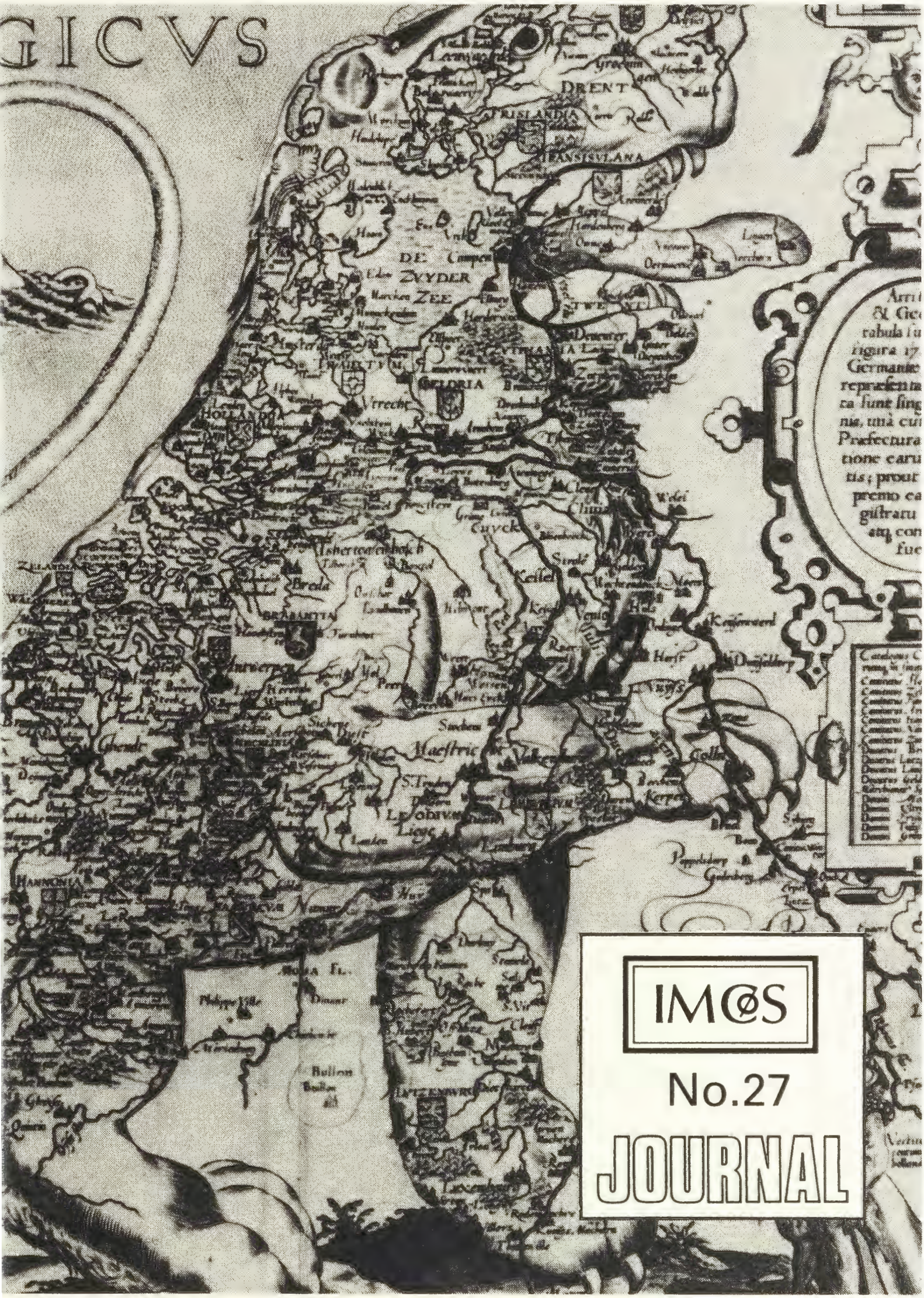
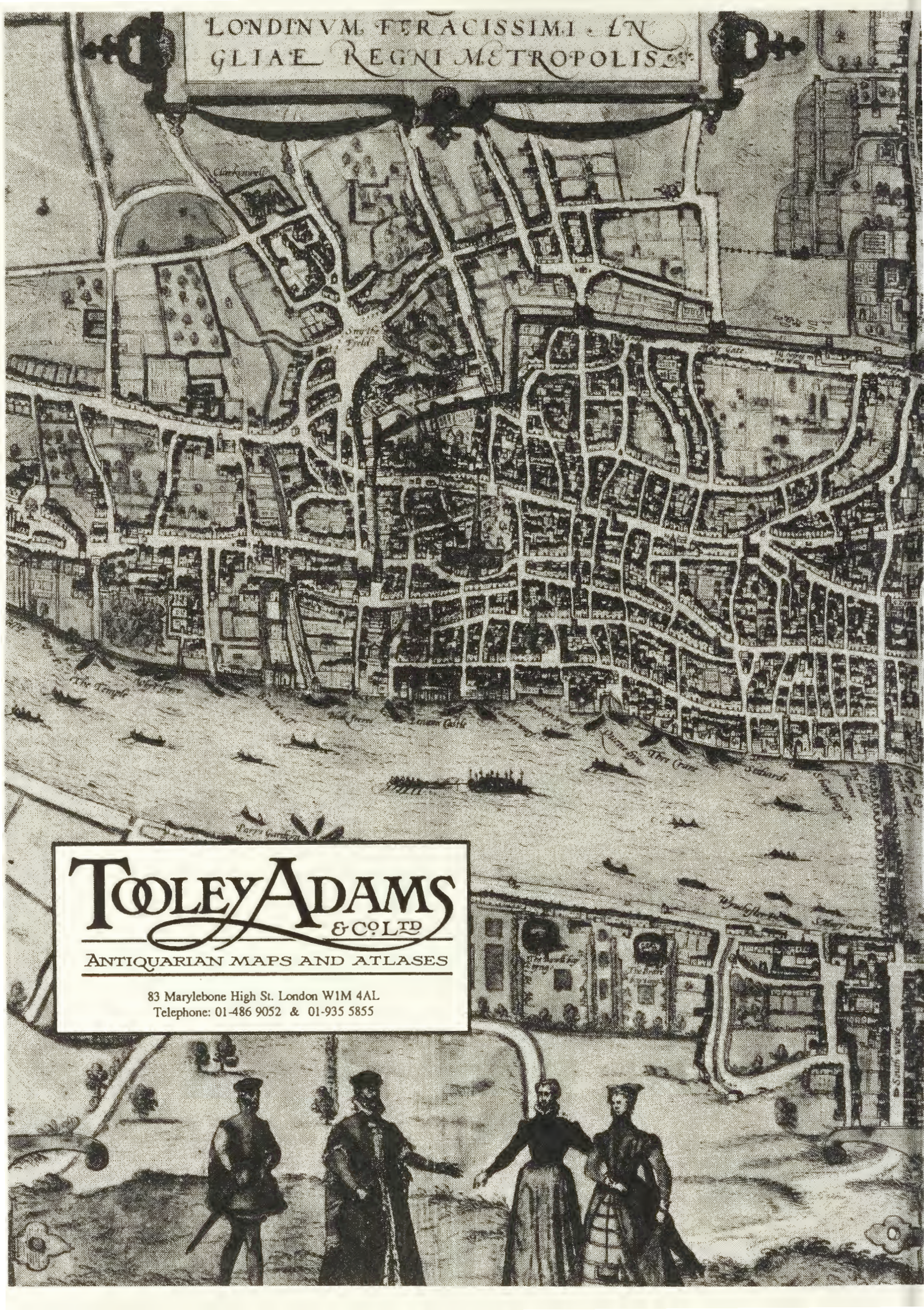


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No.27

JOURNAL


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International Map Collectors' Society

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Copy date next issue 1st December 1987

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AUTUMN EVENING MEETING

As a change from our customary weekend (Saturday) meetings we have arranged a weekday evening meeting of the Society in London this autumn. Make a note in your diary for *Thursday November 26th,* when there will be an informal wine & cheese gathering for members and guests at 6 p.m. at The Farmers' Club, 3 Whitehall Court, close to Trafalgar Square. (Nearest tube station is the District/Circle Line, Charing Cross).

There will be no outside speakers, but three or four collector-members will be talking for just a few minutes each about one or two of the most favoured maps in their collections. Maps will be on show for everyone to look at. If you would like to present any of your maps please let either of the organiser know (Caroline Bachelor on 037284.3425, or Rodney Shirley on 01.212.5396). This is an excellent occasion to bring along another member of your family, a business colleague, or a friend.

Refreshments will be available in the form of wine (or soft drinks) and sandwiches, with a charge of £3 per person collected at the meeting. We look forward to seeing you on the 26th November.

IMCoS List of Officers

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Dr Helen Wallis, OBE: President
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Dr Mireille Pastoureau, Paris; Dr Gunter Schilder, Utrecht

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Vice Chairman: Tony Burgess

Directors: Janet Green
Themis Strongilos.
Kjartan Gunnarsson

Secretary & Treasurer: Harry Pearce, 29 Mount Ephraim Road, Streatham, London SW16 1NQ. Tel: 01-769 5041. (Answerphone service)

Executive Officer: Terry Kay, 31 Hill Side Cresent, Harrow, Middlesex HA2 0QU.

Membership Secretary: Mrs C. Batchelor, Pikes, The Ridgeway, Oxshott, Leatherhead, Surrey KT22 0LG.

International Secretary: Themis Strongilos, 19 Rigilis St, Gr 106 74, Athens, Greece

Editor: Stephen Luck, 83 Marylebone High Street, London W1M 4AL.

Publicity Officer: Yasha Beresiner, 1A Campden Walk, Islington Green, London N1 8DY. Tel: (H) 01-349 2207
(W) 01-354 2599
Telex 896462 Inform G

Appointed Officers

Librarian: Tony Burgess, Weston House, Eltham Green, London SE9 5LB.

Photographer & Slide Registrar: David Webb, Manor Farm, Atworth, Melksham, Wiltshire SN12 8HZ.

Advertising Manager: Warwick Leadlay, Gallery, 5 Nelson Road, Greenwich, London SE10 9JE.

Representatives

America, Central: Paul F. Glynn, Casa El Carmen, 3a Avenida Norte No. 8, Antigua, Guatemala.

America, South: Dr Lorenzo Güller Frers, Paseo Colon 314, 1063 Buenos Aires. Argentina.

Australia: David G. Worland, 33 Wolseley Road, Point Piper, N.S.W.2027.

Canada: Edward H. Dahl, National Map Collection, Public Archives of Canada, 395 Wellington Street, Ottawa, K1A 0N3.

Cyprus: Andreas J. Hadjipaschalis, P.O. Box 4506, Nicosia.

Finland: Jan Strang, Antikki-Kirja, Kalevankatu 25, SF-00100 Helsinki.

France: (Resident in London) Jacques Reutemann, 108 Iverna Court, London W8 6TX.

Germany: Prof. Dr D. Novak, Adenauerallee 23, D-5300 Bonn I, Federal Republic of Germany.

Greece: Themis Strongilos, 19 Rigilis Street, GR 106 74, Athens.

Iceland: Kjartan Gunnarsson, Lyfjabudin Idunn, Laugavegi 40(a), Reykjavik.

Israel: Eva Wajntraub, 4 Brenner Street, Jerusalem.

Italy: J. D. Maranelli, Apex S.N.C., 20123 Milano, Via G.B. Vico 42.

Japan: Kazumasa Yamashita, 10-7 2-Chome, Sendagaya, Shibuya-ku, Tokyo.

Netherlands: Werner Löwenhardt, P.O. Box 2216, Koningsplein 1, Amsterdam.

New Zealand: Neil McKinnon, P.O. Box 847, Timaru.

Portugal: J. C. Silva, Travessa de Queimada 28, Lisbon 2.

Scotland: Bill Waugh, 15 Greyfriars Garden, St. Andrews, Fife KY16 9DE.

South Africa: Oscar Norwich, 46 Garden Road, Orchard 2192, Johannesburg.

Spain: Mr Jaime Armero, General Pardinas 69; Madrid 6.

Sweden: Mr Gunnar Skoog, Lundvagen 142 Box 6, S-201 21 Malmo.

Thailand: Mr & Mrs Rooney, P.O. Box 11-1238 Bangkok

Turkey: Mr F. Muhtar Katircioglu, 14 Karanfil Araligi, Levent–Istanbul.

