

THE ROYAL COMMISSION ON HISTORICAL MANUSCRIPTS

Report on the correspondence and papers

of

BRIGADIER RALPH ALGER BAGNOLD

(1896-1990)

geophysicist

in Churchill Archives Centre, Churchill College,

Cambridge CB3 0DS

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National Cataloguing Unit for the Archives of Contemporary Scientists
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BRIGADIER RALPH ALGER BAGNOLD FRS

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Compiled by Timothy E. Powell and Peter Harper

Deposited in the Churchill College Archives Centre,
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GENERAL INTRODUCTION

PROVENANCE

The papers were received in November 1991 and January 1992 from Brigadier Bagnold's son, Mr S. C. Bagnold.

OUTLINE OF THE CAREER OF R. A. BAGNOLD

Ralph Alger Bagnold was born in Devonport in 1896, the son of Colonel A. H. Bagnold, Royal Engineers and grandson of Major-General M. E. Bagnold of the East India Company. He was educated at Malvern College and the Royal Military Academy, Woolwich, before his commission in the Royal Engineers with the rank of 2nd Lieutenant in 1915. During the First World War he served at Ypres, the Somme and Passchendaele. He rose to the rank of Captain.

In 1919 Bagnold returned to England and entered Gonville and Caius College Cambridge to study for the Engineering Tripos. He completed his degree in two years and returned to the army in 1921. He was posted to the 5th Division Signal Company, then serving in Ireland. On the transfer of the signal units from the Royal Engineers to a new Royal Corps of Signals, Bagnold was sent to the Signal Training Centre at Maresfield Park, Sussex, first as instructor in electricity, then as Chief Instructor.

In 1926 Bagnold was posted to Egypt. He served for two years before promotion to the rank of Major took him to the North-West Frontier of India 1928-31 where he commanded the Waziristan Signals. After a period in England as Chief Instructor at the School of Signals at Catterick, Bagnold was posted to the Far East as Officer Commanding Signals, China Command in 1933. He retired from the army in 1935 on health grounds.

Bagnold's time in Egypt instilled in him a fascination with desert exploration. He went on expeditions with fellow officer into Sinai, Transjordan and the Libyan Desert and, even after his posting to India, returned to North Africa to lead expeditions in 1929, 1930 and 1932. The 1932 expedition was the most adventurous, covering the unexplored frontier between Chad and northern Sudan. This and the earlier explorations are recounted by Bagnold in *Libyan Sands. Travel in a dead world*, first published by Hodder & Stoughton in 1935. In recognition of his explorations in North East Africa Bagnold received the Gold Medal of the Royal Geographical Society in 1934.

During his desert expeditions Bagnold had become interested in the physics behind the creation and movement of sand dunes. On retirement from the army he began scientific research in C. M. White's laboratory at Imperial College London using a home-made wind tunnel. This work culminated in *The physics of blown sand and desert dunes*, first published by Methuen in 1941. This became the standard textbook on the subject and was still in print when Bagnold died in 1990.

On the outbreak of the Second World War Bagnold was recalled to the army. He was originally posted to Kenya but his troopship collided in the Mediterranean en route and put in for repair in Egypt. General Wavell requested that Bagnold remain in Egypt. In 1940, with General Wavell's support, Bagnold founded the Long Range Desert Group (LRDG), a small motorised force which undertook reconnaissance and raids deep into enemy held territory. The LRDG met with considerable success and made a valuable contribution to the Allied victory in North Africa and Bagnold received the OBE (Military) for the part he played in establishing the Group. He handed over command in July 1941 and joined the General Staff in Cairo with the rank of Colonel. Bagnold was later promoted to Brigadier, serving as Deputy Officer-in-Chief of Signals in the Middle East.

Bagnold returned to England in 1944. He was married in 1946 to Dorothy Plank. In 1947 Bagnold was offered and accepted the post of Director of Research at Shell Refining and Marketing Company, based at the new Thornton Research Centre, near Chester. He resigned in 1949 in order to be able to concentrate on research into the transport of solids by a stream of water, at Imperial College London.

He served as consultant on several projects, most notably for the US government from 1958. This arose from an approach in 1956 by L. B. Leopold, Head of the Water Resources Division of the US Geological Survey, to undertake collaborative work on the annual rate at which rivers transport solids. Bagnold's experiments demonstrated that transport rate is an inherent function of flow-depth, a fact previously unknown. He remained an authority on the transport of blown sand and in 1977 was invited by NASA to be key-note speaker at a meeting on the desert landscapes of Earth and Mars.

In later years Bagnold also began to study patterns of random distributions, work which had its origins in observations he had made in 1927. The paper Bagnold published on this in the *Proceedings of the Royal Society* in 1983 prompted a friendly letter from B. B. Mandelbrot, a pioneer of chaos theory.

Bagnold received many honours and awards for his scientific work. In 1944 he was elected to the Fellowship of the Royal Society. In 1969 he received the G. K. Warren Prize of the US National Academy of Sciences, and in 1970 the Penrose Gold Medal of the Geological Society of America and the Wollaston Medal of the Geological Society of London. Bagnold was elected a Fellow of Imperial College in 1971. He received an Honorary D.Sc. from the University of East Anglia the following year, was elected a Foreign Honorary Member of the American Academy of Arts and Sciences in 1974, and in 1978 was awarded the Sorby Medal of the International Society of Sedimentologists and an Honorary D.Sc. from the University of Aarhus in Denmark. Shortly before his death in 1990 Bagnold was awarded the James Alfred Ewing Medal of the Institution of Civil Engineers and Royal Society.

DESCRIPTION OF THE COLLECTION

The material is presented in the order given in the List of Contents. There is good documentation of Bagnold's desert expeditions and a substantial collection of maps and photographs supplementing the manuscript and printed material in sections A, B and C.

Section A, Biographical, includes two drafts of Bagnold's autobiography, published by the University of Arizona Press in 1991. There is a fascinating sequence of Bagnold's childhood letters to his family from St Wilfrid's School, Bexhill-on-Sea, and Malvern College. Of especial interest is a letter to Bagnold from T. E. Lawrence ('Lawrence of Arabia') dated 7 March 1928.

Section B, Expeditions and research, provides good documentation of Bagnold's early explorations with fellow officers in the Middle East and North Africa 1926-32. The expedition of 1932 is particularly well represented. There is also a little material from other overseas visits 1933-38. Bagnold's scientific research is less well documented; most of the material dates from the post-war period and the work best represented is Bagnold's later research on random distributions. There is also a set of Bagnold's publications.

Section C, Long Range Desert Group (LRDG), presents documentation of the history and activities of the Group. Bagnold intended to write a history of the LRDG from an early date and assembled material likely to be of interest. This includes original instructions for and reports of many LRDG operations and draft chapters of a 'war diary and narrative'. A lecture by Bagnold on 'Early Days of the Long Range Desert Group' was published in *The Geographical Journal* **105**, nos. 1 and 2 (1945), but the contemporary history of the unit was written by W. B. K. Shaw, LRDG Intelligence Officer, and published as *Long Range Desert Group* (Collins, London, 1945).

Section D, Maps, is the largest in the collection. It principally consists of the contents of Bagnold's large map cabinet and includes maps relating to his First World War service in France and Belgium, his explorations in North Africa and the Middle East (the 1932 expedition in particular) and the LRDG.

Section E, Photographs, includes an extensive collection of photographs and negatives chiefly relating to desert exploration and the Long Range Desert Group. This section also presents sets of glass photographic plates used by Bagnold in the 1930s for recording results of experiments on wind-blown sand.

LOCATIONS OF OTHER MATERIAL

The following items are retained by the family (Mr S. C. Bagnold) and may be consulted with his permission:

Bagnold's First World War narrative covering the period 20 July 1915 (when Bagnold arrived in France) to 26 August 1917.

Five photograph albums:

- 1) 1909-26, including his home on Shooters Hill, the First World War, Cambridge, and detailed 'diarised' accounts of holidays in France, the Pyrenees, North Africa, Italy, Sicily, Greece, Constantinople, the Balkans, Palestine and Transjordan.
- 2) 1926-28, covering early desert travels in Transjordan and the Libyan Desert together with a personal narrative.
- 3) 1928-30, covering India and Himalayas 1928, India to Cairo 1929 and Libyan Desert exploration 1929 and 1930.
- 4) 1932-33, covering Libyan Desert exploration 1932 and Peking and Malaya 1933.
- 5) 1933-36, including Siam, Angkor, Champéry, Japan and Tanganyika.

In addition the family retain papers of Bagnold's grandfather Major General Michael Edward Bagnold (1787-1857), his great uncle Captain Thomas Maxwell Bagnold RN (1780-1848) and his father Colonel Arthur Henry Bagnold (1854-1943).

ACKNOWLEDGEMENTS

We are very grateful to Mr S. C. Bagnold for making the material available, and for his advice and encouragement.

Timothy E. Powell
Peter Harper
Bath 1992

SECTION A BIOGRAPHICAL A.1 - A.61

A.1-A.15	Autobiographical and biographical
A.16-A.34	Career, honours and awards
A.35-A.47	Family
A.48,A.49	Personal correspondence
A.50-A.58	Passports
A.59-A.61	Miscellaneous

AUTOBIOGRAPHICAL AND BIOGRAPHICAL

- A.1 Memoir by M. J. Kenn, *Biographical Memoirs of Fellows of the Royal Society*, **37** (1991).
- A.2 Obituaries:

The Times, 30 May and 5 June 1990.

