BALNEARIA

Newsletter of the International Association for the study of Ancient Baths

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EDITORIAL

September has been and gone, and you must all have been wondering when the next *Balnearia* would arrive. Collecting material and corresponding with contributors over the summer months created numerous difficulties, and since this presumably would be a perennial problem the newsletter will now appear in December and June rather than September and March.

Considerable progress has been made on the Association. We now have a draft constitution, a copy of which is included at the end of the newsletter and is open for discussion. An amended version, if necessary, will be presented for ratification at the first General Meeting or by post if this seems more realistic. The officers of the interim steering committee are Inge Nielsen as President, Hubertus Manderscheid in charge of the bibliography, Hans–Joachim Schalles as ordinary member and myself as editor, membership secretary and treasurer. We are still lacking a general secretary.

A small subscription fee of £5 (sterling) or nearest round figure equivalent in other currencies will in future be levied from those wishing to join the Association. In order to avoid excessive bank charges falling on individuals, subscriptions will be collected by regional representatives. A subscription form is included with this newsletter, and should be returned to your regional representative or to the Editor by 31 March 1994 . After the first

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subscriptions have been collected, it will be possible to have the newsletter printed professionally and distributed centrally.

Several members of the Association, including Inge Nielsen, attended the 14th International Congress of Classical Archaeology in Tarragona, Spain, in September (for news from the Congress see p. 7). With over 1500 archaeologists from many different countries attending, the opportunity for publicising the Association seemed too good to be missed. Overtures were made to Javier Arce, the new president of the International Association for Classical Archaeology (AIAC), about the possiblity of affiliating the Association with that body and of publicising our initiative through the AIAC News. An announcement of our aims was made at the beginning of the session on baths and hundreds of copies of a broadsheet distributed. At the end of the session Prof. Fikret Yegül made a public proposal that a corpus of ancient baths be established, and it was suggested that the Association would provide a suitable medium for this. We hope to have more on this proposal in the next issue of *Balnearia*..

As a first official act of the Association, the President, Inge Nielsen, together with Hubertus Manderscheid and myself as members of the interim steering Committee and as scholars actively engaged in research on the Baths of Caracalla in Rome, took advantage of the Congress to draw up a petition to Alberto Ronchey, Italy's Minister for Culture, seeking his active intervention in resolving the conservation problems facing the Baths. Several hundred signatures were collected, and the President has recently had a brief reply from Sig. Ronchey thanking us for the petition which, he says, "adds weighty and authoritative support" to his own efforts in that direction. He assures us that there is a ministerial decree of 17 May 1993 which requires the Rome Opera company to vacate the Bathsof Caracalla by the end of the year, which will be the first major step in the right direction.

Finally, through the kind offices of Maura Medri and of Roberto Marcucci of L'Erma di Bretschneider it has been possible to insert n advertisement in the latest L'Erma catalogue for 1994, as a step towards getting the Association better known.

FUEL TRIALS AT XANTEN

Heizversuche in den römischen Thermen im Archäologischen Park Xanten

In den 80er Jahren wurde im Archäologischen Park Xanten ein römisches Bad rekonstruiert. Es handelt sich um eine kleine Thermenanlage, die in Zusammenhang mit einer Herberge der römischen Stadt Colonia Ulpia Traiana steht. Die Rekonstruktion basiert auf dem Ausgrabungsbefund und den Erkenntnissen, die an besser erhaltenen Thermenanlagen der römischen Welt gewonnen wurden. Der Forschungsstand ermöglichte eine funktionstöchtige 1:1 Rekonstruktion des Baus und seiner technischen Anlagen.

Ziel der Rekonstruktion war, durch Heizversuche in der Thermenanlage verlässliche daten zu Leistungsfähigkeit und Energieverbrauch römischer Heizungstechnik zu erhalten.