U.K.: (N.W.) Alan Hulme, 54 Lower Bridge Street, Chester.
(N.E.) Clifford Stephenson.
(Midlands) Paul Sabin.

U.S.A.: (Central) Kenneth Nebenzahl, 333 North Michigan Ave., Chicago, Illinois 60601.
(East) Ralph E. Ehrenberg, Geography and Map Division, The Library of Congress, Washington, D.C. 20540.

Notes from the Chairman

The London Symposium at the Science Museum, the Dinner at Imperial College and the Map Fair in the Forum Hotel were very well attended and a great success. Our thanks go to our President Dr Helen Wallis for obtaining such excellent speakers both for the Symposium and the Dinner.

We would like to thank our Speakers, Map Dealers and IMCoS members who were involved in so many different activities, such as the Valuation and Identification service and the general organisation of the week-ends events.

We were pleased to see so many overseas members and to welcome so many new members who joined at the Map Fair. The 1988 UK Symposium will be held on the 18th-19th June. We hope to hold the Symposium at OXFORD and the Dinner and Map Fair in London, flushed with the success of 87 we feel confident enough to try a different logistical problem next year.

On September 3rd many members had the opportunity to attend part of the Annual meeting of the Society for the History of Discoveries which took place at the British Library.

The Symposium in Israel took place on the 25th-27th October. A sizeable party travelled from the UK and a full report will appear in the next Journal.

On Thursday 26th November there will be an evening meeting at The Farmers Club, Whitehall Court, London. Organizer Rodney Shirley.

Our North of England meeting will be taking place at Durham University and there will be a visit to the Durham Cathedral Library. Jim Wallwork, Durham 38 65732 is the organizer. Please make a note in your diary of the date Saturday March 19th 1988.

Professor Dr Novak is progressing well with plans for the 6th International Symposium in Yugoslavia. It is a two city event at Zagreb and Dubrovnik. The Yugoslav institutions and Tourist organizations have been most helpful. Details will be published later. Dates 1st-3rd October 1988.

I am very pleased to inform members that Themis Strongilos from Athens has kindly offered to take over the position of International Secretary with immediate effect from Alan Bartlett.

It is the Society's policy that as many executive appointments as possible should be based outside the UK. This is especially important considering the increase in the Society's affairs World Wide. Would any members and International Representatives please contact Themis Strongilos in future, his address is:—

Themis Strongilos B.Arch, M.Arch, FHGS
19 Rigilis Street
GR-106 74 Athens
Greece
Tel: 721-0472, or 722-4796

I would particularly like to thank Alan Bartlett for the time he has given to the Society's International affairs since the appointment was made. We all hope to see him at future IMCoS meetings and events and also to read in the Journal his many splendid articles, I for one hope he continues to contribute.

Stephen Luck our Journal Editor will be handing over the responsibilities to an editorial body in 1988 composed as follows:— Production Editor George Beal, IMCoS Liason Yasha Beresiner, Advertising Warwick Leadlay and lastly IMCoS members who will we hope continue to write and send in articles and news items. The more we can get in the better your Journal will become. If any members have any ideas or suggestions regarding the Journal would they contact either Yasha Beresiner or George Beal at 48 Kings Drive, Berrylands, Surbiton, Surrey. KT5 8NQ. Tel: 01-399-9543.

Finally I would like to thank Stephen Luck for the time and energy he has given to the Journal over the last four years. Considering the limited funds, Stephen has achieved a high standard of design and layout in the production and editing of our Journal. We congratulate him on the birth of a son on the 9th July 1987.

Malcolm Young
Chairman

IMCoS Annual Dinner 20th June 1987

Our dinner this year was held at the Senior Common Room at the Imperial College of Science and Technology in Kensington, not such an attractive building as that of the Overseas League but their Catering Department certainly gave us an excellent meal, well-served and at a reasonable price and, judging by the general enthusiasm the hundred or so of us who attended thoroughly enjoyed ourselves.

"7.30 for 8.00" said the invitations but, by the time that everyone had arrived and Caroline had successfully juggled with the seating plan, it was nearer to 8.30 when your correspondant, who was also delegated to be the master of ceremonies, managed to get his voice heard above the conversation and invite our President Dr Helen Wallis to lead us into dinner. She welcomed us all to the dinner and then Montserrat Galera pronounced a few words of grace in the Catelan language before we sat down to enjoy melon with port, poached salmon with Hollandaise sauce and strawberry Pavlova.

After the meal Admiral Roger Morris proposed the Toast to the Queen and those of us brave enough to incur the disapproval of our Chairman Malcolm Young lit up our cigarettes and cigars! Malcolm started the proceedings by talking of the year's activities and how the society is making progress and welcoming the guests. Dr Helen Wallis then introduced our main guest and principal speaker Admiral Ritchie, who spoke most interestingly and amusingly of his long career in the Royal Navy and his wide experience of surveying — very appropriate to us map collectors who often do not know much about the practical aspects of map-making! He also proposed the health of the Society and Muhtar Katircioglu responded on behalf of the Society. Even if, as he said, his dinner had been spoiled by the fact that this duty had been sprung on him by Caroline just before the dinner he acquitted himself excellently and spoke wittily and urbanely. Now came the announcement of the IMCoS Tooley award and this was presented to Dr Mireille Pastoureau for her book *Les Atlas Francais*. This was a very popular choice and in her reply Dr Pastoureau apologised for her lack of fluency in English but she need not have done so, as she spoke with great charm. Finally came amusing and appropriate remarks from Mr Yasha Beresiner, which closed a most enjoyable evening. We are hoping to return to Imperial College for next year's dinner but this time we will try to arrange for the bar to stay open after the dinner so that the conversation can continue as enthusiastically as they always seem to do when map collectors get together, especially so when many different nations are represented — fourteen on this occasion and long may it continue!

Peter Batchelor



Admiral Steve Ritchie. Guest and afterdinner speaker at Imperial College.



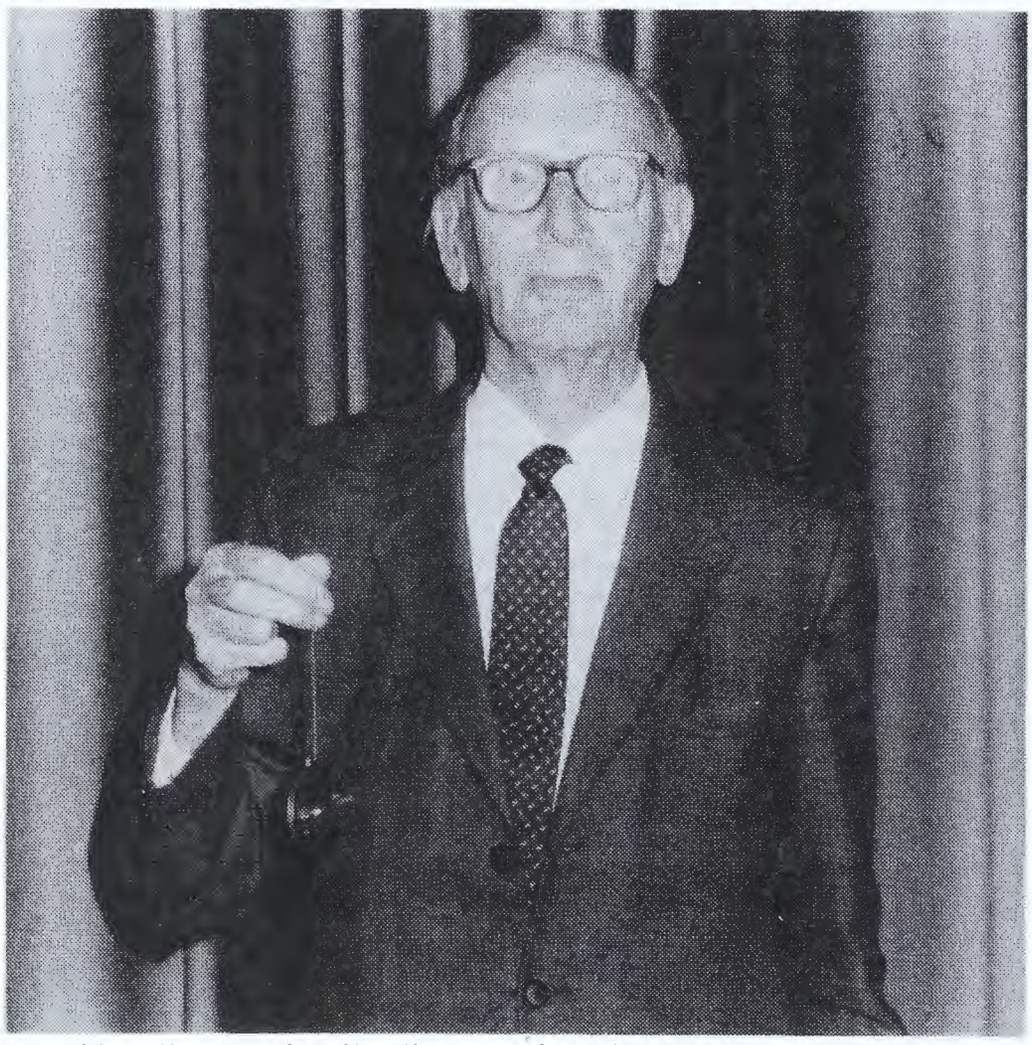
Speakers at the IMCoS Map Fair. L to R: Dr Helen Wallis, Admiral Morris, Malcolm Young (Chairman IMCoS).



The IMCoS Map Fair. L to R: Dr Helen Wallis, Mrs Stylianou from Cyprus, Dr Mireille Pastoureau from Paris, and Mr Tony Campbell from the British Library.



Speakers at the morning session of the London Symposium. L to R: Andrew David, Yolande Hodson, Helen Wallis, Jim Smith.



Professor Oswald Dilke, graphically illustrates his afternoon paper on Roman Surveying.

Eyes in the heavens

The making and use of terrestrial and celestial globes

By Helen Wallis

Once the heavens and earth were conceived to be spherical in shape, celestial and terrestrial globes were regarded as ideal instruments for their depiction. The first recorded celestial globe was made by the Greek astronomer Eudoxus of Cnidus (fl.365 BC). Although it does not survive, an idea of it may be gained from the earliest extant globe, the celestial globe borne on the shoulders of Atlas and forming part of the marble statue, Atlante Farnesiano, in Naples, *c.* 130-100 BC. A replica at half the size was made for Sir Hans Sloane, *c.* 1750, and is preserved in the Map Library of the British Library (Maps G.30). The stoic philosopher Crates of Mallos, royal librarian at Pergamon, *c.* 150 BC., is the first geographer known to have constructed a globe of the earth. The geographer Strabo (*c.* 50 BC to AD 25) commented, "whoever would represent the real earth as near as possible by artificial means, should draw a sphere like that of Crates, and upon this draw the quadrilateral within which his chart of geography is to be placed". He said that to show the oecumene clearly a globe not less than ten feet in diameter was required (Strabo, Bk.II. cap V. 10). In ancient China terrestrial globes were made *c.* AD260. These were small models of the earth constructed as part of armillary spheres and used for purposes of demonstration.

The Arabs as heirs to Greek scientific learning carried on the tradition of Greek geography and astronomy. The earliest extant Arab celestial globe from the western part of the Islamic world dates from 1085. The earliest from the eastern part is a Persian globe, 1140-41. No terrestrial globe of Arab origin survives.

Although no medieval European globes survive, scholars such as Bishop Gerbert (*c.* 940-1003), later Pope Sylvester II, used celestial globes and armillary spheres in teaching astronomical science. The manuscript treatise, "Le Livre du Ciel et du Monde", by Nicolas de'Oresme, 1377, shows in various illustrations the earth as a sphere (Bibliothèque Nationale, MS francais 565). In a French Bible Moralisée of the 13th century God is depicted measuring with a pair of dividers the universe which he has created, comprising a spherical earth surrounded by the ocean and firmament (National Bibliothek, Vienna, Codex 2554).