Independent, 30 May, 8 June and 11 June 1990.
- A.3 Biographical entry for Bagnold by Col. R. M. Adams, Historical Officer, Royal Signals Institution, sent to Bagnold for approval 10 March 1964.

Biographical entry in *McGraw-Hill Modern Scientists and Engineers* 1980.

Entry in *Who's Who* 1990.
- A.4-A.14 *Sun, Wind, War and Water*, Bagnold's autobiography. This was published by the University of Arizona Press in 1991.
- A.4-A.12 269pp typescript draft. 9 folders.
- A.13 Binder labelled by S. C. Bagnold (son) 'An early draft script of RAB's autobiography containing, mainly latterly, scientific sections not included in the final, published work'. Includes some loose pages and corrections.

Biographical

A.14 Two 3pp typescript outlines, one incomplete; draft 'Foreword' and first page; 'Amendments and additions' to earlier draft.

A.15 Contents of Bagnold's 'Personal File'.

This file contains: a family tree tracing the Bagnold family back to the seventeenth century, list of birthdays of family members, list of publications from July 1927 to June 1939, record of 'insurances', letter from Lloyd's Bank, 1 November 1935, listing Bagnold's bankers orders and Bagnold's list thereof, short list of 'Books lent', annual records of 'Important happenings' covering 1933 - August 1939, and record of investments 1917-35.

CAREER, HONOURS AND AWARDS

A.16,A.17 Papers *re* Army Entrance Examination, June 1914.

Bagnold sat this examination to enter the Royal Military Academy, Woolwich.

A.16 Timetables, regulations etc.

A.17 Examination papers.

A.18 First World War

Ms note by Bagnold listing announcements of his promotions and awards, covering 1916-21.

A.19-A.21 Gonville and Caius College Cambridge

A.19 Exchange with War Office, August 1920, *re* course of studies; note from Mayor of Cambridge, 26 January 1921, authorising Bagnold to play a street organ for the Lord Roberts Memorial Workshop Fund; MA degree certificate, 13 February 1925.

A.20 Menus from College functions (chiefly rowing) 1920-25, some signed on back by some of those attending.

Biographical

- A.21 Other College memorabilia.
- A.22 North West Frontier, 1930.

Letter of thanks for Bagnold's service, 4 November 1930; notification of mention in despatches, 14 November 1930; display card warning 'Your conversation can be overheard by the rebels on any line that goes outside this building...'
- A.23 Medical Report on Bagnold, June 1935, and information on sprue, from which he had been suffering.
- A.24 Election to Athenaeum Club 1935; menu for Dinner to Earl Baldwin, 29 November 1937, held at the Club.

Award of Institution of Civil Engineers Telford Premium, 1941, for paper on 'Beach formation by waves: some model-experiments in a wave tank' *J. Inst. Civil Engrs*, no. 5237 (1940).
- A.25,A.26 Second World War

See also Section C The Long Range Desert Group.
- A.25 Includes notifications of promotion (acting rank of Lieutenant-Colonel, 13 December 1940, acting rank of Brigadier and appointment as Deputy Signal Officer in Chief General HQ Middle East, 4 July 1943, Brigadier, 30 August 1944); notification of mention in despatches, 30 December 1941 and award of oak leaf bar to War Medal 1939-45, 13 January 1949; service record to September 1943.
- A.26 Diary, August 1939-May 1944.
- A.27 O.B.E. (Military). Bagnold was awarded the OBE in 1941 but received the award in February 1947.

Biographical

- A.28 Offers of employment, April 1944.
- Appointment as Director of Research, Shell Refining & Marketing Co. Ltd., 10 May 1946.
- Election to University of Liverpool Council, 21 November 1947.
- A.29 Miscellaneous invitations to social functions received during visit to Egypt, December 1950 - January 1951.
- Bagnold was invited to Egypt to attend the foundation of an Egyptian Desert Institute.
- A.30 Election as Correspondent (later Honorary Fellow), Geological Society of America, 1960.
- Penrose Medal of Geological Society of America, 1970.
- Material includes biographical sketch and press-cutting on Bagnold's career.
- A.31 Royal Society Club/Smeatonian Society of Civil Engineers Club Dinner, Buckingham Palace, 3 November 1966.
- G. K. Warren Prize of the US National Academy of Sciences, 1969.
- A.32 Fellowship of Imperial College London, 1971.
- For photograph of occasion see E.59.
- A.33 Foreign Honorary Member, American Academy of Arts and Sciences, 1974.
- Honorary D.Sc., University of Aarhus, 1978.
- Sorby Medal for Excellence in Sedimentology of the International Association of Sedimentologists, 1978.
- Material includes citation for award and Bagnold's reply.

Biographical

- A.34 Ninetieth birthday, 1986.

 Ninety-fourth birthday, 1990.

FAMILY

- A.35-A.42 Bagnold's childhood letters and memorabilia, kept by his mother.
- A.35 1896-1904.
- A.36 1906. Letters from St Wilfrid's School, Bexhill-on-Sea.
- A.37 1907-08. Letters from St Wilfrid's School.
- A.38 1909 January-April. Letters from St Wilfrid's School.
- A.39 1909 April-August.
- A.40 1909 September-October. Letters from Malvern College.
- A.41 1909 November-December. Letters from Malvern College.
- A.42 1911, 1914. Includes envelope of 'White heather from Ralph Aug. 10
[1914] at the moment he received news that he had passed [...] into the
R.M.A.'
- A.43 Father (Arthur Henry Bagnold)

 Letters from father 5 June 1920 (*re* Bagnold's mention in despatches,
13 November 1916 and marriage of Enid, Bagnold's sister), and 31
July 1930 (chiefly financial matters). Folder also includes press-
cutting *re* mother's death, July 1931.

Biographical

- A.44 Sister (Enid Algerine Bagnold)

 Invitation to wedding, 8 July 1920; letters 1941; correspondence
 1971-72 *re* family papers.
- A.45,A.46 Wife (Dorothy Alice Plank)

 Bagnold was married 8 May 1946.
- A.45 Correspondence from Dorothy, February-March 1946.
- A.46 Papers *re* marriage. Include press-cuttings, letters of congratulation
 and marriage certificate.
- A.47 Son (Stephen Chester Bagnold)

 Letter *re* mathematical problem, nd.

PERSONAL CORRESPONDENCE

- A.48 1918, 1920. Includes invitation to tea from E. Rutherford, 21
 February 1920.
- A.48A 1928. Autograph manuscript letter from T. E. Lawrence (signed
 T. E. Shaw) commenting on 'Dr Musil's recent notes on N. Arabia' and
 on topography of Arabia, 7 March.
- A.49 1984, 1986, 1989.

Biographical

PASSPORTS

- A.50 1920-26
- A.51 1933 (China, Japan, Hong Kong)
- A.52 1937-42
- A.53 1943-48
- A.54 1947-52
- A.55 1952-53 (Israel)
- A.56 1957-62
- A.57 1968-78
- A.58 1978-88

MISCELLANEOUS

- A.59 'Truth, belief and make belief', 7pp typescript.
- A.60 Ms drafts by Bagnold written *c.*1990:
- Drafts of poem alternatively titled 'Household wisdom' or 'Winter wisdom', on the difference between a door being closed and it being properly shut. Note by S. C. Bagnold, explains the origins of the poem.
- 'Evolution and confusion of the British linear measure', 5pp (incomplete).
- Notes on evolution.
- A.61 Memorabilia
- Second World War Identity Card; driving licence 1938-50; motor fuel ration book; headed notepaper, calling cards etc.

SECTION B EXPEDITIONS AND RESEARCH B.1 - B.38

The pre-second world war material relates almost entirely to Bagnold's expeditions in the Middle East and North Africa from 1926. This material is supplemented by maps in Section D and photographs in Section E. Bagnold's explorations between 1926 and 1932 are recounted in his book *Libyan Sands. Travel in a Dead World* first published in 1935. At B.38 is Bagnold's own set of his published papers, with bibliography.

Bagnold first became interested in the creation and movement of sand dunes as a result of his expeditions in the desert in 1929 and 1930. He began his study of the physics of blown sand on his return to England in 1934, in a laboratory at Imperial College London with a home-made wind tunnel. The results of this pioneering work were published in *The physics of blown sand and desert dunes* (Methuen, London, 1941).

B.1 Typescript lists of 'Letters from R. A. Bagnold', 1924-28.

The lists for 1924 and 1925 record only the month in which and from where the letters were sent. Those 1926-28 also contain summaries of the contents of the letters.

B.2-B.8 Middle East, 1926-28

Bagnold was posted to Egypt in 1926. It was during his period in Egypt that he began his explorations by motor-car with fellow officers.

B.2 'A trip from Egypt to Palestine and Transjordan by car March 1926', 8pp duplicated typescript account; photograph of map with route inscribed thereon.

B.3 'A journey to Transjordan', December 1926 - January 1927, 13pp typescript account; photograph of map of Sinai and southern Palestine and Transjordan.

B.4 Ms notes on trip to southern Sinai, April 1927.

B.5,B.6 Expedition to Siwa, October - November 1927.