Zusammen mit dem Verein Deutscher Ingenieure (VDI) und dem Ministerium för Bauen und Wohnen des Landes NRW sowie mit der beratenden Unterstötzung namhafter Archäologen konnte ein Forschungsprojekt entwickelt werden, das erstmalig systematisch gewonnene Ergebnisse zu diesem Fragenkomplex verspricht. Vom 25. Juni bis zum 5. Juli 1993 wurden die Messungen durchgeföhrt. Mit Hilfer moderner Messinstrumente wurden die Abläufe beim Heizvorgang registriert.

Der Ofen der Heizanlage wurde im Versuchszeitraum in regelmässigen Abständen mit Buchenholz beschickt. Die verfeuerte Holzmenge wurde gewogen und registriert. Aussentemperaturen und Windrichtung wurden festgehalten, um die Heizergebnisse mit den äusseren Bedingungen verknöpfen zu können.

Ingesamt waren 75 Messstationen bzw. Messsonden angebracht. Sie registrierten Temperaturen, Luftfeuchtigkeit und CO–Gase im gesamtem Heizsystem. Messpunkte lagen dabei sowohl im Hypocaustum als auch in den Hohlwänden des Caldariums und in den Abgaszögen des Tepidariums. Raumtemperatur und Luftfeuchtigkeit wurden an mehrene Stellen in den Räumen gemessen. Auch die Wassertemperatur im Badebecken wurde erfasst.

An die praktische Phase des Forschungsprojektes schliesst sich die Auswertung aller erfassten Dateb an. Sie verspricht wesentliche Erkenntnisse zur römischen Heiztechnik; sie betreffen:

- Die Ausbreitung der heissen Gase im System der Hohlräume,
- die Leistungsfähigkeit des Heizsystems und die
- Effizienz der Heizung im erhältnis von Energie–Aufwand und Ergebnis.

Erste Zwischenergebnisse werden im Herbst 93 vorliegen. Es ist geplant, die so gewonnenen Daten durch eine weitere Versuchsreihe unter winterlichen Wetterbedingungen zu ergänzen.

A. Rieche
Archäologischen Park Xanten

'X' Marks the Spot: Fuel Trials at Xanten

At the end of April I spent over a week stoking the furnace of the baths of the *mansio* at Colonia Ulpia Traiana, Xanten, Germany. The main objects of the exercise were to experience the environment of both the stoker and the bather and to investigate the problems of operation, instrumentation and measurement, so that they might be anticipated in future reconstruction and research.

The Xanten baths (Fig. 1) were constructed on robbed–out foundations in the Archäologischer Park Xanten (hereafter APX), a highly praise–worthy theme park containing a number of convincing and functional reconstructions. The baths represent very closely the kind of establishment which would have stood on the site, from working hypocaust to painted wall–plaster (with designs copied from elsewhere in the north–west provinces of the Roman empire – Switzerland and south Germany). Modern technology is discreetly used; for example, an electric pump raises water from the well, and this is recycled rather than running to waste.

A survey of the structure suggested that it departed from what I believe to have been Roman practice in a number of minor details, some of which resulted from modifications to improve its working. Further modifications can be suggested, and I am discussing these with colleagues at APX. Anyone familiar with small Roman baths will recognise that they were, on the whole, do–it yourself jobs, modified on an *ad hoc* basis. The important thing, however, was that here we had a set of hypocausted baths which worked and which would certainly provide data of the right order.

As stoker my main concern was lighting and maintaining the fire, and I was warned by my experienced German colleague against rushing this, since too rapid heating might result in cracking of the structure, or, worse, separation of the testudo from the wall, allowing water to run into the furnace. A small quantity of charcoal was ignited, and wood cautiously added. A policy of "demand feeding" led to my stoking about 20 kg every four hours, day and night! (Fig. 2) The warming–up process took about a week, and until the flues were warm the smoke came the wrong way – out into the praefurnium. I was red-eyed, kippered, and not at all nice to know. During the operation, baked potatoes were cooked *al forno* in the stokehole; pity Apicius knew nothing of the potato!

The combustion thereafter appeared to be self–accelerating; as the temperature increases the draught increases, causing more rapid combustion. This was the case when the fire door which was provided was closed, causing turbulent air in the furnace. With the door open I believe more air is drawn over the fire and although fuel consumption may rise, the temperature can be better controlled. This was tried on the last day, but the results were not conclusive (see Fig. 2). I would be grateful to hear from readers who have evidence for the provision and use of fire doors on hypocausts.