Specific references to celestial globes date from *c.* 1400, and the earliest extant European one is that made by Nicolas of Cusa at Nuremberg in 1444. In the same city nearly forty years later Martin Behaim made his "Erdapfel", the earliest surviving terrestrial globe, 1492. The sphere is about 50cm in diameter and the medium of depiction is manuscript on vellum. From a geographical point of view the globe's great interest arises from the fact that it was drawn before the results of Columbus's first voyage (1492) were known. The other terrestrial globes surviving from this period all display the discovery of the New World. The earliest extant printed globe-gores are the wood-cut set, 1507, by Martin Waldseemüller of St Dié, Lorraine, known in two examples (no mounted globe survives). On these the outline is a simplified version of Waldseemüller world map, 1507. On both map and globe Waldseemüller names the southern part of the new continent "America", in honour presumably of Amerigo Vespucci. By 1513 Waldseemüller had realized that the true discoverer was Columbus, but it was then too late for the name to be changed, such was the power and influence of the printed word.

Another globe on which America is depicted is the "Globe Vert", *c.* 1515, preserved in the Bibliothèque Nationale, so named because the sea is bright green. The globe is a wooden sphere 24cm in diameter. The surface appears to have been coated in white paint, and the detail of the map drawn on top. America is named four times, twice on North America, twice on South America. This is thus the earliest cartographic item on which the name America is given to both the northern and southern continents. The globe is unsigned, but certain similarities of features suggest that the author may have been associated with Johann Schöner.

A professor of mathematics at Nuremberg, Schöner (1477-1547) was one of the most influential globe-makers and geographers of his day. He was the first to undertake globe production on a considera-

ble scale. His wood-cut globe made in 1515 is the earliest printed terrestrial globe now known. Two examples of the mounted globe survive, and some parchment strips taken from the printed gores of Schöner's globe of 1515 were found during the rebinding of the volume containing Waldseemüller's map of 1507 and 1516 preserved at Schloss Wolfegg; all these works were recently on exhibition in the Smithsonian Institution in Washington, D.C. The globe is identified as Schöner's from the accompanying pamphlet "Luculentissima . . . descriptio . . ." (A most luminous description of the whole earth). The fact that it shows a strait between South America and the southern continent has led to speculation that Magellan knew the globe, and may indeed have been anticipated in his discovery of the Strait named after him.

Another globe believed to be associated with Schöner or his associates is the "Gilt Globe", *c.* 1528, a gilded copper sphere, entitled "Nova et integra universi orbis descriptio", 23cm in diameter, now in the Bibliothèque Nationale. The globe depicts the track of Magellan's ship the *Victoria* round the world, 1519 to 1522. Similarities to the Stuttgart globe gores, *c.* 1535 (Shirley, 1983, No.71), identified as probably by George Hartmann of Nuremberg, may indicate the authorship of the globe.

There are some of the collectors' pieces made at the outset of the period 1500 to 1800, which was the heyday of the globe. The mathematical practitioners at Nuremberg founded one of the leading centres of globe-making. Furthermore, the invention of printing and engraving techniques in the later years of the 15th century gave cartographers as well as instrument-makers the opportunity to take up globe-making. Francesco Rosselli (1445-1510), the printer at Florence, is believed to have made globe-gores (Fiorini, 1899, pp. 93-98). If so these would pre-date Martin Waldseemüller's printed terrestrial globe-gores of 1507, now the earliest known.

The artist Albrecht Dürer (1471-1528) proposed in 1525 the globe-biangle as a means of transferring the sphere on to a flat surface. The Swiss Henricus Loritus Glareanus, professor of mathematics at Basle, was in 1527 the first to describe how to construct globe-gores. In his *Poetae laureati Geographia Liber unus,* Basle, 1527, with later editions to 1542 (Paris), chapter XIX, "De inducendo papyro in globum", he describes the method, illustrated by a diagram. It is now known if Glareanus himself invented the construction, which is simple but not completely correct mathematically (Nordeskiöld, 1889, pp. 74-75)

The newly developing subject of geography was very much centred on the use of the globe. In the symbolism of statecraft, moreover, globes conveyed ideas about man's role on earth and his spiritual destiny in the world beyond. In England the earliest picture displaying globes is Holbein's *Ambassadors,* painted in London in 1533. Jean de Dinteville, French ambassador in London, and his colleague George de Selve, Bishop of Lavaur, are portrayed amidst a variety of scientific and artistic objects which appear on a superficial level as symbols of De Dinteville's life and work. At a deeper level, they express in graphic form the theme of Henricus Cornelis Aggrippa's book on the vanity of the arts and sciences, *De incertitudine et vanitate ominium Scientiarum & artium liber,* first published in 1530. The scientific instruments include a celestial and a terrestrial globe. The celestial was probably by Peter Apian. The terrestrial is similar to the woodcut globe gores now in New York Public Library. (A.D. Baynes-Cope has shown that the extant mounted globes in the National Maritime Museum, Greenwich, Yale University Library, and the Nordenskiold Collection in the University Library, Helsinki, as well as all the globe gores (with the exception of New York's) are 19th century productions. The paper of the New York globe gores have the water mark of the city of Nuremberg produced by the Weidenmuhle in Nuremberg from about 1540.)

The instruments in the portrait of the Abassadors probably belonged to Nicolas Kratzer, the King's Astronomer, as they also appear in his portrait painted by Holbein, *c.* 1528. Kratzer, a mathematical practitioner of Munich, was appointed King's astronomer in 1519, and in 1520 was sent to Oxford, where he taught "Ptolemy and the doctrine of the sphere". He was responsible for the great sphere built for the banquet at the Field of the Cloth of Gold, 12 July 1520. He also designed in May 1526 for Henry's banquet the roof of the hall specially built at Greenwich to show "the whole earth . . . like a very Mappe or Carte". A cloth above displayed the cosmos, and it was described as "a connyng thing and a very pleasant syght to behold". Kratzer probably supplied some of the globes recorded in Henry's palaces in the inventory of the King's belongings at the time of his death in 1547.

A particular concern of geographers in the early and middle years of the 16th cen-



Fig. 1. Portrait of Gemma Frisius dated 1555, holding his celestial globe. Engraved by Jan van Stalburch, 1557. By permission of the Bibliothèque royale de Belgique.

tury was how best to express the relationship between the terrestrial and the celestial spheres. The generally accepted solution was the matching pair of terrestrial and celestial globes accompanied by a book of instruction, and these remained for some 300 years the main instruments and method of geographical teaching. Gemma Frisius, professor of mathematics at the University of Louvain, made the earliest pair of printed globes now extant, 36.5 cm in diameter, the terrestrial dated 1536, the celestial 1537. (Fig. 1.). These were the best known globes in Europe before Gerard Mercator secured the market with his pair, 41 cm in diameter, the terrestrial dated 1541, and the celestial 1551. Mercator had collaborated in the engraving of Gemma Frisius's globes of 1536-37. On his own terrestrial globe he incorporated two innovations. Loxodromes or rhumb lines were marked from the numerous compass roses as a guide for seamen, a feature adopted by later Dutch globe-makers such as Jacob Florensz van Langren, William Jansz Blaeu and his son Joan. The second device was the depiction of stars at various places on land and sea to help the traveller orient himself at night. This did not inspire others to follow suit.

In 1592, with great acclaim, the first pair

of English globes appeared on the London market. Made by Emery Molyneux, a Lambeth mathematician and instrument maker, with the help of the Cambridge mathematician Edward Wright, engraved by the Dutchman Jodocus Hondius, they were produced at the expense of the London merchant-adventurer William Sanderson. With a diameter of two feet two inches they were the largest printed globes yet published. An account of Molyneux and his making of the globes, sent by Petruccio Ubaldini to the Grand Duke of Tuscany, has recently come to light through the researches of Professor Anna Maria Crinò in the city archives at Florence and was reported at the International Conference of the Coronelli Gesellschaft at Amsterdam in September 1986 (Crinò and Wallis, 1987). The Molyneux terrestrial globe provided a full record of England's explorations and discoveries abroad, and the arms of Elizabeth on the continent of North America were designed to encourage her in plans for an English empire there. State portraits of Elizabeth illustrate the role of globes as symbols of imperialism (Fig. 2.).

The fact that the plates of the Molyneux



Fig. 2. The anonymous "sieve" portrait of Elizabeth I at court, attributed by some to the Italian painter Frederico Zuccari, later 16th century. Behind the Queen is a large terrestrial globe bearing the inscription "TUTTO VEDO ET MOLTO" (I see everything and much). By permission of the Pinacoteca Nazionale, Siena.

globes were removed to the Netherlands *c.* 1595 explains why a series of later editions was not published. Jodocus Hondius the engraver must have supplied from Amsterdam the pair, of which the terrestrial is revised to 1603. These globes were presumably ordered by William Crashawe, preacher of the Inn of Court, the Middle Temple, and there the globes remain, justifying Crashawe's description of them as "one of the fairest paire of globes in Englande" (Fisher 1974, p.105) (Fig. 3.).

The removal of the copper plates from England explains why Englishmen in the 17th century had to depend on Dutch globes. Just as the Molyneux globes had celebated England's imperial achievements and designs, so those of the Dutch, such as Jodocus Hondius after his move to Amsterdam *c.* 1595, promoted their national cause. The large terrestrial globes of Willem Jansz Blaeu and Joan Blaeu, 68 cm in diameter, issued from 1617 to 1645-8, were the most famous of their day. They are described as "the most up-to-date and detailed picture of the world then available in a single document" (Campbell, 1976, p.26). Joan Blaeu used regularly an ingenious method of revising the globes and adapting the dedications, by pasting on slips as overlays with new geographical information and new inscriptions. Jodocus Hondius may have been the first to apply this procedure, as a pasted revision slip is found on his terrestrial globe of 1613 (National Maritime Museum, G.167).

Towards the end of the century the Blaeus were surpassed by Father Vincenzo Coronelli of Venice (1650-1718). He claimed, with justification, to be the greatest globe-maker of all time. His pair of manuscript globes 15 feet in diameter, made for



Fig. 3. Revised edition (1603) of the terrestrial globe by Emery Molyneux of Lambeth, first published in London in 1592. By permission of the Honourable Society of the Middle Temple, London.

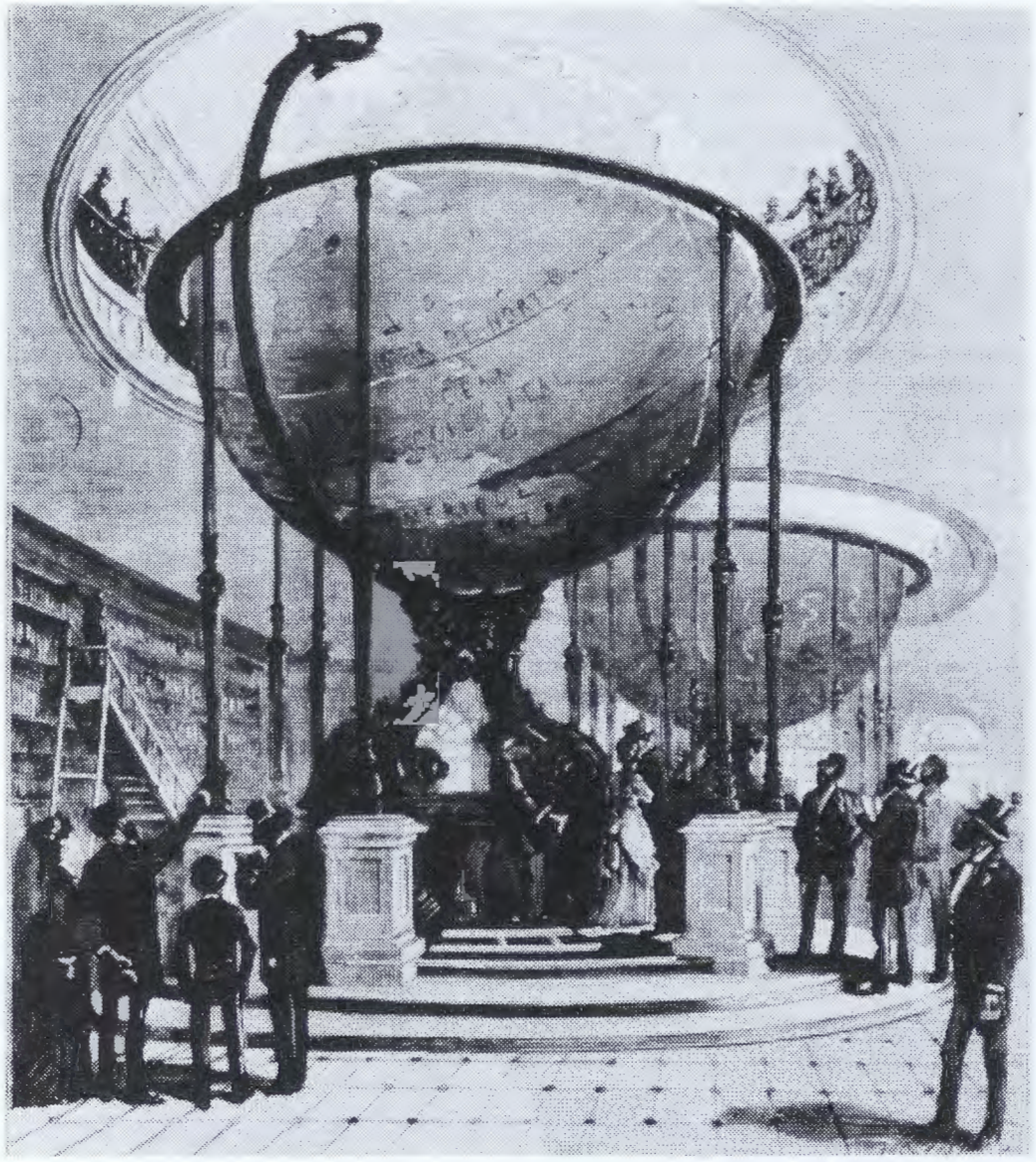


Fig. 4. Vincenzo Coronelli's large globes made for Louis XIV, on display in the Bibliothèque Nationale, 1875. From *La Nature,* no. 116, 21 August 1875. By permission of the British Library.

