

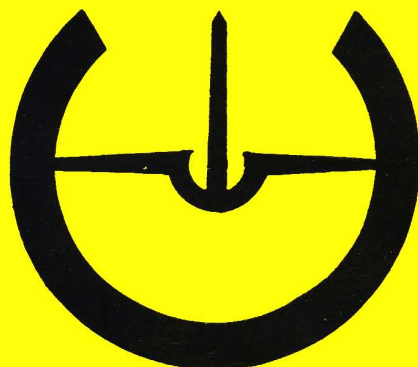
The British Sundial Society



BULLETIN

VOLUME 14 (iii)

SEPTEMBER 2002



Front Cover: Horizontal dial, Botanical Gardens, Christchurch, New Zealand (photo A. O. Wood)

Back Cover: Mass Dial, York Minster (photo Andrew James)

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BULLETIN

OF THE BRITISH SUNDIAL SOCIETY

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EDITORIAL

It is a pleasure to commend to the readers the author-and-title Index of the Bulletin, which should accompany this issue. (You can consult it on our web site also.) The production fills a long-felt need, and its achievement is largely due to Andrew James, and David Pawley, to whom we are very grateful. This Index goes back to the Bulletin's inception in 1989, 13 years' worth of material. This is too long a period for index coverage, and I hope that the next index will cover no more than (say) 5 years, 2002-2006 inclusive.

Our next requirement is for a Subject Index covering the same period as that of this Author Index. I seem to spend (or waste) hours looking through Tables of Contents of back issues for the information which is buried somewhere in the journal. This very day I was asked about the Shepherd's Dial: what it looks like and how it works. If only I had been able to turn up a diagram or photo straight away...!

NEW ZEALAND: FOUR DIALS AND A DIALLIST

A.O. WOOD

Six weeks in New Zealand was firmly meant to be a holiday, so:- no rulers, no compass (just as well at 19° deviation), and no notebook; camera only and an ageing memory.

Firstly, two big dials.

The one outside Clapham's Clock Museum in Whangarei, North Island is claimed to be the largest in the southern hemisphere (Fig. 1). A very large and very traditional gnomon casts its shadow onto a series of marker stones with the hour numerals on. All dials have their unique features (peculiarities) it seems, and this is no exception. Its shape on the ground is the sector of a circle with rounded corners. The hour markers are removable so that every spring and autumn the local council workmen move them one space to the right or left, having retrieved one from and returned one to store. Halfway up the style is a small plate with conical projections, this must be the only dial with provision to stop people from sliding down the gnomon!



Fig.1. Horizontal Dial, Clapham's Clock Museum, Whangarei (large mural in background)

The Clock Museum is well worth a visit and houses an incredible array of timepieces, mainly shipped over by immigrants settling in New Zealand from Europe and

including a rare English longcase. How did they all ever arrive in one piece? Roger Schofield, the Curator, was intrigued by a mass dial picture I had printed out that morning (the wonders of the Internet and cybercafés) and gave me an introduction to local dial maker Ray Sanson, whom we meet later.

Flagstaff Hill at Russell in the North Island looms large in New Zealand history and marks the scene of troubles between settlers and the settled upon. However, Russell did become the Capital for a while and the Flagstaff now stands reasonably safely on a hill just outside the town. Adjacent on a slightly smaller peak is the dial in Fig. 2: again quite a big one, this time on a mosaic circular base, its unique feature being 'the strange pointy bit at the tip'. The dial was constructed in 1988/89 by the New Zealand Institute of Surveyors to mark their centenary; it is on the site of a former triangulation point.



Fig.2. Horizontal Dial, Flagstaff Hill, Russell

Alice Morse Earle in her book 'Sundials and Roses of Yesterday' made a valiant effort to promote the idea that no rose garden was complete without a sundial as central feature. The other two (quite big) dials encountered were indeed in rose gardens and had their appropriate peculiarities.

Still in Whangarei, in 'The Rose Garden', a municipal garden devoted to a considerable collection of carefully labelled roses, is a large horizontal dial (Fig. 3). I was told it had lost its gnomon but all was well and a gnomon is there. It is a distinctly unusual shape and represents a

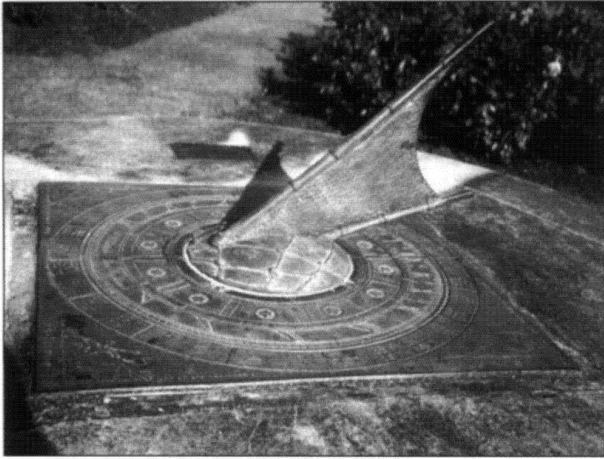


Fig.3. Rose Garden Sundial, Whangarei

Polynesian sail mounted on a stick and shell 'map' which used star and wave patterns for navigation over long distances. The equation of time correction is given for each day of the year and could be read by a tall person leaning across the mount stone, which is around three times the diameter of the dial itself.

Moving to South Island and the Botanical Gardens in Christchurch, another carefully annotated rose garden features, at its centre, a large horizontal dial. This dial's 'unique feature' is immediately apparent (Fig. 4 as shown on the front cover). The base of the style is placed at the centre of the circular dial which is about a yard across and beautifully engraved on polished slate. At first sight it looks 'one sided' but at least the hour lines are radial and the dial face occupies the whole stone.



Fig.4. Dial in Botanical Gardens, Christchurch

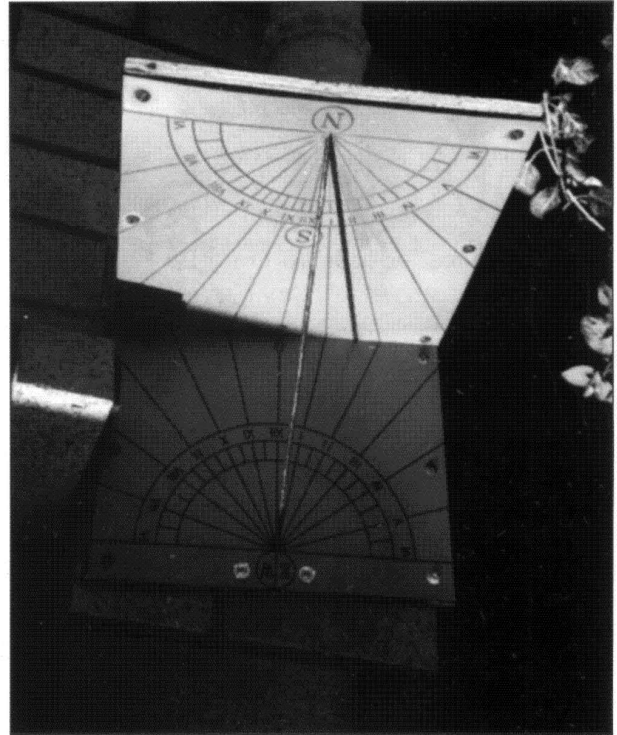


Fig.5. Combined horizontal/vertical dial by Ray Sanson

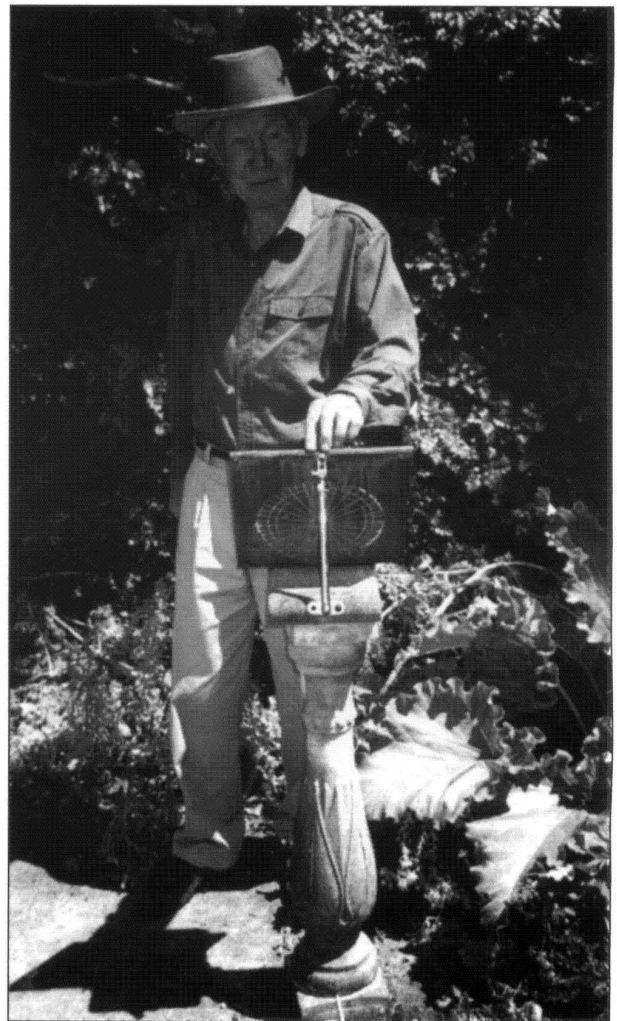


Fig.6. Ray Sanson with equatorial dial, Whangarei

Ray Sanson, Diallist.

Mr Sanson lives in Whangarei, served in the N.Z. Army during the Second World War and actually reached England and Leeds (Kent!). Now retired and armed with a copy of Alan P. Herbert's 'Sundials Old and New', he has made a series of beautifully constructed dials. Taking my watch time as starting point, he applied longitude (174° E) correction, equation of time correction and finally the Summer Time hour. We then looked at the dials - spot on, to a minute! His combined horizontal/vertical dial is shown in Fig. 5; and a two-sided equatorial provides support in Fig. 6. As far as I can see A. P. Herbert doesn't cater for the southern hemisphere, so Mr Sanson must have had to sort out the relevant equations himself. A very pleasant afternoon, thank you Ray!

I suspect a New Zealand Sundial Register might be a slim volume. There are other dials. Jill Wilson saw some, and Peter Ransom told me of four I'd 'missed', and I did see one garden dial 'en passant'. The ones seen here however provided a quiet diversion from climbing volcanoes, sailing, snorkelling, swimming etc. over Christmas and the New Year in the hot sun!

Thanks to Ray Sanson for information on the Russell and Whangarei Rose Garden dials.

A.O.Wood
Churchdown, Glos

THE BRITISH SUNDIAL SOCIETY ANNUAL CONFERENCE AND AGM HELD 19TH TO 21ST APRIL 2002 AT THE CROSSMEAD CENTRE, EXETER

BY ROBERT B. SYLVESTER

Crossmead, a delightful Victorian house on the outskirts of Exeter, provided yet another excellent venue for our Annual Conference. With a record number of delegates in attendance, we were treated to a full lecture programme and were delighted to see just how international we truly are by having talks by American, Australian and French members.

To start the official programme on a light hearted look at sundials, once again Roger Bowling gave us the results of his researches, this time about 'Artists, architects and designers: people who should know better'. As if to balance the dialling ignorance of such people, Fred Sawyer delivered yet another of his erudite talks on co-ordinate systems and their relationship to dialling.

A purely practical touch was given the next morning by Ben Jones whose 'feel' for stone provided us with an insight into the mind of a stonemason. With such a practically minded membership, this discourse on making a dial from stone, and the design and lettering considerations involved, went down very well.

We nearly had a mass walkout when delegates saw that Dr. Martin Jenkins was to deliver a talk entitled 'Essential Science for Diallists' as we were not yet in serious mode, but Martin's talk touched upon hitherto unconsidered factors in a diallist's life such as rate of fall of a dropped sundial (it differs between Dorset and Aberdeen!), thermal effects of clothing when setting up a dial and the warmth

contributed by one's dialling companion when recourse from the elements is sought in the car after perching atop a ladder! The room rocked with mirth and fearing it was a spoof on Fred Sawyer's talk, I was only too pleased to later find them together in a mood of bonhomie.

After coffee, George Smith from New South Wales took us through several antipodean dials including several large public ones. George, a keen engineer and astronomer, is one of our most enthusiastic members and hopes to set up an Australian Sundial society before long.

I was particularly delighted in the next talk as Dr. Hester Higton took us through her work at the National Maritime Museum on portable sundials. This is not my field, but with a sundial talk to antique collectors looming, it gave me an insight into an area of dialling which I have previously neglected. Dr. Higton gave a thorough insight into the various obvious sundials as well as such associated items as nocturnals and quadrants. Although she illustrated how easily it was to be fooled by fake antiques, sometimes the very opposite happens. She recounted a tale of a Roman 'case', excavated near Este in northern Italy and languishing in a museum for a century which on close and perceptive inspection turned out to be a cylinder sundial.

After lunch, two excursions were planned and I opted for the one to the Norman Lockyer Observatory at Sidmouth, now owned by East Devon District Council and managed



Diallists at Norman Locker Observatory inspecting the sundials.

and run by unpaid amateur and professional volunteers. Norman Lockyer was active from 1863 to 1902 and he worked in such fields as solar, stellar and meteoric studies as well as discovering helium in the sun before it was discovered on Earth. He also founded the prestigious science journal *Nature* and is looked upon as the father of astro-archaeology for his studies of Stonehenge, Carnac and the Egyptian pyramids. We saw the refracting telescopes, moved there upon Lockyer's retirement in 1902, notably the Kensington, the Lockyer and the McLean instruments. We also saw the display facility which included sundials. One of the domes houses a planetarium and delegates were treated to the time-accelerating effects such instruments can demonstrate.

The other coach made its way to Buckland Abbey, originally home of the Grenville family and later, that of the Drake family for four centuries after its purchase by Sir Francis Drake in 1581 after his voyage around the world. Delegates saw the stained glass window dial made by our Chairman. The return journey took them over Dartmoor and it was with a degree of relish that the prison, built originally to house French prisoners during Napoleonic times, was pointed out to the French contingent in the party!

After the Conference Dinner, Dr. John Lester sharpened our wits with a quiz. This was a new venture, and the carefully researched and prepared set of 26 questions was tougher than expected. Graham Stapleton was the clear winner with 20 correct answers.

On the Sunday, we were pleased to welcome member Professor Charles-Henri Eyraud and colleagues from the University of Lyon. The morning was devoted to their work in the Lyons area of France. It would be tempting to think that the French could teach us something when it came to interesting children in Dialling, and indeed, Professor

Eyraud showed us the efforts he has gone to. As we have other members in the Lyons area, I am inclined to think that Lyons is a hotbed of such activity. His colleague Gérard Labrosse gave a video presentation of the use of a plotting instrument to delineate sundials on irregular surfaces. Then Gérard Vidal discussed an ambitious database on sundials for the Internet.

John Davis always fascinates us with his activities, be it the intricate sundial replicas he makes, his sterling effort in producing the BSS Glossary and by the thoroughly researched sundial talks the presents to us. This time he spoke on 'A Tale of Four Grocers' and held us spellbound on the intricacies of engraving and stylistic details.

A regular feature of all our conferences is the bookstall run by Rogers Turner. Among this year's offerings of both second hand and new publications, we were pleased to see copies of Hester Higton's book 'Sundials: An Illustrated History of Portable Dials' upon which her lecture was based. Beautifully illustrated, it received a favourable review by Mike Cowham in the December 2001 BSS Bulletin. Another member whose researches had recently appeared in print was Cornish Sundials by Len Burge. Mr. Burge, in a sumptuously illustrated volume, has put together the result of twelve years' work on the sundials of his county.

The Andrew Somerville Lecture is an annual event and features a lecture by an individual distinguished in their field. We were not disappointed. Dr. Silke Ackermann is Curator of the Department of Mediæval and Modern Europe at the British Museum. Dr. Ackermann took us through 'Folded Time Unfolded' in a talk about sophisticated astrolabic quadrants. I was particularly pleased to hear an elucidation of the subject as hitherto, I had been unable to make sense of these old astronomical instruments. The astrolabe was likened to a modern

computer insofar as it was possible to make a great number of calculations of the positions of heavenly bodies. The standard astrolabe was shown in its folded form as a quadrant and it was a portable and widespread instrument.

Of particular interest was a quadrant which Dr. Ackermann had been researching and believed it was little more than a century old despite being assured that it was much older. Her researches took her to Istanbul and an analysis of the Arabic inscriptions gave the names of zodiacal constellations and also French text. As a result of these researches, she felt the Muslim world was awakening to a new pride in their scientific heritage but ruefully added that the prices now commanded by such Islamic artifacts placed them outside what many museums could bid.

The Annual General Meeting saw the retirement of Jane Walker as Education member after 12 years in post and I gave up Membership Secretary duties after a decade. We were both thanked for our efforts and presented with a copy of Hester Higton's book.

Kevin Barrett, the incoming Membership Secretary, accepted the prize for the London sundial trail, adjudged the best of the several now established.

Our evenings had the conviviality which is common to BSS meetings. Those who strayed out into the night relished the impressive planetary alignment in the western sky.

Sunday dinnertime was the long awaited opportunity to gather as many delegates as possible for the now customary group photograph. I commandeered a window in the dining hall to take in the assembled group on the lawn below.

All in all, it was a most successful Conference and continued the tradition for which the British Sundial Society has become known. The standards of presentation was generally very good, several speakers using computer graphics in their projected presentations.

MINUTES OF THE 13TH ANNUAL GENERAL MEETING OF THE BRITISH SUNDIAL SOCIETY

1. The meeting was opened by the Chairman, Christopher St J H Daniel, at 12.20pm. By a show of hands, 67 voting members were present.
2. Apologies were received from Owen Deignan.
3. The minutes of the 12th Annual General Meeting held in York on 29 April 2001 (which had been published in the Bulletin, September 2001, pp103-110) were adopted and the archive copy signed by the Chairman.
4. There were no matters arising.
5. **Secretary's Report** The Secretary's main roles are liaison with the general public, organising the annual conferences, and the supporting administration.

Liaison. Since the last AGM I have dealt with 108 enquiries by letter and a small number by telephone. This is fewer than last year, as more are making use of the web site. A recent example was of HTV seeking dial makers for a TV programme, finding the web site, then following up with a telephone call.

Conference 2002, 19 - 21 April. This, the 13th conference, is being held in the Crossmead Conference Centre, Exeter. A total of 106 have booked and we are honoured to have 5

attending from France. As usual, the programme is quite full, and one of the pleasures of the post of Secretary is how readily members come forward with offers to talk at the conferences. Long may it continue.