Wood was weighed on platform scales, and temperatures were measured with a portable digital thermometer with gas, surface, and general–purpose probes. A sling hygrometer checked temperatures and humidities when operational conditions were reached. Considerations of cost and public access made it impossible to install instrumentation throughout the baths, and no continuous recording instrument was available. It is worth noting that I was unable to locate a commercially available thermo–hygrograph which would operate in the conditions obtaining in the caldarium, and that my automatic camera would not work there.

To investigate the feasibility of calculating heat flow from surface temperature, measurements were taken over the accessible walls, floor and the heated vault of the caldarium (Fig. 3). Clearly with a thermometer accurate to the nearest degree one could not find where heat flowed in and where out. It is possible to imagine gas in the wall flues supplying heat at the bottom and removing it at the top. Unfortunately it was not possible to measure the exit gas temperatures as a violent thunderstorm was raging.

The most significant observation made at this time was mainly subjective. It was impossible, with the relative humidity at 100% and the air at 34.5 ^{o}C to perform the simplest task while clothed; naked, my colleague Bryan Scott's pulse rate was 164. In future experiments it might be informative to have a doctor present. In any case, I must modify the (theoretical) temperature which I used in calculations (BAR 5, 1978); instead of 60 ^{o}C, the air temperature in the caldarium is unlikely to have exceeded 40 ^{o}C.

The results given here relate to the caldarium only. With the present configuration of the system, with a heated vault in the caldarium only, and no collecting channel at the top of the tepidarium flues, the hypocaust of the tepidarium appeared almost ineffective. It was heated by conduction loss from the caldarium. I will discuss the point in a separate note on chimneys.

It is difficult to summarise in a few words the gamut of experience, skills, information and, above all, questions gained from simple experiment. It is clear that there is much to be gained from a full–scale experimentation of this kind. As Director of

the Roman Building Trust (UK), I am working to provide for an experimental suite of baths being built in Britain in the near future.

I am very much indebted to my colleagues at APX, especially Dr H.–J. Schalles and Dr G. Precht, not just for their co–operation and advice, but for making the trials possible by creating the baths. I am also grateful for help from my English colleagues, Bryan Scott and Jenny Wright, and to the Society of Antiquaries of London who provided a research grant to support the work.

Postscript: Since this note was written, a more extensively instrumented trial has been performed by engineers at APX. Inter alia these seem to confirm my conclusions about the tepidarium, and to introduce a further physiological complication: a build–up of carbon monoxide in the caldarium. I hope we will see some results of this published shortly in this newsletter.

