- J.131 1969. Travel grants, delegates etc. at IUPAB International Congress at Boston, Mass; membership of Committee.
- J.132 1970. European Biophysics Congress, Vienna; possibility of holding 1975 International Congress in UK; draft agenda for Committee meeting 17 November.
- J.133 1971. Continuing (unsuccessful) attempts to arrange 1975 Congress in UK; membership of Committee; travel grants for 1972 Congress in Moscow.
- J.134 1972-74. Elections to IUPAB; continuing arrangements for Moscow Congress and report of UK Delegation; draft minutes of Committee meeting 29 February; Royal Society representatives and new Chairman for Committee, letters of thanks for Kendrew's service on Biophysics and ICSU Committees.
- Also included are minutes of meetings on 29 November 1973, 17 October 1974 to both of which Kendrew made extensive contributions.

Soirée Committee

Kendrew served for five years from 1 January 1966.

- J.135 Correspondence and papers 1965-71. Includes invitation to serve, correspondence with colleagues inviting suggestions or making arrangements for exhibits, Kendrew's letter of resignation (January 1971), letter of thanks for service.

Ad hoc Committee "to consider the Society's relations with the Academia Sinica".

Kendrew was invited to serve in April 1966 and attended the second meeting on 29th April (the first meeting was held on 5 February 1965).

- J.136 Letter of invitation only.

International Relations Committee including European Programme Fellowships
Sub-committee

The Committee was set up "to advise Council on general policy in international relations". The Chairman was the Foreign Secretary, Royal Society (until 1971 Sir Harold Thompson, succeeded by Sir Kingsley Dunham (to 1976) and Sir Michael Stoker). Kendrew was a member throughout the existence of the Committee, which met for the first time on 30 March 1966 and was dissolved in November 1979 following a decision by Council that matters of general policy in international relations should be considered directly by itself.

In January 1967 a sub-committee was set up to consider applications for fellowships under the Royal Society European Programme. Kendrew served on the sub-committee until August 1975 when he resigned and was replaced by D.C. Phillips.

At the first meeting of the Committee in March 1966, the sixth agenda item was "International Co-operation in the Basic Biological Sciences", when Kendrew circulated and spoke to a policy statement by the Council of EMBO; the development and affairs of EMBO were the main purpose of the second meeting on 21 June and continued to be regularly discussed by the Committee.

The material comprises papers and a little correspondence covering the whole period of the Committee.

- J.137 1966. Setting-up papers, meetings 30 March, 21 June.
- J.138 1967. Meetings 27 January, 22 June, 18 December.
- J.139 1968. Meetings 1 March, 9 December.
- J.140 1969-70. Meeting 17 November.
- J.141 1972. Meetings 20 July, 1 September.
- J.142 1973. Meeting 10 September.
- J.143 1974. Meetings 11 January, 7 May

J.144 1975. Meetings 5 February, 4 August.

J.145 1976. Meeting 10 March.

J.146 1977. Meeting 13 May.

J.147 1978. Meeting 12 June.

Included here is letter 28 November 1979 from Executive Secretary, on Council's decision to dissolve the Committee.

UNESCO Committee (from 1983 Natural Sciences Advisory Committee)

This was a joint committee with the Overseas Development Administration. (See J.104-J.111) Kendrew sat as a government nominee during the existence of the Council for Scientific Policy and when this was wound up in 1972 he was nominated as one of the Society's representatives. From 1 April 1976 to 31 March 1984 he served as Chairman in succession to Sir Harold Thompson.

The material includes correspondence on Kendrew's appointments and their periodic renewals, membership of the committee, recommendations for prizes (in particular the Kalinga Prize), agendas and minutes of meetings and, from 1976, chairman's briefings and notes and the relevant background or discussion papers.

J.148 1971-72. Membership list; meetings 8 February, 19 May, 27 September; Kendrew's nomination as Royal Society representative (December).

J.149 1973. Meetings 12 January, 10 April, 10 September; setting up, draft charter etc. of United Nations University (q.v.).

J.150 1974. Meetings 11 January, 9 May.

J.151 1975. Meetings 8 January, 26 August, renewal of Kendrew's appointment and request to serve as Chairman from 1 April 1976 (July).

- J.152 1976. Meetings 16 January, 9 April, 24 June, 17 September.
Kendrew chaired meetings from 9 April.
- J.153 1977. Meetings 8 February, 23 May.
- J.154 1978. Meeting 3 March.
- J.155 1978. Meeting 19 May.
- J.156 1978. Meeting 6 October.
- J.157 1978. 20th General Conference of UNESCO, Paris, October.
- J.158 1978. Correspondence.
- J.159 1979. Meeting 26 March.
- J.160 1980. Renewal of appointment, meeting 14 March.
- J.161 1980. Meetings 16 April, 28 August.
- J.162 1981. Meetings 6 February, 12 June, 4 September.
- J.163 1982. Meetings 4 May, 5 November.
- J.164 1983. Meetings 17 January, 15 September.
- J.165 1984. Includes minutes of first meeting of the committee, then
called "British Committee for Co-operation with UNESCO in the
Natural Sciences", held at Royal Society 27 June 1947 and circu-
lated for interest for the 50th meeting of the Committee on 6
September 1984.

British National Committee for ICSU

J.166 Minutes, memoranda, correspondence, nominations etc. 1975-86.

COUNCIL

Kendrew served on Council 1965-67.

J.167 Notification of election, miscellaneous correspondence on the affairs of the Society: finance, awards and medals, appointments.

SECTIONAL COMMITTEE 8

Kendrew attended meetings of the Sectional Committee as a member of Council from December 1965, and was elected to serve on the Committee for three years from 1 August 1967.

J.168 Correspondence, papers and notes 1965-70, mainly on representative membership of the Committee and its nominations for election to Fellowship.

ELECTIONS

J.169	1969	J.173	1979
J.170	1970	J.174	1980
J.171	1972	J.175	1982
J.172	1976	J.176	Undated manuscript notes on candidates.

SECTION K INTERNATIONAL SOCIETIES, ORGANISATIONS, CONSULTANCIES K.1-K.119

K.1 ASIAN MOLECULAR BIOLOGY ORGANISATION (AMBO)

K.2-K.11 BASEL INSTITUTE FOR IMMUNOLOGY

K.12 EIDGENOSSISCHE TECHNISCHE HOCHSCHULE, ZURICH

K.13 EUROPEAN COMMUNITIES COMMISSION

K.14 EUROPEAN RESEARCH AND DEVELOPMENT COMMITTEE (CERD)

K.15 FRENCH ACADEMY OF SCIENCES

K.16-K.39 INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS (ICSU)

K. 40 INTERNATIONAL FOUNDATION FOR SCIENCE (IFS)

K.41 INTERNATIONAL INSTITUTE OF CELLULAR AND MOLECULAR PATHOLOGY (ICP)

- K.42-K.45 INTERNATIONAL UNION OF BIOCHEMISTRY (IUB)
- K.46-K.52 INTERNATIONAL UNION FOR PURE AND APPLIED BIOPHYSICS (IUPAB)
- K.53-K.64 LABORATORIO DI EMBRIOLOGIA MOLECOLARE, NAPLES
- K.65 MAX-PLANCK-GESELLSCHAFT
- K.66-K.80 NATIONAL ACADEMY OF SCIENCES (NAS)
- K.81 NATIONAL SCIENTIFIC RESEARCH CENTER, IRAN
- K.82 NORTH ATLANTIC TREATY ORGANISATION (NATO)
- K.83 STAZIONE ZOOLOGICA, NAPLES
- K.84 UNESCO
- K.85 UNION INTERNATIONALE CONTRE LE CANCER (UICC)

K.86-K.97 UNITED NATIONS UNIVERSITY (UNU)

K.98, K.99 UNIVERSITE LIBRE DE BRUXELLES

K.100-K.117 WEIZMANN INSTITUTE OF SCIENCE and WEIZMANN INSTITUTE FOUNDATION

K.118, K.119 WORLD HEALTH ORGANIZATION (WHO)

ASIAN MOLECULAR BIOLOGY ORGANISATION (AMBO)

1979-80

- K.1 Correspondence and memoranda 1979-80 re proposal to found AMBO and Asian Molecular Biology Laboratories (AMBL) on similar lines to EMBO and EMBL. The proposal was initiated by S. Akabori and I. Watanabe (Japan) and a discussion meeting, conducted by Akabori and J.D. Watson, was held in Tokyo in 1980; the project did not develop further.

BASEL INSTITUTE FOR IMMUNOLOGY

1974-86

The Institute, founded and supported by F. Hermann-La Roche & Co., was completed in 1971, its purpose being "to conduct basic research related to immunology, particularly with regard to fundamental problems of antibody formation and antibody action at the molecular, cellular, and genetic levels". It had permanent and visiting members, a Swiss board of consultants, and an "Advisory Board of outside scientists" which met annually to review its work. Kendrew was invited to join the Advisory Board, initially for three years, in August 1974 by the then Director, N.K. Jerne. In September 1980 he was invited to become a member of the Institute's newly-composed Board of Directors and its Scientific Council, retiring by rotation in 1985.

The material includes agenda and minutes of meetings, schedules of seminars and workshops, correspondence on staffing, principles of appointment and tenure at the Institute, membership of the Advisory Board etc. and Kendrew's manuscript notes of discussions. The correspondence is conducted with the Directors and staff of the Institute, members of the Advisory Board and other scientific colleagues.

- K.2 1974-75

- K.3 1976

- K.4 1977
- K.5 1978-79
- K.6 1980. Constitution of Scientific Council, with drafts of by-laws amended and revised by Kendrew.
- K.7 1981
- K.8 1982
- K.9 1983
- K.10 1984
- K.11 1985-86. Includes correspondence with Director, F. Melchers, on academic freedom.

EIDGENOSSISCHE TECHNISCHE HOCHSCHULE (ETH) ZURICH

1975

- K.12 Correspondence and papers re meeting held 9 July 1975 to discuss research and organisation of molecular biology at ETH. Includes summary of questions discussed and of advisers' replies and recommendations.