Conference 2003, 25-27 April. This has been booked for the Yarnfield Park training and conference centre, which is located near to Stone in Staffordshire. The accommodation is of a high standard, with all en-suite. It is some time since we have had workshop sessions and I look forward to hearing from members to volunteer or send in suggestions.

Conference 2004, 16-18 April. Given the enthusiasm shown for the idea of an international conference, and with Oxford as the preferred city, considerable effort went into visiting colleges, presenting the results of a survey to Council, and then having further visits. Although we were hoping to have a conference with the traditional 'Oxford experience', the older colleges invariably had small lecture theatres, and sometimes not very good accommodation. We therefore chose a more modern college, and St Anne's has a superb lecture theatre that will take 150, has a mixture of accommodation and a large dining room. It also has good facilities for exhibits, and perhaps best of all, it is on a very compact site around the central lawn.

A small sub-committee has been formed to look after the planning, and comprises Christopher Daniel, Margaret Stanier, Jill Wilson, Mike Cowham, Patrick Powers, Ian Wootton and myself. Last but not least, Dr Jim Bennett, Director of the Museum of the History of Science, is on the committee, and has offered to open the Museum out of normal hours for the conference, and possibly host a reception.

Constitution and Council meetings. The culmination of two years of work, albeit intermittently, has produced a draft constitution for consideration at the Special General Meeting. The background is described in more detail with the agenda for the SGM. The sub-committee that toiled over the minutiae of clause and sub-clause was Christopher Daniel, Graham Aldred, Gerald Stancey, Patrick Powers, David Young and myself. Latterly, Ian Wootton steered us through a transition between a draft by the committee, and a 'model' constitution that had been produced quite recently by the Charity Commission. The two versions were very close, and it was not difficult to transfer our needs into the 'spaces' in the model, once this course of action had been agreed. Further effort was then required to confirm that the Charity Commission was happy with the end result, and after some correspondence, the draft reached the stage where it could be circulated to all members in the March Bulletin for comment. So far only two sets of comments have been received, and these were relating to minor typographical errors and some phrases. The errors have been corrected in the version being offered at the SGM.

Leaflets and lectures. The main colour leaflet has been well received. A copy was sent to all members last year, and this, and the general demand, has meant that 2000 have been printed so far. If you need a stock for giving out at meetings or lectures, please contact me for supplies. The 'dial makers' and book list leaflets are photocopied on demand, with the former kept up-to-date. Both of these leaflets are now given in full on our web site.

Last year I mentioned that lectures given by members are an important element and reflect well on the Society. One member has told me that he has given 26 talks since 1997, and quite a few others give several talks a year.

Another form of publicity arose when the Society was asked by the Royal Astronomical Society to set up a small display at the President's reception in February 2002. David Young prepared a selection of photographs to be mounted, and John Moir and myself took a selection of dials. Despite being surrounded by glittering images from satellites, the modest 'hands on' display was very well attended, and

gave an insight about what simple objects to have to available. Further events are planned as static displays, the first being at the Herschel museum in Bath, March to May; and Rutherford Appleton Laboratory, May to July.

There were no matters arising and the report was adopted.

6. Treasurer's Report (The statement of accounts is at the end of these minutes.) The Treasurer reported that the financial state of the Society is healthy. Despite showing a large increase from FICO (the term FICO applies to the tax return from Gift Aid) the Treasurer was disappointed that it was not higher and asked again that members who had the old covenant forms please update to gift aid, and more members could yet complete the forms. The Treasurer noted that the running expenses are quite high, even though quite a few members of Council did not submit full expense claims. The expenses include the cost of the colour leaflets. Event such as the conferences were budgetted so as not to make a loss. The Treasurer wished to thank John Churchill, David Young and Margery Lovatt for their efforts in obtaining incomes for the Society. In the financial year we were seeing the benefit of applying advice by the Charity Commission that for a Society of our turnover, auditing the accounts by an accountant was not necessary, and they would be satisfied by checking by a competent person. In this way there is a saving of nearly £400. The unusual entry of £155 to the British Heart Foundation was part of the agreed 50/50 split between the Society and the BHF arising from the auction of the late Peter Lamont's collection of dials and slide rules. On a personal note, the Treasurer said that his planned tenure of office will be completed at the AGM in 2003, and it will be helpful if members seek a nominee before then.

There being no more comments or questions about the accounts, they were accepted by the meeting and signed.

7. Reports from individual members of Council and Specialists

Advertising: Since John Churchill set up our advertising costings and relinquished the post a year ago, any incoming advertisements have been shared between the Editor and the Secretary. The Editor looks after entries in the Bulletin whereas the Secretary forwards the less formal advertisements to the Newsletter. During the year, there has been little income from advertising, but neither has there been much effort to attract new entries. Council hopes that this task will be taken on by a member.

Biographical Index Project: Jill Wilson At present the draft of the Index is progressing and part has been checked at the first draft stage. I should like to record my thanks to

the vast number of people who have sent me names and details of new dial-makers and photographs and data for known ones. Thanks, too, to all those who have and are assisting in other ways, including proof-reading – and general encouragement.

I now have over 2000 records, including the names of some makers working after 1920 who will not be included in the Index. (To cover modern makers as well would unbalance the list, besides adding enormously to the biographical research required.)

Many of the most recently added names of earlier makers result from queries I receive – the ones I can't answer immediately! Where possible I do give information and am always happy to provide such background as I can.

Reference Library: Graham Aldred The BSS reference library at Nottingham has been in existence for two years. It is a general collection on dialling and closely related dialling topics. Although some books will be familiar to members, there are many that are quite rare and unlikely to be encountered. The collection includes a number of very valuable historic works. A room at Bromley House is currently under restoration and when it is finished, it is planned to relocate the whole BSS Library there, where variable pitch shelving will allow the books to be ordered logically. A further batch of books has yet to be added to the collection and this will happen when the room is complete. Then a catalogue will be published to allow members to be tempted into visiting this atmospheric and interesting library, which includes the restored Meridian Line and mechanical wind direction indicator.

We have ordered a full set of the excellent dialling facsimiles published by NASS in the Shadow Catchers series. These are important reference works, four in number, by Samuel Foster, 1638, 1652; Emerson, 1770; and Clerke 1687. Members can also purchase these from NASS.

I would like to thank Ian Wootton, who, amongst his many other contributions to the Society, not only produces bound volumes of the Bulletin and the Compendium for the Library but also has carried out major repairs and restoration to valuable books in need.

Restoration: Graham Aldred Restoration enquiries continue to come at a rate of one or two per month and the society offers advice freely. It is probable that only a small proportion of these lead to an actual restoration due to the practical complexities and cost of serious sundial restoration or replication. BSS has recently republished the

list of dial makers and this includes those who are prepared to carry out restoration or replication. BSS is not always informed of the outcome on any particular enquiry but it is known that an unfixated horizontal dial by the previously unknown Robert Booth dated 1760, in private ownership, has been fitted with a new gnomon, and a large multiple has been fitted with several new gnomons. Serious ongoing enquiries concern dials in Jersey, Blakesley Hall, and Cowbridge. Often enquiries come from people who did not know that BSS exists so this suggests that we need to increase the public awareness of the Society and its expertise.

Mass Dial Group: A.O.Wood The year has seen a continued good level of reports being submitted, with the NADFAS Church Recorders again making a significant contribution.

Mention must be made of dials discovered in Jersey and Scotland. The Jersey dial is the first recorded from the Channel Islands whilst the two Scottish dials are horizontal. This first definite record of horizontal dials has now been supplemented by an English example in Cambridgeshire.

A start has been made on the Mass Dial Register. It has been decided that it will be available in two formats. Firstly on CD with one page per dial and secondly as a printed short 'one line entry' listing. A full printed version of the CD version, which incorporates photographs, will be available for the archive/library. A complete listing for Lincolnshire, produced by Bob Adams, is now available and has provided an excellent model for the full Register.

Many thanks to Patrick Powers for assistance in setting up the Register database. The decision to include pictures has resulted in some delay but fortunately computer technology has advanced rapidly and no storage capacity problems are now anticipated.

Finally - thanks to all recorders for their efforts over the past year.

Education: Jane Walker 2002 has been my 12th year as Education Officer and I have decided to resign at this AGM. I have enjoyed my years in the post and hope that someone may come forward to carry on what has been an interesting and enjoyable liaison with schools and educational establishments all over the world.

We began as a team, the Education Group, and our two main projects have been the book *Make a Sundial* which has been popular with schools, and the video *Looking at Sundials* which is no longer viable but which found its way

into museums and garden societies. In addition we have run Sundial Days in schools and have given help and advice to teachers and parent/teacher organisations wishing to make sundials in parks and playgrounds.

The new edition of *Make a Sundial* is now under way and should be available in time for next year's Conference.

The BSS Web site: Peter K Scott The BSS web site is now fully established and has become an important part of the Society's infrastructure supplementing the already established methods of communication with members. The web site allows the Society to publish information to its membership and also to the general public, who may have an interest in dialling and require further detailed information. Many of our newest members have been recruited as a direct result of visiting the web site.

During 2001/2002 the site has been expanded once again to include more detailed information and many new features. In particular the sections for mass dials, dials of distinction, and the Newsletter page, have been modified. Individual Council members now have photographs on their relevant pages to help identify them, and the site has been sprinkled with sundial images to make it more visually exciting. Recent additions include a conference page and a list of dial makers with web links. Plans are afoot to improve the site again during the course of this year and to further improve the general layout and user friendliness. Various people have commented on the site and the Webmaster is very grateful for the words of support that he has received.

With the continued growth of the Internet and with faster connection speeds now available via ISDN or cable, the future of the Internet as a powerful communications medium is guaranteed. The BSS web site will continue to grow and keep in line with the technology as it develops.

The Webmaster welcomes feedback on any aspect of the site and constructive suggestions are always encouraged.

Editor: Margaret Stanier During 2001, the BSS Bulletin, as an experiment, was published quarterly, with 44 pages in each issue. This arrangement provided 20 pages more than heretofore, the previous system being 52 pages 3 times a year. Thanks to the dedication and enthusiasm of our contributors, authors, photographers, report-writers and others, we filled the four issues. So we may hope that this experiment will become the established practice. But it is a constant slight anxiety to the Editor in the days and weeks before the next issue is due: will there be enough material? Will tomorrow's post bring another article? A photo? A poem? Delightful as it is to read (almost) anything which

comes in, I especially enjoy items from members of the Society who have not sent anything before, or not for a long time. So if you are wondering whether or not to send me something---send it!

A strenuous effort is currently under way to produce an index for the Bulletin, which will then be circulated to the membership. An index for the first five years of publication was produced by Colin Thorne and circulated to members early in 1994, but nothing in the way of indexing has appeared since, and the current production will supersede the Thorne index. This new index should allow easy reference to articles previously published, avoiding the need to go back through the Tables-of-Contents searching for the item which you know you read 6 months ago--or was it a year ago? Or two years? I should like to take this opportunity of thanking Dave Pawley for several years' hard work on the index. Warm thanks also to Dave's friends Roger and Wendy who scanned and typed-in the original Thorne index, to Mike Isaacs and Colin Davis who contributed to typing-in, and to Michael Lowne, Wilf Dukes, Mike Shaw, Fiona Vincent, Maurice Kenn and Tony Wood who helped in the proof-reading. Andrew James is now doing an excellent job in finalising the work.

Back numbers of the Bulletin are stored and sold by Margery Lovatt, who does an excellent job. She keeps a stock list and sells other items of BSS interest also, such as ties and badges and the Sundial Glossary. I, and indeed all Council members, feel very grateful to Margery.

Membership: Robert B Sylvester During the current season, the Membership database has been tidied up after the several operational changes of the past year. There has been a reduction in subscribing members, the records standing at 596 database entries, of which 570 are paying members. Now, over one hundred members have joined over the years after seeing our publicity on the Internet, attesting to the success of this scheme for recruitment purposes although there have been fewer enrolments generally, over the past six months. The majority loss has been due to members lapsing, despite a record number requiring second reminders to pay their subscriptions. Of the members sending letters of resignation, most send good wishes for the Society's future but cite age and infirmity as their reasons for not continuing.

Mr Sylvester wished to add a personal statement on the occasion of his retiring from the post. He said that over the past ten years, he has enrolled over 760 new members and his records have been a fascinating Odyssey of hopes and sometimes failed intentions as members have told him of their plans, many of which have come to fruition and been

reported in the pages of the Bulletin. Being Membership Secretary has meant that he was the first point-of-contact for most members and it was a privilege to be able to help and advise them. As a result, he also has lots of foreign stamps! Mr Sylvester went on to thank all for the help he has been given over the years. The degree of co-operation had been splendid and he had worked in harmony with an excellent Council. He has had a most enjoyable job and met many good people through the Society. He feels that his successor is going to prove very able and wishes him well.

Fixed dial register: Patrick Powers A further small reprint of the Third Edition of the Register was commissioned earlier in the year to satisfy the continuing demand and, despite the fact that it had to be offered at an unsubsidised price, it has sold well.

In this past year dial sightings have continued to come in at the usual rate but, owing to a software clash problem with the Society's PC, database entry was curtailed for some considerable time. As a result a huge backlog now exists but this is slowly being whittled down.

In the past year the pages on the Society's web site that are devoted to the Register have been maintained and updated as necessary. No further errors, omissions, duplications and other errata relating to the Third Edition of the printed Register have been reported by Members. The full list of these is given on the Society's web site.

Last year I reported that we have a large number of dials that have not been seen for a considerable number of years and although this number has been reduced by Member's reports we now have others falling into this category for the first time. A printed listing of these rarely seen dials will again be available for perusal at the 2002 Conference and it would be appreciated if Members could send in reports for any that may be near them.

Work has been undertaken in the year to put onto CD-ROM the out-of-print Bulletins and A J Adams' excellent Register of the Mass Dials of Lincolnshire. These are available from Margery Lovatt.

Finally can I repeat what I said last year, that the information in the Register is available to *all* Members - not just those who do a stalwart job of recording them. Please do get in touch if I can be of assistance in answering any query you may have or if you wish to record a dial and have not done so before.

Exhibitions: David Young A pack of exhibition material has been produced that can be easily sent by post to members wanting to advertise the society at a local event. It has been used on three occasions last year and is booked for one in July this year.

A display was mounted at a meeting of the Royal Astronomical Society in London in February attended by the Secretary and member John Moir. The panel made for this will be used for further exhibition in Oxford and Bath later this year.

Sundial Safaris. In September last the tour to North Wales took place, some 34 members attending. We stayed at one hotel for the week making trips by coach to many interesting sundials and places amid the pleasant background of the Snowdonia National Park. The tour has been very ably described by Dr Don Petrie in the December Bulletin.

In the present year the tour to Austria has attracted 27 members and this will take place in June with the detailed arrangements being made by Mag. Walter Hofmann with the co-operation of the Austrian Sundial Society.

Internet: Piers Nicholson In 2001, www.sundials.co.uk had 590,500 page views, an average of 1,618 each day. The number of visits in the year was 261,600, an average of 716 per day. The average length of visit was 8 mins 35 secs. There were 104,900 unique visitors – on average each visitor paid 2.6 visits in the course of the year.

In the last quarter, an extensive programme of site redesign was implemented in order to give the site a fresh, modern, and professional appearance. The changes have been commended by users. The main thrust of site development has been on the sundial trails. At the close of the year, there were 17 trails in the British Isles, 14 in Europe and the Middle East, 5 in the Americas, and 2 in Australia. The competition for new trails written in the year 2000 was judged during 2001, and the Guernsey trail was the winner. The winner of the competition for trails written in 2001 will be announced shortly. (A number of council members have assisted with the judging – their contribution is much appreciated.)

These trails are very popular: the Cambridge sundial trail is now getting 4,400 page accesses a year, and 4 other trails (London Thames, East Sussex, Poland, and Toronto) each get more than 4,000 page accesses a year. Sundial trails are a very good method of "spreading the word" about sundials. They will come up on searches for the particular places on the trail.

Plans for the coming year include a complete review of the content, a review of the links between SOTI and the BSS web site and the promotion of a further competition.

The support of the British Sundial Society towards this major educational site is gratefully acknowledged, and it hoped that it will continue at the same level for the current year.

Newbury 2001: Peter Ransom & David Pawley The success of the Newbury meeting owes so much to so many people that it is perhaps unfair to shorten the most excellent report in the December 2001 Bulletin. However this abbreviated version will ensure that Newbury is never in the shade. At the 2000 meeting most of the hot air was pumped into the hot air balloon. The surprise for 2001 was the superb free astronomical software demonstrated by the Newbury Amateur Astronomical Society. With the use of a laptop and digital projector the different events offered by the 80-odd members present were quickly incorporated into a tremendous programme. This technology was also was a valuable asset in showing the astronomical software. David Pawley oversaw the whole event, delegating people to various tasks that help the event run so smoothly. Unlike the annual conference which requires advance planning, the Newbury event relies on members turning up willing to help and contribute either a short talk or exhibition. The variety and excellence of these was sans pareil. Thanks to David, Peter, Tony & Sally, John and Mike for their efforts in keeping the wheels oiled each year at Newbury.

Publication sales: Margery Lovatt Our store of Bulletins reside safely on the 3rd floor of Parndon Mill, with the sculptors, printers and artists quietly working away under the eaves, remote from the dramas of floods and farm-life going on at ground level. We still have 4 Registers for sale. We also have 3 CD-ROMS of the 'out-of-date' issues. Sales trickle along most of then year with a lull after Christmas. After the AGM it picks up again, and my regular visits to the post office start again. It is always very nice to receive requests, especially from our foreign members. The Glossary sold very well, and there is an on-going interest in The Ancient Sundials of Ireland. The Register was of course a huge success too. However, I feel that the Bulletin is our most important publication as it is this that keeps the BSS alive. Any enquiries about Sundials, which do come to me from time to time, I pass on the Doug Bateman or David Young.

Having received these reports in advance there were no questions, and the Chairman deemed the reports to be accepted.

8. Election of Officers

Chairman, Secretary and Treasurer. The Chairman (C Daniel) had been proposed and seconded by J Davis and J M Shaw. The Secretary (D Bateman) and Treasurer (G Stancey) had been proposed and seconded by P Ransom and M Cowham. There being no other nominations the Chairman declared those proposed duly elected.

Members of Council. Under the new constitution, up to 4 members, in addition to those above, may be elected to serve on Council and also be trustees. M Stanier and K Barrett had been proposed and seconded by J Davis and J M Shaw, and G Aldred and P Powers were proposed and seconded by P Ransom and M Cowham. There being no other nominations the Chairman declared those proposed duly elected.

Checking the accounts. The Treasurer proposed that Mr A R Ashmore being nominated for checking the accounts. This being a simple procedural matter, and as there were no objections, Mr Ashmore was duly elected.