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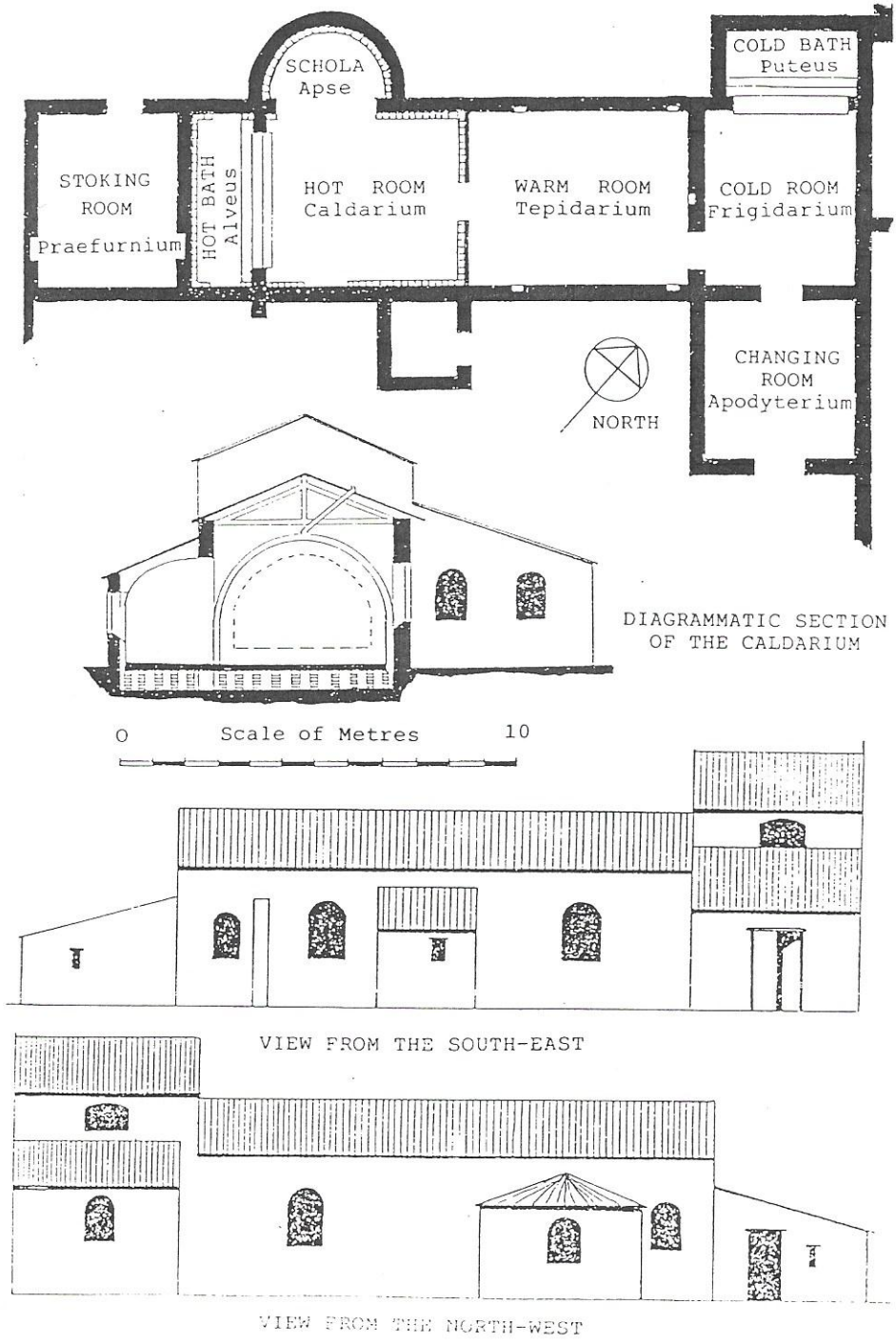

Figure 1. The Xanten mansio baths (after Precht). Flues are indicated diagrammatically.