presentation in 1683 to Louis XIV of France, are the finest of any age. (Fig. 4.). (They are now preserved in the Orangerie at Versailles.) The derived pairs of printed globes, 3½ feet (110 cm) in diameter, were published in Venice between 1688 and 1705, with Parisian versions engraved by Jean Baptiste Nolin, 1688 to 1693. Coronelli in his concern to document the gobes, to make them available to a wide clientele, and to challenge the authority of those who disputed his pre-eminence invented the "book of globes", the *Libro dei Globi*, fo which the first edition was published at Venice in 1697, second edition in 1701. He was not the first to publish globe gores as maps. His originality lay in putting together the gores of his globes in the form of an atlas. All these achievements were acclaimed as notable advances in the art and craft of globe-making. Coronelli also used a system of advanced subscriptions for selling his globes and atlases.

Meanwhile, globe-making in England had been revived by the geographer, mathematician and printer Joseph Moxon on his return from the Netherlands. He introduced two innovations designed to remedy the limitations of matching pairs of globes in representing the place of the earth in the heavens. He first published in England and probably invented the pocket globe. (Fig. 5.). He describes how he showed one to Roger Palmer, Earl of Castlemaine, at the beginning of 1672. "Waiting upon my Lord in the beginning of Anno 1672, at his then arrival into England, I brought his Lordship (knowing that any thing new and ingenious would be acceptable to him) one of my 3 inch Terrestrial Globes, with the Stars described in the inside of its Case, which when his Lordship had considered, and bin inform'd by me, that its only Use was to keep in memory the situation of Countries, and Order of the Constellations and particular Stars, He intimated, that certainly much more might be done by it, and so returning beyond Sea fell upon this excellent Work." (Moxon, 1679, sig. A.2r.v).

Palmer's invention, "this excellent



Fig. 5. Three inch terrestrial pocket globe with a case bearing represention of the celestial hemispheres. By Joseph Moxon, London, c. 1670. By permission of the Huntingdon Library, San Marino, California.

Work", was intended to solve the problem of representing the relative movements of the earth and heavens. Moxon's second innovation was to design and publish in 1679, to Palmer's specification, this new contrivance, the "English Globe". The globe was fixed to a pedestal carrying a dial marked with a stereographic projection of the stars, like an astrolabe. it was described by Moxon in an accompanying handbook entitled *The English Globe. Being a Stabil and Immobil one, performing what the Ordinary Globes do, and much more. Invented and described by the Earl of Castlemaine,* London, 1679. Although Coronelli singled out the globe for special mention in his lectures at Venice, published in his *Epitome Cosmografica,* Venice, 1693, the idea was not taken up by other map-makers.

In 1673 Moxon was advertising a range of globes, from "Globes, 26 Inches diameter. The price 20 £. the pair," to the pocket globes, and he included "Spheres, according to the Copernican Hypothesis, both General and Particular, 20 Inches Diameter. Price of both to 1."; and "Spheres, according to the Ptolomaick Systeme, near 15 Inches Diameter. Price 3 £, 8 Inches Diameter price 1 £. 10 sh." For the sale of his globes Moxon made use of the popular device of the lottery.

His globes were highly regarded and his shop was a well-known haunt. An anecdote of Aubrey's shows that young Edwmond Halley as a schoolboy knew Moxon and visited his shop. Halley "went to Paule's school to Dr. Gale: while he was there he was very perfect in the caelestiall Globes in so much that I heard Mr. Moxton [sic] (the Globe maker) say that if a star was misplaced in the Globe, he would presently find it". Pepys also was a friend and satisfied customer. On 8 September 1663: he went "among other places, to Moxon's and there bought a payre of Globes, cost me 3 £. 10 sh. — with which I am well pleased, I buying them principally for my wife, who hath a mind to understand them — and I shall take pleasure to teach her. Various entries in his diary record "home to my wife . . . Arithmetique, then to supper and to bed". (Wallis, 1978, p.6).

The 18th century was the great period of English globe-making. Pairs of globes were acquired for every well-appointed library. Most of the colleges at Oxford had at least one pair of large globes; and the finest globes of John Senex)*c.* 1740), George Adams (1760 onwards), William Bardin (1780 onwards), and John and William Cary (1792-1840), survive in their libraries as reminders of the globe's (high noon of fash-

ion. Another of Senex's large globes, twenty-seven inches in diameter, features in the portrait of King George III as a boy with his brother the Duke of York and their tutor, Dr Francis Ayscough, painted by Richard Wilson in about 1749. As sovereign George III brought together in the "Mathematical Room" at his Observatory at Kew a collection of scientific instruments, including two pairs of globes by George Adams, now in the British Museum. Adams's textbook, *A Treatise . . . of Celestial and Terrestrial Globes* (1766) contains a dedication to the King written by Dr Samuel Johnson. He reminds the King that as he turned the "terraqueous globe", as oceans and continents rolled before him, he must consider "how large a part of mankind is now waiting on your determinations, and may receive benefits or suffer evils, as your influence is extended or withdrawn".

Thus globes still appealed to the idea of England's imperial destiny. (Fig. 6.). When Captain Cook's ships returned from their great voyages of circumnavigation, Adam's globes were revised to show their tracks and discoveries, and new globes were made bearing dedications to the explorers or their patrons. It is interesting also to note that the Astronomer Royal, Nevil Maskelyne, equipped his room at Greenwich Observatory with the beautiful eighteen-inch pair by W. and J.M. Bardin, *c.* 1799, the terrestrial dedicated to Sir Joseph Banks, Bart., the celestial to Maskelyne himself. Pairs of globes also crossed the Atlantic to North America and still grace the fine colonial houses of the period.

Globe makers such as George Adams the Younger, instrument maker to George III, also invented various pieces of mechanical equipment to improve the terrestrial globe's performance. Adams's "planetary globe", *c.* 1790, was designed, he claimed, to remedy the defects of terrestrial globes "mounted in the common way". It showed the apparent movement of the earth in relation to a planet and thus solved "in an easy natural manner, the several phenomena of the sun, moon and earth" (Adams, 1794). Another globe-maker (probably William Bardin) demonstrated the phenomena of terrestrial magnetism by suitable equipment added to an example of "Ferguson's Terrestrial Globe, Improv'd by G. Wright . . . Made and sold by W^m. Bardin. The sphere, *c.* 1791, is designed to be taken apart, and has been provided with iron bars within it so that the magnetic pole can be moved and bearings taken from it by putting a compass in place at the top. (This globe is in private ownership in England).

In the 19th century in response to popular interest globes became objects of spectacular display, comparable with their role in 16th century pageants. In association with the Great Exhibition in London, 1851, Wyld's Monster Globe was built at Leicester Square by James Wyld Junior (1812-1887), Geographer to Queen Victoria. It comprised a model of the earth, 60 feet in diameter, with 10,000 square feet of surface, which the public viewed from its interior, and was intended to initiate "the commencement of a new era in geographical instruction." Alexander Keith Johnston of Edinburgh, also Geographer to the Queen, celebrated the occasion with an exposition of thematic cartography in global form: "Johnston's Geological & Physical Globe, showing the structure of the earth, currents of the ocean and lines of equal temperature . . . Edinburgh, 1851." Following his publication in 1848 of an English version of Heinrich Berghaus's *Physicalischer Atlas,* 1845, he was the first in Great Britain to add isotherms and geology to the terrestrial globe.

Philippe Vander Maelen of Brussels (1795-1869) undertook a novel project of a different kind in designing a globe from his *Atlas Universel,* printed by lithography and published at Brussels, 1825-27, in six volumes. All the sheets were made on the same scale (1:1,641,836) and on the same projection, so that it would be possible to mount them to form a globe some 7.775m in diameter, made from about 1000 gores. Vander Maelen included in each volume of the atlas a "Carte d'Assemblage", and invited subscriptions either for the atlas or for the sheets to cover the globe. In the event only the Bibliothèque de Bourbon at Naples subscribed or a globe in preference to the atlas (Vander Maelen, vol.1, p.3) Vander Maelen himself constructed the only globe known to have been made and installed it in a special hall in the "Établissement géographique de Bruxelles", which he had founded in 1830. Thus, whereas Coronelli in 1693 had converted his globes into an atlas, Vander Maelen reversed the process and converted his atlas into a globe.

Map publishers working at the more popular end of the market also profited from the new methods of production which made possible the publication of cheaper globes for school room use. Edward Mogg published in London, 1812, "Moggs Dissected Globe", comprising four shaped pieces of pasteboard, printed with maps. F.J. Waygand,. a publisher at Amsterdam and The Hague, made *c.* 1825 a dissected terres-



Fig. 6. Portrait of the hydrographer Alexander Dalrymple in his youth as a secretary in the East India Company, c.1760, with a terrestrial globe. (In private ownership).

trial globe comprising six gores, connected by strings, to be stored in a cover inscribed "Globe artificiel et mecanique à l'usage de Petit Géographe", Amsterdam (Krogt, 1984, p.258). John Betts, the publisher of dissected puzzles, issued in 1852 his "Portable Globe", made up of gores. William Stokes, Teacher of Memory, ventured into a more curious style of globe-making with "Stokes's Capital Mnemonical Globe", London, 1868, "by which the relative portions of the principal geographical places in the world may be learned as an amusement in a few hours". The Bristol schoolmaster Ebenezer Pocock exploited the new processes of lithography to patent in 1830 and publish an inflatable globe made of 12 thin paper gores designed to be inflated by hot air or an air pump to a circumference of 12 feet, yet when rolled "may be placed in a gentleman's side pocket". The Japanese equivalent was a globe which could be inflated by means of an umbrella-like mechanism. Entitled "Chikyu-gi shintei" [A terrestrial globe revised], it was published at Tokyo, *c.* 1880, and was compiled by an Englishman, "Hakudo", with the text translated into Japanese at Tokyo Middle School.

The earliest surviving Chinese terrestrial globe was made in 1623 by the Jesuit missionaries Nicolo Longobardi (1559-1654) from Sicily and Manuel Dias the Younger (1574-1659) from Portugal. The globe (British Library, Maps C.6.a.2.) is believed to have been made at the request of a Christian patron, perhaps for presentation to the Emperor, and may have belonged to the Imperial Palace, Peking. The sphere is painted in lacquer on wood, 59 cm in diameter. When we escorted it to Berlin for exhibition in May 1985, it had its own air ticket as "Mr Globe".

Finally, I return to the London scene, to Michael Faraday's *Advice to a Lecturer* (reprinted 1960, Royal Institution). Faraday wrote that one hour was enough for anyone. But he allowed an exception, the lectures given by Mr Walker at his Orrery, in which Mr Walker succeeded in holding his audience's attention for two or three hours. "But here we have peculiar attendant circumstance", he explained. "The lectures were given in a theatre, where we expect to stay a considerable time; and Mr. Walker left the audience at intervals to themselves, entertaining them by harmony well suited to accompany such a subject. By these interruptions he allows the minds of his company to return to their wonted level and they are in a short time again ready to accompany him into celestial regions."