B.5 Ms note 'Siwa November 1927'; 'Route Report' on expedition completed for the Frontier Districts Administration of the Egyptian Ministry of War; photograph of map with route inscribed thereon.

Expeditions and research

- B.6 'The Western Desert', 13pp typescript account of journey submitted for publication in *The Times*, with account as published 3 July 1928; 'Motor-cars in the Orient' [?by Bagnold], *The Times*, 9 August 1929, found with preceding.
- B.7 6pp typescript account of 'road information gained on a recent motor trip in Sinai, Transjordan and Palestine', December 1927 - January 1928, prepared by Bagnold for use of British troops in Egypt; 'A blighted land', 4pp typescript account of part of the trip from Aqaba to Dead Sea.
- B.8 'The Tamarisk Islands', 8pp duplicated typescript account of reconnoitring expedition to Bir Terfawi in the Libyan Desert to search for signs of a possible invasion of locusts, January 1928; 4pp ms diary of the expedition; photographs of maps.
- Bagnold acted as navigator on this Egyptian Government expedition, shortly before his posting to India.
- B.9-B.15 Libyan Desert, 1932.
- This expedition was made possible by the new Ford Model A car. Bagnold received the Gold Medal of the Royal Geographical Society in 1934 for leading this expedition.
- B.9 'Notes on area of proposed expedition to the southern Libyan desert 1932' by W. B. K. Shaw, 24pp duplicated typescript.
- B.10,B.11 Newspaper cuttings on the expedition 1933. Sent to Mrs Dorothy Bagnold by his sister, January 1974.
- B.10 Series of five articles by Bagnold for the *Daily Telegraph*, 13-21 February.
- B.11 Other press cuttings.
- B.12 Correspondence 1934 re publication of *Libyan Sands* and award of Gold Medal of Royal Geographical Society.

Expeditions and research

- B.13 Red hardback 'Newspaper Cuttings' book. Used by Bagnold 1935-36 for reviews of *Libyan Sands*, cuttings *re* the award of the Gold Medal and 1936 expedition to Japan to view the solar eclipse (see B.17).
- B.14,B.15 Bagnold's 'flat-files' containing data on size of sand grains from the Libyan Desert.
- B.14 Data. Last page is headed 'Experimental deposit 24/3/35 failed to be firm'.
- B.15 Graphs plotting the above data. All samples are taken from identified locations. Several samples dated to 1932.
- B.16 Far East, 1933.

Account of journey in Indo-China November 1933, 5pp typescript, with earlier typescript draft; copy of letter to his father on which the account was based; unfinished letter to father 2 April [?1933].
- B.17 Japan and East Africa, 1936.

Unfinished letter to his sister written in Japan 6 May; 'The mountain of Tanganyika. A climb above the clouds' by Bagnold, 9pp typescript with ms corrections.
- B.18 Zerzura Club

Zerzura was the name given to a legendary oasis said to lie in the heart of the Libyan Desert beyond the then known oases. It lent its name to a Club for explorers of the Libyan Desert by motor-car, of which Bagnold was a member.

Correspondence from Count L. E. de Almasy *re* Zerzura Club dinner, 1936. Includes 'Abd El Melik', 11pp typescript account by de Almasy of the possible discovery of the Zerzura oasis, which he asked Bagnold to read at the dinner, and 'The last of the Zerzura legend? (New evidence obtained by Count L. E. de Almasy)' by Bagnold, draft of explanatory pages to accompany de Almasy's account for publication in the *Geographical Journal*.

Expeditions and research

- B.19 Turkey, 1937.
- 'Notes on a motor journey across Turkey (Anatolia) from Payas to Mudania via Konya April 30th to May 5th 1937. T. W. Kirkpatrick and R. A. Bagnold', 2pp typescript.
- B.20 Egypt, 1938.
- 'The Libyan Desert. A journey into the home land of the earliest Nile Valley settlers' by Bagnold, 5pp ms and typescript account of archaeological expedition to the Gilf Kebir for publication in *Scientific American*, with account as published, November 1939; correspondence with publishers.
- B.21 'Experimental work on the movement of coastal sands and shingles. Lecture to the Geological Society of London and the Challenger Society, 16 April 1947' by Bagnold, 11pp duplicated typescript + figures and plates.
- B.22 Letter from British Petroleum, 2 December 1963, seeking Bagnold's advice on burying a oil pipeline across the Calensio Sand Sea in Libya. On verso is a brief typescript note by Bagnold on the background to the request.
- B.23 'Sand encroachment on installations in the Ahwaz area' by Bagnold, 3pp typescript report, c.1970.
- 'Pressure measurements in gravel beds' by B. S. Jenkins, sent to Bagnold, ?1977.
- B.24,B.25 'Squeaking sand', school science project sent to Bagnold for comment, 3 February 1983. 2 folders.
- B.26 Scientific correspondence 1983-84. Includes letters *re* Bagnold's paper 'The nature and correlation of random distributions', *Proc. R. Soc. Lond. A* **388** (1983), from O. E. Barndorff-Nielsen, A. R. Dexter and B. B. Mandelbrot.

Expeditions and research

- B.27 'Hyperbolic distributions in theory and in the physical world: for example sands, the relativistic ideal gas, turbulence, word lengths, palaeomagnetism' by Bagnold and O. E. Barndorff-Nielsen, Royal Society Review Lecture, 12 April 1984.
- Invitation; notice; 6pp typescript of Bagnold's contribution, with transparencies; brief correspondence.
- B.28,B.29 'Experimental decay rate of average randomness' by Bagnold, submitted for publication in *Proc. R. Soc. Lond.* 1987.
- B.28 9pp typescript + figures etc; amendment; referee's comments.
- B.29 'Scatter of lead shot', 9pp typescript + figures; ms data.
- B.30 Correspondence with C. Bergmann, 1987-88, *re* 1986-87 camel expedition in Egypt and Sudan. See also B.32. For photographs of expedition sent to Bagnold see E.62,E.63.
- B.31-B.33 Correspondence with C. V. Haynes, Jr, 1988-90.
- B.31 1988. 'Bagnold's Barchan: a 57-year record of dune movement in the eastern Sahara and implications for dune origin and paleoclimate since neolithic times' by Haynes, sent to Bagnold 21 December. With covering letter.
- B.32 1989. Includes Haynes's 'Summary report on the 1989 field season for investigations of Late Quaternary geochronology in the eastern Sahara'.
- B.33 1990. Includes Haynes's 'Summary report' for 1990.
- B.34 Scientific correspondence, 1989-90.
- B.35 Hand-drawn 28in. x 22in. diagram of 'Counter-flow velocity-head balance For measurement of low liquid speeds'. Nd.

Expeditions and research

- B.36 'Text-Figures Illustrating "Desert Reconnaissance by Motor-car" ',
 printed on linen. Nd.
- B.37 Miscellaneous drafts, notes, data etc. Includes 'Two-phase flow' by
 Bagnold, 3pp typescript, nd.
- B.38 'R. A. BAGNOLD Collected papers'. Contents of Bagnold's folder so
 inscribed: reprints of published papers, with bibliography. 1 box.

SECTION C

LONG RANGE DESERT GROUP (LRDG)

C.1 - C.32

Bagnold was recalled to the army in August 1939. He was originally posted to Kenya but his troopship collided in the Mediterranean en route and put in for repair in Egypt. General Wavell requested that Bagnold remain in the Middle East and he was posted to the signals unit of General Hobart's armoured division.

With the threat of Italy entering the war and launching an attack into Egypt through the Libyan Desert, Bagnold began pressing from November 1939 for the establishment of a unit prepared to undertake reconnaissance and small-scale raids in the desert behind enemy lines. Italy declared war in June 1940 and in July General Wavell gave Bagnold permission to establish the Long Range Desert Group (LRDG) along the lines he had suggested. Initially all the LRDG were drawn from New Zealand forces, later Rhodesian and British patrols were formed. The LRDG was a great success and made a significant contribution to the Allied victory in North Africa. Bagnold was awarded the OBE (Military) in 1941.

Bagnold conceived the idea of writing the story of the LRDG at an early date and retained and collected material for this purpose. He began drafting chapters during the war. In 1945 he gave an account of the 'Early Days of the Long Range Desert Group' which appeared in *The Geographical Journal* 105. The contemporary history of the LRDG was, however, written by W. B. K. Shaw (*Long Range Desert Group*, Collins, London, 1945).

Maps used by the LRDG, and compiled using information supplied by them, may be found at D.70-D.96. Photographs of the LRDG may be found at E.45-E.54.

- C.1-C.11 'LONG RANGE PATROLS ESTABLISHMENT'. Contents of Bagnold's bulky folder so inscribed divided into eleven for ease of reference: reports on operations, notes on the history of the LRDG and press-cuttings.
- C.1 'Reports "A" Squadron'. Operation reports R2-R7 and R9, September-November 1941.
- C.2 'L.R.D.G. Operation No 14. Coast road watching - Olivey 6/10/41'. Operation instructions, cipher messages.
- C.3 'Operation No 16. Coast road watching - Holliman 21/10/41'. Instructions for operations 15 and 16, cipher messages.

Long Range Desert Group

- C.4 'Operation No 17. Gialo Olivey 20/10/41'. Operation report.

'Operation No 18. Ambush Hon - Misurata road. Holliman 15/11/41'.
Operation report.