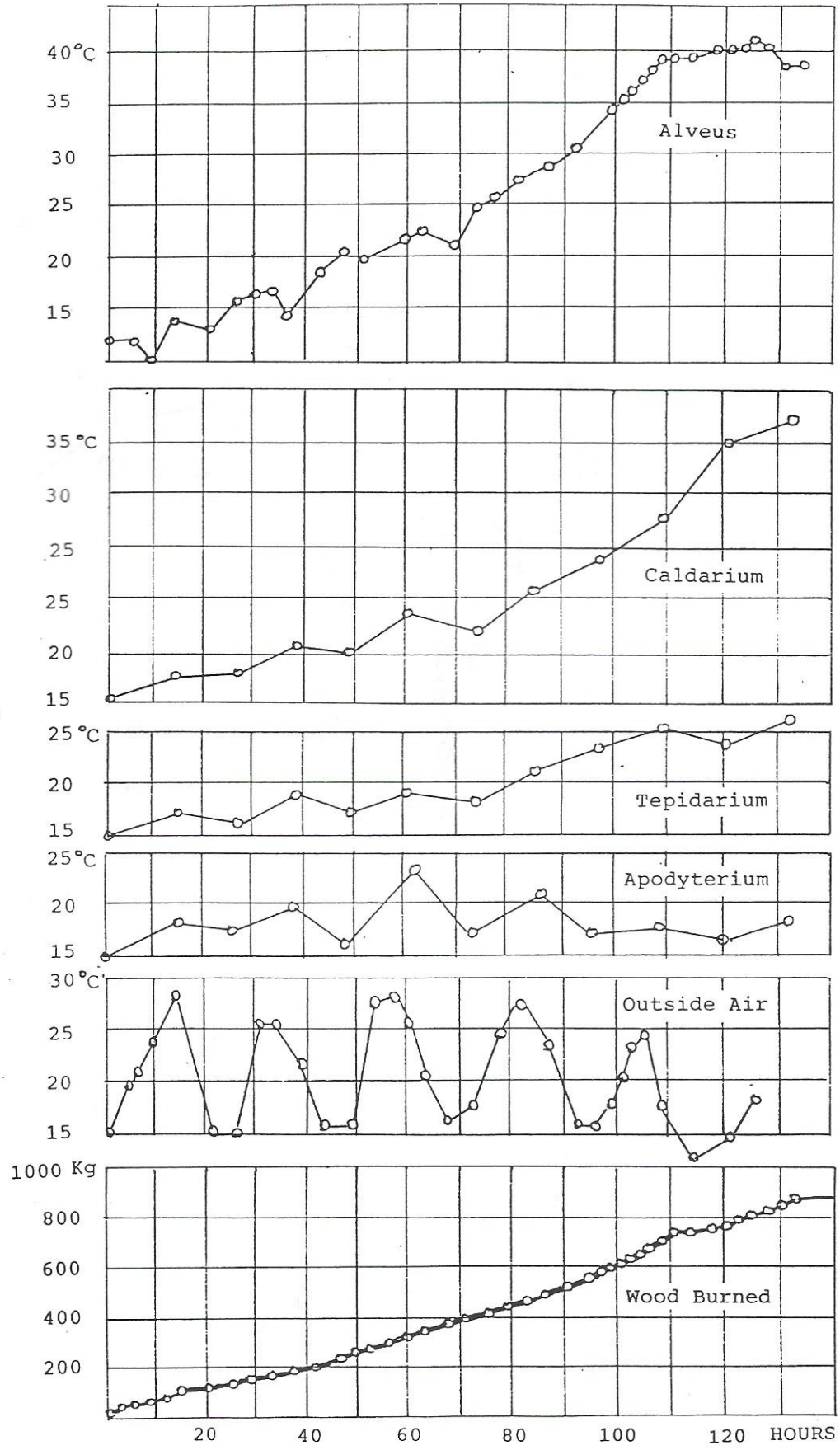

Figure 2. Fuel consumption and temperature. The fuel (wood yielding c. 7 megajoules/kg) is plotted cumulatively. Air temperatures inside the baths are plotted night and morning (when the baths were not open to the public). The apodyterium is included, since it gives a good idea of the performance of an unheated space. The top graph shows the temperature in the hot pool, capacity c. 5.5 m^3, requiring c. 23,000 megajoules/^{o}C.