EUROPEAN COMMUNITIES COMMISSION

1972

Meeting on "European Policy for Science and Technology", Brussels, March 1972. The meeting was relatively small, with 22 participants attending in an individual capacity. The Commission's document "Objectives and Instruments of a Common Policy for Scientific and Technological Development" (COM(72)700) was submitted to the Council of Ministers in July 1972 for discussion at the Paris Summit Meeting in October. Subsequent to the meeting, the European Research and Development Committee (CERD) was set up. See K.14.

K.13 Material includes invitation to attend, schedule and list of participants, preliminary and final version of proposals, background memoranda.

EUROPEAN RESEARCH AND DEVELOPMENT COMMITTEE (CERD)

1973-76

The Committee was set up after a meeting of heads of state of the European Community in Paris in October 1972, to advise the Commission on the identification, formulation and execution of R & D programmes in the community. There were 21 members, appointed to serve for 3 years, and "in their personal capacity". Kendrew was a member from the inception of the Committee, representing the life sciences in the "balance of disciplines". He resigned after his first three-year period of service on the Committee, whose meetings he had not always been able to attend.

K.14 Correspondence 1973-76, mainly about meetings and discussions. Kendrew's letter of 24 September 1973 to H.B.G. Casimir gives his views on the purposes and problems of CERD. Papers of the inaugural meeting 4 April 1973 have also been retained.

FRENCH ACADEMY OF SCIENCES

1979-80

- K.15 Brief correspondence and papers on Kendrew's membership of International Comité d'Honneur for presentation of Academician's Sword to B. Pullman.

INTERNATIONAL COUNCIL OF SCIENTIFIC UNIONS (ICSU)

1974-88

This was one of Kendrew's most important commitments. The high offices he held in the organisation over a considerable period of time kept him in touch with international science at a political as well as a research level, supplemented by extensive travel and first-hand knowledge of projects and personalities worldwide, and by his representative presence as adviser, governor, trustee etc. of many other institutions.

Kendrew was Secretary-General of ICSU 1974-80 and was elected its First Vice-President in September 1982. In October 1983 he became President a year earlier than expected on the resignation of D.A. Bekoe who had accepted the post of Director of the UNESCO Regional Office for Science and Technology in Africa.

As Secretary-General Kendrew attended the biennial General Assemblies and the regular meetings of the Executive Board and Standing Committees, and also undertook special commissions or journeys on behalf of ICSU.

The Secretariat of ICSU is currently based in Paris (Boulevard de Montmorency) where its records are retained. The material preserved here relates only to those projects or activities with which Kendrew was especially involved, and includes manuscript material, correspondence or notes additional to the official records.

The material is presented as follows:

COMMITTEES AND ACTIVITIES 1974-84	K.16-K.24
MEETINGS 1974-88	K.25-K.35A
MISCELLANEOUS CORRESPONDENCE 1980-85	K.36-K.39

COMMITTEES AND ACTIVITIES 1974-84

Committee on the Safeguard of the Pursuit of Science

- K.16 Papers and correspondence 1977-84 on composition, policy, meetings, reports of Committee, cases reported etc.

Committee on Structure and Statutes

This began with an Ad hoc Group on the Structure of ICSU which first met on 18 February 1979 (Kendrew was elected Chairman). In November 1980 the ICSU Executive Board amalgamated two Ad hoc Groups to form a Structure and Statutes Group of which Kendrew became a member; this met for the first time in September 1981. At its meeting in January 1983 it was referred to as the Ad hoc Committee on Structure and Statutes; its meeting of 6 May 1983 was held at St. John's College Oxford. The revised version of the Statutes and Rules of Procedures was presented to the ICSU General Assembly in September 1984.

The material includes correspondence, questionnaires, memoranda, drafts and reports, manuscript notes by Kendrew 1978-84.

For some material relating to ICSU membership of China and Taiwan, which was one of the concerns of the Committee, see K.21-K.23.

- K.17 1978-79.
- K.18 1980 January-September.
- K.19 1980 November - 1982.
- K.20 1983-84.

China and Taiwan

The admission of scientists from the People's Republic of China into membership of the "ICSU family" of constituent Unions, and of China as a national member of ICSU, was a source of prolonged difficulties arising from the position of Taiwan and the attendant political and diplomatic consequences. Some of the Scientific Unions devised solutions for Chinese representation in their membership, a draft resolution was presented to the ICSU General Assembly in 1980, and the Committee on Structure and Statutes considered the problem at several of its meetings. The ICSU Handbook 1988 lists under "National members" both the China Association for Science and Technology Beijing and The Academy of Science located in Taipei Taiwan.

The material is Kendrew's notes and correspondence 1975-83 and is of interest as an addition to the official record.

- K.21 Notes and correspondence 1975-79: on Royal Society and ICSU committee meetings May-September 1975 on Union and individual views on China; on admission of China to International Union of Geodesy and Geophysics (IUGG) 1977; on representation of China in International Union of Biochemistry (IUB) 1979.
- K.22 Manuscript notes, papers and correspondence 1979-80, on forms of words, nomenclature etc. on China and Taiwan, for resolutions to be presented to ICSU Executive Board (January 1980) and General Assembly in Amsterdam September 1980.
- K.23 Manuscript notes, papers and correspondence 1982-83 on discussions with scientists from China and Taiwan, meeting of Structure and Statutes Committee, proposed visit to China by Kendrew and L. Ernster (then Secretary-General, ICSU).

ICSU Press

- K.24 General correspondence on publications and projects, mainly with W.J. Whelan (Chairman, Board of Management, ICSU Press) 1984-85. Includes some correspondence on *BioEssays*, an ICSU Press journal edited by Whelan for the first issue of which Kendrew wrote an editorial.

MEETINGS 1974-80

Miscellaneous material of administrative or personal interest, including annotated agenda, draft resolutions, Kendrew's manuscript notes of discussions, correspondence etc. The problem of China and Taiwan often features.

1974 General Assembly (Istanbul)

- K.25 Annotated agenda, papers on China/Taiwan, Kendrew's manuscript notes on General Assembly and on Executive Board, correspondence.

1975 Executive Board (Paris)

- K.26 Kendrew's manuscript notes, mainly on proposed appointment of Scientific Director.

1976 General Assembly (Washington)

- K.27 Invitations, correspondence with delegates and representatives, travel arrangements and accommodation.
- K.28 Proposals for agenda items, nominations for committee membership, speakers and rapporteurs.
- K.29 Agenda, annotated agenda, draft resolutions (on China and Taiwan), manuscript draft of Kendrew's speech at meeting, letters of thanks.

1977 Committee meetings (Paris, Budapest)

- K.30 Correspondence and papers.

1978 General Assembly (Athens)

- K.31 Agenda, draft report, Kendrew's detailed manuscript notes (38pp.) on meeting.
- K.32 Correspondence arising.

1979 Executive Board meetings (Brussels)

- K.33 Draft reports, correspondence.

1980 Executive Board meeting (Paris)

- K.34 Correspondence, mainly with W.J. Whelan on ICSU organisation.

1980 Extraordinary General Assembly (Amsterdam)

- K.35 Correspondence and papers. The main items for the meeting were the report of the Ad hoc Group on Statutes, and the resolution concerning the admission of Chinese scientists.

1988 General Assembly (Beijing)

- K.35A Copy of Kendrew's Presidential Address at Opening Ceremony in the Great Hall of the People. This was the first major ICSU meeting to take place in China since it became a member.

MISCELLANEOUS CORRESPONDENCE 1980-85

The notes below give some indication of content but are not intended as a calendar of the material.

- K.36 1980. Invitation to Kendrew to serve as President of International Union of Crystallography; affairs of COSTED (Committee on Science and Technology in Developing Countries).
1981. COGENE (Scientific Committee on Genetic Experimentation) Symposium, Rome.
- K.37 1983. Science Council of Singapore; Kendrew's election to Presidency of ICSU on resignation of D.A. Bekoe; ICSU Yearbook.
- K.38 1984. COSTED; World Climate Research Programme; letters of congratulation; Science Council of Japan; Inaugural Meeting, Commission on Environment.
- K.39 1985. Funding of Fellowship Programme; Kendrew's appointment as ICSU liaison officer with EEC, OECD, CTS, United Nations University; death of Y. Nayudamma; Ringberg meeting on future policies for ICSU.

INTERNATIONAL FOUNDATION FOR SCIENCE (IFS)

1975-80

The IFS was created in May 1972 by scientific academies and research councils, with an interim Board of Trustees and the aim of supporting scientific research in biology applied to the production of food and other commodities to improve the health and nutrition of people in developing countries. The secretariat was in Stockholm, and the first 45 research grants were made in 1974 funded by several international nongovernmental sources. At the first General Assembly (Stockholm, 23-25 September 1975) Kendrew was elected to the Board of Trustees as ICSU representative for the period January 1976 - December 1978. His successor as ICSU representative was T.F. Malone. In 1978 the UK became a member of IFS, represented by the Royal Society.

K.40

Papers and correspondence 1975-80, on Kendrew's election to Board of Trustees, meetings attended, and a little background information on activities of IFS.

INTERNATIONAL INSTITUTE OF CELLULAR AND MOLECULAR PATHOLOGY (ICP)

1973-80

The Institute was created in 1973 and officially inaugurated in Brussels in April 1975; the Director was C. de Duve. Kendrew was invited to join the Scientific Board (later Scientific Council) in December 1973 and served until 1979 when he became an "honorary member".

K.41

Papers and correspondence 1973-80. Includes invitation to join ICP Scientific Council, arrangements for meetings, nominations to Council, staff appointments, symposia and lectures, reports of Council, Kendrew's manuscript notes on work in progress 1977, 1978, special meeting for Kendrew, F. Gros and W. Fiers to inspect Pathogen Laboratory and discuss microbiology and rDNA work at ICP, February 1980 and correspondence arising.

INTERNATIONAL UNION OF BIOCHEMISTRY (IUB)

1963-79

Standing Committee on International Symposia

The Committee was set up by the Bureau of IUB to advise on symposia meeting under the auspices of, or proposed for sponsorship by the Union. Kendrew was invited to serve from the inception of the Committee; the other members were F. Lynen, J. Monod, G. Schramm and H. Theorell.