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Appointment of Karen S. Cook as a Research Assistant at the British Library Map Library

After an undergraduate degree in art history from Barnard College, Columbia University (B.A. 1965), Karen Severud Cook studied cartography and the history of cartography at the University of Wisconsin, Madison (M.S. 1971, Ph.D. 1978). She has lectured in cartography as assistant professor at the University of Nebraska, but most of her professional experience has been as a practising cartographer. She has worked in cartographic laboratories at the Universities of Wisconsin, Georgia and Maryland and, before moving to England two years ago, spent five years as a geological cartographer with the Alaska Division of Geological and Geophysical Surveys in Fairbanks.

Her major research interest has been in the history of cartography, especially the related development of map design and printing methods. She has written about German Renaissance maps, aided by fellowships at the Newberry Library and the Herzog August Bibliothek. research on ninetheenth-century American bird's-eye views contributed to a 1981 exhibition of town views at the University of Nebraska, where she also helped to organize an exhibition of world maps. She has also published about map illustrations in nineteenth-century European geographical journals.

During the past two years as an Honorary Research Fellow in the Department of Geography, Birkbeck College she has been comparing the development of the geological map in nineteenth-century England, France and Germany. This research has been supported by a Fulbright Fellowship and a National Science Foundation grant.

She is a member of cartographic societies in different countries (American Congress on Surveying and Mapping (Fellow), British Cartographic Society, Canadian Cartographic Association, and Deutsche Gesellschaft für Kartographie) and of various historical societies, including the British Society for the History of Science, History of Earth Sciences Society, Society for the History of Natural History, and Printing Historical Society. She has recently taken over as Membership Secretary of the Charles Close Society for the Study of Ordnance Survey Maps.

Karen Cook will take up the post at the end of September 1987.

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Susan Gole has made two half-hour video programmes about India in early European maps for India's Higher Education television programme. They were made and directed by Margaret Beveridge at the Mass Communication Centre, Jamia Milia Islamia University, New Delhi, and have appeared several times on Indian TV since they were made in 1985. The programme is titled "Concepts of India" and includes Part I: Inida in World Maps, and Part II: Maps of India.

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The Military Influence on the Official Mapping of Britain in the Eighteenth Century

By Yolande Hodson

The history of surveying extends back to the earliest writings of man. This paper considers a mere moment in this long history; the second half of the eighteenth century. The framework for this discussion will be the role of military survey in delineating the surface of the land, and the detail will be supplied by an examination of the effect of one man's military experience, that of Major-General William Roy, on the genesis of the official survey of Great Britain.

The genre of military mapping has been selected because it provides a wide spectrum of surveying activities, ranging from the skilled grasp by the glance of an eye of the 'accidents of ground' to the careful measurements allowed by the most advanced instruments of the day. The foundation for the development of military cartography in the eighteenth century was two fold. Firstly, the study of mathematics had been advanced during the seventeenth century to such a point that by the age of Queen Anne, 'so far from smelling of the Black Art' as Professor Taylor put it, mathematics, practical geometry and astronomy became a part of schoolroom teaching, together with a pair of globes as a normal part of schoolroom furniture.[1] As a result, the mathematical knowledge of surveyors in general was capable of significant improvement, and land surveyors often augmented their income by teaching the subject. By the beginning of the eighteenth century maps had become a universal symbol, in portraits, of a general's command of ground; for example, the ceiling painting of 'Marlborough victorious at Blenheim' in the Great Hall of Blenheim Palace features a large map of the battle.[2] Secondly, the production of accurate instruments for surveying was a major export feature of this country, whose instrument makers were foremost in Europe, from Jonathan Sisson, the inventor of the spirit level to Jesse Ramsden, who overcame the inaccuracy of hand-divided circular scales by inventing a dividing machine which won a Board of Longitude prize in 1773. With Ramsden's Great Theodolite, completed in 1787, the 'era of precision instrument making had arrived'.[3]

The eighteenth century saw unprecedented development in the theory and practice of military mapping, and maps still retained their symbolic function in art at the end of the century.[4] Although many contemporary writers denied the existence of the competent officer surveyor (the more, perhaps, to promote the sale of their own books), the survival in significantly large numbers of manuscript material from most theatres of operations demonstrates the increasingly ubiquitous nature of the military map. This was accompanied by an increase in the production of text books on the art and conduct of war which included chapters specifically devoted to map-making.[5] During the seventeenth century, statements in military sources on the value of maps are relatively uncommon. Whether they do occur, the usual complaint was that the maps lacked detail, and were on too small a scale to be of any use; thus in instructions for the cavalry in 1632 the author writes 'For the knowledge of the wayes . . . the use of mappes may somewhat help, but (being too generall) is not sufficient'.[6] And again, in advising on the choice of positions for camps, he recommends the necessity of having 'some demonstration on paper, of the place beforehand . . . wherein the guides can better direct them than the usuall maps, which (if not false) are too generall'. Note that there is no suggestion here of making a survey, but, rather, of relying on guides to supply the information. Over a hundred years later the position had changed to the extent that it was the accepted view that all military expeditions entirely depended upon a perfect knowledge of the country and that maps had a more central part to play in its acquisition. Writing in 1760, the French author Folard endorsed this opinion, stating that 'on forme un projet de campagne dans le cabinet, soit d'offensive, soit de défensive; on consulte la carte, c'est presque toujours l'oracle où l'on a recours'.[7]

Printed instructions for military survey in the seventeenth century were more likely to be found directed at the artillery as in 'The compleat Gunner' by Thomas Venn,

1672 who includes in his methods of taking angular observations a neat demonstration of improvisation in his account of how 'with halbeards, pikes, or any staves, having no other instrument, you may measure the distance between any two Towers, Castles or other marks . . . not coming near any of them'.[8] Improvisation was an essential skill in military surveying, and any assessment of the accuracy of a military map cannot be made without bearing in mind the instruments used, many of which were Heath Robinsonish; for example a home-made plumb-bob could be made with a length of grass and a bullet.

One of the reasons for the higher profile of the map in military quarters in the eighteenth century was the wider availability of a topographical base map for those countries which formed the 'seat of war' in Europe; the Netherlands, France and Germany. Thus, for the Low Countries, Eugene Henry Frieex's map of 1712 was updated and published by Covens and Mortier in the 1740s. It became the prime operational map during the War of the Austrian Succession; on it were plotted the movements of the armies, and its outlines were copied and enlarged by military surveyors who then used it as a base for the insertion of the detailed information required in the planning of march routes, forage stops and encampments.

The use of the printed map in this way is not only deduced from surviving examples but is also borne out by the increasing number of references in texts to the existence of the 'common' map and its use as the basis for detail survey; the reader was, however, cautioned that 'as the generality of maps merely show the principal objects' he can only 'put down the chief windings of the rivers, and mark the points where villages are to be drawn'. When he is 'on the ground he will fill up his sketch and above all 'it is still necessary that they (the common maps (should be attentively compared with the country, and all inaccuracies corrected'.[9] Thus the intensive use of maps made by soldiers served to highlight their deficiencies.

Let us, then, examine the requirements of the military map. One eighteenth century author sets it down explicitly: 'Accuracy ought to be the principal object of our attention in all military drawing, and whenever an error has been committed, it must be immediately cut out or corrected; otherwise it may mislead the General, and involve the army in the greatest difficulties. They must express the exact form and declivity of every height, as well as the approaches to them; that it may at once be known how far they command each other, and whether they are difficult of easy of access:– they must point out all advantages and disadvantages of situation, and the best positions for the different posts and guards:– and lastly, they must show the ways in which the position will be capable of being occupied or attacked.[10] The telling last line of this list of exacting desiderata states that without all these attributes the military plan would 'scarce be of more use than a common map'.

This theme of the unsuitability of the existing topographical mapping to military purposes is echoed in many texts from the second half of the eighteenth century; thus, Col. Charles Vallencey, Director of Engineers in Ireland, wrote in 1779 that 'The Common Maps of a Country are sufficient to show the distances of Towns, Villages, Rivers, etc; but are generally drawn on a scale too small to express the Features of a Country'.[11] This view repeats the military cartographic experience in Scotland after the supression of the Jacobite rebellion at Culloden. Writing to Sir Everard Fawkener, the Duke of Cumberland's Secretary, Major General John Campbell added as a postscript: 'by the Map of the Country it appears very easy & a short cutt to cross over from Appin by the end of Lismore to Strontian. I have had it view'd and it is impracticable in every respect'.[12] In this chance remark lay the germ of a great undertaking, unprecedented in its scope in this country, and that was the survey of the mainland of Scotland at a scale of 1" to 1000 yards, or 1:36,000. It was to take eight years, from 1747 to 1755, and on it were to be employed three future generals, one of them, William Roy, the founder of the Ordnance Survey, together with Paul Sandby, the most famous watercolour artist of the eighteenth century, whose work today is the height of fashion, commanding large sums of money. The idea of the survey was apparently the brainchild of Colonel David Watson, Deputy Quarter Master General, who was entrusted with the task of controlling the Highlanders after the rebellion. He, his brother officers, and the Duke of Cumberland had 'found themselves greatly embarrassed for want of a proper survey of the country' and William Roy recalled many years later that 'as Assistant Quarter-Master, it fell to my lot to begin . . . the execution of that map'.[13]

Here, then, was a peacetime response to the inadequacies of the 'common map'. Military in its purpose, it sought to show

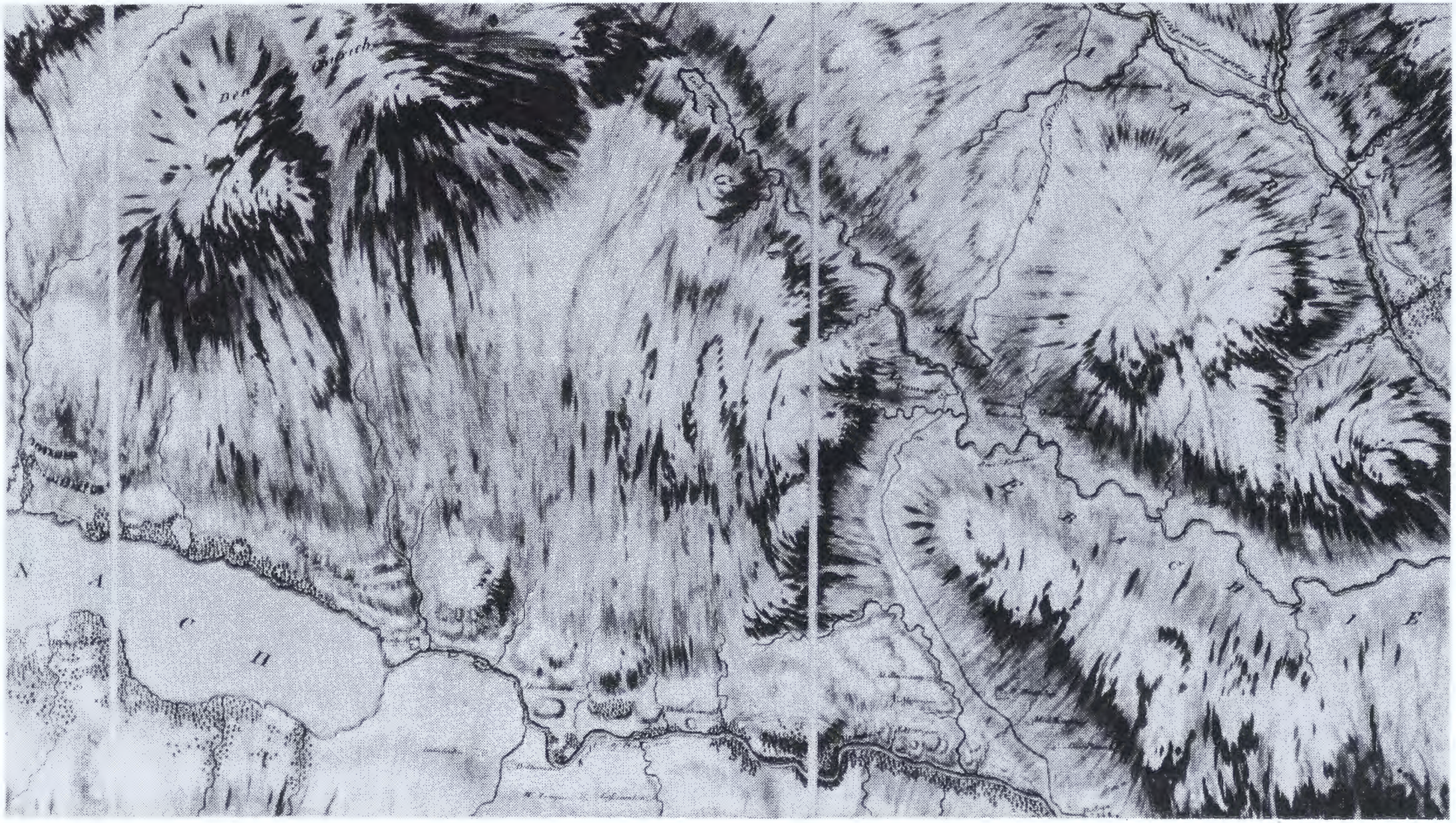


Fig 1. Part of the Survey of Scotland, 1747–55. By courtesty of the British Library Board.