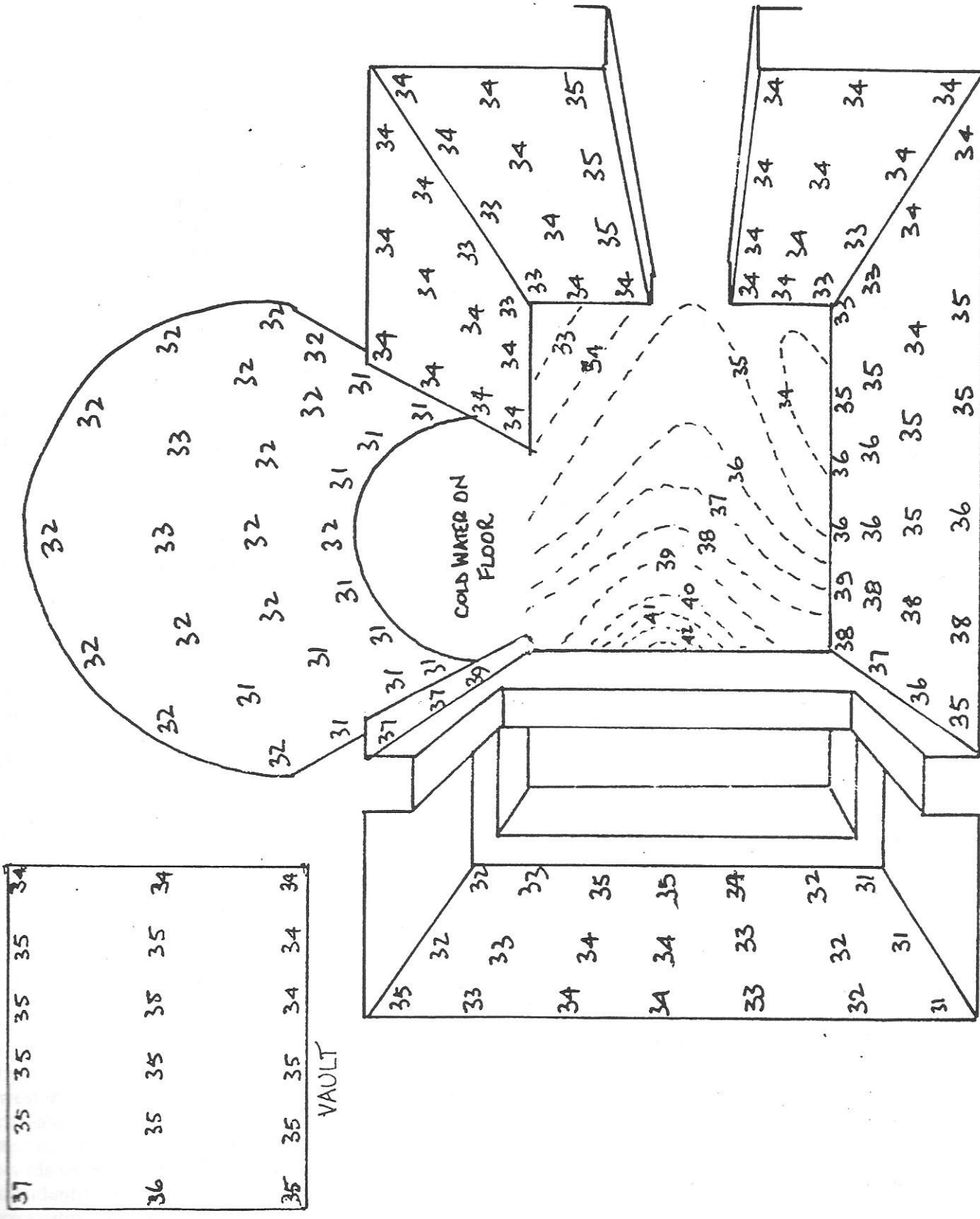

Figure 3. Surface temperatures in the caldarium after 110 hours heating.
Air temperature uniform at 34.5 $\pm$1 ^{o}C

The Tarragona Conference

The 14th International Congress of Classical Archaeology, held in Tarragona 5–11 September 1993, had as its theme the Roman city. In keeping with the growing appreciation of the importance of the public baths in Roman urban life, a whole afternoon session, chaired by Dr Riccardo Mar, was devoted to this topic. Inge Nielsen, in her paper "Roman baths and urban society", stressed the importance of baths as an element in Romanisation, particularly in the western provinces, where baths formed an integral part of towns from their foundation, their obvious physical appeal and lack of overt political message making them readily acceptable to all. This theme was reflected by Sorin Cocis of the Muzeul National de Istorie al Transilvaniei, Roumania, who discussed the distribution of Roman baths in Dacia. The earliest baths are found in or near forts, but later both public and private baths occur in the towns of Romula, Dobreta, Ulpia Traiana, and Apulum, and in rural villas. Several spa baths are also known, and Dr Sorin described the new excavations at Gemisara, which have produced an interesting series of gold votives and dedications to the nymphs and to the healing powers of the waters.