- K.42 Correspondence, on themes, dates, frequency, level of participation etc. of proposed symposia, conducted 1963-69 with P. Handler, Chairman of the Committee until 1969 when he resigned on his election to the Presidency of the US National Academy of Sciences.

Commission on Biological Nomenclature (CBN)

This was a joint commission with the International Union of Pure and Applied Chemistry (IUPAC), which set up several sub-commissions to prepare documents on specific topics.

The Subcommittee on the Conformation of Polypeptide Chains was set up in 1966, with Kendrew as Chairman; at a meeting of CBN at Woods Hole in 1969, when the draft document was discussed and approved for publication, two further subcommissions were formed to produce analogous documents on the conformation of polynucleotides and polysaccharides. Kendrew was asked to chair these also, but resigned in April 1971 because of pressure of other commitments, his successors being R.H. Marchessault (polysaccharides) and F. Cramer later G.N. Ramachandran (polynucleotides).

The material includes, as well as correspondence, extensive drafts, comments and revisions, necessitated not only by the international membership of the subcommissions which made meetings rare, but also by the highly technical nature of the assignment, requiring great accuracy and fine detail and making an agreed version extremely difficult to achieve.

K.43 Polypeptide Conformation

Correspondence 1965-75 with officers of CBN, members of Subcommittee and colleagues on drafts, amendments and publication arrangements for the proposed, and for the eventual document which appeared as "Abbreviations and Symbols for the Description of the Conformation of Polypeptide Chains" in *J. molec. Biol.*, *Biochim. Biophys. Acta.*, *Biochemistry*, *Arch Biochem. Biophys.* Also included is brief correspondence 1964, with M.F. Perutz, on protein sub-unit nomenclature.

K.44 Polynucleotides

Kendrew's manuscript notes, correspondence September 1969 - May 1974 on organisation, members and consultants (of both polynucleotides and polysaccharides subcommissions), Kendrew's letter of resignation 27 April 1971, continuing correspondence and drafts to 1974 and 1978-79.

K.45 Polysaccharides

Brief manuscript notes by Kendrew, correspondence September 1969 - August 1975 on organisation, membership and consultants of subcommission, drafts and comments.

INTERNATIONAL UNION FOR PURE AND APPLIED BIOPHYSICS (IUPAB)

1964-74

See also: BRITISH BIOPHYSICAL SOCIETY J.13-.J.14
BRITISH NATIONAL COMMITTEE FOR
BIOPHYSICS (under ROYAL SOCIETY) J.127-J.134

Kendrew was involved from the earliest stages with the movement to create IUPAB. He served on its Commission on Molecular Biophysics from April 1962, and was Vice-President 1964-69, President 1969-72 and Honorary Vice-President 1972-75.

Most of the material presented here concerns the IUPAB Symposium organised by the IUPAB Molecular Biophysics Commission in Cambridge 1968 (Kendrew was Chairman of the Organising Committee), but a little historical material at K.46 documents some of the early meetings of the International Organisation for Pure and Applied Biophysics (IOPAB) and its application for membership of ICSU and full international union status. See especially J.127 for a historical note on the foundation of IUPAB.

K.46 Historical material: miscellaneous committee papers and memoranda, some annotated by Kendrew, relating to IOPAB Second General Assembly Paris 1964, recommendations for IOPAB commissions, application for admission to ICSU etc. 1964-66. Also included is "A short history of the foundation of the International Union for Pure and Applied Biophysics" by A.K. Solomon (Secretary-General IUPAB), *Quarterly Review of Biophysics*, 1, 1968.

K.47 Brief correspondence about IOPAB Executive Committee meeting and Second International Biophysics Congress Vienna 1966.

Symposium at Cambridge 1968

The Symposium, on "Interactions between Subunits of Biological Macromolecules", was organised by the IUPAB Commission on Molecular Biophysics and held 24-27 July. Kendrew was Chairman of the Organising Committee, the other members being H.E. Huxley, J.A.V. Butler, A. Klug, R. Markham and the Secretary was K.C. Holmes.

- K.48 Correspondence with IUPAB officials and colleagues on organisation, funding and preliminary programme, invitations to chair sessions, meetings to be held during symposium, February-November 1967.
- K.49 Invitations, accommodation, arrangements for Council etc. December 1967 - August 1968.
- K.50 Finance: draft budget, grants from IUPAB and Royal Society, final account.
- K.51 Organisation: notes of IUPAB and committee decisions, circulars and forms, information, final programme, abstracts of papers.

Later material

- K.52 Minutes of IUPAB Executive Committee (annotated by Kendrew), correspondence on science policy, 1974.

LABORATORIO DI EMBRIOLOGIA MOLECOLARE, NAPLES

1973-82

In June 1973 Kendrew was invited by the Consilio Nazionale delle Recerche (CNR) of Italy to serve as EMBO representative "esperto" on the Scientific Advisory Committee of the Laboratory in succession to E. Hadorn. At the first meeting he attended (26 November 1973) Kendrew was elected President of the Committee. The term of office was four years, which was renewed in February 1978; he was asked to continue in May 1981 but left the Committee at the end of 1981 when new Statutes came into operation for the Laboratory.

The Director of the Laboratory was A. Monroy until 1976 when he was appointed Director of the Stazione Zoologica, Naples (q.v.); his successor, from May 1977, was E. Scarano.

The correspondence and papers relate to meetings of the Committee, appointments, space allocation, funding and research projects at the Laboratory and often reflect its internal wrangles. Those involved are members of the staff, visiting research workers such as J. Brachet and other Committee members, notably M.M. Burger (representative of International Society of Developmental Biologists). Minutes of the Committee have been retained as they are often the subject of discussion and accompanied by Kendrew's manuscript notes of meetings.

- K.53 1973 June-December. Kendrew's appointment, meeting 26 November.
- K.54 1974. Minutes of meeting November 1973, arrangements and minutes for meetings 30-31 May and 2-3 December. Includes manuscript notes by Kendrew and proposals by him and M.M. Burger for "Peripatetic Advanced Training Courses in Molecular and Cellular Biology".
- K.55 1975. Arrangements and minutes for meeting 30-31 May, Kendrew's manuscript notes.
- K.56 1976. Monroy's appointment to Stazione Zoologica, minutes of meeting 5 March and papers relating to financial difficulties of laboratory and to choice of successor to Monroy (Rossi-Bernardi was appointed interim director), minutes of meetings 19 July, 29 November, Kendrew's manuscript notes on interviews with laboratory staff, copy of his letter 1 December to President CNR pressing for appointment of a new director.

- K.57 1977. Appointment of Director (E. Scarano, with effect from 1 May). No minutes survive of meetings 23 February, 21-22 July. Scarano's letters of 15 September and 24 November thank Kendrew for his willingness to continue as President of Committee. Letter of 15 September also refers to historic meeting at Stazione Zoologica, Naples, in 1951 when J.D. Watson met M.H.F. Wilkins and learnt about X-ray diffraction patterns in DNA.
- K.58 1978 (1) January-June. Research projects by J. Brachet and others, possible move of Laboratory, minutes of meeting 2 March, drafts of Kendrew's letter to President, CNR (Italian and English versions).
- K.59 1978 (2) July-December. Minutes of meeting 29-30 June (Kendrew could not attend; M.M. Burger was Chairman), research projects and difficulties.
- K.60 1979. Correspondence, arrangements and papers for meetings 5-6 March, 12-13 July, research projects.
- K.61 1980 (1) January-May. Correspondence with J. Brachet on research; correspondence, papers and minutes of meeting 6-7 March.
- K.62 1980 (2) June-November. Correspondence and minutes for meeting 10-11 July, research projects.
- K.63 1981 (1) February-June. Correspondence and papers relating to meeting 23-24 February. The meeting was stormy and it was not possible to agree a "verbale", three versions of which are included, with annotations and comments by members of the Committee.
- K.64 1981 (2) April - March 1982. Correspondence and papers on new regulations of CNR and of new Committee for Laboratory; Kendrew was asked by Scarano to continue to serve, but he preferred to make room for a new appointment after two four-year terms; papers and minutes of meeting 15-16 July, and later correspondence.

MAX-PLANCK-GESELLSCHAFT

1976-80

Presidential Committee on research in molecular biology and biochemistry.

The committee was set up in July 1976 "to assess the present situation as well as the prospects of the future development of molecular-biological and biochemical research within the Max-Planck-Gesellschaft". The committee met 24-26 March 1977 and there was a follow-up meeting 18-19 July 1980.

K.65 Correspondence and papers for both meetings.

NATIONAL ACADEMY OF SCIENCES (NAS)

1977-85

See R.45 for Kendrew's election as Foreign Associate of the Academy.

K.66 Correspondence, papers, list of participants, programme and report of meeting organised by National Research Council of NAS of "Planning Panel on Large International Science and Technology Facilities" held at NAS 20-21 September 1985. Kendrew attended as a "Discussant".

Submissions to PNAS

Correspondence, drafts and papers, including discussions with authors and referees, on papers communicated by Kendrew for publication in *Proceedings* of NAS, or submitted to him for review.

K.67	1977	K.74	1981 (3)
K.68	1978	K.75	1981 (4)
K.69	1979	K.76	1982
K.70	1980 (1)	K.77	1983 (1)
K.71	1980 (2)	K.78	1983 (2)
K.72	1981 (1)	K.79	1984
K.73	1981 (2)	K.80	1985

NATIONAL SCIENTIFIC RESEARCH CENTER, IRAN

1974-75

K.81 Correspondence and papers with Ministry of Science and Higher Education, Tehran, 1974-75 on proposed national scientific research centre in Iran. Kendrew was invited to join a committee "to investigate the issue and come up with specific recommendations"; a meeting of the "Advisory Experts" was held in Tehran 23-28 June 1975.

Material includes invitation, travel arrangements, list of participants and programme of meeting, manuscript notes taken at meeting by Kendrew, miscellaneous drafts and recommendations, background papers on proposed centre.