'Operation No 19', 6-11 November 1941. Operation report.
- C.5 'Operations Nos 20 & 22', November 1941. Operation instructions
and reports.
- C.6 'Operation No 21', December 1941. Operation instructions.

'Operation No 25', February 1942. Operation report.
- C.7 Operation No 23, December 1941. Operation instructions and reports.
- C.8 Operation reports for patrols of ' "A" Squadron', December 1941-
January 1942; individual reports by members of T2 patrol, attacked by
aircraft 31 December.
- C.9 'Notes on Long Range Desert Patrols. (For operations in the interior of
Libya)', by Bagnold, January 1941, 11pp duplicated typescript.

'L.R.D.G.', 15pp typescript account of origins and early operations,
c.1942.
- C.10 'Some account of the part played by L.R.D.G. in the operations of 8
Army in Cyrenaica in November - December 1941. Period Nov.1 -
Dec.6', 4pp typescript; 'L.R.D.G.'s part in the 8 Army's offensive The
Second Phase 6 - 24 Dec. 41', 3pp typescript.
- C.11 Press-cuttings, 1939-41.

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- C.12-C.14 'War Diary and Narrative Long Range Desert Group'. Bagnold's bulky softback binders so inscribed.
- The binders contain papers and reports by Bagnold, copies of operation instructions and reports and miscellaneous official papers and maps. The material is retained in the original binders.
- C.12 'VOL I CHAPTERS 1 - 3 June 1940 - November 1940'.
- C.13 'VOL II CHAPTER 4 Dec 1940 - March 1941'.
- C.14 'VOL III CHAPTER 5 April 1941 - August 1941'.
- C.15-C.17 Material found with preceding.
- C.15 'For inclusion in Ch 4'. Contents of Bagnold's folder so inscribed: list of operation reports for July - December 1941 and maps sent to General HQ Middle East.
- C.16 'War Diary Ch 5'. Contents of Bagnold's folder so inscribed: typescript and ms draft of first three chapters of war narrative.
- C.17 Contents of Bagnold's untitled folder: notes and pages of draft for narrative.
- C.18-C.20 Material *re* Bagnold's war narrative.
- C.18 Ms draft outlines of narrative; ms and typescript drafts of chapter one.
- HMSO exercise book used from the front for account of 'Operations at Aujila', October 1940.

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- C.19,C.20 The Kufra convoys.
- The oasis of Kufra was captured from the Italians by Free French forces from Chad on 1 March 1941. In April 1941 it became LRDG Headquarters. The material relates to the supply of the oasis by the Sudan Defence Force over very difficult terrain and with the constant threat of enemy attack.
- C.19 Typescript information on the Kufra convoys.
- C.20 'Chapter V - The Kufra convoys' by Bagnold, typescript ; 'The Story of a Convoy', ms, not in Bagnold's hand but annotated by him 'Maj. J. V. Simpson March 44' , with 'Observations on "The Kufra Convoys" ' in the same hand.
- C.21 Correspondence, 1941-42, between Bagnold and Colonel Leclerc, commander of Free French force which captured Kufra oasis; letters to Bagnold 26 June 1942, and 29 March and 19 April 1943, *re* background to Chad Territory rallying to the cause of De Gaulle in August 1940.
- 'Glimpses of the Western Desert, and the capture of the Kufra oasis by the Free French' by Col. E. G. Hume, 'Christmas lecture, January 7, 1942'. Printed.
- C.22 Posters of 'Kufra Proclamations' numbers one and two, 1941.
- Bagnold commanded British forces in the Kufra oases group after their capture and these proclamations were issued by his authority.
- C.23 Middle East Training Pamphlets No. 9 Part VI. 'Field Navigation Parts 1 to 3. Dead Reckoning' and 'Part IV. Astro-Fix' by Bagnold, 1942.
- C.24 General Orders, issued by General Sir Bernard Paget 4 February 1944, listing Bagnold's 'inventions or applications of existing principles to military purposes' (sand channels, sand mats, sun compasses and methods of desert navigation, expansion tank for conservation of radiator water, and composite ration pack); illustrations of vehicle sand channels and engine water conservator; instructions for use of Bagnold sun-compass.

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- C.25 Commendations received by Bagnold and the LRDG.
- Most of the material concerns a letter of congratulation Bagnold received from General A. P. Wavell in October 1940. This was counterpart to a similar letter his father had received in December 1881 during the First Boer War from Colonel A. H. Wavell (uncle of the Second World War general).
- C.26-C.32 Miscellaneous LRDG and related material.
- C.26 Review of *Long Range Desert Group* by W. B. K. Shaw; extract from letter of congratulation to Shaw, 19 January 1946; photocopy of *Daily Telegraph* article *re* book on LRDG by General D. L. Lloyd Owen, *Providence Their Guide* (Harrap, London, 1980).
- Correspondence with Major-General I. S. O. Playfair, 1952, 'responsible for the official history of the "War in the Mediterranean and Middle East 1939/45" ', *re* account of LRDG activities for the history.
- C.27 Includes copy of personal letter from Sir Roderick Jones, Bagnold's brother-in-law, to G. Dawson, editor of *The Times*, *re* picture of Bagnold published in *The Times*, 12 December 1940; copy of letter from D. Newbold to G. Murray enclosing 4pp typescript note on Merga oasis, 19 March 1941; letter to Bagnold *re* possible renaming of Bir Natrun oasis, 23 November 1942.
- C.28 Includes information on the Darb El Arba'in slave route from Sudan to Egypt; letter from Sir Roderick Jones passing on Wavell's good wishes, 3 December 1948.
- C.29 Bagnold's collection of supplements to the *London Gazette* June - September 1946 reporting on operations in North and East Africa and the Middle East 1939-42, and recording appointments to OBE for services in the Middle East 1940-41 (includes Bagnold).
- C.30 Printed booklet 'Destruction of an army. The first campaign in Libya Sept. 1940 - Feb. 1941', HMSO 1941.

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C.31 Correspondence with Jean Howard, 1978, 1980, an Intelligence Analyst at Bletchley Park during the Second World War, *re* desert campaign, with particular reference to the activities of Count L. E. de Almas, a desert explorer who worked for the Germans in the war.

C.32 Long Range Desert Group Association.

Bagnold was President of the Association.

Correspondence with Maj-Gen. D. L. Lloyd Owen, Chairman of the Association, 1983, 1987, 1989-90.

SECTION D

MAPS

D.1 - D.196

Most of the maps were found in Bagnold's upright map cabinet divided into labelled compartments. The presentation of this material follows Bagnold's own arrangement.

- D.1-D.69 'Egypt & Sudan...'
- D.70-D.96 'Libya...'
- D.97-D.109 'Asia...'
- D.110-D.160 'Misc...'
- D.161-D.192 'Egypt & Sudan Misc.'

At D.193-D.196 are maps not found in Bagnold's cabinet.

'EGYPT & SUDAN 1/500,000 & 1/250,000'

Presented in a broadly chronological sequence. The maps D.1-D.50 were used for the 1932 expedition and are annotated with routes taken, features noticed along the route and with notes of ease of travel by car. Most have Bagnold's own numbering, from 1 to 41 (incomplete sequence). The material has not been rearranged to follow Bagnold's sequence but the sequence may be reconstructed as follows:

1	D.1	22	D.27
2	D.2	23	D.35
3		24	D.28
4		25	D.37
5		26	D.39
6		27	D.43
7		28	D.4
8	D.47	29	D.44
9	D.11	30	D.41
10	D.13	31	D.38
11	D.16	32	D.36
12		33	D.34
13	D.7	34	D.31
14	D.6	35	D.32
15	D.5	36	D.21
15A	D.46	37	D.23
16	D.26	38	D.15
17		39	D.48
18		40	D.49
19	D.18	40A	D.3
20	D.29	41	D.50
21	D.33		

Maps

- D.1 'Wadi Natrun - Moghara - Baharia', 1:500,000. Compiled by Survey of Egypt 1917, revised to October 1922. Printed on linen-backed paper.
- Annotated in ink with route. Numbered '1'.
- D.2 'Baharia and Farafra oases, and their approaches', 1:500,000. Compiled by Survey of Egypt October 1916, revised to October 1917. Printed on linen-backed paper.
- Annotated in ink with route and features. Numbered '2'.
- D.3 'Libyan Desert West of Aswan and Halfa', 1:500,000. Compiled by Survey of Egypt April 1924. Printed on linen-backed paper.
- Annotated in pencil with route taken and calculations, and on verso 'Material for Major Bagnold's map of Libyan Desert'. Numbered '40A'.
- D.4 'El Fasher', 1:1,000,000. Compiled by Sudan Survey Department July 1925. Printed on linen-backed paper.
- Annotated in ink with route taken. Numbered '28'.
- D.5-D.45 1:250,000 maps of Anglo-Egyptian Sudan.

These maps were prepared by the Sudan Survey Office at Khartoum. There are two series - those compiled 1928-29 which Bagnold used during his 1932 expedition, and those compiled 1934-36 which include information provided by Bagnold's expeditions of 1930 and 1932.

The earlier maps have been trimmed at top and bottom, sometimes removing key information about the map. Most have been annotated, originally in pencil but later in ink, with the route taken by the Bagnold expedition of 1932, with notes on topographical features and on the ease of travel by car. The detail provided by the maps is generally sparse, indeed some are virtually blank save for the information provided by Bagnold's team (see for example D.35). A number also have had the route of the 1930 expedition added neatly in ink prior to the 1932 expedition.