Other papers concentrated on Pompeii and Rome. Luciana Jacobelli, who with H. Manderscheid and G. Soricelli is preparing a systematic study of the baths of Pompeii in their urban context, discussed the role of the Suburban Baths and their relation to the terraced residential developments on the south–west side of the town overlooking the sea. The water systems of the Suburban baths of Pompeii and Herculaneum were the subject of Hubertus Manderscheid's paper, in which he stressed the advances shown in both these cases over the well–known system used in the villa La Pisanella at Boscoreale, and argued that this reflects a more select clientele than that catered to by the Forum and Stabian baths. The papers on Rome both presented the preliminary results of excavations carried out by the Soprintendenza Archeologica di Roma. Marina Piranomonte discussed the excavations carried out by her and Alessandra Capodiferro in the south–western "library" of the Baths of Caracalla, which revealed traces of a geometric opus sectile floor and cuttings for six columns in the opening towards the xystus, and reexamined the evidence for the identification of this structure as a library. The excavations in the octagonal room (the ex–Planetarium) of the Baths of Diocletian, discussed by Daniela Candilio, revealed two phases of construction pre–dating the baths. The second of these clearly belongs to a major public building identified with Domitian's *Templum Gentis Flaviae*, a point of great interest in considering the affect of building these baths on the urban fabric.

SITE NOTES AND NEWS

Pompeii, Terme Suburbane – a new example of the "Samovar" system

In January 1993, a foundation wall was partially uncovered in the natatio of the Suburban baths at Pompeii (See L. Jacobelli, "Terme Suburbane: stato attuale delle conoscenze", *Rivista dei Studi Pompeiani* 2 (1988), 202) which, on the basis of the few known examples, immediately suggested that the pool and its water had been heated using the "samovar" system, the name given by Umberto Papparlardo to that used in the Suburban Baths of Herculaneum. In May the excavation was extended, the results fully confirming the original hypothesis. Nearly in the centre of the pool was found a foundation, squared outside and circular inside, made to support the metal tank which kept the water warm. In order to heat the water, a passage led from outside the natatio under the floor of the pool directly to the "samovar". The best parallels among the five previously identified examples of this system are the completely preserved one in the Suburban baths at Herculaneum and the rather less well–preserved example in the Villa San Marco at Stabia. For a preliminary report, see H. Manderscheid, "Bemerkungen zur Wasserbewirtschaftung der Suburbanen Thermen in Pompei", *Archäologisches Korrespondanzblatt* 1993 (forthcoming).

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News from Bulgaria

Excavations of a bath building (? thermae) at Diocletianopolis, now Hissar in the district of Plovdiv, began in 1993. The edifice is situated in the vicinity of the famous spa of Hissar. Some 30m to the east of the building are the remains of a Roman bath which was partly excavated in 1935 (see: H. Manderscheid, *Bibliographie zum römischen Badewesen*, München 1988, Abb. 184). The possibility exists that the two buildings are part of the same large complex.

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Contributitions to **Site Notes and News** are always welcome. Reports can be sent through Regional Representatives or direct to the Editor.

A Recently Discovered Military Bath (Kastellbäder) at Intercisa in Pannonia.

A new, relatively well–preserved Roman military bath complex was discovered by Zsuzsa Pongröcz and her team of Hungarian archaeologists in the summer of 1992; the present report is based on her account of the excavations. The bath building is located about 50 m NW of the *porta principalis sinistra* of the castellum of Intercisa (fig. 1).

So far the excavations have uncovered six rooms of different sizes on the north, east and west; the south side of the complex had entirely disappeared (fig. 2). On the north is a room with the remnants of a hypocaust installation, and the northern enclosure wall of the entire complex. On the east side is the main drainage system, while on the west are additional rooms of as yet unknown dimensions.

Room I (44 m^2) probably served as the frigidarium. About one third of the to the east was occupied by two basins, and there was a bathtub in the NW corner. Most of Room II is still unexcavated, although a drainage pipe was located here. The destination of Room III remains a puzzle. There are indications that this room was originally not an independent unit but rather part of Room I. Room IV is the caldarium; it has hypocausts and remains of a waterproof *opus signinum* floor in its SW corner. Room V is only partially excavated. From Room VI comes a series of *tubuli*, and its floor has a substantial layer of scale–coating indicating that it had served as the sudatio. The praefurnium has not yet been located.