NORTH ATLANTIC TREATY ORGANISATION (NATO)

1965-71

Advanced Study Institutes Programme

Kendrew was invited to serve on the Advisory Panel on the Advanced Study Institutes Programme of NATO Science Committee. His appointment, as successor to S. Zuckerman, was in June 1966, the first meeting he attended being in July 1966. He resigned as from the end of 1970, his successor being H.L. Kornberg.

K.82 Correspondence and papers 1965-71, mainly on appointment and succession.

STAZIONE ZOOLOGICA, NAPLES

1976-78

K.83 Correspondence 1976-78 with A. Monroy (Director) on history, organisation and research at Stazione, collaborative research with EMBL and possible EMBL outstation at Naples.

UNESCO

1976

Mid-term Project Review of UNDP/UNESCO project "Strengthening Training and Research at the Biological Research Center of the Hungarian Academy of Sciences".

Kendrew was invited by UNESCO to be one of a group of six experts "to assist in this Review mission for the evaluation of the project" held at the Biological Research Center, Szeged, September 27 - October 2 1976.

K.84 Correspondence and papers, including invitation, list of participants, schedule of meetings, background material (Preliminary Summary Report, original Project Document) draft and final report.

Also included is the final report of the first meeting of the European Expert Committee on Biophysics held at the Hungarian Academy of Sciences, Budapest, 2-4 June 1976, which Kendrew also attended. The experts were invited by UNESCO and sat in a personal capacity.

UNION INTERNATIONALE CONTRE LE CANCER (UICC)

1964-65

K.85

Correspondence and papers 1964-65 with President (A. Haddow) and officials, mainly on conference on "International Support of Cancer Research", Stockholm 7-9 September 1964. Kendrew attended and spoke on EMBO as a contribution to a series of reports on current and projected international initiatives. Includes list of participants, programme, Kendrew's report on EMBO and his manuscript notes, statements and press releases.

UNITED NATIONS UNIVERSITY (UNU)

1980-86

UNU was set up in 1973 under the joint sponsorship of the United Nations and UNESCO to engage in "research into the pressing global problems of human survival, development and welfare that are the concern of the United Nations and its agencies ...". The University Centre was in Tokyo. The UNU Council had twenty-four members serving in their individual capacity, appointed jointly by UN and UNESCO for a term of six years; the Council considered and approved the work programmes and budget of UNU, at two annual sessions usually in June and December.

Kendrew was appointed to the Council from 3 May 1980 and was elected Chairman in December 1982 for two years, his successor V.L. Urquidi being elected in December 1984. Under his Chairmanship the Twenty-third Session of Council in July 1984 was held in Oxford. Kendrew also chaired the Nominating Committee for the Rectorship of UNU 1984-85.

The material consists of letters, cables, notes and memoranda, and a little background material relating to meetings, projects and affairs of UNU with which Kendrew was especially involved.

Meetings

- K.86 1980. Kendrew's appointment, letters of congratulation, arrangements for meeting December.
- K.87 1981. Meetings June and December (Kendrew spoke on procedural inadequacy of Council).
- K.88 1982. Meetings June and December (Kendrew was elected Chairman).
- K.89 1983. Meetings June and December.
- K.90 1983-84. Meeting at St. John's College, Queen Elizabeth House and other venues in Oxford, and Symposium on "Democracy and Development", 2-6 July; includes costings, arrangements, social occasions and receptions, programme, list of participants, guest lists, proceedings.
- K.91 Correspondence and cables on membership of Council 1982-85.

Nominating Committee for Rectorship of UNU

The Nominating Committee was set up at the Council meeting of December 1983, with Kendrew as Chairman and two other UNU members, S. Saito and V.L. Urquidi. S. Tanguiane and S.U. Yolah served as representatives of UNESCO and UN respectively. The Committee held three meetings, on 1 July, 2 November and 8 December 1984, all in Oxford, and a panel of five recommended names was put forward on 9 January 1985. Under the articles of the UNU Charter, the Rector in post, K. Soedjatmoko, was eligible to serve for a second term, and his appointment was renewed for two years from August 1985 (see correspondence at K.97).

- K.92 Correspondence, cables, recommendations and back-up material, notes of meetings and discussions, information on UNU passed on to Kendrew by staff and Council members, February 1984 - January 1985.

- K.93 Miscellaneous memoranda and submissions on administration of UNU.

Correspondence

- K.94 Correspondence 1982-83 on UNU World Hunger Programme.
- K.95 Correspondence and papers 1983-85 on World Institute for Development Economics Research (WIDER), Helsinki, the first research and training centre to be established by UNU; location, appointments, statutes, notes of visits and discussions, funding.
- K.96 Miscellaneous correspondence and papers 1983-85 on various proposed collaborative projects with UNU.
- K.97 Shorter correspondence on UNU affairs 1984-87. Includes letters of congratulation on renewal of K. Soedjatmoko's appointment as Rector July 1985, letters of thanks on conclusion of Kendrew's service on Council May 1986.

UNIVERSITE LIBRE DE BRUXELLES

1974-78

Department of Molecular Biology

Kendrew was invited in March 1974 by the Director, J. Brachet, to be a member of the international scientific advisory committee being set up to re-evaluate the scientific activities of the department and staff, with special reference to the renewal of a research contract between the Belgian state and the University of Brussels. The annual meetings were timed to tie in with those of the Scientific Council of the ICP at Brussels (q.v.) several of whose members, including Kendrew, also served on the committee. The committee met on 30 April 1975 to inspect and receive reports on the current research, on which it reported favourably. Funding difficulties, however, continued.

- K.98 Correspondence and papers 1974-76. Includes invitation to serve, arrangements for meetings, reports and evaluations.
- K.99 Correspondence and papers on the Francqui Symposium on Differentiation, chaired by Kendrew, held 19-21 June 1978 to mark the retirement of J. Brachet and R. Jeener. Includes Kendrew's notes for his opening and closing speeches and of papers given at meeting, draft and final programme, list of participants, tributes and short accounts of work of Jeener and Brachet.

THE WEIZMANN INSTITUTE OF SCIENCE

and WEIZMANN INSTITUTE FOUNDATION

1963-86

Kendrew's long connection with the Weizmann Institute began in 1963 when he was invited by N.M.V. Rothschild to become a member of the Board of Governors, to which he was formally elected in 1964. He became an Honorary Fellow of the Institute in 1969 and served it in many capacities: as a member of the Executive Council, Co-Chairman of the Scientific Academic Advisory Board, Vice-Chairman of the Appointments and Promotions Committee (from 1983) and on the Nominating Committee for Members of the Board, as well as on various *ad hoc* committees.

He was also a member from 1966 of the Executive of the Weizmann Institute Foundation, a Foundation incorporated in the UK to support the objects and research programmes of the Weizmann Institute of Science in Israel (K.117).

The material covers all aspects of the scientific life of the Weizmann: arrangements for meetings, symposia and visits, comments on research projects proposed or in hand, evaluations, promotions, recommendations, funding and support etc. In addition, since many of the leading biological scientists at the Weizmann were or became personal friends of Kendrew through EMBO, EMBL and other international organisations, there is some reference to these institutions, and a little personal correspondence.

- K.100 1963-65. Invitation and election to Board of Governors, possible collaborative research proposals with UK Ministry of Technology (unsuccessful), report on chemistry at the Weizmann.
- K.101 1966-67. Proposed School for Molecular Biology, research and funding proposals, Abba Eban Chair (first holder: A. Katzir).
- K.102 1968-69. Fund-raising, proposed research group in neurophysiology, Kendrew's election to Honorary Fellowship, Memorial Centre for A. de-Shalit.
- K.103 1970. Extraordinary General Meeting of Board of Governors May (includes Kendrew's manuscript notes for report of committee on scientific affairs), possible future expansion in biological sciences, membership of Scientific and Academic Advisory Committee.

- K.104 1971-72. Summer Symposium "The impact of science on society", Brussels 28-29 June (Kendrew chaired a session), membership of Academic Sponsoring Committee of International Summer Science Institute (as from 1972).
- K.105 1972-73. Material relating to the death of A. Katchalsky* in the attack on Lod airport May 1972. Includes letters and cables of condolence, arrangements for posthumous publications, memorial issues of journals, memorial Fellowship, Symposium and Katzir Center at Weizmann. Kendrew served on the International Committee for the Katzir Center (letter of 24 July), and wrote an appreciation of Katchalsky for the *Jerusalem Post*.
- * Aharon and his brother Ephraim used the name Katchalsky, later hyphenated as Katchalsky-Katzir and Katzir-Katchalsky; subsequently the form Katzir alone was used. Correspondence and international reference books vary in their choice of form.
- K.106 Miscellaneous material relating to Katchalsky, tributes, information on Memorial Conferences, Katzir Center etc. Includes reprinted version of Kendrew's tribute from *Jerusalem Post*.
- K.107 1973
- K.108 1974-76. Research groups on membranes and neuroscience, membership of International Sponsoring Committee for the Chaim Weizmann Centenary Celebration, arrangements for meetings of Board and of Scientific and Academic Advisory Committee (includes Kendrew's manuscript notes on Chemical Immunology Department 1975).
- K.109 1977. Arrangements and schedules for meetings, evaluation and report on activities.
- K.110 1978. Arrangements and schedules for meetings, research proposal, report on research on "The physical chemistry of proteins" and on general research activities, with Kendrew's extensive manuscript notes.
- K.111 1979-81. Recommendations, re-election to Board of Governors.

- K.112 1983. Research, election to Appointments and Promotions Committee.
- K.113 1984. Meetings, recommendations.
- K.114 1985. Re-election to Executive Council and to Board of Governors, appointments, meetings, research projects.
- K.115 1985-86
- K.116 1986. Meetings and assessments, equipment, Kendrew's notes and presidential remarks for opening ceremony of symposium in honour of E. Katzir.

Weizmann Institute Foundation 1963-88

- K.117 Kendrew's election to the Executive 1966, his resignation 1975 because of inability to attend meetings while working at Heidelberg, rejoining 1983 on retirement from EMBL. Includes Kendrew's message for 50th Anniversary Endowment Dinner with a brief account of his connection with the Weizmann.