Co-opted members. The Chairman explained that under the new constitution, Council had the power to co-opt up to 3 members. At present, the Chairman stated that Mr A O Wood is likely to be co-opted as the specialist on Mass dials. However, this did not preclude other experts being invited as non voting members to serve on Council when required.

9. The proposed Election of a Vice-President The Chairman proposed that Mr David Young be elected as a Vice-President. The Chairman explained that since our foundation in 1989 the Society has customarily had two Vice-Presidents, which posts have been bestowed as an honour on such person or persons who are distinguished in the science of gnomonics or the art of dialling, or who are deemed to to have made a significant contribution to the Society. Charles Aked was the last such person, and since his death and that of René Rohr, there have been two 'vacancies'.

David Young, like Charles Aked, was a Founder Member of the Society in 1989, since when he has devoted considerable time, effort and knowledge to the progress and well being of the Society, particularly during the formative years when he was Secretary. Having played a crucial role in the development of the Society, the Chairman said that we are indebted to his sense of duty and freely given services, and therefore justly deserves the honour of being elected as a Vice-President.

The proposal was seconded by the Secretary, and the motion was unanimously and enthusiastically carried.

10. Any other business A vote of thanks was given for what was considered to be a successful conference and enjoyable weekend. The Chairman responded by thanking all the speakers.

Mr David Brown proposed that the Society should explore the idea of the European database of sundials, as had been outlined by the visiting speakers from France. This was endorsed by the meeting.

The Chairman reported that two very long serving members of Council had retired at this AGM, and in recognition Jane Walker and Robert Sylvester were presented with autographed copies of the book by Hester Higton, *Sundials, An Illustrated History of Portable Dials*. Both replied by saying how they had enjoyed their terms of office, and received very warm applause.

The meeting was closed at 12.45pm.

D A Bateman, Honorary Secretary

MINUTES OF THE SPECIAL GENERAL MEETING OF THE BRITISH SUNDIAL SOCIETY

1. *Opening remarks by the Chairman, Christopher St J H Daniel, at 12.15pm.*

By a show of hands, 67 voting members were present.

The Chairman reminded all present that advance notice had been given of the SGM concerning the adoption of the draft constitution that had been circulated to all members of the Society in last month's Bulletin, and furthermore, a copy with minor corrections, was included in the conference pack for all delegates at this conference. Explanatory notes had also been given. The Chairman invited comments or queries, but there being none, moved onto agenda item 2.

2. *The adoption of the draft constitution that had been included in the conference pack.*

Given the earlier comments and background information, the Chairman simply asked for a show of hands in favour of the new constitution. All were in favour, and as a check, the Chairman asked if there were any objections. There were none, and the Chairman declared the adoption of the new constitution. The Chairman thanked the sub-committee members for their work, and closed the SGM at 12.20pm.



BRITISH SUNDIAL SOCIETY
ACCOUNTS FOR THE YEAR ENDED
31 DECEMBER 2001

STATEMENT OF FUNDS (£)

Year ending 31 December	2000	2001
Current account balance	1,703.12	599.06
Deposit account balance	12.76	16.19
Charities Office Investment Fund	21,588.94	30,744.78
TOTALS	23,304.82	31,360.03
Reduction in funds during the year	6,819.26	8,055.21
Income received during the year	49,280.04	50,383.61
Expenses incurred during the year	56,099.30	42,328.40
Excess of expenditure over income in the year	6,819.26	8,055.21

Income	2000	2001	Expenses	2000	2001
Subscriptions	12,096.97	11,904.44	Bulletin	10,239.82	11,192.39
Covenants	720.00	1,569.48	Officers	3,582.07	3,891.87
<i>Sub-totals</i>	<i>12,816.97</i>	<i>13,473.92</i>		<i>13,821.89</i>	<i>15,084.26</i>
Events	29,815.90	31,673.00	Events	30,557.93	23,846.26
Sales:			Sales:		
Books, etc (ML)	3,423.25	2,163.29	Books, etc	5,500.30	836.07
Education (JW)	582.56	556.00	Education	291.19	272.90
Advertising (JC)	272.40	160.00	Advertising	69.90	0.00
Misc (DY)	126.50	50.00	Misc	0.00	0.00
<i>Sub-totals</i>	<i>4,404.71</i>	<i>2,929.49</i>		<i>5,861.39</i>	<i>1,108.97</i>
Awards	370.00	0.00	Awards	3,110.09	0.00
Donations	393.30	130.84	BH Lib	681.15	200.00
Auction	125.00	1003.85	UKIC	31.00	0.00
Interest	1,325.96	1,159.27	Accountants	387.75	0.00
Misc	28.20	13.24	Internet	608.63	508.63
			Insurance	183.75	184.74
			Somerville	0.00	76.50
			Dial Reg.	772.72	487.76
			B Heart Fndn	0.00	155.00
			Archivist	0.00	597.47
			Misc	83.00	78.40
<i>Sub-totals</i>	<i>2,242.46</i>	<i>2,307.20</i>		<i>5,858.09</i>	<i>2,288.50</i>
TOTALS	49,280.04	50,383.61		56,099.30	42,328.40

STOCKS HELD AT YEAR END

Bulletins	2,710
CD Roms	3
BSS Fixed Dial Register	4
Sundials of Australia	4
BSS Glossary	33
A Celebration of Cornish Dials	5
The Ancient Sundials of Ireland	30
Cambridge Sundials	170
Make a Sundial	5
Postcards	2,830
'Clocks' IV	10
BSS Ties	6
BSS Lapel Pins	87

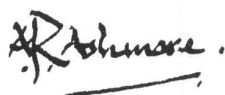
Notes to the accounts

1. The accounts are prepared on a payments and receipts basis. That is, money is booked when it is received or spent. This is in line with the Charity Commission's guidance.
2. The year-end funds are held in an approved investment account as well as a current account. They also include £2142 which represents future subscriptions already paid by members paying under the five year scheme and £877.64 in the Andrew Somerville Memorial Fund.
3. The management accounting figure for the excess of income over expenditure is £3,100, rather than £8,055.21. This allows for pre-payments on the Exeter AGM and five-year payers.
4. Events are priced not to make a loss.
5. Stocks are valued at nil as it is difficult to see that they would have any value in the event of the Society being wound up. This does not impact our cash flow.

Treasurer: G. P. Stancey



Checked by: A. R. Ashmore



AUSTRIA 2002: A SUNDIAL SAFARI

FRANK EVANS

We knew we had arrived at the right place at Vienna Airport when we saw the carefully drawn sign bearing the Austrian and British flags and the British Sundial Society symbol, carried aloft by our leader, Herr Walter Hofmann. At the hotel in Schwechat we found a clutch of old hands already present, together with a couple of new chums, shortly destined to become old hands too. It was evening and the tour promised well.

The next day, Sunday, we got down to work. Under Walter's guidance Vienna was our quarry and especially the magnificent buildings of the old Austrian Empire. We began with Belvedere, the baroque castle of Prince Eugene, victor over the Turks in 1697 (the word "baroque" occurred again and again throughout our stay) and from there on to Schönbrunn, a fairly imposing structure considering it was used by the Austrian emperors only in the summer. On its balcony was a slight dial, one of the few horizontals we were to see during the whole week. Then to the rose garden, to a battered dial of 1979 with much of the time marking on its equinoctial surface flaked off. This was a false introduction to the many magnificent dials which were to follow in the course of our visit. Coffee next, and there were to be several false introductions to that sustaining liquid, too, in the course of our tour, so intensive was our programme. Poor Walter produced many apologies for this. Of course, in the end we forgave him everything.

At Perchtoldsdorf we saw wine bushes. All Brits know that good wine needs no bush but today we learnt that the bushes, made of fir, are an indication that the "vin nouveau" has fermented and that this is an invitation to drink up what was left of last year's pressings to make room for it. The village contained several dials including an indisputably Anglo-Saxon one dated, indeed, 1968.

We shall not forget the concrete church at Georgenberg, the inspiration of Margarethe Ottillinger, a one-time prisoner of the Russians. It had been a wartime anti-aircraft gun site and the harsh concrete of the church reflected the emotions of those times; now it is surrounded by a conservation area supporting many different plants. Also there is an original and intriguing outdoor planetarium over which we were taken by its director, Prof. Hermann Mucke. It is in many ways more instructive, more fun and closer to the hearts of sundialists than the indoor variety. On a north-south orientation a noon line is drawn, onto which the sun's image



Open-air Planetarium, Georgenberg, Vienna

is projected through a shadow disk mounted on a tall mast. The noon line, at first horizontal with date marks progressing from the summer solstice, eventually deflects upwards to climb the style of a large dial to the level of the winter solstice. In this ingenious way the sun's winter image may still be clearly marked although through distance from the shadow disk it would have been fuzzy at ground level. To the south of these structures a central disk is placed on a railed platform and from it the points of sunrise and sunset at equinoxes and solstices are indicated by distant poles. Estimates of civil twilight can be made by judging the height of the poles, which tend angles of six degrees at the centre plate. More cosmically the centre plate itself is said to attract UFOs and aliens although the landing pad is admittedly rather small, less than a metre. Perhaps it is just for pixies. And should these miniature aeronauts need to know, the pad is at 48° 08' 50"N, 16° 15' 13"E.

On this day we formed our first impressions of Vienna. The Danube is a mighty artery, artificially divided into a dual carriageway on its passage through the city, although there is currently little water traffic. The town is clean (you guessed), the metro stations are ornate, there are trams, there are lime trees everywhere and we had wiener schnitzel and apfel strudl for supper. And beyond the palaces, the squares, the Opera House and the tall buildings are the Vienna Woods. All strange and yet somehow familiar. The history of this country brings back hazy school lessons in European history, in some of which our own country was involved. The 'Pragmatic Sanction' bothered several of our members until Walter explained. It was, he revealed, the agreement by which Maria Theresa ("Theresia" in Austria), although a woman, secured the Austrian Emperorship. She was a Hapsburg, of course. The prominent Hapsburg lower lip, due to an inherited elongate lower jaw, appeared in several pictures we were to see.



*Graeco-Roman Sundial, Ephesus Museum Store, Vienna.
Below: Walter taking measurements*

On Monday we first visited a pair of Romano-Greek sundials. They had been found near Trieste although they were apparently made for Alexandria during the classical period, 400 BC to 300 AD. Currently they reside in an overflow repository of the Ephesus Museum of Vienna. When they were trundled out on trolleys for our inspection, creamy bright in the sunlight they had long been denied, their ancient stone warmed happily to the touch. And touch

them we did, for Roman sundials are few indeed in Britain. One of the dials was conical in section, the other spherical, and both were comprehensively measured and photographed by our party. It was rather sad to see them afterwards being returned to their shady confinement. St. Stephen's Cathedral next and one of the most important dials of the tour, a dial of 1554, thought to be a replacement for one by Georg Peuerbach a hundred years earlier, and the oldest surviving Austrian dial. Much of the cathedral's east end was under repair during our visit but Walter had arranged for the plastic protecting the stonework to be drawn aside to allow us to see the dial. It is no surprise that this historic dial forms the emblem of the Austrian Sundial Society.

On the floor of the cathedral itself is set a geodesic point which was the base mark for geographical measurements throughout the Austrian Empire. Following lunch we visited another church, the Minoritenkirche, with an adjacent Augustinian monastery. The day's tour ended with a drive up a steep and winding road to Leopoldsburg, a fine viewing point over Vienna, with a chance to buy ice cream thrown in.



*Timepieces on Hofburg Palace, Vienna: Sundial,
Clock, Moon-sphere*

During our time in Vienna we were joined by Dr. Traude Stelzl who proved a constant source of support and information for the rest of our tour.

On Tuesday our coach set off westwards in the direction of Linz. On the way the first of our dials was at Oberhautzenthal. It was a stone dial in the form of a scroll and offset from the line of the church. This resulted in some disagreement among the party as to the direction of south, with members' pocket compasses sternly waved about. Did we observe Walter fingering his yellow card? Of the remainder of the day's visits the most memorable was to the remarkable Romanesque church of Schöngrabern dating from the thirteenth century. On the outer walls of this church are the sculptures known as the "Stone Bible". The figures, arising from the structural stones, depict biblical events from both the Old and New Testament. The carvings are stark, gripping and lively. We know of no other church with anything resembling them. Interestingly, there is a sundial on this church with the typical appearance and "D" shape of the late Anglo-Saxon period. This design of dial disappeared in England shortly after the Conquest, to be



*Two of the painted wall-dials at Stift
(monastery) Altenburg*

replaced by crude scratches, yet here in the thirteenth century it has survived and survived well, for there is little sign of erosion. Further, the dial, although marked in hours, had every second hour emphasised, recalling the eleventh century dial at Pittington, Co. Durham.

Unlike so many other Austrian churchyards which were occupied with well tended graves this one was filled with apple trees. Was this part of the biblical story?

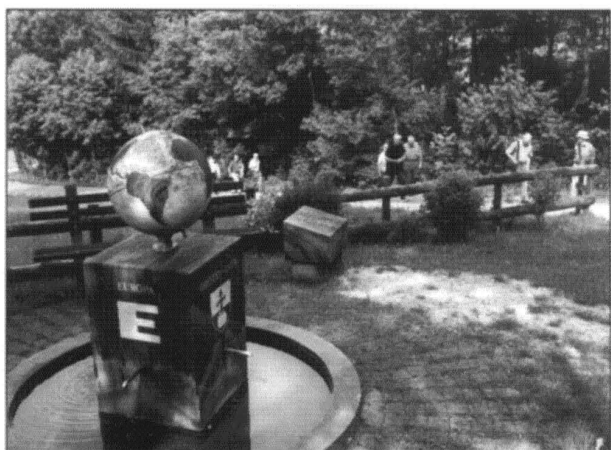
The itinerary thoughtfully prepared for us by Walter mentions the picturesque market square at Eggenburg where we stopped for lunch today. Here we may mention that every lunch we took was in attractive surroundings and the food, as in all the hotels we stayed in, was good. Near us was a portly Austrian gentleman in shirtsleeves and lederhosen, drinking lager. Magic! Moreover, at Eggenburg we found a convenient cash machine and like all the rest we met it courteously spoke English as well as German and French. But our slight German was improving and the church of Mariadreiischen (another dial) became Maria of the Three Oaks. Then came the Benedictine abbey of Altenburg, gloriously baroque although now housing only twelve monks. It is interesting that continental monasteries differ so much in layout from English and Scottish ones. The reason appears to be that they carried on functioning into recent and sometimes present times and hence have been rebuilt where ours stopped dead in the sixteenth century. In Altenburg there survived traces of a medieval cloister which was presented as an archaeological curiosity but which to us looked quite familiar.

We were coming to the wine country of Wachau now, no wine bushes but vast acres of real vineyards, many on steep slopes above the Danube. Avoiding Krems we reached the little church of St. Michael whose roof ridge bore a row of stone hares, recalling real animals that had migrated there during an exceptionally heavy snowfall. The tiny churchyard was occupied by numerous well-tended graves, all recent and crammed together, while beyond the church chancel was a charnel house resembling another free-standing chancel. Were the packed graves and the charnel house related?

In the pleasant hotel at Spitz, a short distance further on, dinner was followed by a choral entertainment from a vocal group led by the local burgomaster, all in traditional dress. They sang local songs but concluded with "Auld lang syne". We took a cup of kindness with them.

Walter was careful to point out nearby Durrenstein Castle, a ruin above the Danube, where Richard Coeur-de-Lion had been held to ransom and where he was discovered by the minstrel Blondel in 1194.

Wednesday. The Charterhouse monastery at Aggsbach reminded us of the rigour of the Carthusian rule, although the individual cells of the monks are no longer separate houses as they once were (again we see rebuilding post-sixteenth century and a departure from the medieval format).



Geographical Marker, 15°E, 48°N

The dials here were numerous, painted and ingenious and included an evening (north west) dial. From Aggsbach we called at Mauer to see a church containing a magnificent wood triptych carved with numerous human figures depicting both suffering and celebration, before diverting away from the Danube to Gaming, another Carthusian monastery, and more dials. At the last of the day we made a sortie to 48°N, 15°E, to a monument erected in that exact position in the form of a sphere mounted on a heavy stone block and labelled "Niederösterreich". But following the Royal Society's motto: *Nullius in verba* ("don't believe a word of it") our party produced several GPS machines and the monument's position was found to be a couple of thou out. The suggestion that there were enough of us present to shift it to the correct location was reluctantly rejected.

Thursday morning was different. We were taken to a place, Weiten, where dials were actually being made. Johannes Joseph Jindra was a smith, both black and white (ferrous and non-ferrous metals) and his dials and workshop were totally fascinating. He was of a line of smiths, all called John Jindra, only the middle name differing, and his ingenuity in creating dials was equalled only by his skill in making them. Space prevents a description of the dozens of dials of all types that he presented to us to view but perhaps the strangest was the blue glass sphere which functioned as an altitude dial and which set several heads scratching. Moreover there was coffee provided and for those who ventured into his workshop there was whisky in a tall bottle with a label in the form of a shepherd's dial. Even odder, the whisky itself was Austrian. It was quite good whisky, too. Herr Jindra had no English, only the Russian he had been required to learn at school.

In the village street was a large (perhaps two metre) Jindra dial announcing the foundation of Weiten in the year 1050. It also proclaimed its twinning with the town of the same name in the Saar region of Germany.

The hail of painted monastic dials, each with a round bar gnomon and many with a nodus and declination lines, pursued us onwards. There were so many in the next couple of days that only our photographs would allow us, once home, to examine them intimately. The monastic flavour evinced itself over lunch at Ardagger abbey where we ate simple but delicious food off wooden platters on refectory tables. Our host had made a delightful quince jam to accompany our cheese; he thought we Brits took jam and cheese together. Eureka, a new dish.

At last, at Wilhering we were in a monastery with real monks, Cistercians in this case. We saw one walking into the distance dressed in his *black and white habit and trousers and a baseball cap*. Verily the Middle Ages have past.

Wilhering church was breathtaking in its extravagant decoration. No wedding cake could have competed with the pulpit in its rococo majesty. We were becoming dizzy with gingerbread but more awaited us on the next day, Friday. Meanwhile we made our way to a particularly comfortable hotel at Kremsmünster. Here we were delighted to be joined by our old friends Günther and Christiane (Christl) Berger who had been with the BSS in Wales and had now driven from Munich to join us. On Friday, unfortunately, we could offer them only torrential rain after the brilliant sunshine of the last few days. But we set off bravely under our umbrellas to visit the immense Kremsmünster monastery which dominates the little town from its high vantage.

As we learnt as school, monasteries have fish ponds and this one had a long row of them. The fish, traditionally the easily bred carp, had as we saw been replaced by sturgeons. The monks, it seems, were going upmarket. Indeed, everything about the monastery was upmarket. Founded in 777 AD and always Benedictine, it was destroyed by the Hungarians, fortified during the Thirty Years War and rebuilt again into its present magnificence as peace returned. The book-lined library of 1683 with an immense terrestrial globe on the floor presented an air of scholarship, enhanced by a book-covered secret door leading to an inner sanctum. There were numerous treasures displayed there including, we noticed, a loose leaf of Carolingian script and a charming student's manuscript psalter in cream kid binding.