Fig 2. An etching by Paul Sandby, of surveyors in the Highlands, 1750. By courtesy of the British Library Board.

in detail the face of the countryside and Roy said that 'particular Buildings & Inclosures or Fields were to be represented truly topographically'. No original instructions for the survey survive, but the recollections of General David Dundas, one of the surveyors, serve to illuminate some of the methodology. He stated that 'the Courses of all the Rivers and their Branches; of all the principal Roads; and of the Lakes, salt and fresh were followed and measured; as well as such other intermediate and Cross Lines as were found necessary for filling up of the Country'.[14]

Roy later attributed deficiencies in the map to the use of 'Instruments of the common or inferior kind'. We know, also from Dundas, that 'Each Surveyor kept a field book and a sketch book' and that 'in the first he noted the angles and measurements of his stations and also the intersections made from each, with observations' and that in the sketch book, 'which was of sufficient size, he delineated his stations and the face of the country on each side'. Further evidence is offered by a sketch by Paul Sandby, one of three known to have survived, of a surveying party in the field. Drawn in about 1749, it lends authority to Dundas's recollections of fifty years later that 'each Surveyor was attended by a Non-Commissioned Officer and 6 soldiers as Assistants — one carried the lieutenant — Two measured with the chain. Two for the fore and back stations — One as a batman'. The instrument appears to have been a circumferentor, sometimes known as a plain theodolite, and the methods used are commonly described in later military textbooks, for the filling up of large areas. Unfortunately, none of the field or sketch books appears to have survived, and all that

remain are the rough protractions and the fair copy.[15] The rough drafts show lines parallel with magnetic north, which would have been used for protracting angular measurements, and the fair copy illustrates the perfection of drawing which could be achieved by the skilled hand. Incidentally, it is interesting to note that the style of four of the draughtsmen, Sandby, Roy, Debbeig and Tarrant can, on occasion be identical and there is scope here for the study of its diffusion among later military surveyors who may have come under the influence of these four. The undertaking of the survey followed the usual military seasonal pattern, that is to say, five months spent maneouvring, or in this case surveying, and the seven winter months drawing up at Edinburgh Castle. Current research[16] has thrown up inexplicable discrepancies between field sheets and fair copy, as well as errors of position; some of these were recognised at the time by Roy, but even so, there can be no question that the fair copy was superior to the 'common map' and affords some insight into military surveying in practice.

The Survey of Scotland was interrupted before the fair drawing was completed by the advent of the Seven Years' War but, even as it stood, it was to be regarded in the eighteenth century as 'the greatest work of this sort ever performed by British Subjects and perhaps for Representations of the Country not to be equalled in the World'.[17] It set the pattern for surveys of the St. Lawrence by George Murray (1760-61), East Coast of North America by Holland (1764-75) of Bengal by Rennell (1765-77) and Ireland by Vallancey (1778-90). The principal surveyors, Roy, Debbeig, Tarrant and Pleydell were to continue their military surveys in various capacities, and many parts of operational theatres from Europe to America are depicted in their unmistakeable style.

Only eight years later, in 1763, Roy, at the age of thirty-seven, proposed a national survey of Great Britain which was to incorporate the Scottish Map. It was rejected on financial grounds; but what prompted the suggestion at this time in the first place? To answer this question, it is necessary to examine Roy's military mapping experience during the Seven Years' War. he was in 1755 commissioned as a Practitioner Engineer and, within a fortnight, as a lieutenant in the newly-formed 51st Foot (now the King's Own Yorkshire Light Infantry); dual commissions were common in the eighteenth century. He served again as AQM to Watson in the south of England and his duties included reconnoitring the south coast from Kent to Pembrokeshire to plan camp positions and march routes for the mobilised army. Many of his maps from this period survive. He was present at the abortive expedition at Rochefort in 1757, and again his task was reconnaissance and the production of sketch maps.

He was also present at the Battle of Minden on 1 August 1759 and, here, one of his duties was to prepare a map of the battle; the fair manuscript is in King George III's collection of military maps at Windsor Castle, Minden was the only pitched battle in which British troops fought during the Seven Years' War. None of the compilation material for Roy's map survives, but it is not at all unlikely that he would have had ample opportunity for simple survey in the area in the days leading up to the confrontation; this was accepted practice at that time. His finished product[18] was also published in French and was apparently used at the court martial of Lord George Sackville. It should be noted that battle plans were regarded as vital didactic aids in the study of warfare, which at that time was conducted according to set rules, and their general description as 'commemorative' maps is too dismissive and underestimates their importance.

Roy was then transferred to Keith's recently raised Corps of Highlanders,[19] who astonished the continentals, not only by their dress, but also by their ferocious and intrepid conduct. During the next two years, Roy appears to have spent much of his time in surveying and recording in maps the progress of the Allied Army across Germany. In his map of the manoeuvres round Einbeck[20] we return again to the theme of the 'common map'. On the scale of about 1" to a mile, this very detailed map portrays the manoeuverings of an army at the close of the season. reminiscent of the Highland Survey, the only clue as to its construction lies in Roy's inscription 'N.B. No opportunity having offered of making any sketch of the Country to the Eastward . . . this District is only inserted from the common map to show nearly the Situation of Hildesheim with regards to other parts of the Plan . . .'

It is clear then, that Roy had solid experience of comparing printed generalisation with physical reality and of realising how limited the scope was for redressing the situation during war. It would also have been forcibly brought home to him after sixteen years of supplying the cartographic needs of the army, how essential detailed topog-

raphical maps were to the conduct of offensive and defensive operations. This experience was endorsed by le Comte de la Roche, who in 1770 wrote "Il ne suffiroit pas que le Commandant en fît une étude particuliere sur la carte; je regarde com-impossible, et presque inutile, de pouvoir, par ce seul moyen, se procurer des connoissances bien certaines d'un pays'.[21] He had found that the common map was not adequate for military purposes.

But the common map in England was beginning to assume a more respectable face, and the second half of the eighteenth century has been termed a 'crucial and distinctive period in the development of English regional cartography'.[22] The new county maps, prompted in part by the offer of a premium of £100 by the Society of Arts for any original county survey meeting the required standards at a 1" scale, embodied original triangulations; many foreshadowed the work of the Ordnance Survey. In their publication Roy saw the means for resubmitting his 1763 national survey project.

In 1766, Roy's second proposal for making a 'General Military Map of England'[23] commented that 'there are already good Surveys made by different people of the undermentioned counties (there followed a list of twenty, completed or under way). 'These County Maps are sufficiently exact, in what regards their geometrical measurements, for common purposes, but are extremely defective with respect to the topographical representation of the ground, giving scarcely any idea, or at least but a very imperfect one, of what is remarkably strong or weak in the nature of the country'. He then suggests that 'an exact triangulation along the coasts, principle hill and mountain ranges, with good instruments *prepared for that purpose'* (my italics) would provide the accurate framework so that the secondary tiangulations could be filled in from the county maps to avoid the cost of repeating a local survey. By this he undoubtedly meant the military technique, so familiar to him, of plotting the salient points from the 'common map' and adding detail in the field. Roy's appointment in 1765 to 'inspect, survey and make reports from time to time of the State of the Coast and Districts of the Country adjacent to the Coast of this Kingdom' was reflected in this specification for a National Survey which laid down that 'the line of the coast and the country for two miles parallel to it, as being an essential part, should be very minutely surveyed, even in the counties where the ordinary surveys may have taken place.

Roy reiterates that the 'accuracy of this map will depend chiefly on the goodness of the Instruments made use of'.[24] This proposal contains the earliest surviving references by Roy to a standard of surveying instruments which, one infers, was not yet available but which should, in his view, have been possible. In the following year Roy was elected to the Royal Society; he was proposed by James short, whose reflecting telescopes were the 'best of their kind' and with whom he is supposed to have received mathematical tuition from Professor Colin MacLaurin of Edinburgh.[25] His other supporters for the fellowship were John Bevis and William Harrison. So, although we have little knowledge of Roy's private life, it is clear that he had for some time been keenly interested in the development of astronomical and surveying instruments, and was fully aware, as the remarks in his proposal show, of their current limitations for accurate observation. he must have moved in the circle of the famous instrument makers of the day, whose names are now legendary: Sissons, Dolland, Burton and Ramsden; he knew, or was shortly to become a friend of Neville Maskelyne, Astronomer Royal, and was a regular correspondent with James Lind, Physician to George III and who in 1765, just before Roy's proposal, had 'turned longitude mad' having acquired 'a most novel sextant by my friend Ramsden'.[26]

Roy was no 'common' topographical surveyor, for as well as understanding the niceties of topographical detail requisite for a general military map, he was also capable of comprehending the wider geodetic implications of survey, and was aware of continental practice. In 1766 he suggested that 'in carrying on the Series of Triangles, it would be useful to trace one grand meridian line thro' the whole extent of the Island, marked by obelisks . . . like that thro' France'. His purpose was explained in that having 'about 8½ degrees of meridian . . . exactly measured intermediate to those measured in France and at the Polar Circle — hence the increase in degrees of Latitude and spheroidal figure of the Earth might be more truly determined'.

He had indeed made a close study of the French map which he pronounced to be drawn on too small a scale, for 'the inclosed ground is not distinguished from the open, and the plan is but partly topographical', and so for England he recommended that 'an inch, or an 1" and a ¼" to a mile appears to be a good scale' and in this, of course, he anticipated the 1:50,000 by over 200



Fig 3. Roy's map of South east England, 1765, drawn to illustrate a report on troop deployments. By courtesy of the British Library Board.

years. The instruments he specified were a quadrant with a 2½ foot radius for angular measurement, and a smaller one; rods with spirit levels for the base measurement and plain tables, theodolets and chains for detail survey. This well-thought-out blueprint was to wait in the wings for twenty-five years before its precepts were brought into action.

In the meantime Roy's work as DQMG entailed preparing endless reports on areas along the south coast which would be suitable for encampments and practice manoeuvres.[27] In the initial stages of this work, roy used existing county maps which, by 1776 covered the whole of southern England except for Sussex and Somerset. Other tasks required detailed reports and drawings of the state of coastal fortifications.

In 1784 a significant restructuring of the Corps of Engineers was undertaken by the Duke of Richmond, the Master General of the Ordnance, and a surveying company was created for the first time; Roy became its Commanding Engineer. Within eight months he had produced what was probably the most significant document on military survey methods to have been written in the English language.[28] Designed, evidently, for this Survey Company; its title implies that their first task was to be a survey of the 'Coast and Districts of the Country near it'. Here is a loud echo from the 1766 proposals for the national survey. The appendix, 'practical observations on surveying' gives, in a few pages, more information on methodology than many contemporary text-books. Astronomical observations were to be used in determining the true meridian in order to calculate the variation of the compass; telescopic spirit levels and Ramsden's 'best Theodolet' were to be used. Fields, hedges, woods, marshes; all were to be 'distinctly surveyed', and the descriptive matter to be entered into the notebooks would, had they survived, have provided a rich seam of source material for historians of many disciplines.