WORLD HEALTH ORGANIZATION (WHO)

1963-66

Material May 1963 - May 1966 relating to a proposed World Health Research Centre, to be set up under the aegis of WHO. Informal meetings of European scientists were held on 26-27 June 1963 (under the title "Informal WHO meeting on research development in chemical mutagenesis and toxicities") and 29-30 November 1963 (under the title "WHO Informal meeting of scientific advisers on special research development"). A report was prepared and accepted by the Executive Board of WHO in January 1964. It was expected that the WHRC would concentrate its research programme on epidemiology, communications science and technology, and biomedical research. The siting of the WHRC, and the development of research in molecular biology through EMBO and its proposed laboratory, were not determined at this time.

Kendrew was one of the advisers involved from the start of the project and contributed ideas on organisation, costs and research projects based on early discussions of the EMBO group. Most of the correspondence is conducted with M.M. Kaplan, Special Adviser on Research Development, WHO. See also F.169.

K.118 May 1963 - January 1964. Correspondence and papers, arrangements for meetings, lists of participants, reports, submissions to Executive Board, meeting of MRC in London 16 January 1964 to discuss proposed new WHRC, with manuscript notes by M.F. Perutz.

K.119 January 1964 - May 1966. Correspondence, papers, press comment on possible work of WHRC, arrangements and list of participants for "Informal meeting on work in communications science and technology in the proposed WHRC" 1-3 July 1964, relations of WHRC and EMBO.

Supplementary catalogue of the papers and
correspondence of

Sir John Cowdery Kendrew FRS

(1917 – 1997)

by Adrian Nardone and Peter Harper
NCUACS catalogue no. 78/7/98

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GENERAL INTRODUCTION

PROVENANCE

The papers were received in July 1998 from Kendrew's executor Mr J.A. Montgomery, St John's College, Oxford.

BIOGRAPHICAL NOTE

John Cowdery Kendrew was born in Oxford on 24 March 1917. His parents were Evelyn Sandberg, an art historian and Wilfred George Kendrew, tutor of St. Catherine's and Reader in Climatology at Oxford University.

Kendrew was educated at the Dragon School, Oxford (1923-1930) and at Clifton College, Bristol (1930-1936). He went to Trinity College, Cambridge in 1936. His main subject was Chemistry. As an undergraduate Kendrew displayed an interest in many branches of science and also developed an interest in radio while in the Cambridge OTC (Officer Training Corps). In June 1939 he graduated with first class honours in chemistry and began research in reaction kinetics in the Department of Physical Chemistry. In December 1939 he was appointed Junior Scientific Officer at the Air Ministry and from 1940 worked on operational research with special reference to anti-submarine warfare, bombing accuracy and radio aids. Most of his war service was spent abroad in the Middle East Command and South East Asia Command where he held the honorary rank of Wing Commander.

In 1946 Kendrew returned to Cambridge. He began a collaboration on the X-ray crystallographic analysis of protein structures with M.F. Perutz at the Cavendish Laboratory under the direction of Sir Lawrence Bragg. In October 1947 the Medical Research Council formed the two researchers into the Unit for the Study of the Molecular Structure of Biological Systems. This unit was the origin of the Laboratory of Molecular Biology. Long and arduous work with sperm-whale myoglobin eventually succeeded in producing a three-dimensional model at various Angström levels and was rewarded when he shared the Nobel Prize for Chemistry with Perutz (who had continued work on haemoglobin) in 1962. He had already been elected FRS in 1960.

Alongside the laboratory work, Kendrew maintained links with university life as a Fellow of Peterhouse, where he was Director of Studies for many years. He also became increasingly involved with scientific matters in the wider world. From the early 1960s he was involved at all stages in the development of the European Molecular Biology Organisation (EMBO) and was first Director General of the European Molecular Biology Laboratory (EMBL) at Heidelberg, West Germany, 1975-1982. In

Britain he served on the Council for Scientific Policy, 1965-1972 and on the Defence Scientific Advisory Council, 1969-1974. In the international sphere he was appointed Governor of the Weizman Institute Israel in 1964, Vice-President and President of the International Union of Pure and Applied Physics, 1964-1972 and Secretary General, Vice-President and President of the International Council of Scientific Unions, 1974-1988. During the period 1982-1987 he was President of St John's College, Oxford.

Amongst Kendrew's many non-scientific interests were photography, music, art and archaeology. He married Elizabeth Jarvie in 1948 (marriage dissolved 1956). He received many public honours in the United Kingdom including a knighthood in 1974. He died on 23 August 1997.

DESCRIPTION OF THE COLLECTION

This catalogue of papers of Sir John Cowdery Kendrew is a supplement to that compiled in 1989 (NCUACS 11/4/89). The material has been arranged and numbered to follow the sequence of the previous catalogue, which should therefore be consulted in conjunction with this catalogue. Papers supplementary to the first catalogue have been found for section R (Biographical). The material covers the period 1884-1997.

Section R, Biographical, is mainly a sequence of folders inscribed by Kendrew 'archives' or 'souvenir papers' and assembled by him as a personal record of his professional and personal life over the period 1936-1996. Initially several years at a time were covered by an individual folder but from 1963 onwards Kendrew began keeping one folder for each year. There is some correspondence and speech material but the contents of Kendrew's folders were mainly photographs, press cuttings and mementos such as menus, seating plans, invitation cards and a variety of programmes for formal dinners and tributes, visits and conferences, honorary degree or awards ceremonies and for theatres, concerts, operas and art exhibitions. The material comprises Kendrew's personal record of such aspects of his life and career as school and undergraduate days, war service, postwar research at Cambridge, the award of the Nobel Prize, the conferral of various honorary degrees and awards, attendance at conferences, involvement with national and international organisations, his presidency of St John's College, Oxford as well as his wide-ranging interest in the arts. In addition to the folder sequence Kendrew compiled two scrapbooks covering the period 1960-1962 containing letters, photographs and press cuttings relating to research and other developments at the Cavendish Laboratory, Cambridge, the award of the Nobel Prize, and also the death of his parents. There is a folder of cards and letters of congratulation on the occasion of Kendrew's eightieth birthday in 1997.

ACKNOWLEDGEMENTS

We are grateful to Kendrew's executor Mr J.A. Montgomery, St John's College, Oxford for his assistance in making the material available.

A. Nardone
P. Harper

BATH 1998

SECTION R	BIOGRAPHICAL	R.52-R.367
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R.52-R.364	BIOGRAPHICAL FOLDERS
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R.365-R.367	OTHER BIOGRAPHICAL MATERIAL
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R.52-R.364	BIOGRAPHICAL FOLDERS	1884, 1920-1997
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The headings given by Kendrew to his folders of biographical material have been reproduced in the catalogue entries. The folders themselves have been subdivided for ease of reference.

A large proportion of the material consists of memorabilia and has not been described in detail. Where there is material of biographical or documentary interest attention has been drawn to it in the entries.

R.52-R.64	'Archives 1936-41'	1930-1963
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R.52	Correspondence, 1937.
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R.53	Clifton College, Bristol, 1930-1933. 'Reminiscences of 1931', 25pp typescript/manuscript draft so inscribed, ca 1930-1931. Kendrew was a co-editor of this draft for an intended publication of collected Clifton College reminiscences.
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Scientific Society Report for the years 1930-1933, Clifton College, 1933.

R.54-R.60	Cambridge University, 1936-1939.
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R.54	Trinity College, Cambridge memorabilia, 1936-1939. Includes a weekly lecture timetable.
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R.55-R.58	Cambridge University societies memorabilia, 1936-1939. Four folders.
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Biographical

- R.59, R.60 Other Cambridge University memorabilia, 1937-1939.
- At R.59 are papers *re* Cambridge University, Officers Training Corps.
- Two folders.
- R.61 *The origins and development of operational research in the Royal Air Force*, HMSO, 1963.
- Photocopies of extracts mentioning Kendrew, 9pp.
- R.62, R.63 Two passports, 1934-1951.
- R.62 March 1934-March 1944.
- R.63 October 1941-April 1951
- R.64 Other memorabilia, *ca* 1930s.
- Includes two photographs of Madeleine Pinkerton; an advertisement for *The climates of the continents* by W.G. Kendrew, (father of Kendrew), Oxford University Press, (third edition 1937).
- R.65-R.75 'Souvenir papers 1942-1945, Jan. 1946-1949' 1920-1951
- R.65 Correspondence, 1920, 1946, 1949.
- R.66 'Middle East 1942-1943'. Contents of folder so inscribed. *ca* 1940-1943.
- Typescript letter *re* Kendrew's arrival in the Middle East, September 1941; press cutting and certificate *re* mention of Kendrew in despatch for distinguished service, January 1943; etc.
- R.67 'South East Asia - Pacific - U.S.A. 1944-1945'. Contents of folder so inscribed. 1944-1945.
- Pencil sketch of Kendrew; photograph and film advertisement autographed by filmmaker, musicologist and explorer Laura C. Boulton; concert programmes; printed memorabilia.

Biographical

- R.68 Election to Research Fellowship at Peterhouse, Cambridge, April 1947.
Announcements from *The Times* and the *Cambridge University Reporter*.
See also R.8 of previous catalogue NCUACS 11/4/89.
- Approved for degree of D.Phil., June 1949.
Announcement from the *Cambridge University Reporter*.
- R.69, R.70 Cambridge University memorabilia, 1946-1949.
Two folders.
- R.71 Meeting of the Physiological Society, Cambridge, 18 January 1947.
Kendrew gave an oral communication entitled 'An X-ray study of foetal and adult sheep haemoglobin'.
Programme.
See also C.16 of previous catalogue NCUACS 11/4/89.
- R.72 Group photograph taken at the Cavendish Laboratory Cambridge with 1p typescript identification key, n.d.
- R.73-R.75 Other memorabilia, 1945-1951.
- R.73 Doggerel, 4pp typescript and 2pp manuscript, ca 1947, 1948.
Written by various authors the material includes a 1p manuscript re Kendrew's marriage to Elizabeth Jarvie in 1948 initialled J.G. [?John Graham].
- R.74 Includes a programme for a performance of character sketches by Ruth Draper with letter to Kendrew from the same, enclosed, February 1949.
- R.75 Includes National Registration Identity Card, 1945-1951.