The Festival Room where we next went had a painted, highly domed ceiling, or so it seemed until we were told that the dome was an artist's illusion and that the rise was a mere fifty centimetres. In this room a rehearsal was taking place of the monastery school choir, the "Stiftsgymnasiums Kremsmünster". As we sat and listened about fifty children,

boys and girls, were taken through a series of traditional Austrian songs including: "You are the promised kiss of Springtime", "Summertime" and similar local numbers. They sang beautifully. It was odd, though, to see children in such an orderly group not wearing any kind of school uniform.

Abbots, like princes and bishops of the time, liked to show off their learning; and part of the monastery complex was devoted to a museum and an observatory. We were shown over them by Pater Armand. The museum, of both physical and biological sciences, was very well stocked and kept. The observatory required a long haul to the roof, past life-sized statues of Ptolemy, Galileo and Kepler. There, among the astronomical instruments we were shown yet another noon line and from there hung a wire, sixty three metres down to the basement, to form Foucault's pendulum.

Later, at the monastery, a presentation of a sundial (Tony Moss fecit) was made to Walter Hofmann for all his hard work in preparing and conducting the tour. Everyone was most appreciative of his sterling efforts and we felt the BSS had found a real friend. Gifts also were presented to David and Lilli Young, and to Dr. Traude Stelzl in recognition of their important contributions to our visit. After these presentations, we were privileged to be addressed by both Helmut Sonderegger, current President of the Austrian Sundial Society, and Karl Schwarzingger, past President, who showed slides of many dials. In honouring all these people we ourselves felt honoured.

On the last dialling day we finally reached Salzburg, the town famous for its music (and presumably salt). Descending from the coach we were greeted by the sound of a brass ensemble; later there were fleets of fiddles in the street and avenues of accordions, music everywhere. The Mirabelle Gardens were lovely in the sunshine. In the Museum Carolino Augusteum a curator had assembled a magnificent display of the establishment's holding of dials and we spent long moments examining them. Lunch was as attractive as usual; and then the party split up, some to wander, others to examine yet more dials including a very fine one on St. Mary's Church off the Mozartplatz. And so, threading our way between the tourists, we made our way back to the coach to return to Kremsmünster for dinner.

On this our last evening before departure we found ourselves entertained in the hotel by a quartet of players, again in Austrian dress, consisting of a fiddle, cello, hurdy-gurdy and Austrian bagpipes. This last was sustained by a bellows held under the arm like the Northumbrian pipes, not blown like the Scottish pipes. Both the chanter and single drone had upturned ends in the style of a saxophone.

The sound all these instruments made was very jolly and set the mood for the night. After a dinner intended to prepare us for our return to Britain, roast lamb, baked beans and tomatoes, there was an impromptu entertainment supplied by the company, over which we draw a discreet veil.



Musicians at Hotel Schlair, Kremsmünster

On Sunday we returned to Vienna and home, stopping on the way at Heilingenkreuz just outside the city. Here was an opportunity to see a little of what had preceded the Gothic architectural period. It was a Romanesque church of outstanding bleakness, standing close to our parked coach. Within, the pillars of the nave were crowded, square, massive and unadorned, the arches small and rounded, the whole overbearing and sombre. Come back Gothic, come



Walter Hofmann, organiser, guide and friend

back baroque, come back rococo, we love you for your extravagance, your colour, your exuberance. And all those wonderful painted dials, how unforgettable was the impression they made.

Thank you, Walter Hofmann, for a tremendous week, for your kindness, for the endless trouble you took and the patience you showed. We remain in your debt.

(Most of the photographs illustrating this report were taken by Doug Bateman.)

ANCIENT SUNDIALS OF ISRAEL PART 2: SUNDIALS FOUND IN ISRAEL OUTSIDE JERUSALEM

SHAUL ADAM

The sundials and fragments of dials described in Part 1 of this article came from archeological sites in and around the ancient buildings of the city of Jerusalem. Most of these objects, or in some cases replicas, are now to be found in museums in Israel or elsewhere. The only 'ancient' sundials still on their original site in Jerusalem are the pair of medieval sundials inscribed on the south wall of Jerusalem's Armenian Church. In Part 2, I will describe sundials found elsewhere in Israel. Most of them are from the Roman and Byzantine eras and are of the Hemicyclium or the Conical types.

A SUNDIAL OF ANCIENT EGYPT

The most ancient sundial that has been found in Israel was unearthed in 1912, by Prof. R.A.S. Macalister from the Palestine Exploration Fund¹, during his excavations in "Tel Gezer" (an ancient important town on the main road from Jaffo (Jaffa) to Jerusalem). The excavators unearthed a small ivory object, dated to the 13th century BC, and identified it as a portable sundial (Fig.1). On its front face (according to Pilcher:² I think it is the rear side) there is etching depicting Pharaoh Merneptakh (1225 - 1215 BC) bowing to the Egyptian sun god "Re". On both sides of the picture there are seals identified as those of Pharaoh Merneptakh. Above Pharaoh's bowing scene there is another portion, which shows two lines of stars;

it probably depicts the stars of heaven. This part is broken and probably contained more stars originally. Within the etchings there are remains of green paint; no analysis of the paint's nature, its composition and source has been done.

The other side of the sundial (the front face - to my opinion) contains the hour lines (10 lines are visible in the attached drawing), and a hole for the gnomon.

Pharaoh Merneptakh had conquered Gezer during his campaign in Israel and Syria, through which he reached the northern part of Israel, conquering the major towns in the way. I don't know where the sundial is preserved nowadays - if at all, and if it had not been lost. (It may be preserved at the Museum of the Ancient Oriental Cultures in Istanbul, but I have no certain information about that). The question how the Egyptians used to align the sundial due north - south, is yet has to be solved. They might have located known geographic features in reference to Polaris (or other significant star) during night, and used these features as orientation points during daytime. Or they may have had another system of orientation, which we don't know today. Though it is well known that the ancient Egyptians knew the Gnomon and used it to measure the length of the shadow, it was assumed that they did not know or did not

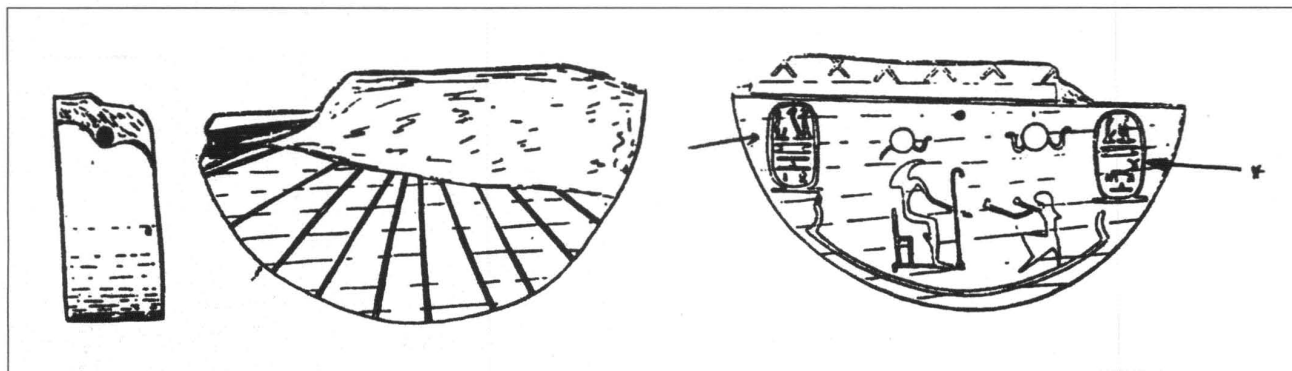


Fig.1. Egyptian Ivory Sundial

use the sundial to measure the shadow's angle and azimuth till the Ptolemaic era.

OTHER SUNDIALS FROM SITES IN ISRAEL

A number of sundials of various sizes and designs have been found in the surroundings of Jerusalem.



Fig.2. *Semicyclium from Khilkia Palace, 1st cent. AD, concrete reconstruction*

In 1968 Immanuel Damti found a hemicyclium in King Khilkia's Palace, at Mt. Hebron, about 40km south of Jerusalem. The sundial was dated to the 1st century AD³. The sundial is 48cm wide, 46cm high, and 45cm thick. The concave diameter is 43cm. It carries 11 hour lines, dividing the concavity to 12 equal hour sectors. It has no numerals, lettering or symbols. The sundial is engraved in soft limestone, and its lower front designed in the form of "stairs", similar to the design we find in some portable sundials from Jerusalem, and the sundial from Abu Mina (Egypt). The sundial was taken from its original place in the Palace and was combined as ordinary building stone, in the wall that surrounds the later building that was built upon the ancient palace. A 1:1 scale replica made of concrete has been erected in the *Land of Israel Museum* in Tel-Aviv. Fig.2 shows the concrete replica.

A tripartite sundial

The most interesting sundial from the professional point of view so far found in Israel was unearthed by Prof. R.J. Bull, in 1978 in the temple of Zeus Hypsistus that was built by the Emperor Hadrian in Mt. Gerizim, near Nablus⁴.

The sundial was dated to the 2nd century AD, and it actually consists of three sundials, in one piece of stone. (Fig.3)

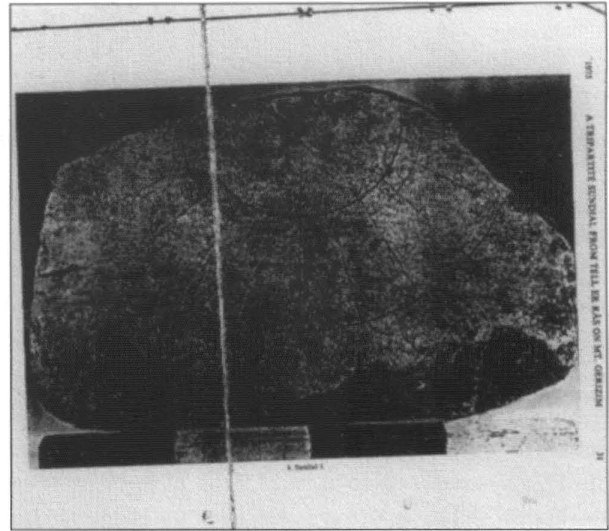


Fig.3. *Tripartite Sundial from Zeus Temple*

The sundials are carved in a local limestone block in the form of trapezoid prism. Its dimensions are: 44cm wide, 32cm height of the back of the sundial, 30cm depth; 44cm is the length of its northern slope face. The sundial is broken in the upper and bare sides, and quite badly eroded all around, but the basic figure and the lines and marks are still recognisable. Its full structure and dimensions were reconstructed according to the complete part's sketches.

The northern slope dial face is an equatorial sundial, tilted 57 degrees above the horizontal base, meaning that the perpendicular gnomon is 33 degrees above the horizon; (the latitude of Mt. Gerizim is 32.25 degrees north). Considering the fact that the sundial's reconstructed dimensions and data were taken partly from its original dimensions due to its breakage, a mistake of 0.75 degree is absolutely reasonable. However, it may well be that this was the accuracy of the sundial's original construction. But we may assume that this proves that the sundial was constructed to be placed in the site of Zeus Temple, and was not imported from another place.

On this equatorial sundial on the northern face, about 30cm above the base, there is a horizontal line, 41cm long, from the centre of which a vertical line 21cm long descends. Three half circles of diameters 11cm, 12.5cm, and 20.5cm respectively, with common centre, are carved from the

meeting point of the lines. Eleven lines radiate from the inner circle to the outer circle, dividing the half circles to 12 equal sectors, 15 degrees apart, related to the circles' centre. Then, 3cm under the meeting point of the vertical and the horizontal lines (the circles' centre), on the vertical line, there is a square hole, 1x1 cm, 3cm deep, carved perpendicularly to the plane of the northern slope. The hole's edges are partly covered with remains of melted lead, probably used to fix the gnomon in its place, perpendicular to the dial's face, forming 33 degrees above the horizontal. To the right of each hour line (facing the dial plate) there is engraved a large Greek letter (or Greek "numeral".) The letters are located half way between the two outer circles. Due to the breakage, part of the lines and at least one or two letters have disappeared.

Reading the letters from right to left (clockwise) we can identify:

[A], B, Γ, Δ, E, Φ, Z, H, Θ, I, IA, [IB]. Some letters were reconstructed from surviving parts of the sundial, and some may have been misidentified.

Two concaves (quarters of a spheres) are carved in the back of the stone block, each side of the back. Each one is a "half hemicyclium", the eastern one for the morning hours, and the western one for the afternoon. (A concrete reconstruction is shown in Fig.3a). Each hemicyclium carries declination lines presumably for the solstices and equinoxes, and hour lines marked by Greek letters. The sundial was erected so that the sloping surface faced north and the back faced south.

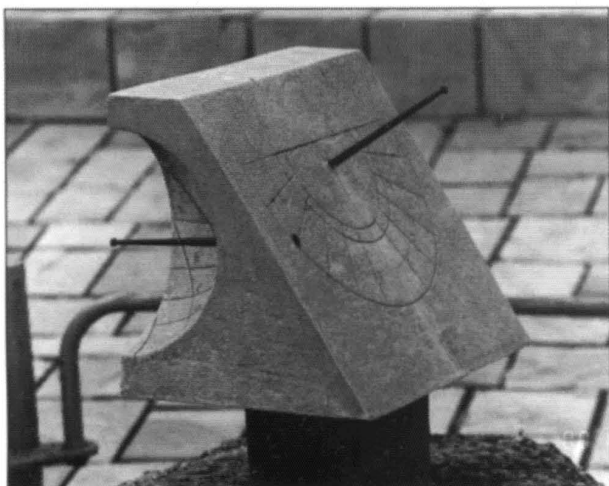


Fig.3a. Tripartite Sundial from Zeus Temple

By its quality, its technical design and construction, and its functioning, this is certainly the most interesting and complicated ancient sundial ever found in Israel.

A conical sundial carried by Hercules

A beautiful conical sundial was unearthed by the archeologist Hananya Hizmi in 1989 (?) in "Archilais" (the village of Archilaus), about 35km north east of Jerusalem and about 12km north of Jericho. The sundial was found in the yard next to the southern entrance to the Byzantine church⁵⁶. It is a conical sundial, engraved on a column squad of sandstone, dated to the 2nd century AD, according to its decoration and artistic style. (Fig.4)



Fig.4. Conical Sundial with Hercules figure

The whole piece might be divided into three different sectors. The upper part is the conical concave - the sundial itself; the mid sector is a figure of Hercules (or Heracles) half lying on his left side and leaning on his left arm, in a characteristic position; and a lower sector includes a 10cm wide strip with a Greek inscription. The inscription is badly eroded and could not be reconstructed.

The sundial's concave includes 11 lines dividing the concave into 12 equal hour sectors, and three parallel declination lines for the solstices and equinoxes. Except for the Greek inscription on the lower part, the sundial bears no numerals or lettering. It is one of the most beautiful sundials that have been found in Israel, speaking of its artistic and decoration qualities.

Two interesting sundials that somewhat resemble this one, with a Hercules figure, have been found in Europe. They

are described by M. Arnaldi in a comparison article in June 1999: one in the ancient town Sermium (nowadays Sremska Mitrovica) in Yugoslavia, and the second one in Ravenna, Italy. Both of these dials are hemispheriums (or "roofed sundials" as Mrs. Gibbs calls them) with a hole gnomon in the upper edge, dated to the 1st or the 2nd century AD. This kind of sundial was well known in the Roman and Byzantine world, around the Mediterranean. The sundial from Sermium is carried by three natural-size figures, implying quite a large piece. The figures are Hercules, Atlas and the third one is probably Jupiter (the figures of Hercules and Atlas were certainly identified by the archeologists). In both pieces from Europe, as in the piece from Archias, the actual sundials are held by the figures above the body. The three figures were linked in mythology with astronomy; the building of sundials carried by these figures was probably a custom in the Roman and Byzantine periods.

An Agricultural Sundial

During a survey done by Ygal Tepper in the western Shomron (Samaria), he discovered an interesting vertical sundial scratched on the inner wall of a water pool, part of the estate of an ancient farm that grew mainly grapes and produced wine. The farm was established in the Roman era and worked till the Byzantine era (1st - 6th century AD, approximately⁷).

The sundial is scratched in the north east corner of the pool, on the inner face of the wall, facing south, right below the pool's edge. There is a notch in the edge to hold a gnomon, and there are remains of mortar that held the gnomon in its place. Eleven lines are scratched, radiating from the notch, and outlined by an arc, of which the upper edge of the pool uses as the string, 70cm long. The radius of the arc is 30cm, and the hour lines' length is 17cm. The sundial is eroded and the lines are faded. The hour lines divide the half circle of the sundial into 12 nearly equal sectors (I believe that the maker's intention was for equal division, but he could not keep accuracy).

Ygal Tepper speculates that the sundial was not "an ordinary sundial" but used as special sundial for the special professional needs of the farm, and showed special "professional hours" and that is why it was scratched where it is. He thinks that the person who made the sundial was not unprofessional; rather, he scratched the sundial where it is purposely. Tepper believes that the location of the sundial is due to its functioning to show mid day time division, and he thinks that the sundial measured unique local time division, related to the farm devices and working needs.

I doubt Tepper's theory, however interesting. The time division seems regular to the era, showing regular seasonal hours. The place of the sundial - though in a "strange" place (why in the northeast corner and not in the middle of the south facing wall?) was chosen due to approaching convenience, or it might have been constructed by non professional person, who did not pay too much attention to the location of the sundial.

(I must emphasize that I did not see the sundial in the place, but just inspected the single photograph brought by Tepper).

The sundial somewhat resembles the scratched sundials from later periods. Tepper dates the farm to the Roman - Byzantine eras, but does not give dating to the sundial itself.

At least three other large hemicycliums have been found near Jerusalem, two in the Martirius monastery (at least one of them found complete) in Maale Adumim neighborhood, east of the city center, and one in Ramat-Rakhel in the southernmost end of the city, but unfortunately I could not get any further detailed information about any of them.