The instructions were approved by the Duke of Richmond in July 1785 with the order that the fist part of the survey should commence in the Medway area. But was this survey ever carried out? The evidence of surviving maps is very slim, but that a start was made is confirmed by a report in *The Daily Universal Register* (subsequently *The Times*) of 5 December 1785 which reads 'A party of engineers . . . during the greatest part of last summer, have been employed, under the direction of General Ray (i.e. Roy) in surveying the county of Kent; it being the intention of government to have a survey of the whole counties of England, on a much more accurate and extensive scale than has hitherto been done. It is not however intended to publish them, because they are to contain surveys of the coast, with the landing places and the depth of water etc made from actual experiment . . . Scotland has already been surveyed on the same plan some years ago . . . it is now the intention of the Master General of the Ordnance to have it completed.'[29]

What prompted this report, and who supplied the information, remains a mystery, but if there is a grain of truth in it, then it is clear that the idea of a national survey was under active discussion well before 1791, the officially accepted date of its foundation. But Roy must already have caught the public imagination by his measurement, only the year before, of the five mile long base on Hampstead Heath. The story is well chronicled now of how, in 1783, the third Cassini, Cassini de Thury, sent a paper to George III suggesting that a triangulation of south-east England, linked with France would establish the relative positions of the Greenwich and Paris Observatories. The paper was passed to the Royal Society who entrusted the project to Roy, regarding him as the 'one Person at least' whom 'we possess in this Island . . . able to execute the most difficult operations of mensuration'. The definitive measurement of the 1784 Hampstead Heath base was made with glass rods, but Ramsden's 100 foot steel chain was used for the first time on an experimental basis. So impressed was Roy with their performance that he used those alone for the measurement of the base of verification of Romney Marsh in 1787.

Roy had decided at the beginning of these operations that the instrument did not exist which was capable of providing the order of accuracy necessary for the triangulation of south-east England, and that it was necessary to 'reinvent' them. Ramsden was the inventor and he undertook the work, as he put it, 'to the neglect of a more lucrative business and chiefly with a view to the advancement of science and the honour of this country'.[30] But he was maddeningly dilatory and his obsession with perfection frequently led to long delays in the delivery of his instruments. His total disregard for time is illustrated by the occasion on which he 'attended at Buckingham House precisely, he supposed at the time named in the Royal Mandate'. The King remarked that he was punctual as to the day and hour,

while late by a whole year.

His three foot theodolite, completed in July 1787, was the crown of his career and from it dates the real flowering of the theodolite and derivative instruments. Weighing over 200lb it was the first instrument capable of reading a mark at seventy miles distance with an angular error of only two seconds, and had frequently to be manoeuvred up awkward heights such as church steeples. The triangulation was completed in 1789; but the cross channel observations did not settle the question of the relative longitude of the two observatories satisfactorily and Roy died the following year, while, as the story has it, correcting the proofs of his account of the measurements for the *Philosophical Transactions* of the Royal Society. Pursuing to the end his argument of the case for a national survey, he had in his report recommended 'that the triangulation so successfully begun, should certainly be continued . . . The honour of the nation is concerned in having at least as good a map of this as there is of any other country'.

A year later, on 10 July, the Duke of Richmond, who had always given Roy's surveying ideas practical support, formally instructed the continuation of the triangulation. The base on Hampstead Heath was remeasured and in 1795 the detailed survey began. The first sheets, covering Kent, were published by Faden on 1 January 1801. They were produced very much in the mould of the eighteenth century county surveys; they showed, however, a wealth of topographical information and were a great advance on the 'common map'. Finally, in 1802 Col. William Mudge, the second Director of the Trigonometrical Survey, measured an Arc of Meridian from Dunnose to Clifton using Ramsden's last instrument, the Zenith Sector. That the results were erroneous is unfortunate, but its accomplishment meant that all the points in Roy's 1766 proposal had been finally met. His long cherished General Military Map of Great Britain had begin its public life on the first day of the new century.

Acknowledgement

Material from the Royal Archives is quoted by gracious permission of Her Majesty Queen Elizabeth II.

Footnotes

1. E.G.R Taylor, *The mathematical practitioners of Tudor & Stuart England 1485-1714*. Cambridge: University Press for the Institute of Navigation, 1970 p.133.
2. The Great Hall ceiling was painted by Thornhill in 1716.
3. R.P. Multhauf, 'Early instruments in the history of surveying: their use and their invention'. *Surveying and Mapping*, 18, No.4., 1985. pp.339-416.
4. See, for example, Savage's portrayal (1796) of 'The Washington Family', seated around a table over which is spread a map. National Gallery of Art, Washingdon, D.C.
5. The role of military textbooks in the practice of military surveying is discussed by J.B. Harley in his contribution to *Mapping the American Revolutionary War*, Chicago and London: The University of Chicago Press, 1978.
6. *Militarie Instructions for the Cavallrie . . . according to the present practise of the Low-Countrey Warres*. Printed by the printers to the Universitie of Cambridge, 1733. [by I.C.] p.57.
7. *L'Esprit du Chevalier Folard tiré de ses commentaires* . . . Amsterdam, par La Compagnie des Libraires, 1760 p.22.
8. *In: Military and Maritine Discipline* By Captain Thomas Venn, London, Printed by E. Tyler, *et al.*, 1672 p.61.
9. *Tielke's Field Engineer*. Translated by Edwin Hewgill. London, 1789 p.195.
10. *Ibid* p.246.
11. *An Essay on Military Survey accompanied with Military Itineraries*. By Lieut. Colonel Charles Vallancey, Director of Engineers. 1779. MS. British Library, Map Library 6.TAB.64.
12. Royal Archives. Cumberland Papers, Box 14/411. Letter dated 13 May 1746.
13. Extract from the *Philosophical Transactions* of the Royal Society of London for 1785, quoted in C.F. Close, *The early years of the Ordnance Survey*. Introduction by J.B. Harley. Newton Abbot: David and Charles, 1969 p.2.
14. [D. Dundas] *Memorandums respecting the Map of Scotland. Jan^{y}.12.1806*. Given to Arrowsmith. MS. Scottish Record Office.
15. MSS of the military survey of Scotland, 1747-55, are in the British Library, Map Library.
16. See, for example, Graeme Whittington, 'The Roy map: the protracted and fair copies'. *Scottish Geographical Magazine*, Vol.102, 1986, pp.18-28.
17. Yolande O'Donoghue, *William Roy 1726-1790. Pioneer of the Ordnance Survey*. London: British Museum Publications, 1977, p.4.
18. *To Prince Ferdinand of Brunswick, This*

Plan of the Battle of Thonhausen . . . taken from an Actual Survey, is . . . dedicated by William Roy. Surveyed and drawn by Captain William Roy and engraved by Thomas Major. London, 29 Feb. 1760, 1:35,000 approx.

19. *A List of the General and Field-Officers . . .* to June 1759, p.99, MS annotation. *See also* Mrs Gillespie Smyth, *Memoirs and correspondence of Sir Robert Murray Keith, 1849, 2 vol.*
20. *Plan shewing the Movements of His Majesty's Army in Germany on the Expedition to Eimbeck in Novbr. 1761.* [signed:] W. Roy D.Q.M.G. MS. 1:63,360 approx. Royal Library, Windsor Castle. Cumberland Collection XIII.40.
21. *Essai sur la Petite Guerre . . .* Par M. le Comte de la Roche. A Paris: Chez Saillant & Nyon, 1752, p.72.
22. J.B. Harley, 'The re-mapping of England, 1750-1800'. *Imago Mundi,* XIX. 1965, p.56.
23. *Considerations on the Propriety of making a General Military Map of England . . .* [By William Roy]. 1766. MS. Royal Archives, Windsor Castle. George III Papers 415(2).
24. *Ibid.*
25. E.G.R. Taylor, *The mathematical practitioners of Hanoverian England 1714-1840.* Cambridge: University Press for the Institution of Navigation, 1966. p.24.
26. *Ibid.* p.237.
27. An MS volume of his reports is in the Public Record Office, WO 30/115.
28. *General Instructions for the Engineers to be employed in Surveying the Coast and Districts of the Country near it.* 17 July 1785. MS. PRO WO 30/115.
29. I am most grateful to Richard Oliver for drawing this report to my attention.
30. Ramsden to the Council of the Royal Society, 13 May 1790. Royal Society Miscellaneous Manuscripts 3.

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VIEWS OF THE PAST

The British Library's Major Autumn Exhibition

Before the advent of photography, images of places and buildings were the business of the topographical artist. Generals needing pictures of enemy terrain, antiquarians collecting views of architectural relics, publishers preparing illustrated travel books and guides, country squires wanting to celebrate their handsome houses and parks — all had need of topographical draughtsmen.

The British library possesses in its collections a vast number of topographical drawings and watercolours, dating from medieval times to the late 19th century. A selection of these, by accomplished artists like Rowlandson, Mulready, Dayes and Grimm and by gifted amateurs, forms a new exhibition *Views of the Past* opening at the Library on 25th September. Most of this material is largely unfamiliar to the public — for example, three Rowlandson watercolours discovered in the collections are on view for the first time.

The range of pictures on show is wide and varied. The selection includes our first real view of London, seen at the end of the Wars of the Roses; Queen Elizabeth's procession leaving the gateway of the Tower of London on the eve of her coronation; Tahiti as Captain Cook saw it two centuries ago; and the city of Boston under siege at the beginning of the American War of Independence.

Of particular interest are the works of touring artists, showing buildings and landscapes throughout the length and breadth of late Georgian England. Fountains Abbey, Stourhead, Felbrigg House, Arundel Castle, and Exeter Cathedral are among the places featured. Some of the buildings still stand; others have long gone — houses on the corner of Fleet Street and Chancery Lane demolished in 1799, a section of Knightsbridge pulled down to make way for the Albert Gate improvements in the 1840s, and Sunderland Iron Bridge replaced by the present bridge in 1929.

This new exhibition gives a fascinating insight into the world of yesterday, much of which can never be seen again. It will take place in the magnificent neo-classical King's Library, a setting which allows the drawings to be seen to their best advantage.

Further information about the exhibition is available from Ann Payne, Western Manuscripts, The British Library, Great Russell Street, London WC1B 3DG tel. 01-323 7504 (direct line) or from Press and Public Relations tel. 01-323 7113. Colour transparencies and black and white prints of a number of the exhibits are available from Susan Easton, The British Library, Press and Public Relations, 2 Sheraton Street, London W1V 4BH tel. 01-323 7111 (direct line).

Please note:

1. The exhibition is being held in the King's Library, the British Library's central gallery at Great Russell Street, London WC1B 3DG. It runs from 25 September 1987 to 31 January 1988. The galleries are open free of charge Mon-Sat 10.00-5.00, Sun 2.30-6.00 p.m.
2. A book also entitled 'Views of the Past' by Ann Payne is available priced £5.95. ISBN 0 7123 0130 5, from the bookshop at Great Russell Street, or by post from Publications Sales Unit, The British Library, Document Supply Centre, Boston Spa, Wetherby, W. Yorkshire LS23 7BQ.

Letters

Seventh Annual Symposium 1987

Dear Mrs Batchelor,

Having returned back to daily routine again, first of all I wish to express my sincere thanks to you for the pleasant reception and meeting at the most interesting symposium with excellent programme and arrangements. Also I thank you most warmly for the unforgettable Annual Dinner at the Imperial College.

Please pass on my very best regards also to the other persons in charge of the organization.

I am looking forward to seeing you soon again.

Yours sincerely,
Nils-Erik Raurala



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World Directory of Map Collections

Second edition, edited by John A. Wolter, Ronald E. Grim and David K. Carrington for the Section of Geography and Map Libraries, IFLA, (IFLA Publications 31), Saur: Munich, New York, London, Paris 1986.

This directory is a revised edition of a work first published in 1976, which was itself the fruits of the first professional project of the Geography and Map Libraries Subsection of the International Federation of Library Associations and Institutions (IFLA). Coverage of the *Directory* has been considerably expanded from the first edition. The professed aim of the editors is to include important map collections "in all countries including national libraries and archives, principal geographical, cartographical and historical society and institute collections, the collections of military geographical institutes on departments, and all other map collections, archives or libraries of special significance".

Sixty-five countries are represented although for the USSR the first edition entries have had to be repeated due to no current information being made available. Also details were withheld from the compiles concerning collections in the People's Republic of China. Some 670 institutions are listed and arranged by country with an alphabetical index combined with (perhaps surprisingly) an index to "persons in charge". This latter information provides a humen touch, which is welcome, but which has to be offset by the inevitable fact that this will date fairly rapidly as curators retire, transfer to new posts or otherwise disengage themselves from the custodianship of a particular map collection.

For each entry the size of the collection, staff numbers, any special collections held and a brief note on the reference facilities is provided. Thus the National Library of Australia lists the Ferguson, Nan Kivell and Petherick collections in addition to the Tooley collection of historical maps of Australia which will be well known (by name at least) to IMCoS members. A note is also provided concerning the individual library's policy on photocopying. This includes such statements as "not permitted" or "if the materials are not secret" etc. Some entries include more general comments pointing out that legal/copyright restrictions and the relative rarity, or fragility of the item in question will be major considera tions before copying can be allowed. For the larger collections some information guides, acquisitions lists or selected exhibition notes may be available (priced or unpriced). These are listed together with details of any published articles or monographs concerning the particular institution and its map collection.