The maps are presented in order of their classification number. The index to these sheets is at D.171.

Maps

- D.5 'Wadi El Faregh', sheet 33-J. Compiled September 1928. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '15'.
- D.6 'Sarra Wells', sheet 33-K. Compiled June 1928. Printed on linen-backed paper.
Annotated with route and features of 1932 expedition. Numbered '14'.
- D.7 Untitled, sheet 33-L. Compiled July 1928. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '13'.
- D.8 As D.7. Printed on linen-backed paper.
Unannotated.
- D.9 Untitled, part of Italian Libya, sheet 33-P. Compiled May 1935.
Printed on linen-backed paper.
Incorporates route of 1932 expedition.
- D.10 'J. 'Uweinat', sheet 34-I. Compiled March 1934. Printed on linen-backed paper.
Incorporates routes of 1930 and 1932 expeditions.
- D.11 Untitled, sheet 34-J. Compiled August 1929. Printed on paper.
Annotated with route and features of the 1930 and 1932 expeditions.
Numbered '9'.
- D.12 Untitled, sheet 34-J. Compiled March 1934. Printed on linen-backed paper.
Incorporates routes of 1930 and 1932 expeditions.

Maps

- D.13 Untitled, sheet 34-K. Compiled October 1929. Printed on paper.

Annotated with route and features of 1930 and 1932 expeditions.
Numbered '10'.
- D.14 Untitled, sheet 34-K. Compiled March 1934. Printed on linen-backed
paper.

Incorporates routes of 1930 and 1932 expeditions.
- D.15 'Selima', sheet 34-L. Compiled September 1928. Printed on paper.

Annotated with part of route of 1932 expedition. Numbered '38'.
- D.16 'Selima', sheet 34-L. Compiled September 1928. Printed on paper.

Annotated with route of 1930 expedition and part of route of 1932
expedition. Numbered '11'.
- D.17 'Selima', sheet 34-L. Compiled March 1934. Printed on linen-backed
paper.

Incorporates routes of 1930 and 1932 expeditions.
- D.18 Untitled, sheet 34-M. Compiled post-1925. Printed on paper.

Annotated with route and features of 1932 expedition. Numbered '19'.
- D.19 Untitled, sheet 34-M. Compiled November 1934. Printed on linen-
backed paper.

Incorporates route of 1932 expedition.
- D.20 Untitled, sheet 34-N. Compiled November 1934. Printed on linen-
backed paper.

Incorporates route of 1930 expedition.

Maps

- D.21 'Burg Et Tuyur', sheet 34-O. Compiled July 1929. Printed on paper.
Annotated with route and features of 1930 and 1932 expeditions.
Numbered '36'.
- D.22 'Burg Et Tuyur', sheet 34-O. Compiled November 1934. Printed on
linen-backed paper.
Incorporates routes of 1930 and 1932 expeditions. Ms correction of
two heights.
- D.23 'J. Hadada', sheet 34-P. Compiled July 1929. Printed on paper.
Annotated with route and features of 1932 expedition. On this part of
the journey Bagnold was travelling on the Darb El Arba'in slave route
and the map has been corrected by Bagnold to show the true line of the
route. Numbered '37'.
- D.24 'J. Hadada', sheet 34-P. Compiled November 1934. Printed on linen-
backed paper.
Incorporates route of 1932 expedition.
- D.25 'Wadi Halfa', sheet 35-I. Compiled June 1935. Printed on linen-
backed paper.
Includes acknowledgement of information provided by Bagnold.
- D.26 'Hagar Waqif', sheet 43-D. Compiled June 1928. Printed on paper.
Annotated in ink and pencil with route and features of 1932
expedition. Three routes are recorded. Numbered '16'.
- D.27 'Erdi Well', sheet 43-H. Compiled July 1928. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '22'.
- D.28 'Ein Aga', sheet 43-L. Compiled June 1928. Printed on paper.
Annotated in ink with route of 1932 expedition. Numbered '24'.

Maps

- D.29 'Desert', sheet 44-A. Compiled July 1928. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '20'.
- D.30 Untitled, sheet 44-A. Compiled November 1932. Printed on linen-backed paper.
Incorporates route of 1932 expedition.
- D.31 'Nukheila oasis', sheet 44-B. Compiled September ?1928. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '34'.
- D.32 'Laqiya', sheet 44-C. Printed on paper.
Annotated with route and features of 1932 expedition. The plan of Laqiya has been crossed out by Bagnold and a more accurate hand-drawn plan inset. Numbered '35'.
- D.33 'Desert', sheet 44-E. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '21'.
- D.34 'Bir Natrun', sheet 44-F. Compiled post-1927. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '33'.
- D.35 'Desert', sheet 44-I. Compiled July 1928. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '23'.
- D.36 'Zolat El Hammad', sheet 44-J. Compiled post-1927. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '32'.

Maps

- D.37 'Libyan Desert', sheet 44-M. Compiled post-1926. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '25'.
- D.38 'J. Mafarit', sheet 44-N. Compiled April 1930. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '31'.
- D.39 'Musbat', sheet 54-A. Compiled post-1925. Printed on paper.
Annotated with route and features of 1932 expedition. Numbered '26'.
- D.40 'Musbat', sheet 54-A. Compiled September 1934. Printed on linen-backed paper.
Incorporates route of 1932 expedition.
- D.41 'Meidob', sheet 54-B. Compiled August 1929. Printed on paper.
Annotated with route and features of 1932 expedition, and with 'Note. Route on this sheet follows Sandison's tracks approximately up to W. Darrikki. Printed detail on this sheet is very inaccurate...' Numbered '30'.
- D.42 'Meidob', sheet 54-B. Compiled December 1934. Printed on linen-backed paper.
Incorporates route of 1932 expedition. This sheet has been extensively corrected compared with its predecessor (D.41).
- D.43 'Kuum', sheet 54-E. Compiled August 1930. Printed on paper.
Annotated with route of 1932 expedition. Numbered '27'.
- D.44 'Tagabo Hills', sheet 54-F. Compiled March 1927. Printed on paper.
Annotated with route of 1932 expedition. Numbered '29'.

Maps

- D.45 'Tagabo Hills', sheet 54-F. Compiled November 1936. Printed on linen-backed paper.
- D.46 Map grid probably intended for ms mapping of route and features on sheet 33-F. Hand-drawn features in top-left and bottom-right corners (the former crossed out).

Numbered '15A'.
- D.47 Untitled map of Jebel 'Uweinat, 1:250,000. ?Hand-drawn on paper.

Includes route of 1930 expedition and later annotation of route of 1932 expedition. Numbered '8'.
- D.48 Hand-drawn 1:250,000 scale plan of route from Selima to Wadi Halfa. In pencil on ?waxed linen.

Numbered '39'.
- D.49 'Desert north of Halfa', 1:250,000. Printed on linen-backed paper.

Annotated in pencil with route. Signed 'P.A. Clayton Nov-Dec. 1930'. Numbered '40'.
- D.50 'Sheb', 1:250,000. Printed on linen-backed paper.

Annotated in pencil with route. Signed 'P.A. Clayton Jan 193[?1]'. Numbered '41'.
- D.51 'North Eastern Desert and Southern Sinai', 1:500,000. Compiled by Survey of Egypt January 1920, revised to 15 May 1933. Printed on paper.

Maps

D.52-D.69 1:500,000 maps of Egypt.

These maps were compiled by the Survey of Egypt from 1933. Those D.60-D.69 are provisional issues. They are presented in order of classification number.

D.52 'Matrûh', sheet 1. Published 1933, reprinted October 1935. Printed on linen-backed paper.

D.53 'Matrûh', sheet 1. Published 1933, reprinted September 1938 with Egyptian purple grid. Printed on linen-backed paper.

D.54 'Cairo', sheet 2. Published 1934, reprinted October 1935. Printed on linen-backed paper.

D.55 'Cairo', sheet 2. Published 1934, reprinted May 1941 with Egyptian red grid. Printed on linen-backed paper.

D.56 'North Sinai', sheet 3. Published 1934. Printed on linen-backed paper.

D.57 'North Sinai', sheet 3. Published 1936, reprinted May 1941 with red and Palestine black grids. Printed on linen-backed paper.

D.58 'Baharîya', sheet 4. Published 1935. Printed on linen-backed paper.

D.59 'Baharîya', sheet 4. Published 1935, reprinted September 1938 with purple grid. Printed on linen-backed paper.

D.60 'Asyût', sheet 5. Provisional issue published 1935. Printed on linen-backed paper. Right and left edges trimmed.

D.61 'South Sinai', sheet 6. Published 1941, reproduced by Royal Engineers July 1942. Printed on linen-backed paper.

Maps

- D.62 'Dakhla', sheet 7. Provisional issue published post-1933. Printed on linen-backed paper. Trimmed at the bottom removing key information.

Annotated with route of expedition in red ink.
- D.63 'Qena', sheet 8. Provisional issue published 1935. Printed on linen-backed paper.

Annotated with route of expedition in red ink.
- D.64 'Quseir', sheet 9. Provisional issue published 1935. Printed on linen-backed paper.
- D.65 'Uweinât', sheet 10. Provisional issue published 1935. Printed on linen-backed paper.