BYZANTINE SUNDIALS

In 1962 Baruch Safray, a member of Kibbutz "Sa'ar" (near Naharya, in the northern coastal plain -north of Haifa) found a very nice Byzantine sundial, in an ancient ruined village near the Kibbutz. It is a hemicyclium sundial, carved in limestone. The sundial is 56cm wide, 43cm high, and 31cm thick. It was found complete and very well preserved, except the gnomon that has been lost. According to its decoration style and a cross, carved on its east face, it was dated to the 5th or 6th century AD. The sundial is very well and professionally done, and the styling and carvings are very good and precise. It has 11 hours lines dividing the concave to 12 equal sectors, but has no numerals or lettering. Each sector is ended with a little arch, closing the gap between any two lines. The entire section of the hours system is very well and smoothly carved, a little bit shaggy of the concave face, and it forms a decoration resembling a great rosette. The other parts of the sundial are a bit more roughly carved. On the eastern face there is a typical Byzantine cross, carved as a shaggy pattern given in a very deeply carved circle. Left of the cross there are three deeply carved circles, about 6cm in diameter each, forming a "Pyramid" shape or an upside down triangle; (could this be a symbol of the trinity?).

The cross and the circles are engraved in a somewhat deeper area under a small cornice of the upper side. In the front face under the concave edge, there is a vertical short and deep line engraved right under the noon line. It may be



Fig.5. Sundial from Kibbutz Sa'ar, 6th cent.

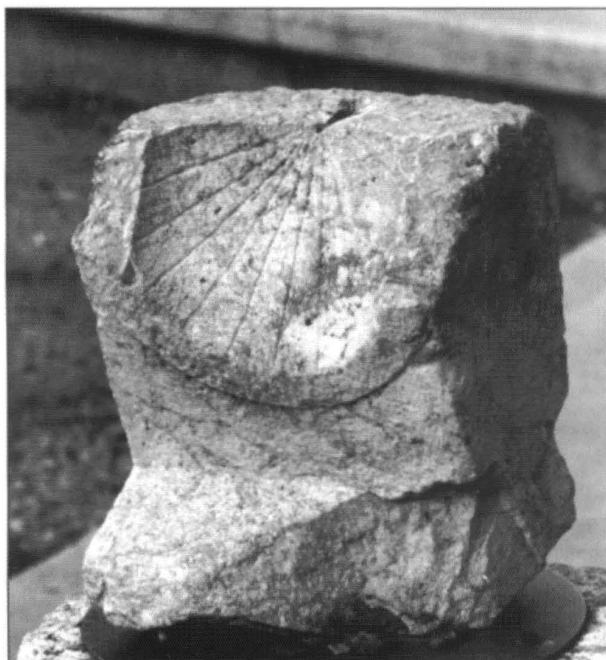


Fig.6. Byzantine hemicyclium Tirrat Tzvi, 4th or 5th cent.

a line just to mark the noon line, but it may also be an abandoned attempt to carve a cross (Fig. 5).

Hemicyclium from Tirat Tzvi

Some time in the 1960's, a simple and handsome hemicyclium was found in the fields of Kibbutz Tirat-Tzvi, near Beit-Shean (Schytopolice of the Roman era), about 35km south of Tiberias. The sundial is carved in a local limestone; the carving and sculpting work is very well done. Its dimensions are: 35cm wide, 35cm high, and 28cm thick.

The concave is divided into 12 equal sectors by 11 lines, but has no numerals or lettering, or any other signs or symbols, and there are no declination lines (Fig.6). The only "decoration" is a somewhat rough belt on the front face, about 3mm thick and about 4cm wide, encircling the concave edge, on the sundial's front face. Remains of an iron gnomon were found. The sundial might have come from an ancient village or wealthy farm from nearby, or it might have come from the town of Schytopolice (a large and wealthy town few kilometers north of Tirat-Tzvi).

Hemicyclium from a desert monastery

An interesting hemicyclium sundial has been found in the ruins of Horcania, a Byzantine monastery in the Judea desert, south east of Jerusalem. The sundial was dated to the 6th century AD. It bears 10 hours lines (another line probably disappeared when part of the sundial was broken) dividing the concave into 12 equal sectors, marked by Greek letters. The letters B, Γ, Δ, E, Φ, Z, H, Θ, I are still recognisable on the front face, reading counterclockwise from the upper left side (west side).

A typical Byzantine cross is carved on the front face, directly under the noon line mark (Φ) and as the noon line's continuation, and it emphasizes the noon line (Fig.7).



Fig.7. Byzantine hemicyclium, Horcania 6th cent.

This type of Byzantine sundial with "Noon Cross" carved on its front face has been found in several other places in Israel.

In the late 19th century or at the turn of the 20th century a hemicyclium sundial, possibly from the Byzantine era, was found at some place in south Israel, probably in Beer-Sheva. B. Bagatti recalls this sundial in his article "L'Archeologia Cristiana in Palestina" (Italian), saying that in south Israel (Palestina) there has been found a sundial, which bears just two Greek letters, Γ and Δ. The concave surface of the sundial is divided into 12 equal sectors by 11 lines, and on its front face there is a typical Byzantine cross, carved right under the noon line and as its continuation, (Fig.8, thanks to M. Arnaldi).

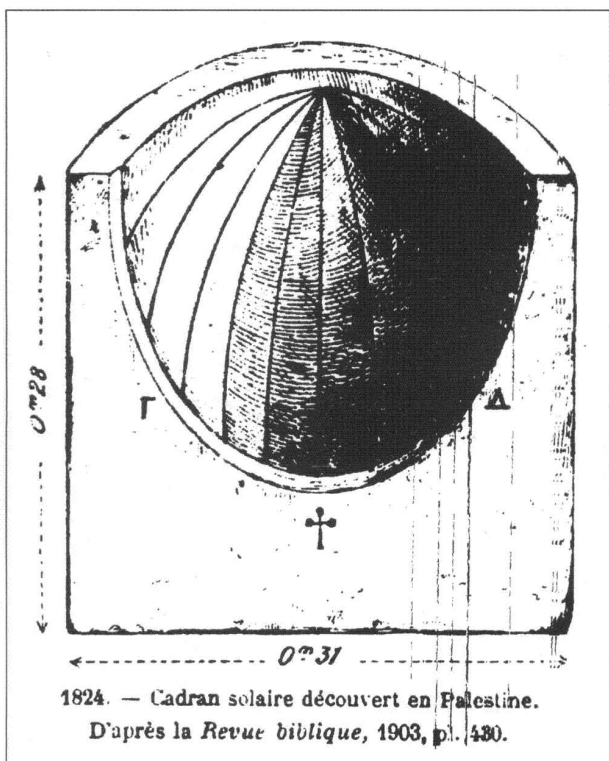


Fig.8. Byzantine hemicyclium, Beer Sheva 5th cent.

R. J. Bull refers to another sundial in his article about the tripartite sundial from Zeus Temple, as follows:

"An additional sundial is recalled but not described, by ABEL, probably from Beer Sheva..... It is carved in a block of limestone, 31cm wide and 23cm high. Two numerals are shown on the sundial, Γ in the left side, and Δ in the right side. A cross is carved under the central meridian, and shows that the sundial is probably from the 5th or the 6th century AD" The Γ showed the third hour of the morning (9:00 in our terms), and the Δ showed the ninth hour (15:00 in our terms).

A Sundial from Mamshit (Curnub)

In 1968, a third sundial of similar type and design was found in Mamshit (an ancient Nabatean town east of Beer Sheva), during the excavations led by Prof. Avraham Negev⁸. This sundial was dated to the 5th century AD, and was unearthed nearly complete, with just a minor breakage in its base. It is 38cm wide, 28cm high and 21 cm thick. The concavity is divided by 11 lines into 12 equal sectors (more or less), with no numerals or lettering marking the hours. A typical Byzantine cross is carved on its front face, under the noon line and as its continuation, so it emphasises the noon line. (Fig.9)



Fig.9. Byzantine hemicyclium, Mamshit, Curnub 5th cent.

From either side of the cross there is a carving of date palms, of which each central axis is continuing the hour lines of the third and the ninth hours respectively (9:00 and 15:00 in our terms), in a similar manner as the noon cross. The carvings and sculpting are roughly crude, and probably done by a novice.

This style of the Byzantine "Noon Cross" carved on the front face of the sundial just under the noon line reveals something of great interest about the three sundials mentioned above. It has been found only in sundials from the Byzantine epoch (4th till the 7th century AD in our area), and it is interesting that they have been found only in the southern parts of the country. It is possible that this manner of "Noon Cross" was a characteristic style for the southern parts of the country during the Byzantine era. Amongst the Byzantine sundials that have been found in the central and the northern parts of the country, none is of this style. I have no information of a similar style in Byzantine or any other sundials, from other places in the Byzantine empire.

In a few of the Byzantine sundials that have been found in Israel there is a large and rough notch in the sundial's head. From its appearance it seems that it was probably for a portable gnomon that was laid at the notch just when

someone wanted to read the hour. This "style" is seen in simpler sundials, however. In the better and more "professional" sundials, there is usually pierced a hole for a fixed gnomon, where sometimes there are still remains of the metal gnomon (mainly brass and copper or sometimes lead, or even iron).

It is interesting that no sundials from the Crusaders epoch have been found in Israel up to now, as far as I know. After the Byzantine epoch that ended in the 8th century, no later sundials have been found, till the Armenian church sundial already described.

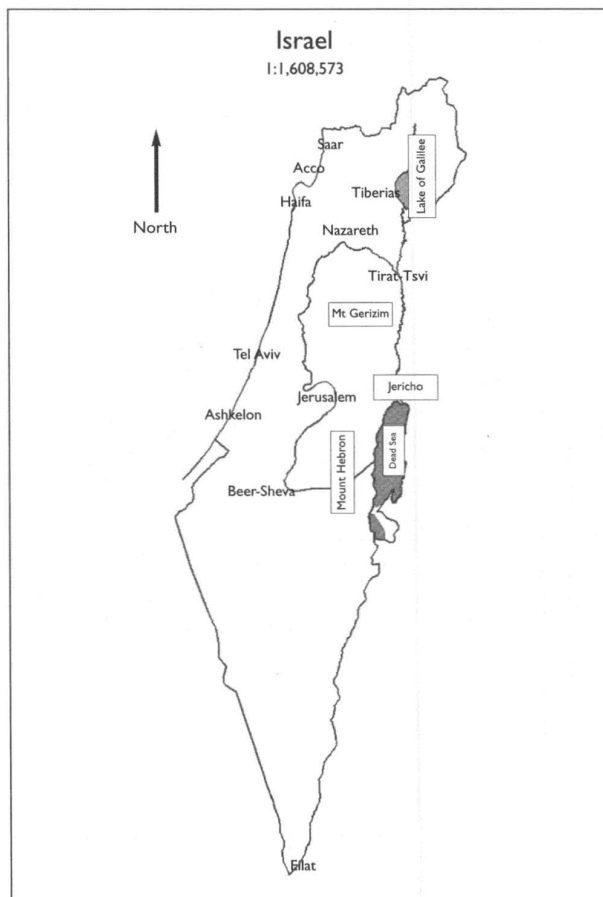
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THE TWENTIETH CENTURY

MARGARET STANIER

The twentieth century is now behind us, and we can ask ourselves about its legacy. What contributions to the art and science of dialling were made between the years 1901 and 2000? Apart from innovations in technical skills, 'machinery' and materials, what has this 100-year span given us in the way of design? Are there any dials, or features of dials, about which diallists in sixty or seventy years' time will say: 'Ah yes, a typical twentieth century sundial'? Many of us have some general concept of eighteenth century sundials, made in the heyday of the skills of brass and bronze engraving, frequently including a form of the recently defined EoT, and with the double-horizontal dial as a summit of glory. Similarly we may

connect the nineteenth century with country-house-rose-garden sundials: eye-catching garden features rather than scientific instruments. So what has this just-past century to offer to posterity?

By the end of the 20th century, you would be likely to find a built-in equation-of-time correction. Earlier on, sundials allowed calculation of clock-time by the use of a graph somewhere nearby: y minutes plotted against x date, giving the dial-user a number to be added to or subtracted from today's reading on the dial-face; or the even clumsier device of a nearby table of figures for appropriate dates. But sundials made in the second half of the century

frequently had curved hour-lines or analemmas, building-in the correction by making use of the changing altitude of the sun as the seasons passed. Even the dial put together out of salvaged materials in the Japanese interment camp in the 1940's managed curved hour lines.¹ An elegant wall dial of analemma-hour-lines was designed by a mathematician of Monash University, Melbourne, in the 1980's: the wide portion of the analemmas at their lower end reveal that it is for a southern hemisphere site. (Fig. 1) The drawback is the difficulty of indicating without confusion the half-hours or quarter-hours on such a dial-plate. The built-in correction may also involve a shaped gnomon, such as that of the Bernhardt dials²; a shaped gnomon is to be seen too in the photograph of an equatorial dial provided by BSS member J.M. Shaw, with a feline dial-viewer. (Fig.2)

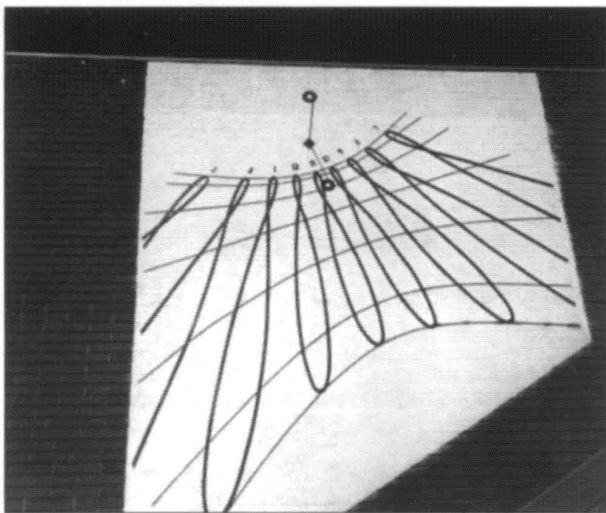


Fig.1 Wall Dial, Monash University, Melbourne, Australia



Fig.2 Equatorial Dial with shaped gnomon: Buttons asks 'Is it teatime?'

A remarkable device made early in the twentieth century was the heliochronometer. It represents a peak of fine engineering and engraving in brass work. There are only a few hundreds of these dials in existence, and we should

cherish those we have. One of the most handsome is the heliochronometer now in the garden of Holehird, above Windermere in the Lake District, salvaged and restored by our member Graham Aldred³, and valued by its owners. (Fig.3). But the heliochronometer is, in a sense, a dead end: nobody is likely to develop sundials further in that direction.



Fig.3 Heliochronometer at Holehird, Windermere, Cumbria

In contrast to this dead-end is the proliferation and branching-out of ideas arising from the concept of Bifilar Dials. An original bifilar horizontal dial has equally-spaced hour-lines converging on a point and with angles of 15° between each hour. Two threads are fixed horizontally at different distances above the dial plate at right-angles to each other, one east-west, the other north-south. The hour is read at the point where the shadows of these threads cross. The required height of the two threads above the dial-face is given by trigonometric functions of the latitude angle. Fer de Vries, a BSS member in Hilversum, Netherlands, responded to a call⁴ for twentieth century inventions by giving the following account of the early history and subsequent development of bifilar dials.

"The inventor is Hugo Michnik, Germany, and he wrote in the early 1920's an article for a horizontal dial. Joseph Drecker mentions this dial in his book of 1925 and gives the

formula [for the heights of the threads in relation to the latitude-angle]. Then there was a long time silence about this dial...In 1978 Thijs de Vries studied these dials and he was an enthusiast of the possibility of this type. Fred Sawyer also published an article about this dial in 1978. De Vries then got the idea to bend the north-south wire into a hyperbolic curve...De Vries also restricted his dials to have parallel hour lines.... [He developed] another type as a polar dial with parallel hour lines and parallel date lines also. Now the east-west line is curved.... There is even an article about a horizontal bifilar in which the two filars are cylinders with a certain diameter, one upright, the second parallel to the east-west line"

An article by Sawyer⁵ brought bifilar dials to the attention of BSS members in 1993. The theory of vertical declining bifilars was described in exhaustive detail by D. Collin in issues of 'Compendium', 1999-2000. In general, (as indicated by Fer de Vries' account) it appears that theory has far outstripped practical realisations of this sundial: the type has not 'caught-on'. The concept of the bifilar has acted as a challenge, not to the practical diallist but to the mathematician, to develop equations, for instance, for making one of the threads curved as a circle, or a catenary, or hyperbola or parabola. But the actual examples seen in Fig.4 may not strike many viewers as particularly interesting or beautiful. If the shadow-casting threads form part of another structure, the device might gain in interest. An example is the design of a fountain in which the top edge of a horizontal barrier across a pool, and a jet of water falling over the barrier in a parabolic curve a fixed distance from its upper edge, form the two shadow-casting objects. Such a design was produced for the Sundial Park at Genk

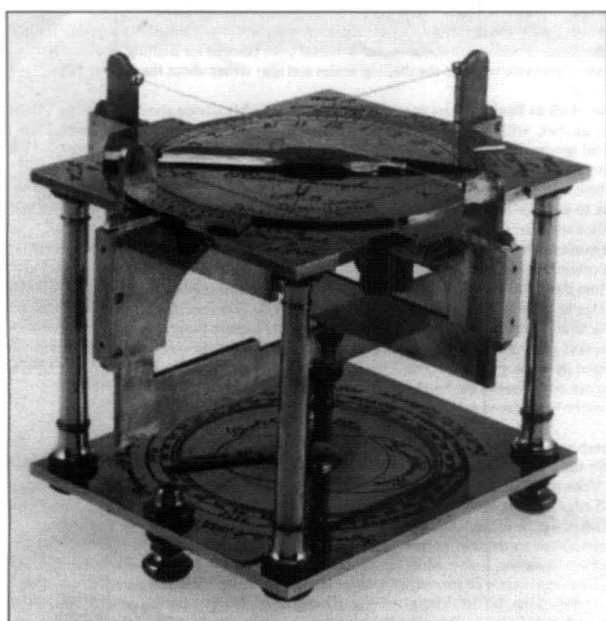


Fig.4 Bifilar Sundials:
(a) designed by Zakariya & Sawyer

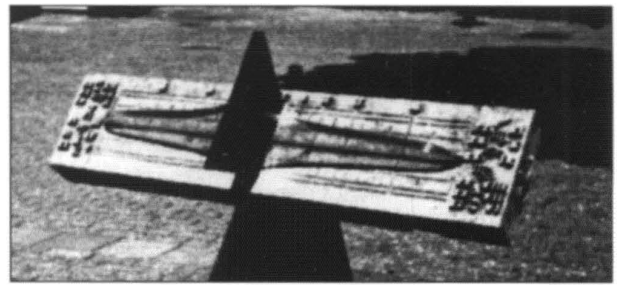


Fig.4 Bifilar Sundials: (b) designed by F.de Vries

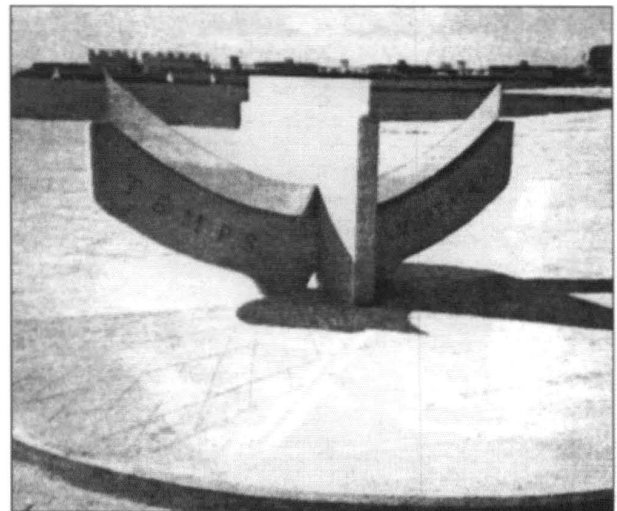


Fig.4 Bifilar Sundials: (c) designed by Soler.