All potential users of the *Directory* are reminded that it is always advisable to contact an institution in advance of a prospective visit. Section 10 of each entry in this IFLA Directory does provide some advance guidance to opening hours and admissions policy but this should still be checked by personal enquiry. IMCoS members will be pleased to note that a copy has been deposited with Tony Burgess the Honorary Libr arian.

Terry Kay
Library Association Library

IMCoS Library

Additions

Lainio E. *'Compass Rose'* Events at sea and nautical charts from Finnish history. Donated by Nils-Erik Raurala.

Pandzic A. *'Stare Karte I Atlasi'* Old Maps & Atlases Exhibition Catalogue from Zagreb May-June 1987. [English summary]. Donated by Prof Novak.

Seboek L. Ed. *'Atlases published in the Netherlands in the rare atlas collection'* Public Archives of Canada [National Map Collection] 1973. Donated by Terry Kay.

Wolter, Grim & Carrington. Ed. *'World Directory of Map Collections'* 1986. Donated by Terry Kay.

Catalogues Received

Ingol Maps. June 87. Maps & Prints.

Antique Maps & Prints. June 87. Worldwide Maps, Plans & Prints.

Ash Rare Books. June 87. Maps, Plans, Prints & Books.

Tooley Adams. June 87. Maps, Plans & Books.

Ivan Deveral. Summer 87. Maps worldwide.

Susanna Fisher. No. 57. June 87. Charts worldwide.

The City in Maps: urban mapping to 1900

By James Elliot, London: British Library, 1987

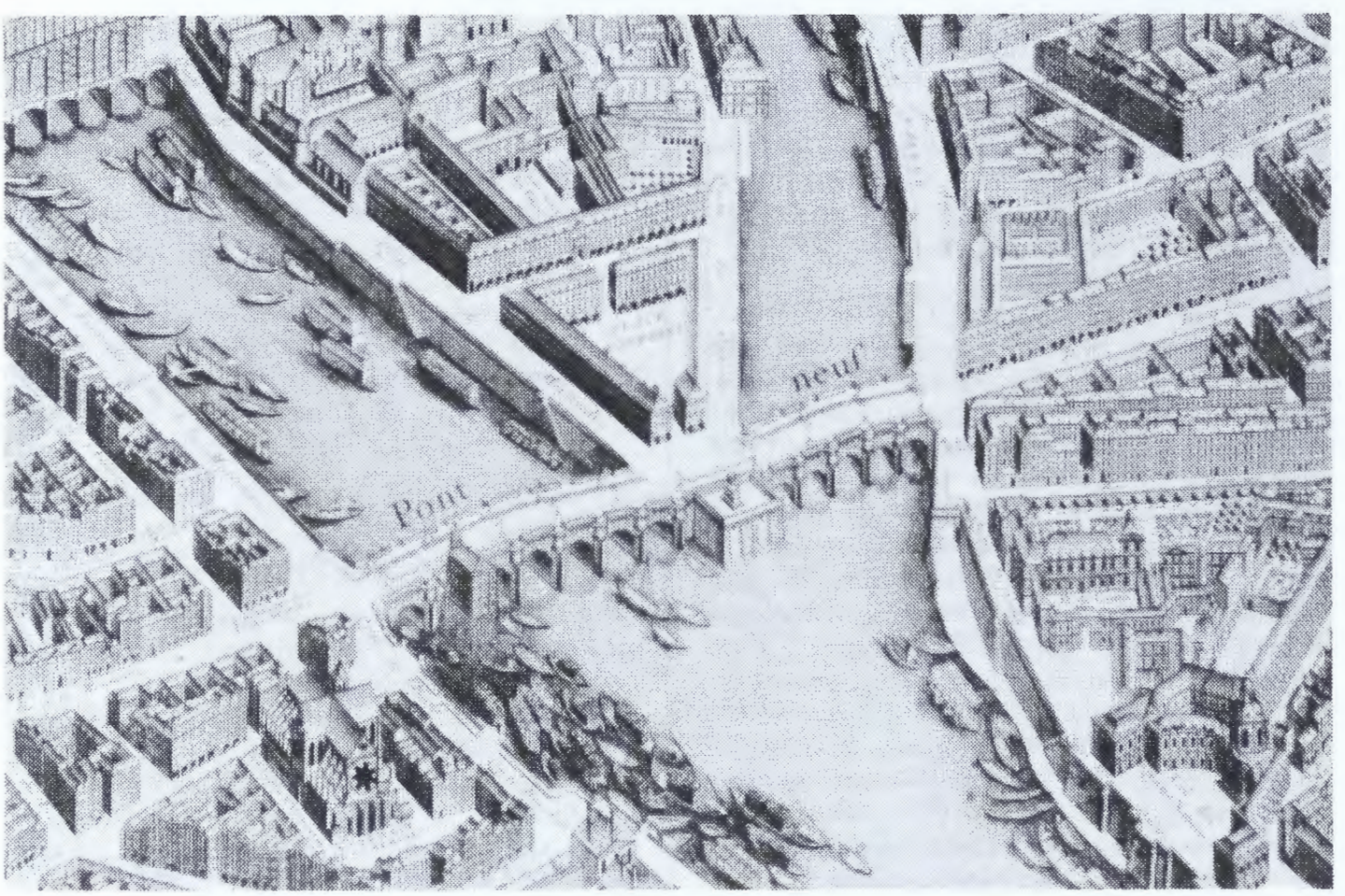
This British Library publication is based on the continuing exhibition of the same name on display in the British Library Map Gallery. Hitherto those visiting the Gallery have relied upon the exhibition leaflet which will continue to be freely available both in the Gallery itself and by application to the Map Library at Great Russell Street. Many IMCoS members will recall the private view for Society members held last year in the King's Library. The appearance of this publication might now act as a spur to those members to revisit the exhibition and indeed as a reminder to anyone who has not yet been able to attend.

As a record of an exhibition James Elliot's book is excellent. Of the 75 exhibits, over 40 are represented in the book by black and white illustrations and there are 13 colour plates. In addition there is a full list of exhibits complete with the Library shelfmarks. The book commences with an introduction in which James Elliot discusses the earliest town plans as represented by (amongst others) an illustration from a Babylonian clay tablet of the 14th century BC. There are chapters on various aspects of the history of city maps which reflect the same general arrangement as the cases in the Exhibition. These cover such topics as maps of medieval cities, Braun and Hogenberg, early town plans of the British Isles, town plans of the eighteenth and of the nineteenth century, and sections on medical, social and military maps of urban areas.

The City in Maps, originally due to run until 31 December 1987, has now been extended by the Library to continue until at least the middle of 1988 thus providing plenty of opportunities for IMCoS members to make a visit. The publication by James Elliot costs £9.95 and is available from the Publication Sales Unit, The British Library, Boston Spa, Wetherby, West Yorks. LS23 7BQ or to personal callers who can buy directly from the British Museum shop at Great Russell Street.

Terry Kay
Library Association Library

Note: The City in Maps is also available from leading mapsellers.



Detail from a plan of Paris by Louis Bretez, 1739, currently on display at the British Library exhibition The City in Maps. By courtesy British Library Board.

IMCoS Regional Meeting, Durham

Date: Saturday, 19 March 1988. Non-members welcome.

Place: Univ. of Durham, Geography Dept Durham Cathedral, Dean & Chapter Library.

Time: 11.00 a.m. (Coffee 10.30 a.m.)

Programme: (provisional)

11.00-12 noon (Geography Dept.):

1. 'Maps, Society and their Meaning'
   Mr M. Blakemore (Geog. Dept.)
2. 'Mapping of Local Medieval Settlement Plans'
   Lecturer to be confirmed

12 noon-12.30 p.m.:

3. Study of Geog. Dept. map collection

12.30-2.00 p.m.:

4. Lunch (Grey College, Univ. of Durham)

2.00-3.00 p.m. (Dean & Chapter Library):

5. 'Earliest Estate Maps of England'
   Prof. P.D.A. Harvey (formerly History Dept., Univ of Durham)

3.00-4.00 p.m. (Library):

6. Study of Library's Map Collection
   Close of Meeting

Cost: (inc. lunch) £10 (excluding wine)

Registration: & further details) Jim Wallwork (Meeting Chairman & Organizer), Aldersyde, 64 Claypath, Durham DH1 1QT.
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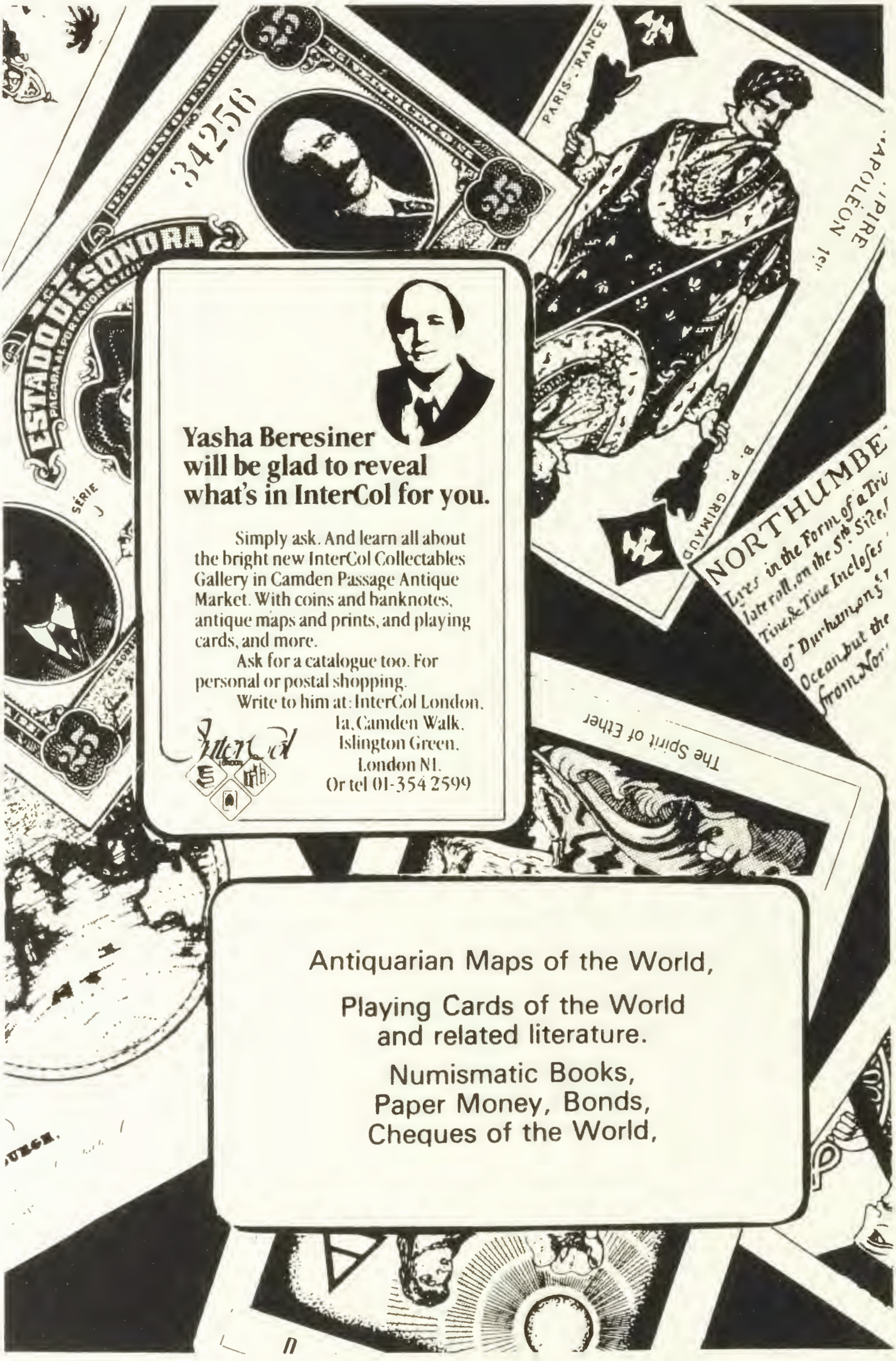
From Bünting's "Itinerarium Sacrae Scripturae" first published in 1581, the Asian Continent is shown as a winged horse, Pegasus.

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