Biographical

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|------------|---|-----------|
| R.76-R.83 | 'Souvenir papers 1950-1953'. | 1950-1953 |
| R.76 | Award of Supernumerary Fellowship at Peterhouse, July 1953.
Announcement from <i>Cambridge University Reporter</i> . | |
| R.77-R.79 | Cambridge University, 1950-1953. | |
| R.77 | Downing College, Peterhouse and Trinity College, Cambridge memorabilia, 1950-1953. | |
| R.78 | Cavendish Laboratory, Cambridge memorabilia, 1951, 1953.
Includes booklet <i>re</i> open day. | |
| R.79 | Other Cambridge University memorabilia, 1950-1953.
Includes announcement from <i>Cambridge University Reporter re</i> examination results of M.E. Kendrew, July 1950 (underlined in red crayon). | |
| R.80, R.81 | Conferences, etc, 1950, 1951. | |
| R.80 | Royal Society Conversazione, London, May 1950.
The event included an exhibit on 'The Structure of Polypeptide Chains by Proteins' by Sir Lawrence Bragg, M.F. Perutz and Kendrew.
Programme.
See also L.10 of previous catalogue NCUACS 11/4/89. | |
| R.81 | Gordon Conference, New Hampton, New Hampshire, USA, 27-31 August 1951.
Group photograph of delegates with 1p typescript identification key; press cutting.
See also N.2 of previous catalogue NCUACS 11/4/89. | |
| R.82 | Press cuttings <i>re</i> discovery of DNA chemical structure by J.D. Watson and F.H.C. Crick, 1953. | |

Biographical

R.83	Other memorabilia, 1950, 1951.	
R.84-R.91	'Souvenir 1954-1957'.	1884, 1954-1967
R.84	Correspondence, 1955.	
R.85-R.88	Cambridge University memorabilia, 1884, 1954-1957. Four folders.	
R.89, R.90	Conferences, etc, 1955, 1957.	
R.89	Royal Society Conversazione, London, 19 May 1955. Descriptive catalogue of exhibits.	
R.90	Royal Society Conversazione, London, 28 June 1957. Programme.	
R.91	Press cuttings, etc <i>re</i> Cavendish Laboratory, Cambridge, 1955-1967.	
R.92-R.99	'Archives 1958-60'.	1958-1960
R.92	Cambridge University memorabilia, 1958, 1959.	
R.93-R.96	Conferences, etc, 1958-1960.	
R.93	Royal Society Conversazione, London, 26 June 1958. The event included an exhibit on 'A three-dimensional model of the protein myoglobin', by Kendrew <i>et al.</i> Programme.	

R.94	43rd annual meeting of the Federation of American Societies for Experimental Biology, Atlantic City, New Jersey, USA, 13-17 April 1959.	
	Kendrew gave a lecture entitled 'Structure and function in myoglobin and other proteins'.	
	Biographical sketches of speakers including Kendrew, 5pp typescript.	
R.95	Discussion of aspects of social responsibility in science, Scientists' Lunch Club, Michelmas term, Peterhouse, Cambridge, 1959.	
	Kendrew was president.	
	Programme.	
R.96	Royal Society Tercentenary Celebrations, London, 18-26 July 1960.	
	Programme.	
R.97	Photographs, ca 1959.	
R.98	Press cuttings, 1958-1960.	
R.99	Other memorabilia, 1958.	
R.100-R.106	'Archives 1961-2'.	1961-1971
	In 1962 Kendrew shared with M.F. Perutz the award of the Nobel Prize for Chemistry and much of the material at R.100-R.106 relates to this.	
	See R.365, R.366 this supplement and also R.20-R.33 of previous catalogue NCUACS 11/4/89.	
R.100	Correspondence, 1962.	
R.101	Award of Nobel Prize, 1962.	
	Papers <i>re</i> ceremony and related events, October, December.	
R.102	Photograph, ca December 1962.	

Biographical

- R.103, R.104 Press cuttings *re* award of Nobel Prize, April-December 1962.
Two folders.
- R.105 Photocopy of obituary for Kendrew's father, W.G. Kendrew, 1p with attached manuscript bibliographical notes in Kendrew's hand, 1p.
- R.106 Passport, February 1961-February 1971.
- R.107-R.111 'Archives 1963'. 1962-1963
- R.107 Cambridge University memorabilia, 1963.
- R.108 Presentation by Commanders – in - chief of the Home Fleet and Coastal Command *re* the present state of anti submarine warfare, Headquarters Coastal Command, Northwood, Middlesex, October 1963.
Programme; memorabilia.
- R.109 Photographs, 1963.
- R.110 Press cuttings, etc, 1963.
Includes material *re* award of CBE to Kendrew.
See also R.34 of previous catalogue NCUACS 11/4/89.
- R.111 Other memorabilia, 1963.
Includes poster of British Nobel Prize winners of 1962.
- R.112-R.116 'Archives 1964'. 1964, 1975
- R.112 Speech day, Bishop's Stortford College, Hertfordshire, 13 June 1964.
Kendrew presented prizes and gave an address.
Programme.

Biographical

- R.113-R.115 Photographs, 1964.
- At R.113 are photographs *re* 'The thread of life', a BBC Television series, broadcast over the period January-March 1964, in which Kendrew gave ten talks.
- Three folders.
- R.116 Press cuttings, etc, 1964, 1975.
- R.117-R.120 'Archives 1965'. 1965
- R.117 Award of the Royal Medal of the Royal Society, November.
- Royal Society announcement with press cutting attached.
- See also R.35 of previous catalogue NCUACS 11/4/89.
- R.118 Photographs.
- R.119 Press cuttings.
- R.120 Other memorabilia.
- R.121-R.123 'Archives 1966'. 1966, 1994
- R.121 Correspondence, 1994.
- Photocopy of letter from Kendrew to R.J. Roberts (Nobel Laureate Physiology or Medicine 1993) with 1p typescript attached.
- R.122 Photograph, *ca* 1966.
- R.123 Press cuttings, 1966.

Biographical

R.124-R.127	'Archives 1967'.	1967, 1989
R.124	Correspondence, 1989. Letter to Kendrew from S. Bonotto with 4pp typescript article <i>re</i> Bonotto's research etc attached.	
R.125	Photographs, <i>ca</i> 1967.	
R.126, R.127	Press cuttings, etc, 1967. Two folders.	
R.128-R.132	'Archives 1968'.	1968
R.128	Conferral of honorary D.Sc., University of Reading, Berkshire, 25 May. Programme. Conferral of honorary D.Sc., University of Keele, Staffordshire, 2 July. Programme. See also R.37 of previous catalogue NCUACS 11/4/89.	
R.129	Photographs.	
R.130, R.131	Press cuttings Includes material <i>re</i> J.D. Watson and his book <i>The Double Helix</i> . Two folders.	
R.132	Doggerel by T.H. Jukes, 1p typescript.	

Biographical

R.133-R.137	'Archives 1969'.	1969
R.133	Award of honorary Fellowship of the Weizmann Institute of Science, Rehovot, Israel, 4 November. Programme; memorabilia. See also K.102 of previous catalogue NCUACS 11/4/89.	
R.134	Cambridge University memorabilia.	
R.135	<i>Nature</i> Centenary Celebration, Royal Institution, London, 31 October. Programme; memorabilia.	
R.136	Press cuttings.	
R.137	Other memorabilia.	
R.138-R.140	'Archives 1970'.	1970
R.138	Photograph.	
R.139	Press cuttings.	
R.140	Other memorabilia.	
R.141-R.144	'Archives 1971'.	1971
R.141	Correspondence.	
R.142	Photographs.	

R.143	Press cuttings. Includes announcements <i>re</i> Kendrew's appointment as Chairman of the Defence Scientific Advisory Council.	
R.144	Other memorabilia.	
R.145-R.150	'Archives 1972'.	1971-1972
R.145	Correspondence, 1972.	
R.146	Award of honorary Fellowship of Trinity College, Cambridge, February 1972. Correspondence.	
R.147	Visit of a delegation of scientists from the Peoples' Republic of China to Britain, 1971. Press release; memorabilia.	
R.148	Photographs, 1972. Includes formal photograph, with key, of the final meeting of the Council for Scientific Policy, 27 October.	
R.149	Press cuttings, 1971, 1972.	
R.150	Other memorabilia, 1972.	
R.151-R.158	'Archives 1973'.	1973
R.151	Correspondence. Letter from the Prime Minister's office <i>re</i> possible award of knighthood, November. See also R.160 of this supplement and also R.38-R.44 of previous catalogue NCUACS 11/4/89.	

Biographical

- R.152 Cambridge University memorabilia.
- R.153 Ceremony of signing of agreement establishing the European Molecular Biology Laboratory, CERN, Geneva, Switzerland, 10 May.

7pp typescript speech by Kendrew; memorabilia.

See R.119 and R.200 of this supplement and also H.4 of previous catalogue NCUACS 11/4/89.
- R.154 Annual Meeting of the British Association for the Advancement of Science, University of Kent at Canterbury, 22 August.

Memorabilia.

See also J.4 of previous catalogue NCUACS 11/4/89.
- R.155, R.156 Photographs.

Two folders.
- R.157 Press cuttings.
- R.158 Other memorabilia.
- R.159-R.168 'Archives 1974'. 1973-1974
- R.159 Correspondence, 1974.
- R.160-R.162 Honours and appointment, 1974.
- R.160 Award of Knighthood, January.

Correspondence.

See also R.151 of this supplement and also R.38-R.44 of previous catalogue NCUACS 11/4/89.