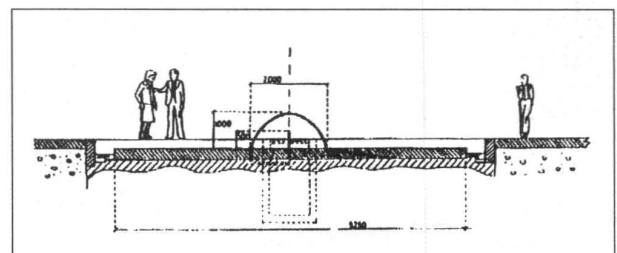


Fig.5 Design for a bifilar sundial as a fountain: the two gnomons are the water-jet and the barrier

in Belgium (Fig.5) though it is not clear where the hours are marked; or even whether the fountain was ever actually built. The most entertaining bifilar dial I have yet seen was a table-top model of a garden with two hedges of different heights placed at right-angles to each other, and the two gardeners chatting over the hedge. (Fig.6).

Spiral Sundials, on the other hand, are a twentieth century novelty with considerable aesthetic possibilities. The idea originated with a Danish designer and poet, Piet Hein, and a notable large example of the form is on view in the grounds of Egeskov Castle, Fyn, Denmark. The fundamental structure is simply an equatorial dial-face strip surrounding a spike gnomon sloping at the latitude angle, the dial-face strip being then 'pulled-out' into a spiral curve.⁶ This was soon developed by eliminating the separate gnomon and making the edges of the dial-strip

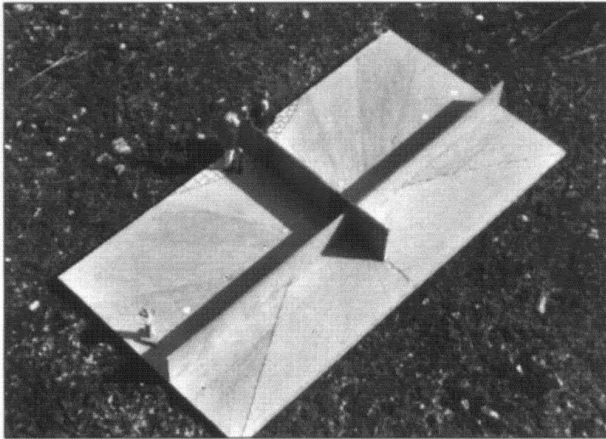


Fig.6 Bifilar Dial: 'Two hedges'

itself the shadow-casting objects. This requires several turns to the spiral, and the edge between the shadowed and illuminated portions of the spiral lies on the hour number. Accuracy is limited by the lack of sharpness of this edge, and by the fact that only at the equinoxes does this edge lie transversely across the strip: the hour should be marked by a central dot rather than a transverse line. Developments of this type of dial have included John Moir's 'double helix', a left-hand and a right-hand spiral joined end-to-end to maximise accuracy, and Gary Rolfe's 'spiral staircase', where a stack of bricks is twisted into a spiral, and the face of each brick in turn enters and leaves the sunlight in the course of a 12-hour day (Fig.7). We may see further developments of spiral sundials, a happy thought.

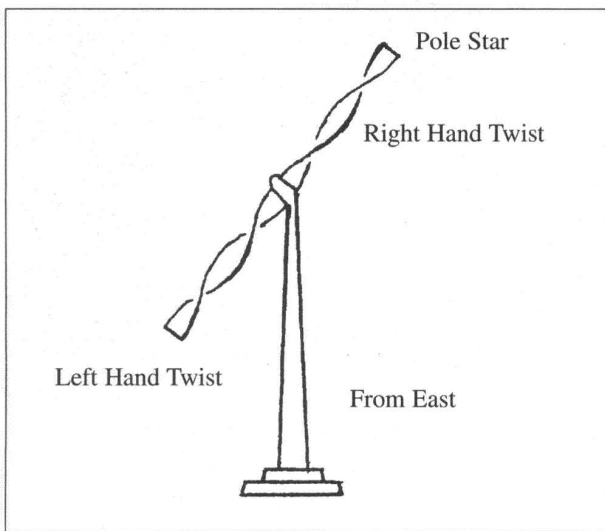


Fig.7 Spirals (a) Double helix (Moir)

Another response to my request for suggestions about contributions to dialling design in the 20th century produced the simple reply 'Large Sundials'. It is true that as the century and millennium ended there was an outbreak of enthusiasm for large monumental and sculptured dials commemorating civic or institutional pride in a context of time-and-eternity. But the phrase 'large sundials' reminded me of an article by Allan Mills, subtitled 'What's the point



Fig.7 Spirals (b) staircase (Rolfe)

of big sundials?', in which the author explains that an inherent limitation on size is caused by the fact that the sun is not a point-source of light, so there is a penumbra in addition to the umbra; and the shadow becomes more blurred by the penumbra, the further the dial-face is moved from the gnomon. So to enable accurate reading of a large sundial one needs a shadow-sharpening device. Obviously many large sundials were built long before the 20th century; one thinks immediately of Jaipur in India, where Jai Singh's enormous equatorial dial was built in the 1720's. Mills showed that accuracy of reading such a dial can be achieved by a fairly simple shadow-sharpener, such as a pinhole card or a convex lens inserted in a card, the card's shadow then being moved across the width of the penumbra to reveal the edge of the umbra. The time would thus have been readable 'within seconds'. Though it is not known whether such a device was in use in 18th century India, there is a written record of a similar shadow-sharpening device for a meridian line in China built in 1276 AD (quoted by Mills).

Both the Indian and the Chinese dials were astronomical instruments made large for purposes of accuracy: smaller time-divisions can be marked on the scales of large dial-faces. So what about our large 20th century dials? Some of them, such as the 3-storey-high truncated cone in the middle of the Disney Building in Orlando, Florida, or a dial covering the entire roof-top of a conference centre in Japan



Fig.8 Large sundial-pair (equatorial and horizontal) in Suffern, CT, USA

and readable from a nearby hill, are simply making a statement of ostentation: 'Big is Beautiful and Bigger is Better'. Such dials are large, not in the interests of accuracy but of vainglory: they are read only to the nearest hour, anyway. However a recently designed 'civic' sundial placed outside the public library in Suffern, CT, USA, is large *and* accurately readable. (Fig. 8a,b) This monumental object is in fact a pair of dials, an equatorial dial based on a flat plinth which is itself marked out as a horizontal dial; and the two dials have a single common gnomon, a stainless steel rod sloping at the latitude angle. On this rod is a disc with small central hole, so a light-spot shines from the gnomon onto the lines of the dial-faces; a young dial-user points out this feature in Fig. 8b. This disc-and-pinhole sharpener, in use for many years for large vertical meridian lines, continues in use to this day. But a convex lens is preferable if the dial-face or meridian line is on a curved surface (Mills, Fig.9)

Finally I will mention a recently invented sundial fitting: not a new design but a device for ensuring the safety and longevity of window dials. The gnomon of a glass-window dial, especially if fastened onto the window itself, is always in danger of being broken off, and of causing the breaking the window also. In a double-glazed window on the top floor of the Tolbooth Gallery of Kirkcudbright in Scotland, the two panes of glass are placed 1 inch apart, and the dial is inscribed on the inner pane. In the words of David Gulland, its designer: *'In a normal sundial you have a gnomon, the projecting arm that casts the shadow. This method has a spot on the outer pane, which casts a shadow on the abraded inner pane. The moving shadow crosses the dial, which is engraved on the inner pane. The space between the panes—in this case one inch—is an imaginary gnomon and the spot represents its tip'*. (Fig.10) The Kirkcudbright window is a memorial to George Higgs, whose life spanned almost the whole 20th century, who introduced the idea of double-pane engraved window dials to Britain, and who made a number of such dials. They are a joy to see.

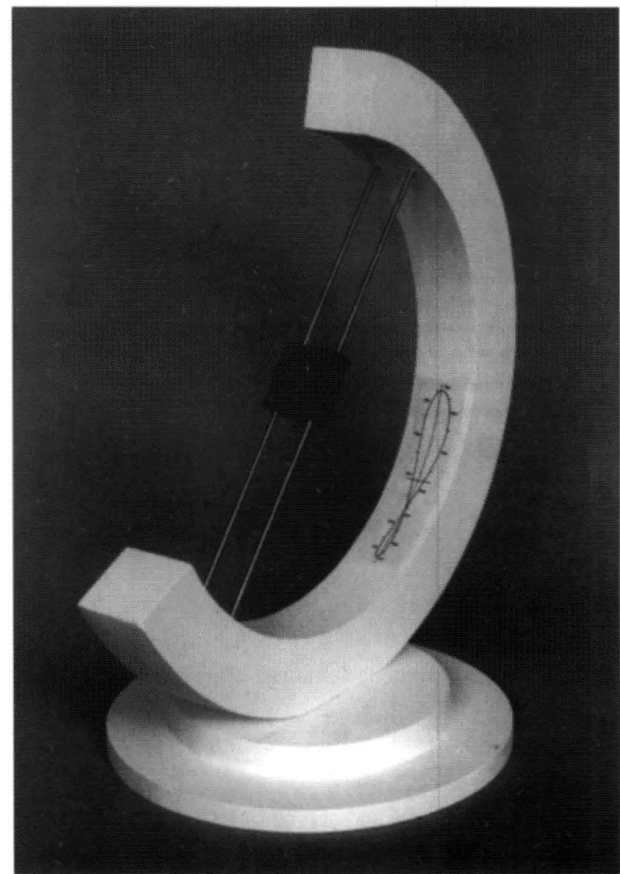


Fig.9 Model of 'Wheel of Time': a convex lens is used to focus the sun's image on the analemma

What else is new? What offerings can we diallists of 2002 make to future historians? We are still too close to the 20th century to make any intelligent guess as to how the future will assess us, but at least we can tell ourselves and our successors that the Art of Dialling is not dead.

ACKNOWLEDGEMENTS

I warmly thank all those who have lent photographs, and who have given permission for the use of the photographs, which illustrate this article. They are: R.Adzema, G.Aldred, F De Vries, D.Gulland, A.Mills, J.Moir, G.Rolfe, F.Sawyer, M.Shaw, R.Soler

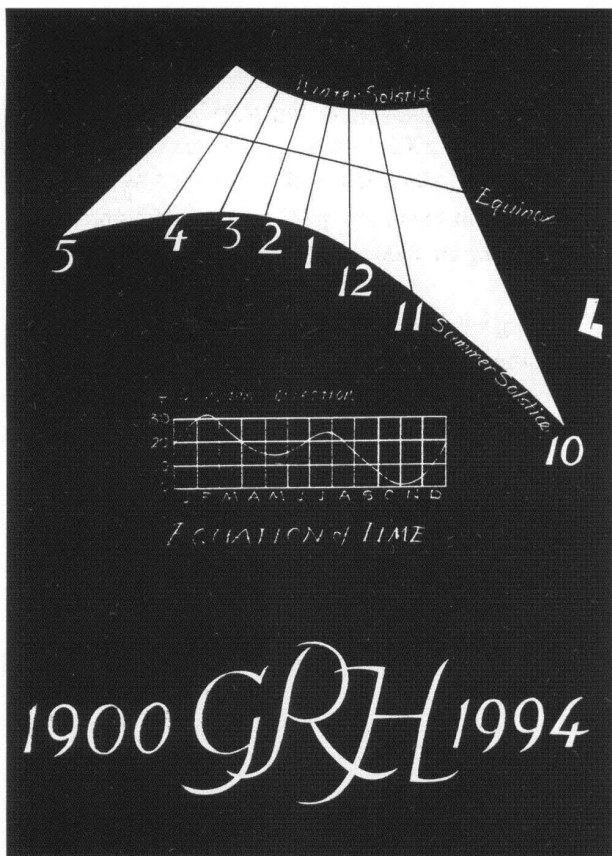


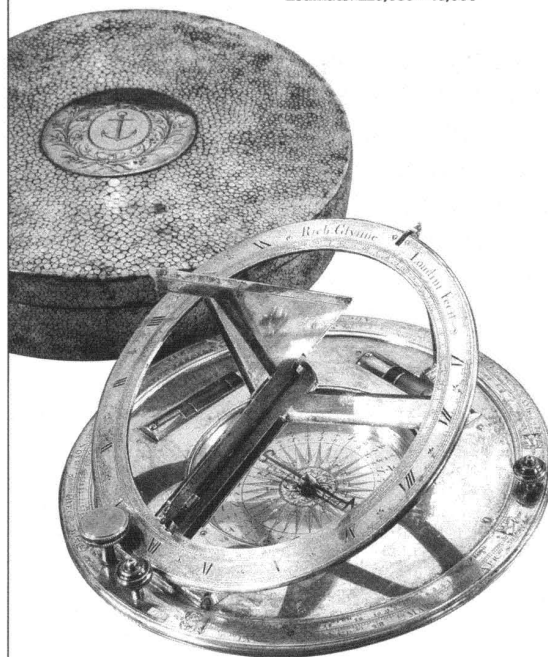
Fig.10 Window Dial, Kirkcudbright, Scotland

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BOOK REVIEWS

Cornish Church Sundials by Len Burge, Published privately by the author, 2002, ISBN 0 9542239 0 X, 272 pages, 182 b&w photographs, 88 figures, 8 tables, map.

This book by Len Burge makes a very valuable contribution to dialling literature by cataloguing a unique regional collection of dials. It is a well-researched study and the author should be complimented for the detailed analysis he has carried out into the many dials and their specific locations. I thoroughly enjoyed this book even though it is somewhat idiosyncratic in style and content, and I shall treasure it for its unpretentious and vernacular style.

The book is divided into three parts. Part one is entitled 'The Dials in their Church settings: How they work, and what they stand for'. There is a nice start to this first part with the section 'Introduction to Church Sundials' providing an overview of the topic, however in the next section 'Sundials and Schools', the first example of inadequate proof reading of the original manuscript occurs with the misleading caption to Figure 2.5, p12, attributing the Holker Hall sundial as being a gift from the BSS. An inserted erratum corrects this particular mistake but the book contains many others that are not acknowledged.

Following on from 'Sundials and Schools' is a section on 'How Sundials Work' and here I found some of the analogies used to be more confusing than helpful. For example, in trying to describe a framework for the sun's movement the author has described a cylindrical cage made up of twenty four canes in a base set at the appropriate latitude: Figure 3.5, p17. Unfortunately the explanation would lead the layperson to possibly imagine that the sun will travel around a complete circle and thus pass each cane on the hour when in fact of course the sun will not travel beyond the twelve canes above the horizon.

In the sub-section dealing with shadows, in order to try to explain the effect of the sun's seasonal declination on the length of shadow line in the shadow plane, the author has used an analogy of flags in a steady breeze: Figure 3.18, p25, which I do not feel helps to clarify the manner of the shadow's length; far better to have used a good perspective diagram.

Next follows a section on 'Cornish Dials: Their charms and accomplishments', and it is here that one meets further examples of annoyingly poor proof reading of the original in the form of captions with incorrect linking. On page 38

for instance, the caption to Figure 4.10 gives a link to Appendix 2.9 on p000. Similarly in the text on p140 for the dial at Le Juch, Finistere the illustration is given as being on p000, and in Figure A4, p223 the table of differences is given as being on p000.

One unforgivable error is in the second paragraph of this section where the BSS, correctly referred to in the preface, is here referred to as the British Sundial Association.

Subsequent sections in part one then go on to deal with 'Symbols, Messages and the Spirit of the Age', 'The Capabilities of Vertical Church Dials', and 'The Bearings of Churches and their Dials', this latter section being particularly interesting. In this section the author discusses the various possibilities for why there is considerable variation in churches not lying exactly east-west given that in many cases there was no reason not to align them correctly when constructing them.

Part one of the book concludes with a section on the 'Independent Spirit among Cornish Dials' with particular attention being paid to the design and implementation of numerals on the various dials.

The next 114 pages form Part two of the book and is entitled 'The Parish Reports', the very substantial body of detailed cataloguing of Cornish Church Dials. The part starts with a description of terms used and a dial location map. Each dial receives considerable attention in the form of a good photograph, a description, and data in tabular form. It was most gratifying to cross-reference the book's records with the 2000 BSS register and to discover that nearly all of the dials are in the register and that there were only a few instances of discrepancies of information. In fact the information in the book was invariably more accurate than the BSS record. I must assume that the dials researched by the author, which are not in the 2000 copy of the register, are now in the updated register to which I did not have access at the time of this review.

I realise that every book is a compromise on content, layout, and cost but besides the photograph of each dial I would very much liked to have seen a photograph of each church as well to set the dial in context with its location.

Finally we come to Part three, 'The Appendices'. Appendix 1 is a rich miscellany of information ranging from names of dial makers, to treatment of the Roman 'four', to mottoes on Cornish dials. I particularly enjoyed

the section relating to the link between dial makers and monumental masons. It is interesting to note that the author's researches into the St Erth dial made by a Mr Amos Dabb in 1823 brings to light in the church warden's accounts for that year that the dial was painted. I wonder how many of our now weather worn plain stone dials were once a brightly adorned local landmark?

Appendix 2 covers a range of issues from places named on a specific dial to an unconventional declining design and classical works on practical dialling, the latter proving most disappointing as it consists of a short piece of text about Albert Waugh's book and some copies of engravings from Ferguson's Lectures on Optics 1772. Neither of these are given as proper references, and this brings me to one of the major criticisms I have of this book and that is that no references are given acknowledging sources of information used, or to point the reader in the right direction for more information about a particular topic. A comprehensive work such as this should have the benefit of a decent reference section.

Appendix 3 concludes the book and deals with the making of sundials. The first section, 3.1, is a short biography of John Couch Adams, a farmer's boy from Bodmin Moor who went on to become Cambridge Professor of Astronomy and Geometry. However, the idiosyncratic nature of the book's style and content continues to the end whereby section 3.2 showing lovely photographs of an equatorial dial to make is separated from the instructions and templates, in sections 3.6 and 3.7 respectively, by a section on horizontal and vertical dials for home use, a section on an equatorial sun clock, and an anecdote about the correct length of the gnomon.