Annotated in red pencil.
- D.66 'Uweinât', sheet 10. Provisional issue published by Department of Survey and Mines 1938. Printed on paper.

Extensively annotated with route of expedition exploring the Gilf Kebir plateau in red ink. See also D.94.
- D.67 'Aswân', sheet 11. Provisional issue published 1935. Printed on linen-backed paper.
- D.68 As D.67 with red grid.
- D.69 'Elba', sheet 12. Provisional issue published 1935. Printed on linen-backed paper.

Maps

'LIBYA 1/500,000 1/M 1/2M 1/4M'

These maps were used during the war. Italian maps captured by the LRDG proved of little use, being very inaccurate (see W.B.K. Shaw, *Long Range Desert Group*, pp.24-25) and the LRDG collected its own material which formed the basis for many of the 1:500,000 maps of Libya (D.78-D.93).

- D.70 'General map of Egypt', 1:2,000,000. Published by Survey of Egypt 1928. Printed on linen-backed paper.
- Some pencil annotation of places off the map in Libya..
- D.71 'Djado' (French West Africa), 1:1,000,000. Provisional edition compiled by Service Geographique de l'Armee 1925, reprinted by Royal Engineers November 1940. Printed on paper.
- Annotated 'A'.
- D.72 'Faya' (Chad), 1:1,000,000. Compiled by Service Geographique de l'Armee 1936. Printed on paper.
- Annotated 'B'.
- D.73 'Libyan Desert', MDR. 601/10394, 1:2,000,000. Compiled by LRDG September 1942, reprinted by Royal Engineers February 1944. Printed on paper.
- Annotated 'C'.
- D.74-D.77 Wartime 1:1,000,000 maps of Libya
- D.74 'Tripoli - Socna', MDR. 1/7603 sheet N I/H 33. Compiled by Royal Engineers November 1941, reproduced April 1943. Printed on paper.
- D.75 'Bengasi Augila', MDR 1/1660 sheet N I/H 34. Compiled by Royal Engineers June 1943. Printed on paper.

Maps

- D.76 'Sebha', MDR 1/921 sheet NG 33. Compiled by Royal Engineers March 1942. Printed on linen-backed paper.
- D.77 'Cufra', MDR 1/708 sheet NG 34. Compiled by Royal Engineers January 1942, reprinted January 1943. Printed on linen-backed paper.
- D.78-D.93 Wartime 1:500,000 maps of Libya.
- The maps of the desert areas rely heavily on LRDG information for coverage of Italian territory (see D.86-D.93).
- D.78 'Bengàsi', MDR 125/1563 sheets 4 and 12. Reproduced (from Italian maps) by Royal Engineers March 1942, revised to May 1942. Printed on linen-backed paper.
- Annotated on verso 'Issue voucher inside via G.H.Q. map depot. For X Branch G.H.Q. M.E. (for Brig. Bagnold)'.
- D.79 'Derna', MDR 125/1412 sheets 5 and 13. Compiled by South African Survey Company (SASC) September 1941, revised to April 1942. Printed on linen-backed paper.
- D.80 'Aghéila - Marada', MDR 125/1754 sheets 11 and 20. Compiled by Royal Engineers June 1942. Printed on paper.
- D.81 'Bardia', MDR 125/1341 sheet 14. Compiled by SASC September 1941, revised to March 1942. Printed on paper.
- D.82 'Giàlo', MDR 125/321 sheet 21. Compiled by SASC October 1941, reprinted June 1942. Printed on paper.
- D.83 'Garet Khud', MDR 125/371 sheet 22. Compiled by SASC October 1941. Printed on linen-backed paper.
- D.84 'Giarabub', MDR 125/372 sheet 23. Compiled by SASC October 1941, reprinted November 1941. Printed on linen-backed paper.

Maps

- D.85 'Bu Hascíscia', MDR 125/295 sheet 29. Reprinted (from revision of Italian map) by SASC January 1942. Printed on linen-backed paper.
- D.86 'Calànsccio (Kalansho) Serir', MDR 125/641 sheet 30. Compiled by SASC November 1941, reprinted August 1942. Printed on paper.
- Reproduced from 1:400,000 compilation of LRDG material dated October 1941.
- D.87 'Calànsccio (Kalansho) Sand Sea', MDR 125/642 sheet 30. Compiled by SASC November 1941, reprinted August 1941. Printed on linen-backed paper.
- Reproduced from 1:500,000 compilation of LRDG material dated October 1941.
- D.88 'Big Cairn', MDR 125/643 sheet 32. Compiled by SASC November 1941. Printed on paper.
- Reproduced from 1:500,000 compilation of LRDG material and surveys by P.A. Clayton.
- D.89 'Tazerbo', MDR 125/882 sheet 39. Compiled by SASC February 1942. Printed on linen-backed paper.
- Reproduced from 1:400,000 compilation of LRDG material dated October 1941.
- D.90 'Cufra (Kufra)', MDR 125/1999 sheet 40. Compiled by Royal Engineers October 1942. Printed on linen-backed paper.
- Compiled from LRDG surveys.
- D.91 'El Riqûba', MDR 125/739 sheet 41. Compiled by Survey of Egypt, reproduced by SASC November 1941. Printed on paper.
- The map covers the Egyptian-Libyan border. Information on the Libyan side was supplied by the LRDG.

Maps

- D.92 'Ma'aten Bisciara', MDR 125/2143 sheet 48. Reproduced (from Italian map) by Royal Engineers October 1942. Printed on linen-backed paper.

'With track revision by the LRDG'.

- D.93 'Àrchenu', MDR 125/740 sheet 49. Compiled by Survey of Egypt, reproduced by SASC November 1941. Printed on paper.

The map covers the Egyptian-Libyan border. Information on the Libyan side was supplied by the LRDG.

- D.94 'Uweinât', Survey of Egypt sheet 10, 1:500,000. Provisional issue published 1935 (see D.65). Printed on linen-backed paper. The western edge of the map charts Italian territory.

A more detailed map of the Gilf Kebir plateau has been pasted onto the original map (on which it was blank). Extensively annotated in red ink with route and features.

- D.95 Untitled 1:500,000 map of desert north of Gilf Kebir plateau. Post-1932. Printed on linen-backed paper. The western edge of the map charts Italian territory.

Annotated with route and features around the north edge of Gilf Kebir.

- D.96 'North East Africa', MDR 236/778, 1:4,000,000. Revised and reprinted by Royal Engineers January 1942. Printed on paper.

Material for map supplied by LRDG November 1941.

Annotated in red pencil.

Maps

'ASIA 1/4 M'

D.97-D.107 1:4,000,000 conical orthographic projection maps of Asia.

These maps were compiled by the War Office between 1923 and 1932. The key information has been trimmed from the edges of the maps and pasted onto the verso. Printed on linen-backed paper.

D.97 'South Russia', sheet 20, 1924.

D.98 'Central Asia', sheet 21, 1931 (2nd edition).

D.99 'Mongolia', sheet 22, 1931 (2nd edition).

D.100 'Manchuria', sheet 23, 1931 (2nd edition).

D.101 'Persian Gulf', sheet 32, 1924, revised 1928.

D.102 'Northern India', sheet 33, 1927.

D.103 'China', sheet 34, 1926, railways revised February 1932.

D.104 'Japan', sheet 35, 1923.

D.105 'Southern India', sheet 45, 1926.

D.106 'Malay Peninsula', sheet 46, 1926, railways revised 1931.

D.107 'Philippine Islands', sheet 47. No key information.

Maps

- D.108 'China and Japan', MDR 520/253, 1:8,000,000. Compiled by Royal Engineers December 1941. Printed on linen-backed paper.
- D.109 South East Asia, MDR 520/254, 1:8,000,000. Compiled by Royal Engineers December 1941. Printed on paper.

'MISC. FRANCE 1914-18 E.AFRICA MIDDLE EAST INDIA'

The maps in this subsection have been subdivided as follows:

- D.110-D.133 First World War
D.134-D.140 East Africa
D.141-D.157 Middle East
D.158,D.159 India
D.160 Newfoundland

First World War

Bagnold was posted to the 83rd Field Company, Royal Engineers in July 1915. The unit was posted to the Ypres salient in the autumn of 1915 and to the Somme in July 1916. At the end of 1916 Bagnold joined the signals branch of the Royal Engineers. In Spring 1917 he was posted to the 19th Corps Signals in Ypres, where he spent the rest of the war.

- D.110 Small scale map of entrenchments south of Boesinghe Station, north of Ypres. Dated 29 February 1916. Printed on paper.

The 83rd Field Company was attached to the 60th Brigade holding the most northerly part of the salient.

- D.111 '60th Brigade Front May to July 1916', Ypres. Map gridded at 5000 yard intervals. Printed on paper.
- D.112 Map of area north-east of Longueval, north of the River Somme, showing sector held by 12th Division and 60th Brigade. Printed on paper.