Biographical

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|--------------|---|------|
| R161 | Appointment as Trustee of the British Museum, May.
Minutes of meeting with press cutting attached. | |
| R.162 | Conferral of honorary degree, Doctor of the University of Stirling, 2 September.
Programme. | |
| R.163 | Cambridge University memorabilia, 1974. | |
| R.164 | Photographs, 1973-1974. | |
| R.165, R.166 | Press cuttings, 1974.
Two folders. | |
| R.167, R.168 | Other memorabilia, 1974.
Two folders. | |
| R.169-R.181 | 'Archives 1975'. | 1975 |
| R.169 | Correspondence. | |
| R.170 | Conferral of honorary degree from the Medical University, Pecs, Hungary, 3 October.
Speech, 1p manuscript. | |
| R.171 | Cambridge University memorabilia. | |

Biographical

R.172-R.175	Conferences, etc.	
R.172	Annual Banquet of the Operational Research Society, London, 23 April. Kendrew was guest speaker. Notes for speech 1p manuscript; memorabilia.	
R.173	137th Annual Meeting of the British Association for the Advancement of Science, University of Surrey, Guildford, 27 August. Kendrew gave an address. Programme.	
R.174, R.175	Celebration of 75th Anniversary of the Nobel Foundation, Stockholm, Sweden, 7-12 December. Programmes (at R.174); memorabilia. Two folders.	
R.176, R.177	Photographs. Two folders.	
R.178	Press cuttings, etc.	
R.179	Photocopied contents of Kendrew's filofax, 26pp manuscript, inscribed 'Copied Jan 75', ca 1975. Includes addresses of executors and location of will as well as inventory of possessions, addresses and other personal details.	
R.180, R.181	Other memorabilia. Two folders.	
R.182-R.188	'Archives 1976'.	1976
R.182	Correspondence.	

Biographical

- R.183 Cambridge University memorabilia.
- R.184 European Molecular Biology Organisation Symposium, Neckar, West Germany, 4-8 May.

Programme.
- R.185 Symposium in honour of the President of the State of Israel, Professor Ephraim Katzir, on the occasion of his sixtieth birthday, Jerusalem and Rehovot, Israel, 13-16 May.

Programmes; memorabilia.

See also L.149 and N.45 of previous catalogue NCUACS 11/4/89.
- R.186 Photographs.
- R.187 Press cuttings.
- R.188 Other memorabilia.
- R.189-R.196 'Archives 1977'. 1977
- R.189 Correspondence.

Includes group photograph of delegates to the Elmau - Symposium on Dynamics and Regulation of Evolving Systems, Schloss Elmau, West Germany, 10-16 May.

See also N.48 of previous catalogue NCUACS 11/4/89.
- R.190 Cambridge University memorabilia.
- R.191, R.192 Conferences, etc.
- R.191 European Molecular Biology Organisation Symposium, Neckar, West Germany, 25-30 April.

Programme.

Biographical

- R.192 Celebrations to commemorate the Golden Jubilee of the Clifton College Science School, Clifton College, Bristol, 5 November.
- Kendrew gave a lecture entitled 'Fifty years of biology: the impact of physics and chemistry'.
- Programmes; memorabilia.
- R.193, R.194 Photographs.
- Two folders.
- R.195 Press cuttings.
- R.196 Other memorabilia.
- R.197-R.206 'Archives 1978'. 1969-1988
- R.197 Correspondence, 1978.
- Includes an undated photograph of Kendrew attending a Scientific Advisory Committee meeting at the Weizmann Institute of Science, Rehovot, Israel.
- R.198 Cambridge University memorabilia, 1978.
- R.199-R.201 Conferences, etc, 1978.
- R.199, R.200 Official Inauguration of the European Molecular Biology Laboratory, Heidelberg, West Germany, 5 May.
- See R.153 of this supplement and also H.50-H.55 of previous catalogue NCUACS 11/4/89.
- R.199 Information pack.
- R.200 Memorabilia.

R.201	17th General Assembly, International Council of Scientific Unions, Athens, Greece, 24-29 September. Programme; memorabilia.	
R.202, R.203	Photographs, 1978. Two folders.	
R.204	Press cuttings, 1978.	
R.205	Passport issued March 1969 and extend for use until February 1988 by attachment, with official tape, of another passport issued February 1978 (latest date of use of this attached passport is November 1981).	
R.206	Other memorabilia, 1981.	
R.207-R.222	'Archives 1979'.	1956, 1979
R.207	Correspondence, 1979. Includes letter to Kendrew <i>re</i> death of Olga Deterding.	
R.208-D.213	Conferences, etc, 1979.	
R.208	World Climate Conference, Geneva, Switzerland, 12-23 February. Programme; speech, 2pp annotated typescript.	
R.209	'In defence of DNA', European Molecular Biology Organisation Lecture, Lecture, [?Heidelberg, West Germany], 27 March. Notes for lecture, 2pp manuscript.	

Biographical

- R.210, R.211 Inauguration of the Electron - Positron Storage Ring (PETRA), Deutsches Elektronen Synchrotron (DESY), Hamburg, West Germany, 26 April.
- Memorabilia.
- Two folders.
- See also H.207 of previous catalogue NCUACS 11/4/89.
- R.212 Structure in Science and Art, Third Boehringer Symposium, Taunus, West Germany, 2-5 May.
- Programme.
- R.213 Lipmann Symposium on Concepts of Medical Recognition in Biology, Institut National Agronomique, Paris, France, 18-20 July.
- Memorabilia.
- See also N.52 of previous catalogue NCUACS 11/4/89.
- R.214-R.216 Photographs, 1956, 1979.
- R.216 includes a photograph dated 1956.
- Three folders.
- R.217 Press cuttings, 1979.
- R.218-R.222 Other memorabilia, 1979.
- Five folders.
- R.223-R.234 'Archives 1980' 1980
- R.223 Correspondence.

Biographical

- R.224 Election as foreign member of Bulgarian Academy of Sciences, Sofiya, Bulgaria, May.
4pp typescript torn from booklet (Bulgarian).
- R.225-R.227 Conferences, etc.
- R.225 Commemoration for F. Lynen, München, West Germany, 29 February.
Programme; memorabilia.
- R.226 Molecular Biology and the Physical Sciences, II Facolta' di Medicina E Chirurgia, Naples, Italy, 5 March.
Announcement.
- R.227 Academic ceremony, Weizmann Institute of Science, Rehovot, Israel, 12 November.
Programme.
- R.228, R.229 Photographs.
Two folders.
- R.230, R.131 Press cuttings.
Two folders.
- R.232-R.234 Other memorabilia.
R.232 includes a sketch portrait of Kendrew and a poster signed by N.K. Jerne (Nobel Laureate Physiology or Medicine 1984).
Three folders.

Biographical

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|-------------|---|------------|
| R.235-R.241 | 'Archives 1981'. | 1981, 1982 |
| R.235-R.237 | Conferences, etc, 1981. | |
| R.235 | Inauguration of the Synchrotron - Radiation Laboratory (HASYLAB), Deutsches Elektronen Synchrotron (DESY), Hamburg, West Germany, 29-30 January.

Programme; information booklet; memorabilia.

See R.210 and R.211 of this supplement and also H.207 of previous catalogue NCUACS 11/4/89. | |
| R.236 | The Immune System, Symposium to Celebrate the Tenth Anniversary of the Basel Institute for Immunology, Switzerland, 16-17 June.

Programmes; collected press cuttings with attached letter; memorabilia. | |
| R.237 | Council meeting, European Molecular Biology Laboratory, Heidelberg, West Germany, ca December, 1981.

'Draft Council Minutes', 2pp incomplete typescript draft so inscribed.

See also H.417 of previous catalogue NCUACS 11/4/89. | |
| R.238 | Photographs, 1981. | |
| R.239 | Press cuttings, 1981. | |
| R.240 | Passport, November 1981-May 1982. | |
| R.241 | Other memorabilia, 1981, 1982.

Includes a pocket sized edition of <i>Holiday Memory: a story</i> by Dylan Thomas with attached postcard from Ruth Harris, ca 1982. | |

Biographical

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|-------------|---|------------|
| R.242-R.254 | 'Archives 1982'. | 1981, 1982 |
| R.242 | Correspondence, 1982.

Includes photographs. | |
| R.243 | Conferral of honorary D.Sc., University of Exeter, 25-26 April, 1982.

Programme; memorabilia.

See also R.46 of previous catalogue NCUACS 11/4/89. | |
| R.244 | Occasion of Kendrew's retirement from the directorship of the European Molecular Biology Laboratory, Heidelberg, West Germany, 21 March 1982.

Programme; newsletter with attached press cuttings; and 1p manuscript of address and notes <i>re</i> retirement.

See also H.360-H.367 of previous catalogue NCUACS 11/4/89. | |
| R.245 | Cambridge University memorabilia, 1982. | |
| R.246-R.248 | St John's College, Oxford memorabilia, 1982.

Kendrew was appointed President of the college in 1982.

Three folders. | |
| R.249 | Discourse given by Lord Zuckerman, Royal Institution of Great Britain, London, 26 November 1982.

Discourse abstract; memorabilia. | |
| R.250 | Photographs, 1982. | |
| R.251 | Press cuttings, 1981, 1982. | |
| R.252-R.254 | Other memorabilia, 1982.

Three folders. | |

Biographical

R.255-R.261	'Archives 1983'.	1983
R.255	Correspondence. Includes photographs.	
R.256	Conferral of honorary D.Sc., University of Buckingham, 23 July. Programme; memorabilia.	
R.257	Cambridge University memorabilia.	
R.258	St John's College, Oxford memorabilia.	
R.259	Photographs.	
R.260	Press cuttings, etc.	
R.261	Other memorabilia. Includes photocopy of pencil sketch of Kendrew with autographs; curriculum vitae of artist Ruth Harris.	
R.262-R.266	'Archives 1984'.	1984
R.262	Correspondence. Includes photographs.	
R.263	St John's College, Oxford memorabilia.	
R.264	Photographs.	

Biographical

R.265	Press cuttings.	
R.266	Other memorabilia.	
R.267-R.276	'Archives 1985'.	1985
R.267	Correspondence.	
R.268, R.269	Conferences, etc.	
R.268	Address by Kendrew to the Parliamentary and Scientific Committee, London, 18 June. The Address concerned Kendrew's Report into UK participation in high energy particle physics research. 3pp offprint from <i>Science in Parliament</i> , 43 , (October 1985).	
R.269	International Conference on Science and Technology Education and Future Human Needs, Bangalore, India, 6-14 August. Photocopies of collected press cuttings; memorabilia.	
R.270	Cambridge University memorabilia.	
R.271	St John's College, Oxford memorabilia.	
R.272, R.273	Photographs. Two folders.	
R.274	Press cuttings, etc.	
R.275, R.276	Other memorabilia. Two folders.	