To summarise; this book is one to treasure if you have any interest in our heritage of church dials, and in particular Cornish ones, and should encourage any dialling enthusiast to explore the villages and byways of Cornwall. It is very well illustrated with clear figures, tables, and photographs and contains a rich miscellany of dialling information besides the specific Cornish content. But it is not a book for the dialling novice given the depth of analysis in some sections. It may seem presumptuous to draw attention to the many typos and proof reading errors but given the author's considerable endeavours to produce such a superb book it really warranted just that little more proof reading before committing to print.

Martin Jenkins
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An Introduction to the history of timekeeping - The Leicester Time-trail by Allan Mills ISBN 1 901156 11 7 Available from the Museum Shop, New Walk Museum, Leicester. Price £3.50 (£4.00 with p&p)

In the majority of sundial trails, the participant is directed from one example to another, relentlessly avoiding anything that does not possess a gnomon. This is rather perverse, particularly in England where cloud frequently prevents the sundial from performing its role. The Leicester trail breaks new ground by considering clocks and other devices as well as the sundial.

The booklet is "designed to show the general reader how time has been measured over the centuries", and its 24 pages achieve this objective very well, providing the diallist with information in a much wider but related field.

The booklet begins with a list of the 13 sites where items of interest can be seen, followed by a map showing the location of the sites. After a brief Astronomical Background, there follows sections on early dials (including a reconstruction of a public Hemicyclium), water clocks (two reconstructed Clepsydra), and more modern dials (vertical, horizontal and multiple).

Further sections deal with sandglasses, candle clocks, mechanical clocks and Automaton clocks. This last category is represented by a fine re-creation of the All Saints' automaton clock, with handsome new jacks and modern electrical mechanism Leicester is fortunate that, thanks in part to Allan Mills, it possesses a wealth of reproductions to augment its quota of original artefacts. The final two sections of the booklet deal with public and astronomical clocks.

Even if you do not intend to walk the trail, this booklet is worth reading for its own sake. It contains many drawings, photos, and is clearly printed. One small problem I found was that in order to discover beforehand what each particular site had to offer you must first read through the whole booklet. If, like mine, your memory is not so good, it would then be a good idea to annotate the Site List: there is ample space on the page to do this (possibly provided for just such an exercise!). Also, to avoid disappointment you may wish to check out the opening times of the Museums included in the trail.

To sum up, this is a most interesting trail, and perhaps will persuade future trail compilers to cast their nets wider when considering what items to select.

John Moir

Sundials at Greenwich edited by Hester Higton. Published by Oxford University Press and the National Maritime Museum: 464 pages 16 colour plates Price £99.50

It is good to see that yet another museum has been able to publish a catalogue of one of its collections. In certain countries, such catalogues are more common than in Britain – but a catalogue like this costs a great deal of time and money.

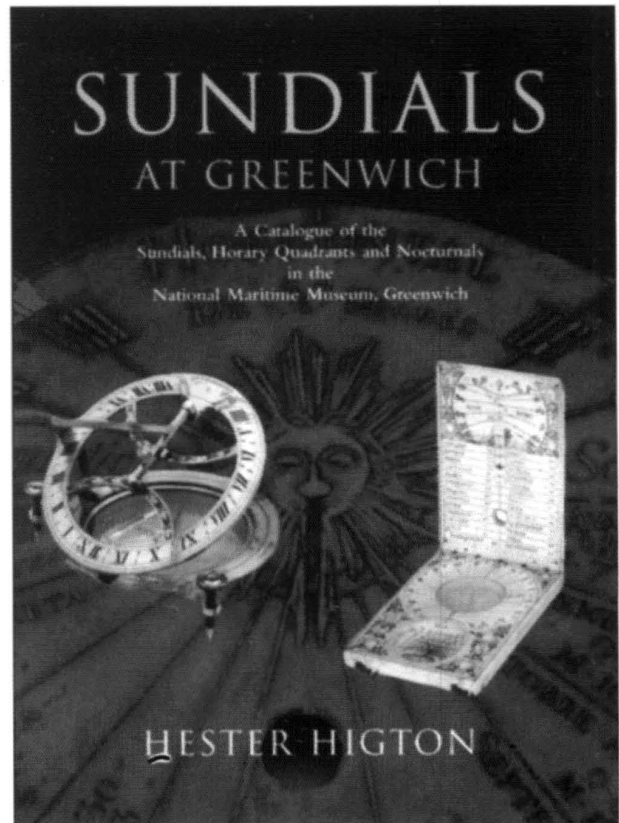
Dr Higton has obviously spent a great amount of time in this task and a very commendable volume is the result. ‘Sundials at Greenwich’ contains 464 pages with 16 pages of colour plates. It is a joint publication of the Oxford University Press and the National Maritime Museum.

Apart from the extensive cataloguing, mainly done by Dr Higton, there are four introductory chapters forming Part 1. These are by Kiyoshi Takada, (Sundials of the Far East), Anthony Turner, (Essential Complementarity: The Sundial and the Clock), Hester Higton (An Obsession with Dialling), and Richard Dunn, (Sundials and the Arts).

The useful notes on ‘Sundials of the Far East’ explain how the Chinese, Koreans and Japanese noted their hour and calendar systems. The chapter is well illustrated with dials from the NMM collection.

Anthony Turner discusses how the clock and the sundial have become inseparable in the history of Man until relatively recent times where the sun is no longer the basic timekeeper. In his explanation he shows how timekeeping and civilisation have gone together. He also explains the need for the Equation of Time.

Hester Higton’s ‘An Obsession with Dialling’ describes the collection of books and other documents from the Lewis Evans Collection, now in the Museum for the History of Science in Oxford. From this collection of books she shows how much of the early dialling material has been regurgitated from author to author with little new information being added at each step. Naturally most authors in their defence explain the need for their new book because it has simplified the subject even more. She goes into details of the development of the Equinoctial Ring Dial from its predecessor, the Astronomical Ring Dial, (thought to be first designed by Gemma Frisius, c1530), to its introduction by William Oughtred in the 1620s. One very interesting illustration for diallists is shown, from a book by Marius Bettini, ‘Aerarium Philosophiae Mathematicae’, (Bologna 1648), where in the dialling section a ‘sandal’ or shoe is shown where its sole and arch are covered with dials. This seems to be an eminent new project for handy Members of the BSS!



In ‘Sundials and the Arts’, Richard Dunn shows how the decorations on some dials have been copied from various publications. This is particularly so in the case of scrolls or images used to fill odd corners of a dial. Again it seems that there is little new here too! He also gives details of some sundials occurring in paintings such as Holbein’s ‘The Ambassadors’. This painting is reproduced in black and white and as a colour plate, showing its fascinating anamorphic projection of a skull. It is a pity that in the colour print it has been cropped a little too much and the crucifix that he mentioned in the text has been lost.

Part 2 is the catalogue itself. This has been laid out in sections starting with Direction Dials followed by Altitude Dials, Multiple Dials, Horary Quadrants, Islamic Dials and Quadrants, Dials from the Far East, Nocturnals and finally, Imitations. The order has been chosen so that the commoner types of dial occur first rather than in an evolutionary sequence. Within each section certain common types, (e.g. Butterfield and Dieppe dials), have been given their own sub-sections.

Each dial in the NMM collection is catalogued with a full description and at least one black and white photograph. Certain dials also appear in the colour plates.

The layout of each entry follows the following order:-

- Catalogue Number
- Inventory Number

Dial Type
Plate Number (if any)
Date
Country of Origin
Details of any Signature
Provenance
Overall Dimensions
Material(s)
Latitude(s)
Features of Interest
Technical Details
Literature
Photograph of the Dial (normally early in the entry)

In most cases just one photograph is shown but occasionally others are added to show important features. My review copy was unfortunately just a final proof printout and the black and white photographs were in low resolution and it was impossible to see the quality of the finished prints.

In some cases the pictures are not on the same page as the text and a few are separated by more than one page. This is mainly due to the fact that sometimes two or more dials have been photographed together. Luckily such multiple pictures are relatively rare and are usually employed where the dials shown are very similar to each other and comparison was needed. I found the multiple pictures a little confusing in some cases because the dials would seldom be in catalogue order across the plate, left to right, and in one case I had to carefully read the description to be certain that a mix-up of captions had not occurred.

The section on 'Islamic Dials and Quadrants' has been written by Silke Ackermann. She explains the strong links between Islamic religion and science. She gives brief details of Islamic prayer times and the Islamic Lunar Calendar. She talks of the Quibla Indicator for giving the direction of Mecca, used so that every Muslim knows the direction in which to pray. The Arabic text on dials and quadrants has been transliterated into English for convenience, complete with any original errors.

Far Eastern Dials have their own section, as do Nocturnals. Astrolabes are omitted altogether but Astronomical Compendiums are included as these devices always have at least one sundial on them.

The section on Imitations is useful, particularly for the beginner. It shows and describes the dials that we often find as replicas, some sold in museums. It also describes several outright fakes that were made to deceive.

At the end of the book is a substantial Bibliography, four pages in all, followed by five very useful appendices.

Appendix 1 gives a concordance of accession numbers by catalogue number and by old inventory number.

Appendix 2 has biographies of makers and retailers, totalling nine pages.

Appendix 3 has a useful glossary of terms used.

Appendix 4 has rather brief notes on hour and calendar systems plus the Equation of Time.

Appendix 5 is a list of the books and texts from the Lewis Evans Collection used for preparation of Chapter 3 in Part 1.

To conclude, the book has a name index with makers identified with an asterisk.

This book is primarily a catalogue of the Greenwich collection and is not intended as bedside reading or as a coffee table book. It does catalogue the dials very well but it left me a little weary as I read one description after another. I was asking the question, 'Do we really need such detail for each dial?' I think that the answer is both 'Yes' and 'No'. For a book of this nature, designed to appeal to collectors everywhere, a shorter description would have been very adequate. Admittedly, in sections where most of the dials share common features a typical dial is described at the outset and only differences are noted in the actual entry.

Several times I wanted to see a photograph of the other side of a dial or perhaps details of its gnomon. The old saying that 'a picture says a thousand words' applies here and could have saved a lot of text. I am not saying that the text should not exist, but perhaps it should have been available, if required, from Greenwich or from their website.

A particular criticism is that where tables are reproduced in the description they have been modified to columns of text. It would have been very simple to replicate the tables complete with their lines or boxes or to have just photographed them. In one case almost a whole page has been used to replicate the tables on an otherwise simple and low-value dial.

One statement by Dr Higton set me a challenge. In her description of a Butterfield dial by Jacques Thourry she says 'it is the only known instrument signed by Thourry'. Such statements are dangerous and I was able to trace three

others! One in the Museum of Decorative Arts in Prague, one sold in Paris in 1987 and another offered for sale by a dealer in 1995.

A very useful feature of the catalogue is where the latitudes of places are shown on the dial. Often, in these lists, we find a place name that we don't recognise either due to a name change or different language usage. In virtually all of these cases Dr Higton has tracked down the place and supplied the name of any town where any slight doubt could exist or has supplied a probable name followed by a question mark. I think that an additional appendix of these obscure names would have been quite appropriate.

For museum curators, collectors of portable dials and for those interested in the minutest details of a dial I would heartily recommend this catalogue. Its introductory chapters are particularly interesting, being written by experts in each of their subjects. For the person wanting a picture book of dials I think that perhaps other books would be more appropriate. I will certainly be adding this book to my own library shelves. It will make an invaluable reference in the study of Portable Sundials.

Mike Cowham

NOTES FROM THE EDITOR

INDEX

With this Bulletin you should receive a copy of the cumulative Index (Authors and Titles) of the Bulletin of the BSS, from its inception in 1989 until 2001. This is mainly the work of Andrew James, to whom the Society owes much gratitude. We hope to produce a Subject Index for the same period, before too long.

The first three issues of the Bulletin were produced by photocopying. These three numbers were re-issued at the end of 1993 as a single Three-part Reprint. In the Index, page-numbers refer to the pagination of this three-part Reprint. Anyone whose Membership Number is 250 or less, and who now wishes to obtain a copy of this three-part reprint, may do so free of charge by sending a request to Margery Lovatt (address on back page).

CORRECTIONS

Shaul Adam notes some errors in his article 'Ancient Sundials of Israel, Part 1:'

On page 53, under the heading 'Excavations of the Jewish Quarter', in the third line the name should be Nakhman.

On page 53 Figure 2, about dimensions of holes, the depth should be 'about 3 to 4 mm', not '34 mm'

Cyril Routley sends corrections for the article 'The Japanese Sundial at Epidaurus' published in the June issue of the Bulletin.

On page 68, the dates of Eudoxus of Knidos are 400-350BC. The dates given in the article would have made him 127 years of age when he died!

Also on page 68: Aristophanes' dates should be 450-388BC. Otherwise he would be referring to sundials before Anaximander had taught the Greeks how to use them

Maurice Kenn has sent two small amendments to his article 'John Harrison's Clock' in the June issue. On p.81 the name of O. Howard Boyd should be spelt thus: and on p.82, last words of third line should be: 'In July 1988.'



THE HORIZONTAL SUNDIAL OF ATHENS

THEODOSSIOU, E., MANIMANIS, V.N. AND KALYVA, E.-M.

ABSTRACT

In Athens of the 5th Century BC, lived the great astronomer and geometrician Meton who carried out his observations using his *heliotropium* (heliotrope), a kind of improved sundial. He might have placed many sundials in Athens, as well as carved calendars used for daily purpose

In Athens, we also find the magnificent monument of Andronicos Kyrrestes, a hydraulic clock, decorated with eight sundials, carved on the sides of the octagonal construction, and an archaic water clock, preserved in the Museum of the Ancient Roman Agora (Old Market).



North side of the 'Tower of the Winds' in Athens, the monument of Andronicus Kyrrestes, decorated with eight sundials carved on the sides of the octagonal structure

Nevertheless, we find no horizontal sundial of that period; the only such sundial of Athens dates from the middle 19th Century and it is placed at the entrance of the National Garden. It was initially made as an ornament for the Palace of Othon, the first king of modern Greece, and then relocated to its current position.

1. FROM THE HELIOTROPIUM TO MODERN SUNDIALS

During the era of Pericles, in 432 BC, the famous geometrician, architect and great astronomer Meton suggested the application of a new time period, divided in 19 tropic years, after which the phases of the Moon were repeated in the same days and dates of each year. This 19-year long cycle, which combined the solar and lunar calendar, was called *Cycle of Meton* or *Cycle of the Moon*.

According to Diodorus Siculus (IV, Book XII, 36, 1-3) "*When Apseudes was archon in Athens, the Romans elected as consuls Titus Menenius and Proculus Geganius Macerinu. ... In Athens, Meton, the son of Pausanias, who had won fame for his study of the stars, revealed to the public his nineteen-year circle, as it is called, the beginning of which he fixed on the thirteenth day of the Athenian month of Scirophorion*".

From Diodorus Siculus we know that the *Cycle of Meton* was applied on the 13th day of the Skiroforion, the 12th month of that time's Attic calendar. This was possibly the 27th of June, according to the proleptic Julian Calendar. Meton himself possibly chose this date having astronomically calculated the summer solstice taking place at that day.

Meton and his assistant Euktemon placed his heliotropium, a kind of improved sundial, on the wall of the Pnyx. According to Philochorus (*Schol. to Aristophanes 997*) what Meton set up was a sundial, on the wall of the Pnyx.

The great astronomer Claudius Ptolemy (2nd Century AD) informs us that Meton was making his astronomical observations using the *heliotropium*. With Euktemon, they discovered, using this instrument, that the equinoxes and the solstices do not divide the year into four equal seasons. Furthermore, the heliotropium was used in Antiquity to observe the summer solstice. As mentioned by Claudius Ptolemy (Book III, 3) "*Furthermore if because of its antiquity, we compare the summer solstice observed by the School of Meton and Euktemon (though somewhat crudely recorded) with the solstice which we determined as accurately as possible, we will get the same result. For that [solstice] is recorded as occurring in the year when Apseudes was archon at Athens, on Phamenoth 21 in the Egyptian calendar [-431 june 27] at dawn*".

This calculation took place in 432 BC and was used as the basis for determining the apparent annual solar orbit.

It is a fact that, during the solstice, the shadow of a pole, vertical to the ground, is the maximum or the minimum possible length, depending on whether it is the summer or the winter solstice.

The German mathematician and astronomer Carl Friedrich Gauss in 1820 manufactured an instrument also called

heliotrope, when he turned his interest to Geodesy. This instrument reflects the sunbeams towards a specific target to be used for geodesic observations. Today it is no longer in use.

Meton was a known architect; Phrynichus in his *Menotropos* mentions Meton as an engineer and geometrician, who manufactured fountains.

The new Cycle of Meton as well as the man himself was partly supported and partly criticized, something common to all calendrical revisions. The usefulness of the new calendar was questioned, and Meton was satirized by Aristophanes (414 BC) in the comedy *"The Birds"* (*Meton, 992-1020*). Furthermore, there is a saying "*αναβάλλεσθαί τι ες τον Μέτωνος ενιαντόν*" "put off till the Cycle of Meton" for something being postponed for a long time.

Despite these, Meton placed sundials and calendars carved on plates made by stone or bronze at the Athenian Forum and in Kolonos.

Athens had a tradition in measuring time, and yet the only ancient clocks that we find are the magnificent monument of Andronicos Kyrrestes (the "Tower of the Winds"), a hydraulic clock, decorated with eight sundials, carved on the sides of the octagonal construction, and an archaic water clock, preserved in the Museum of the Ancient Roman Agora.

2. THE HORIZONTAL SUNDIAL OF ATHENS

The horizontal sundial which now decorates Athens belongs to a much later time, in the 19th Century. It was made as an ornament for the Palace of Othon (Otto von Wittelsbach), the first king of Athens, after the liberation of Greece from the Ottoman Empire.

Othon was the second child of King Ludwig I von Wittelsbach of Bavaria (1786-1868) and reigned in Greece from 1833 until 1862. His father, visiting Athens in 1835, lent 100,000 golden pounds to the Greek State to build the Palace, designed by Friedrich von Gaertner and founded in the presence of King Ludwig II, in January 1836. It was completed only in 1842 and the horizontal sundial was then placed as an ornament besides the marble stair, leading to the Gardens of the Palace (Royal Garden).

Today, this sundial is located at the entrance of the National Garden off Queen's Amalias Avenue in Athens. Unfortunately, the original gnomon (style) probably made by the famous sculptor Nikeforos Lytras was stolen, and in its place now stands a simple bronze copy.