Maps

- D.113-D.116 Ordnance Survey 1:40,000 maps of Belgium and northern France.
- D.113 Area round Ypres, sheet 28 relief map. Compiled September 1917. Printed on paper.
- D.114 Area round Ypres, sheet 28 road and rail map. Compiled November 1917.
- D.115 'Albert', combined sheet 57c SW, 57d SE, 62c NW, 62d NE. Compiled April 1918. Printed on linen-backed paper.
- D.116 Area east of Bertincourt, sheet 57c, second edition. Printed on paper. The left side of the map, and the key information has been trimmed.
- D.117-D.130 War Office 1:100,000 maps of Belgium and northern France.
- D.117 'Tournai', sheet 5 relief map. 2nd edition compiled May 1916. Printed on paper.
- D.118 'Tournai', sheet 5 road and rail map. 2nd edition compiled May 1916. Printed on paper.
- D.119 'Hazebrouck', sheet 5A relief map. 2nd edition compiled 1916. Printed on paper.
- D.120 'Hazebrouck', sheet 5A road and rail map. 2nd edition compiled 1916. Printed on paper.
- D.121 'Namur', sheet 8 road and rail map. Compiled December 1910. Printed on linen-backed paper.
- D.122 'Lens', sheet 11 road and rail map. 2nd edition compiled 1916. Printed on paper.
- D.123 'Valenciennes', sheet 12 relief map. 2nd edition compiled April 1916. Printed on paper.

Maps

- D.124 'Valenciennes', sheet 12 road and rail map. Printed on paper. Trimmed around all edges removing the key information.

Pin-holes suggest the map was attached to a noticeboard.
- D.125 'Amiens', sheet 17 relief map. 2nd edition compiled October 1916. Printed on paper.
- D.126 'Amiens', sheet 17 road and rail map. 2nd edition compiled October 1916. Printed on paper.
- D.127 'St Quentin', sheet 18 relief map. Compiled November 1915. Printed on paper.
- D.128 'St Quentin', sheet 18 road and rail map. Printed on paper. Trimmed around all edges removing the key information.

Pin-holes suggest the map was attached to a noticeboard.
- D.129 'Mézières', sheet 19 road and rail map. 2nd edition compiled November 1915. Printed on linen-backed paper.
- D.130 'Soissons', sheet 22 road and rail map. Printed on paper. Trimmed around all edges removing the key information.

Pin-holes suggest the map was attached to a noticeboard.
- D.131 'North West Europe', sheet 1, 1:250,000. Printed on paper. Trimmed at the bottom removing the key information.

Pin-holes suggest the map was attached to a noticeboard.
- D.132 North West Europe, ?sheet 2, 1:250,000. Printed on linen-backed paper. Trimmed at the top and bottom removing the key information.

Pin-holes suggest the map was attached to a noticeboard.

Maps

- D.133 Map of Western Front from Soyecourt (Somme) to Ypres salient. Printed on linen-backed paper. Trimmed around all edges removing the key information.

East Africa

- D.134-D.139 1:2,000,000 maps compiled by the War Office. Printed on paper.
- D.134 'Kenya Colony', compiled 1919, 2nd edition 1935.
- D.135 'Kenya Colony', 3rd edition 1938.
- D.136 'Juba River', compiled 1925, 2nd edition 1936.
- D.137 'Zanzibar', compiled 1927.
- D.138 'Abyssinia', compiled 1925, 3rd edition 1937.
- D.139 'Somaliland', compiled 1926, revised to 1935.
- D.140 'German East Africa Kilimanjaro', GSGS 3026, 1:300,000. Compiled by OS 1915. Printed on paper.

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Middle East

D.141-D.146 1:1,000,000 maps of Middle East

D.141 'El Djuaf', North H-37. Compiled at Royal Geographical Society and printed by War Office 1918. Printed on paper.

D.142 'Esh Sham (Damascus)', North I-37. Compiled at Royal Geographical Society and printed by War Office 1918. Printed on paper.

D.143 'Baghdad', North I-38. Provisional edition, compiled at Royal Geographical Society and printed by War Office 1918, revised to 1924. Printed on paper.

D.144 'Izmir', North J-35. Compiled by War Office 1916, reprinted and revised by Royal Engineers to August 1942. Printed on linen-backed paper.

D.145 'Ankara', North J-36. Compiled by War Office 1916, reprinted by Royal Engineers July 1942. Printed on linen-backed paper.

D.146 'Istanbul', North K-35. Published by War Office 1937, reprinted by Royal Engineers May 1942. Printed on paper.

D.147-D.150 French 1:500,000 maps of Sahara compiled by Service Geographique de l'Armee. Printed on paper.

D.147 'Hi. Inifel', NH 31 SE. Compiled February 1929, revised to 1939.

D.148 'Ouargla', NH 31 NE. Compiled September 1923.

D.149 'Fort Lallemand', NH 32 NO. Compiled October 1927, revised to 1938.

D.150 'Fort Flatters', NH 32 SO. Compiled 1936.

Maps

- D.151,D.152 1:750,000 'Surveys of Syrian & Arabian Deserts by Major A.L. Holt ... 1920-1922'. Printed by War Office November 1925. Printed on paper.
- D.151 Syria, Transjordan and Hejaz, sheet 1.
- D.152 Iraq, sheet 2.
- D.153 'Route traverse across the Rub' Al Khali from Dhufar to Doha [Arabia] by Bertram Thomas 1930-31', 1:3,000,000. Published in the *Geographical Journal*, September 1931. Printed on paper.
- D.154 Arabia, 1:2,000,000, with maps of northern coast of Arabia and of 'Rub' Al Khali by H. St. J. B. Philby' 1932, pasted on. Trimmed at the top and sides. Printed on paper.
- D.155 'Damascus', 1:500,000. Compiled by Department of Lands & Surveys, Amman, 1941. Printed on linen-backed paper.
- D.156 'S.E. Kuwait', 1:50,000. 'Drawn by P.M. Devereux Dec. 1946 ... Revised Aug. 1948'. Printed for Kuwait Oil Co. Ltd, London. Printed on linen-backed paper.
- D.157 'The Near and Middle East', 1:4,000,000. Compiled at War Office 1940, published 1941. Printed on paper.

India

- D.158 'Cooch Behar', Assam, Bengal & Bhutan sheet 78 F, 1:253,440. Published by Survey of India 1934. Printed on paper.
- D.159 'North-West Frontier Province', 1:1,000,000. Third edition 1925. Printed on paper. Trimmed at bottom removing key information.

Maps

Newfoundland

D.160 'Newfoundland Upper South-West Gander River...By the Public Schools Exploring Society August 1935', 1 inch = 1 mile. Printed on linen.

The map as printed includes Bagnold's signature at bottom right corner.

Bagnold was an assistant leader in this expedition, led by G. Murray-Levick.

'EGYPT & SUDAN MISC.'

D.161-D.166 Maps drawn by Bagnold reproduced in *Libyan Sands*(1935).

D.161 'Libyan Desert with outline of India super-imposed'. Hand-drawn on thin cardboard.

D.162 'Sinai and surrounding countries'. Hand-drawn on thick cardboard.

D.163 'Egypt and Western Desert , showing journeys of 1927, 1929 and 1930'. Hand-drawn on thick cardboard.

D.164 'Libyan Desert, showing caravan routes, etc'. Printed on thick cardboard with ms corrections.

D.165 'Libyan Desert, showing route of 1932 expedition'. Draft printed on thick cardboard with ms corrections.

D.166 'Libyan Desert, showing route of 1932 expedition'. Hand-drawn on thick cardboard.

Maps

D.167-D.177 Other expedition maps

- D.167 'The Libyan Desert...by Dr John Ball, 1:4,000,000. Published by Survey of Egypt c.1925. Printed on paper.
- D.168 'Map to accompany report on explorations in the south Libyan Desert by Messrs D. Newbold and W. B. K. Shaw (Winter 1927)', 1:2,000,000. Published by Sudan Survey Department July 1928. Printed on paper.
- D.169 'Route map of Bagnold expedition 1932', 1:4,000,000. Printed on linen-backed paper.
- D.170 As D.169 but annotated.
- D.171 'The Anglo-Egyptian Sudan Index to 1:250,000 sheets published by the Sudan Survey Dept Khartoum', 1:8,000,000. Published May 1925, revised to 1932. Printed on paper.
- Annotated with route of 1932 expedition in green pencil.
- For 1:250,000 sheets see D.5-D.45.
- D.172 Untitled map of area round Selima oasis and Gilf Kebir plateau, 1:2,000,000. Hand-drawn on ?waxed linen.
- D.173 As D.172 but printed on paper.
- D.174 As D.173 but annotated with archaeological sites.
- D.175 'The Gilf Kebir southern plateau 1938' by R. F. Peel, 1:250,000. Hand-drawn on cardboard.
- D.176 Photocopy of draft of D.175 annotated with place-names.
- D.177 Photocopy of draft of D.175 annotated with comments on place-names and identified features.

Maps

- D.178-D.181 1:1,000,000 maps from Atlas of Egypt, 1928.
- D.178 'Orographical Map (North-Western Section)', plate 2. Printed on linen-backed paper.
- D.179 'Orographical Map (South-Western Section)', plate 4. Printed on paper.
- D.180 'Orographical Map (South-Eastern Section)', plate 5. Printed on paper.
- D.181 'Geological Map (North-Western Section)', plate 7. Printed on paper.
- D.182-D.184 1:100,000 Survey of Egypt maps. Printed on linen-backed paper.
- D.182 'Luxor', 1934.
- D.183 'Qena', 1934.
- D.184 'Nag' Hammâdi', desert detail overprinted 1936.
- D.185 'Cairo', 1:25,000. Published by Survey of Egypt 1929, new roads and waterways added 1940. Printed on linen-backed paper.
- D.186,D.187 1:1,000,000 maps of Egypt.
- D.186 'Dakhla', sheet NH-35. Special edition compiled by Survey of Egypt August 1942. Printed on linen-backed paper.
- D.187 'Cairo', sheet NH-36. Compiled by Survey of Egypt April 1930. Printed on paper.
- D.188 'Alexandria - Tobruch', 1:1,000,000, MDR 1/9676 sheet NIH 35. Compiled by Survey of Egypt 1941, revised by Royal Engineers to May 1942. Printed on paper.