Biographical

R.277-R.283	'Archives 1986'.	1985, 1986
R.277	Correspondence, 1986.	
R.278, R.279	Conferences, etc, 1986.	
R.278	Biopolymers and Biotechnology, Symposium in Honour of Professor Ephraim Katzir on his 70th Birthday, Weizmann Institute of Science, Rehovot, Israel, 18-22 May. Kendrew acted as chairman. Programme.	
R.279	Opening of the General Assembly of the Swiss Academy of Sciences, Berne University, Switzerland, 14 September. Programme; memorabilia.	
R.280	St Johns College, Oxford memorabilia, 1986.	
R.281	Photographs, 1986.	
R.282	Press cuttings, 1985, 1986.	
R.283	Other memorabilia, 1986. Includes United Nations identity certificate.	
R.284-R.295	'Archives 1987'.	1986, 1987
R.284	Correspondence, 1987.	

R.285	<p>Award of Distinguished Service Award sponsored by the Miami Winter Symposium and Elsevier Science Publishers, University of Miami, Florida, USA, 10 February 1987.</p> <p>Announcement.</p> <p>See also R.286.</p> <p>Conferral of Doctores Honoris Causa, Universidad Complutense, Madrid, Spain, 26 June 1987.</p> <p>Programme.</p> <p>See also R.287.</p>
R.286-R.289	<p>Conferences, etc, 1987.</p>
R.286	<p>Advances in Gene Technology: the Molecular Biology of Development, Nineteenth Miami Winter Symposium, University of Miami, Florida, USA, 9-13 February.</p> <p>Programme.</p> <p>See also R.285.</p>
R.287	<p>Conference, Fundacion Ramon Areces, Madrid, Spain, 23 February.</p> <p>Programmes; memorabilia.</p> <p>See also R.285.</p>
R.288	<p>Education - Reform and Development, Pondicherry University, India, 14 April.</p> <p>Memorabilia.</p>
R.289	<p>Anniversary Open Day, Laboratory of Molecular Biology, Medical Research Council, Cambridge, 22 May.</p> <p>Correspondence; memorabilia.</p>
R.290	<p>Cambridge University memorabilia, 1987.</p>

Biographical

R.291, R.292	St John's College, Oxford memorabilia, 1987. Two folders	
R.293	Photographs, 1986, 1987.	
R.294	Press cuttings, 1987.	
R.295	Other memorabilia, 1987.	
R.296-R.303	'Archives 1988'.	1988
R.296-R.298	Conferences, etc.	
R.296	Meeting of Nobel Laureates, Paris, France, 18-20 January. Memorabilia.	
R.297	22nd General Assembly of the International Council of Scientific Unions, Beijing, China, 11 September. Programme; memorabilia.	
R.298	Symposium on Transuranium Elements Today and Tomorrow, 25th Anniversary of the European Institute for Transuranium Elements, Karlsruhe, West Germany, 28 October. Booklet of ceremonial addresses and attached note.	
R.299	Cambridge University memorabilia.	
R.300	St John's College, Oxford memorabilia.	
R.301	Photographs.	

Biographical

R.302	Press cuttings, etc.	
R.303	Other memorabilia.	
R.304-R.312	'Archives 1989'.	1989
R.304-R.308	Conferences, etc.	
R.304	Workshop on Awareness of Rapid Advances in Science and Technology, National Chemical Laboratory, Pune, India, 23-26 January. Memorabilia.	
R.305	Retirement of F.W.G. Baker as Executive Secretary of the International Council of Scientific Unions, Paris, France, 1 March. Commemorative booklet; memorabilia.	
R.306	Sixth Economic Summit Conference on Bio-ethics, Brussels, Belgium, 10, 11 May. Memorabilia.	
R.307	Technology, Product Environment, Industrial Forum, Venice, Italy, 27, 28 October. Programme.	
R.308	Dedication of the Helen and Milton A. Kimmelman Center for Biomolecular Structure and Assembly, Weizmann Institute of Science, Rehovot, Israel, 12 November. Memorabilia.	
R.309	St John's College, Oxford memorabilia.	
R.310	Photographs.	

Biographical

R.311	Press cuttings, etc.	
R.312	Other memorabilia.	
R.313-R.321	'Archives 1990'.	1990
R.313-R.316	Conferences, etc.	
R.313	Talk to the Sawston Rotary Club, Cambridgeshire, 6 March. Speech notes, 1p manuscript.	
R.314	30th Anniversary Celebration, Central Bureau for Nuclear Measurements, Geel, Belgium, 10, 11, May. Programme; memorabilia.	
R.315	Silver Jubilee Symposium, Glynn Research Foundation, Bodmin, Cornwall, 11, 12 October. Memorabilia.	
R.316	Science and technology in a changing world: the role of Europe, Conference of Nobel Prize Laureates, Castelporziano, Italy, 3, 4 December. Programme; memorabilia.	
R.317	Cambridge University memorabilia.	
R.318	St John's College, Oxford memorabilia.	
R.319	Photographs.	
R.320	Press cuttings.	

Biographical

R.321	Other memorabilia.	
R.322-R.328	'Archives 1991'.	1991
R.322, R.323	Conferences, etc.	
R.322	Centennial Remembrance of Vannevar Bush, Carnegie Institution of Washington and the National Science Foundation, Washington DC, USA, 19 March. Information pack.	
R.323	The History of Molecular Biology, Cambridge Wellcome Unit for the History of Medicine, Whipple Museum, Cambridge, 27 November. Memorabilia.	
R.324	Cambridge University memorabilia.	
R.325	St John's College, Oxford memorabilia.	
R.326	Photographs.	
R.327	Press cuttings.	
R.328	Other memorabilia.	
R.329-R.336	'Archives 1992'.	1992
R.329	Correspondence.	
R.330	Symposium in Honour of John T. Edsall, American Academy of Arts and Sciences, Harvard University, Cambridge, Massachusetts, USA, 31 October. Programme; announcement.	

Biographical

R.331	Cambridge University memorabilia.	
R.332	St John's College, Oxford memorabilia.	
R.333	Photographs.	
R.334	Press cuttings, etc.	
R.335, R.336	Other memorabilia. Two folders.	
R.337-R.346	'Archives 1993'.	1993
R.337	Correspondence.	
R.338-R.340	Conferences, etc.	
R.338	The Role of the United Nations in the 21st Century, United Nations University, Tokyo, Japan, 18 February. Programmes; memorabilia.	
R.339	Fortieth Anniversary of the Publication of the Structure of DNA, Kings College London, 29 September. Programme; memorabilia.	
R.340	Redefining the Good Society, Fourth Indira Gandhi Conference, New Delhi, India, 19-22 November. Memorabilia.	
R.341	Cambridge University memorabilia.	

Biographical

R.342	St John's College, Oxford memorabilia.	
R.343	Photographs.	
R.344	Press cuttings.	
R.345, R.346	Other memorabilia. Two folders.	
R.347-R.353	'Archives 1994'.	1994
R.347	Correspondence.	
R.348	Birthday Lunch for Sir Hermann Bondi, Save the Children, Cambridge Branch, 6 November 1994. Letter; speech notes written on card, 5pp manuscript; and invitation card.	
R.349	Cambridge University memorabilia.	
R.350	St John's College, Oxford memorabilia.	
R.351	Press cuttings.	
R.352	Other memorabilia.	
R.353	Small photograph album commemorating the life of O.J.G. Beer, December 1994. The album includes a photocopy of a letter from Kendrew to Beer thanking him for his work on European Molecular Biology Laboratory building projects dated June 1980.	

Biographical

R.354-R.359	'Archives 1995'.	1995
R.354	Correspondence.	
R.355	Commemoration of the 50th Anniversary of the Adoption of the UNESCO Constitution, Institution of Civil Engineers, London, 7 December. Memorabilia.	
R.356	Cambridge University memorabilia.	
R.357	St John's College, Oxford memorabilia.	
R.358, R.359	Other memorabilia. Two folders.	
R.360-R.364	'Archives 1996'.	1996
R.360	Third Plenary Session, Independent World Commission on the Oceans, Rotterdam, Netherlands, 26-28 November. Programme; memorabilia.	
R.361	Cambridge University memorabilia.	
R.362	St John's College, Oxford memorabilia.	
R.363	Press cuttings.	
R.364	Other memorabilia.	

Biographical

R.365-R.367	OTHER BIOGRAPHICAL MATERIAL	1960-1962, 1997
R.365, R.366	Two scrapbooks of correspondence, photographs, press cuttings, etc <i>re</i> Cavendish Laboratory, Cambridge, award of Nobel Prize, etc. 1960-1962. See R.100-R.106 of this supplement and also R.20-R.33 of previous catalogue NCUACS 11/4/89.	
R.365	January 1960-June 1961. The album consists of papers <i>re</i> research developments at the Cavendish Laboratory; papers <i>re</i> plans for building of the Laboratory of Molecular Biology, Cambridge; papers <i>re</i> 'Shapes of Life' a programme from the BBC Television series 'Eye on Research' (broadcast to celebrate the tercentenary year of the Royal Society in 1960); and papers <i>re</i> various visits, dinner engagements and lectures.	
R.366	September 1961-December 1962. The papers in the album are largely related to the award of the Nobel Prize for Chemistry to Kendrew (shared with M.F. Perutz). The early pages of the album include obituaries of Kendrew's parents Evelyn Sandberg (died 8 September 1961) and Wilfred George Kendrew (died 4 April 1962). There are also papers <i>re</i> the research developments at the Cavendish Laboratory, Cambridge; papers <i>re</i> Queen Elizabeth's tour of the new Addenbrooke's Hospital and the Laboratory of Molecular Biology, Cambridge; and papers <i>re</i> Kendrew's role as scientific advisor to the Ministry of Defence; etc.	
R.367	Letters and cards of congratulations <i>re</i> eightieth birthday, 1997	

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