The Sundial of modern Athens, at the entrance of the National Garden on Queen's Amalias Avenue (west side)



The sundial of modern Athens (southeast side)

On its plate, one reads the exact coordinates of its location: *latitude 37° 58,3' N and longitude 23° 44' E.*

On the one side of the marble pedestal are the solutions of the equation of time for every five days time-period throughout the year, and on the other side one reads the ID of the sundial: "*The present sundial was initially placed on the western side of the Palace during the reign of Othon and it was afterwards relocated, upon this marble pedestal, in April 1929*"

And it was at this time that the Palace became the *House of the Greek Parliament* and the Royal Garden was given to the people, and was renamed the *National Garden*.

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The Lament of the Layman or, A Song Against the Equation of Time

The wandering Sun is like my little dog
who'll race ahead, or stop to tease a frog.
Whether ahead, behind, afar or near
I never know where he will next appear.

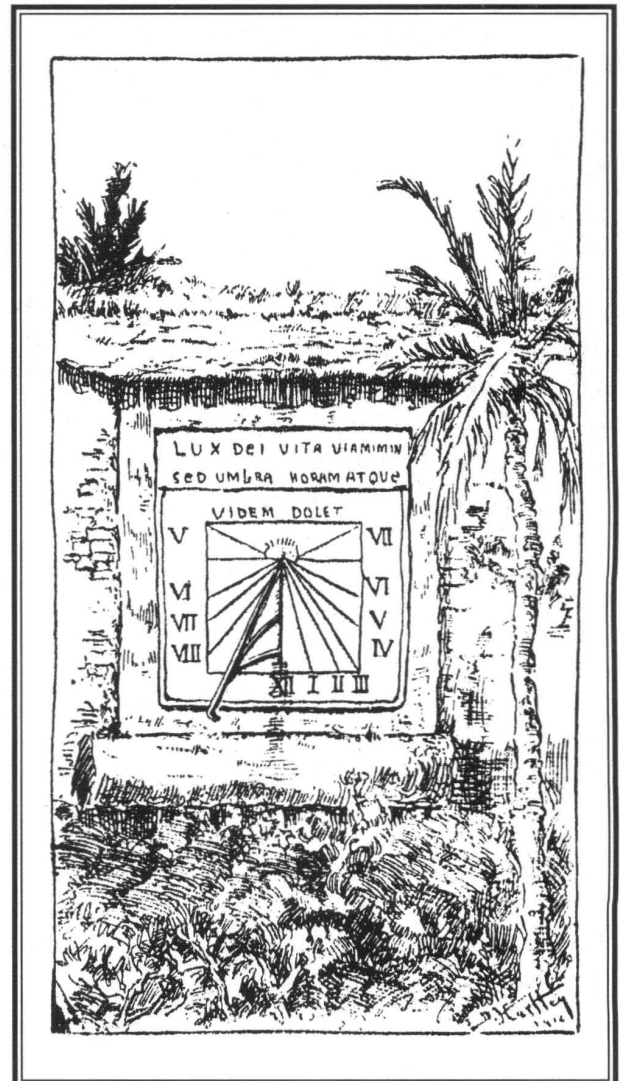
The Sun's the same. He'll find a burst of power
and surge ahead a quarter of an hour
then coast until his batteries run low
and soon we find he's fifteen minutes slow.

They say four days a year he's right again
but that's no use if I can not tell when.
Most of the year he's wrong, or so I say-
I need to know how much, on any day.

But no mnemonic tags that I recall
give Mean Time from the Shadow on the Wall;
and no gnomonics I can understand
will reconcile the Shadow with the Hand.

So can't we Oil that Grand Celestial Clock
and get it running steady as a rock?
Get Sun and Watch in harmony sublime
and we can scrap that pesky E of Time!

John Foad



IN PURSUIT OF SHROPSHIRE DIALS

JOHN LESTER

Many people have marked the new century with a special project: mine was to explore the county of Shropshire in search of unrecorded dials, a task which I thought could be completed during 2001. Being a keen Rambler I aimed to combine country walking with this search so that on a day's outing I could cover on foot a circuit of from 4 to 11 miles passing through several villages; and if time remained visit a few more places by car. First of all I made a list of towns and villages based mainly on the Shropshire volumes of Arthur Mee's 'King's England' and Pevsner's 'Buildings of England'. It was alarmingly long but I subtracted from it places I had already visited and any that were featured in the Sundial and Mass Dial Registers, on the possibly unsafe assumption that anyone who had recorded one dial at a location would have recorded them all. The remaining list then needed to be divided into geographical sections so that itineraries could be planned.



*Pair of Dials, Albrighton Hall Hotel,
Albrighton Shrewsbury*

Soon after the project started the foot and mouth outbreak began and for a while only urban walks were possible. This was not wholly a bad thing as it forced me to face the prospect of doing three walks in the Telford area, an unattractive task which nevertheless yielded two dials. Later it became possible to walk on country lanes but this was not entirely satisfactory as some churchyards remained closed and had to be revisited when the epidemic was over. Hope of completing the exercise in one year was abandoned and it drifted on into 2002.

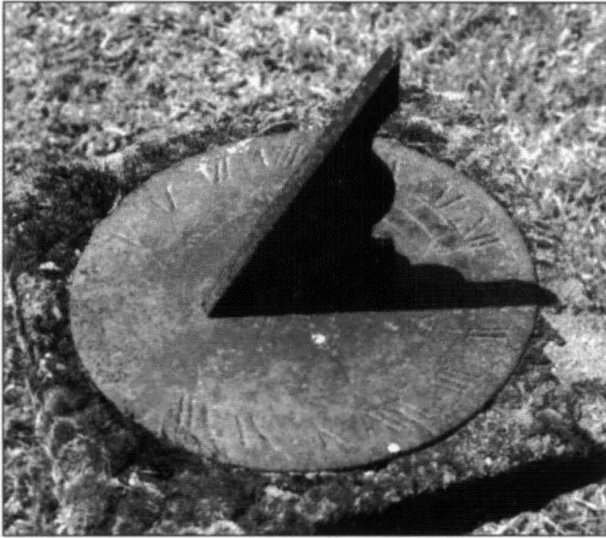
In all I made 28 excursions visiting 213 places and walking 187 miles (no attempt was made to record motoring mileage). The yield from this was small and comprised 19 horizontal dials (together with another 11 empty plinths where dials had once been), 4 vertical dials, 1 cube dial and 2 mass dials (plus another 2 doubtful ones). All were notified to the appropriate BSS Registrars. Three of the horizontal dials were 'millennium' dials installed in 2000. Though this aspect of the exercise was disappointing there were many compensations and I remember with pleasure the winter aconites carpeting the churchyard at Morville, the spotted orchids at Cwm Head and the surprise discovery of a Roman altar in the churchyard at Uppington. There were interesting conversations with people I met, particularly at Stoke St. Milburgh where I borrowed a pair of steps so that I could photograph a horizontal dial mounted on a tall buttress. There were interesting tombstones in the churchyards, one at Petton recording the unusual fate of a man who died from 'the wheels of a wagon going over his head'. Shropshire has many miles of narrow winding lanes with grass down the middle and by the time the project was completed I felt I had walked or driven along them all in my alphabetical journey from Abdon to Yockleton.



*Millennium Sundial, All Saints' Church,
Wellington, Telford*

There were difficulties and disappointments too. Many churches are now private dwellings while others have become enclosed in parkland to which there is no public access and some of these I did not attempt to visit. In order to find the remains of one ruined church I had to fight my way through a thicket only to find that what masonry remained was so densely shrouded in ivy and brambles that

a week's gardening would have been required to reveal it. There were a few surprising errors in Pevsner such as the location of a church in the wrong village and the confusion of two villages of the same name. Pevsner in one of his rare references to sundials mentions one with a date of 1560 at Stanwardine Hall. Eden and Lloyd mention it too but it is no longer there though there is a more modern replacement. I would be interested to know what happened to it as would the present owner of the hall. Can anyone tell us?



St. Culixtus Church, Astley Abbots, Sundial in churchyard

Although I had planned to visit only those places where dials had not been recorded I often found myself near a village which possessed a dial and went to see it. Sometimes this revealed yet another missing dial but once resulted in the reclassification of a dial (at Stanton Lacy the mass dial is now regarded as an early sundial). Should my efforts discourage others from looking for dials in Shropshire? For reasons too many to list the answer is a firm 'No'. My proven ability to walk past a dial without noticing it should be sufficient to encourage others to continue the quest. To persuade further those who are not walkers, I can tell you that I found no dials by walking that I could not have discovered by driving a car.

APPENDIX Locations of dials recorded.

Horizontal: Acton Scott, Bettws-y-Crrryn, Cardington, Chelmarsh, Eaton under Ileywood. Edgton, Ellesmere, Hinstock, Little Wenlock, Loppington, Melverley, Selattyn, Shawbury, Stanton upon Hine Heath, Stanwardine Hall, Stockton, Stoke St.Milburgh, Wellington, Westhury.

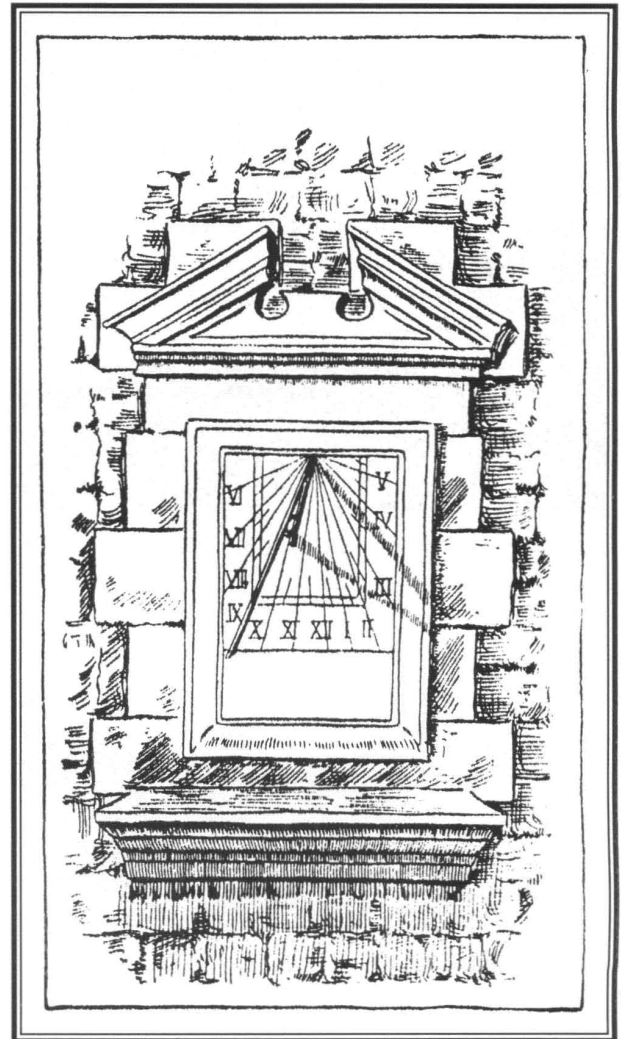
Empty Plinths: Berrington, Cardeston, Chirbury, Ford, Great Bolas, Lianyblodwel, Oswestry, St. Martin's, Wellshampton, West Felton, Whittington.

Vertical: Albrighton (nr Shrewsbury) 2, Nash, Peplow Hall.

Cube: Wellington.

Mass Dials: Burford ? a second dial, Clungunford, Culmington, Ford (gnomon hole only)

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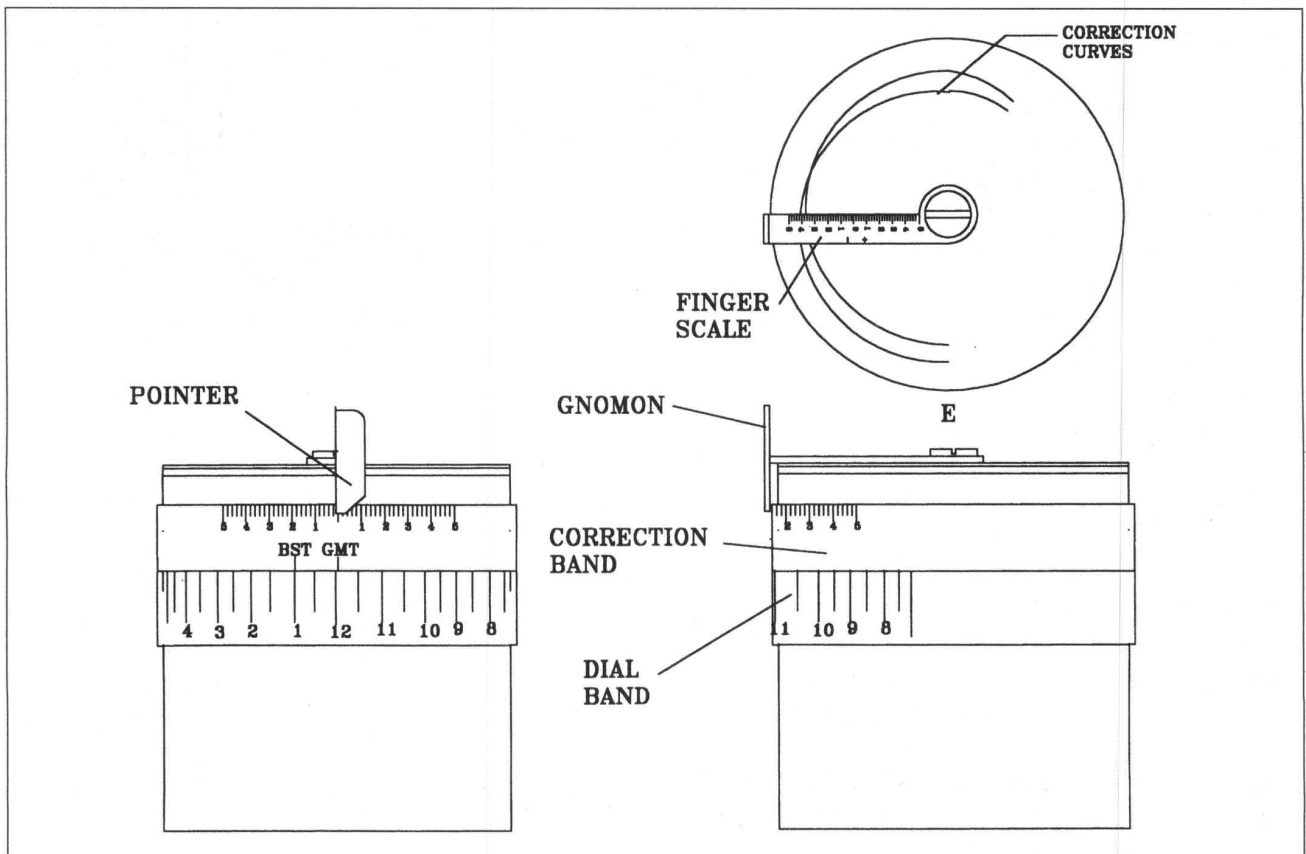
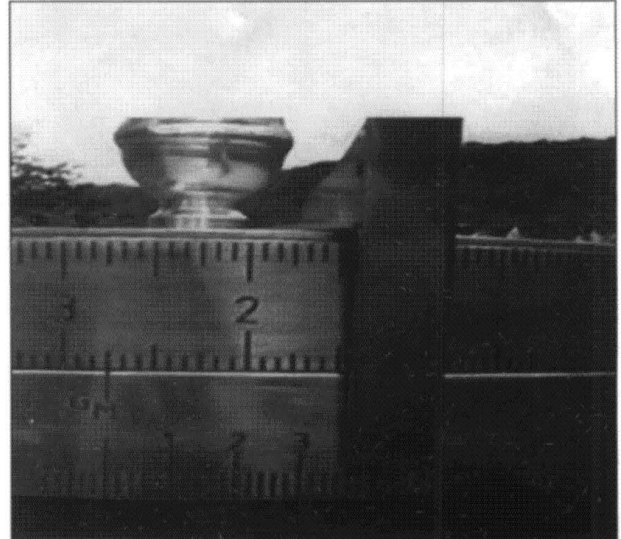
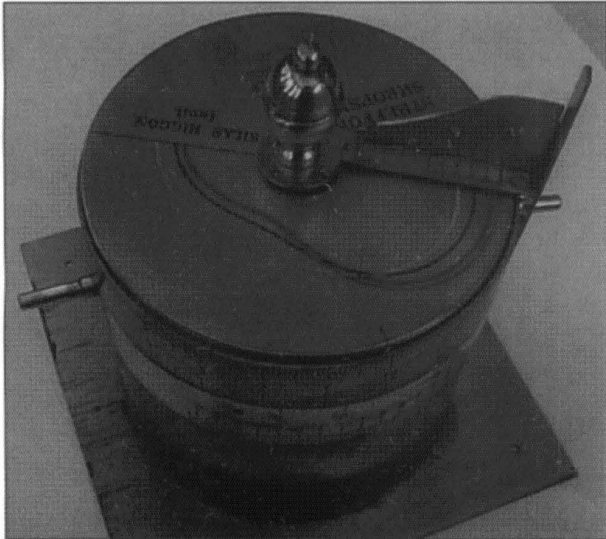
IMPROVED AZIMUTH DIAL

SILAS HIGGON

The June 2002 issue of the Bulletin carried details of a new azimuth dial. Unfortunately the details had gone to press before I was able to submit this improved design

The sun-sighting block, thrust bearing and azimuth scale of the original version have all been discarded and replaced

with a vertical gnomon attached to the end of the rotating finger. The cursor band has been replaced by a pointer which is itself an extension of the gnomon. These changes can be clearly seen in the photographs and have made the operation of the dial very much easier.



Azimuth Dial mark 2

EXTRA PHOTOGRAPHS FROM BSS AUSTRIA TOUR



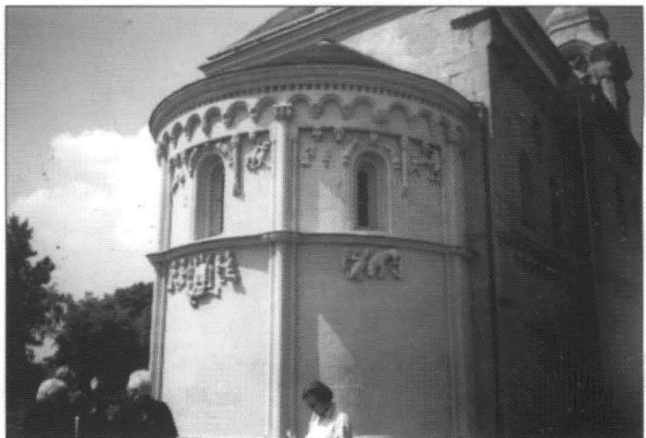
*St. Marys of the Three Oaks:
a rush to take photographs*



Sundial with organ pipe hour lines



*West door of romaneseque church of
Heilingenkreuz*



*"Stone Bible" carvings on a Wall of apse of
Schönggrabern Church*



*Hares along the roof-ridge,
St Michaels Church, Weissenkirchen*

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