Maps

- D.189 'The Anglo-Egyptian Sudan', 1:3,000,000. Compiled by Geographical Section, General Staff 1928. Printed on linen-backed paper.
- D.190 'Sudan', 1:2,000,000. Compiled by the War Office 1933, 2nd edition 1939, reprinted by Royal Engineers July 1942. Printed on linen-backed paper.
- D.191 'The Nile Valley', 1:6,000,000. Published by Edward Stanford Ltd., London, pre-Second World War. Printed on paper.
- D.192 Untitled map of North East Africa, 1:4,000,000. Hand-drawn on paper.

Maps not found in the map cabinet

- D.193 'The Libyan Desert showing the routes of Major R. A. Bagnold's expeditions 1929 & 1930. With those of previous expeditions', 1:1,000,000. Published in the *Geographical Journal*, December 1931. Printed on paper.
- D.194 'The Libyan Desert showing the route of Major R. A. Bagnold's expedition, 1932', 1:8,000,000. Published in the *Geographical Journal*, August 1933. Printed on paper.
- D.195 'Sketch map to show area of proposed expedition, autumn 1932', 1:4,000,000. Printed on paper.
- D.196 'Libya', 1:4,000,000. Reproduced by Royal Engineers, August 1941. Printed on paper.

SECTION E

PHOTOGRAPHS

E.1 - E.81

E.1-E.69 Biographical and expeditions
E.70-E.81 Research

BIOGRAPHICAL AND EXPEDITIONS

E.1 Photograph of Col. A. H. Bagnold. Nd.

'The hatted subject on the left of the photograph is my father's father, Colonel Arthur Henry Bagnold (1854-1943). The other subject is unknown to me; possibly it is Major Charles Philips, who is mentioned in my father's autobiography (pages 16 and 17). The location of the shot is undoubtedly outside the bay window on the south west corner of Warren Wood, on Shooter's Hill, south east London, my grandparents' home from 1903 until the time of the Colonel's death. The house was demolished a few years ago'. (Information from S. C. Bagnold, 7 June 1992).

Photocopies of photograph of 'Cold Spring House Jamaica'.

'Coldspring House was the Jamaican home for my father and his family from June 1899 to March 1902, during the period when my grandfather had an army posting in Kingston, Jamaica'. (Information from S. C. Bagnold, 7 June 1992).

E.2 Two childhood portrait photographs of Bagnold, the first taken 19 December 1902.

Pre-First World War photographs of Bagnold as a young man. Taken in the garden of Warren Wood.

E.3 Mounted portrait photograph of Bagnold in military uniform (First World War).

E.4 Photographs of Bagnold in military uniform (First World War). Probably taken at Warren Wood while on leave.

Photographs

- E.5-E.17 Bagnold's set of photograph wallets and envelopes, numbered 1-13, containing chiefly negatives of photographs taken c.1924-33.
- E.5 '1st Album Egypt Early Photos'.
- E.6 'No 2 Sinai 1926'.
- E.7 'No 3 Petra'.
- E.8 '4. Southern Sinai'.
- E.9 'No 5 Siwa Nov 1927'.
- E.10 'No 6 Wadi Rayan'.
- E.11 'No 7 Wadi Araba Xmas'.
- E.12 'No 8 Bir Terfawi'.
- E.13 'No 9 Pindari Sept 1928'.
- E.14 'No 10 Persia & Dalla'.
- E.15 'No 11 Sand Sea Uweinat etc 1930'.
- E.16 '12. Libyan desert 1932'.
- E.17 '13 Angkor 1933'.

Photographs

- E.18 Contents of Bagnold's photograph wallet: photographs taken in Egypt, mid-1920s.
- Photograph of Old Siwa, annotated on verso 'Picture from 1927'.
- E.19 Photographs from the 1929 and 1930 expeditions to the Great Sand Sea. Annotated on verso.
- E.20,E.21 Photographs from the 1932 expedition, including photographs of members of the expedition. Annotated on verso. 2 folders.
- E.22-E.24 Contents of Bagnold's photograph wallet divided into three for ease of reference: photographs from ?1932 expedition.
- E.25,E.26 'Various Pre-War Expedition Photos'. Contents of Bagnold's envelope so inscribed divided into two for ease of reference. Some annotated or labelled on verso.
- E.27-E.32 'Prints'. Contents of Bagnold's envelope so inscribed divided into six for ease of reference: miscellaneous photographs from pre-war expeditions.
- E.33-E.37 'Illustrations and originals of "Libyan Sands" - without tables'. Contents of Bagnold's envelope so inscribed divided into five for ease of reference. Some annotated or labelled on verso.
- E.38 'Negatives'. Contents of Bagnold's envelope so inscribed: negatives of photographs of maps for *Libyan Sands*.
- E.39-E.41 '116 photographs. "Voyages in the Sand" by Major Bagnold'. Contents of envelope so inscribed divided into three for ease of reference. Some annotated or labelled on verso.
- 'Voyages in the Sand' was the initial title of *Libyan Sands*.

Photographs

- E.42 'Possible illustrations for book on Sand'. Contents of Bagnold's envelope so inscribed.
- The physics of blown sand and desert dunes* was completed in 1939 and published by Methuen & Co. in 1941.
- E.43 'Rock pictures (view of Wadi Sora to RGS 31/1/39)'. Contents of Bagnold's envelope so inscribed.
- 'Archaeology'. Contents of Bagnold's envelope so inscribed. Found with E.42.
- E.44 Two photographs of Bagnold rock-climbing in Egypt, sent to him at the Turf Club, Cairo, 21 December 1939.
- ?Pre-Second World War photograph of Bagnold.
- E.45-E.49 'LRDG Photos'. Contents of Bagnold's envelope so inscribed divided into five for ease of reference: chiefly photographs of personnel and equipment of LRDG in the desert. A few photographs annotated on verso.
- E.50,E.51 'Various LRDG photos'. Contents of Bagnold's envelope so inscribed divided into two for ease of reference: includes photographs from pre-war expeditions. Some annotated or labelled on verso.
- E.52,E.53 Miscellaneous photographs of personnel and equipment of LRDG. 2 folders.
- E.54 Negatives of LRDG photographs.
- E.55 Portrait photograph of Bagnold in Second World War uniform.
- Portrait photograph of Bagnold, with copy of a print of it from magazine under caption 'Colonel R. A. Bagnold - for (like an Eastern sand-diviner) finding the fortunes of the British Army in Libya writ in sand', probably *re* award of the OBE to Bagnold in 1941.

Photographs

- E.56,E.57 Thornton Research Centre, Chester.
Bagnold was Director of Shell's Thornton Research Centre 1947-49.
- E.56 Photographs of Bagnold at his desk and at an official ?opening ceremony.
- E.57 Other photographs.
- E.58 Photograph of 'Removal of RAB's oesophageal diverticulum by d'Abreu in Westminster Hospital 26 Apl 51'.
- E.59 Photograph of Bagnold receiving scroll of Fellowship of Imperial College London, 1971 (see A.32). With covering letter.
- E.60 Contents of photograph wallet: colour photographs from Libyan Desert 1980-82. Include photographs of debris left ?by Bagnold's expedition. Some photographs annotated on verso.
- E.61 Contents of photograph wallet: colour photographs from ?Libyan Desert, numbered 1-10. Most are of tracks or debris left ?by Bagnold's expedition.
- E.62,E.63 Colour photographs from C. Bergmann's camel expedition, 1987-88. See B.30. Annotated on verso.
- E.64 Colour photograph of Bagnold with C. R. Thorne, ?King's College London, and Charles [?], Marksburg, Mississippi, taken August 1989.
- E.65 Miscellaneous monochrome photographs.
- E.66 'Dufaycolor' transparencies, nd.
- E.67,E.68 Miscellaneous negatives. 2 folders.
- E.69 Bagnold's box of miscellaneous plate glass negatives.

Photographs

RESEARCH

Photographs and glass photographic plates recording results of wind tunnel experiments on sand movement. The material was found in Bagnold's boxes, the titles of which are reproduced in the catalogue entries.

- E.70 'Grain path negatives'.
- E.71 'Grain path prints'.
- E.72 'Ripples & wind tunnel photos'.
- E.73-E.81 Boxes of photographic plates recording ?saltation experiments.
- E.73 'Run 5'.
- E.74 'Run 6'.
- E.75 ' $f = 150 \text{ m/m}$ '. Sets of photographic plates labelled 'Run 7' and 'Balloons', and unlabelled set.
- E.76 'Run 9. 1/2/39 $v=50$ 1/2cm=3lbs'.
- E.77 'Run 9. 1/2/39. $v=50$. 1/2cm=10lbs + 3 plates of [?] vibration'.
- E.78 Untitled, run 9.
- E.79 Untitled, run 9.
- E.80 Untitled, run 10.
- E.81 Untitled.

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