Brick of various sizes and forms was the basic material used to construct the bath complex. Besides fresco fragements, pieces of decorative stucco were also found. The small finds, especially the coins, indicate that the bath complex – the second one found at Intercisa – was built around the middle of the third century. There is also evidence that the building was renovated and somewhat altered on one occasion. By the second half of the fourth century a new building had arisen above Room II.

There is no clear answer yet as to why the bath is situated outside the castellum. Nevertheless, it is known that after the Marcomannic wars a large military unit, a *cohors equitata*, replaced the troops previously stationed at Intercisa. Consequently the larger number of troops may have required a more spacious bath for which there was probably insufficient room within the castellum.

The excavation of the military bath has been discontinued for the time being, and until the work is renewed the site has once more been covered by a protective layer of soil.

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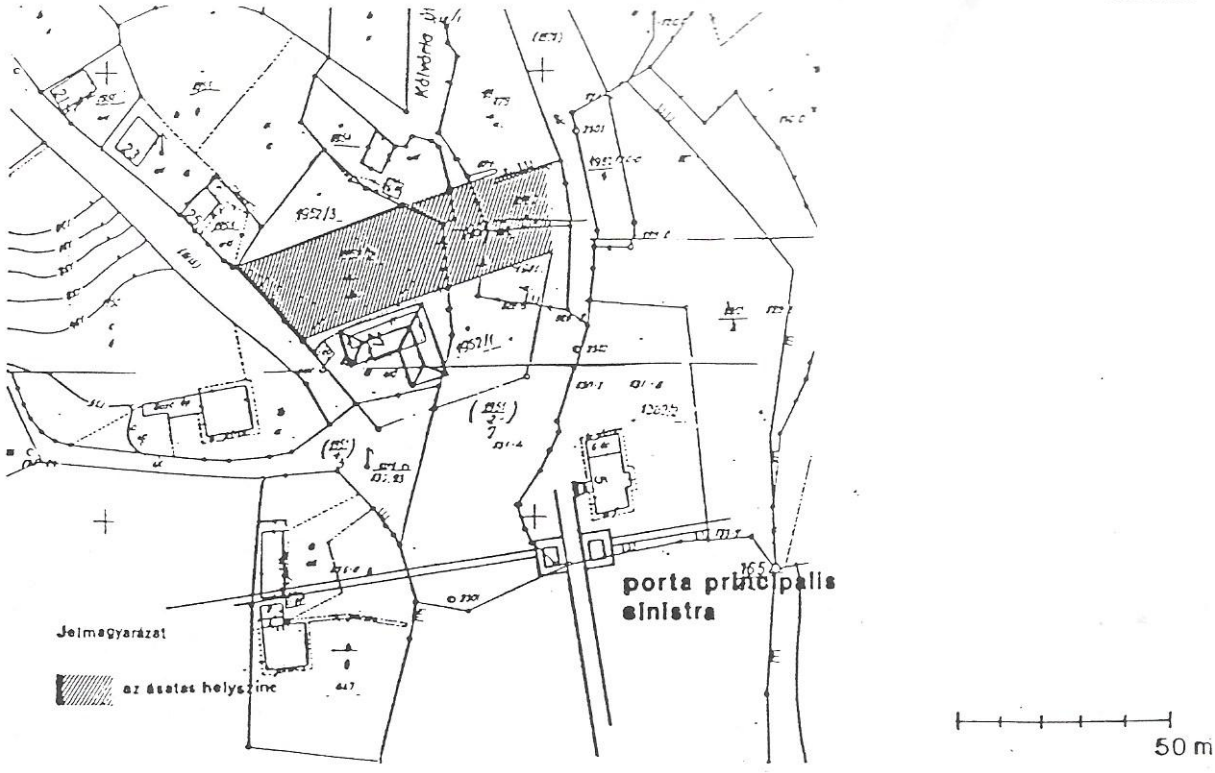

Figure 1. Intercisa. Area of excavations is shaded.

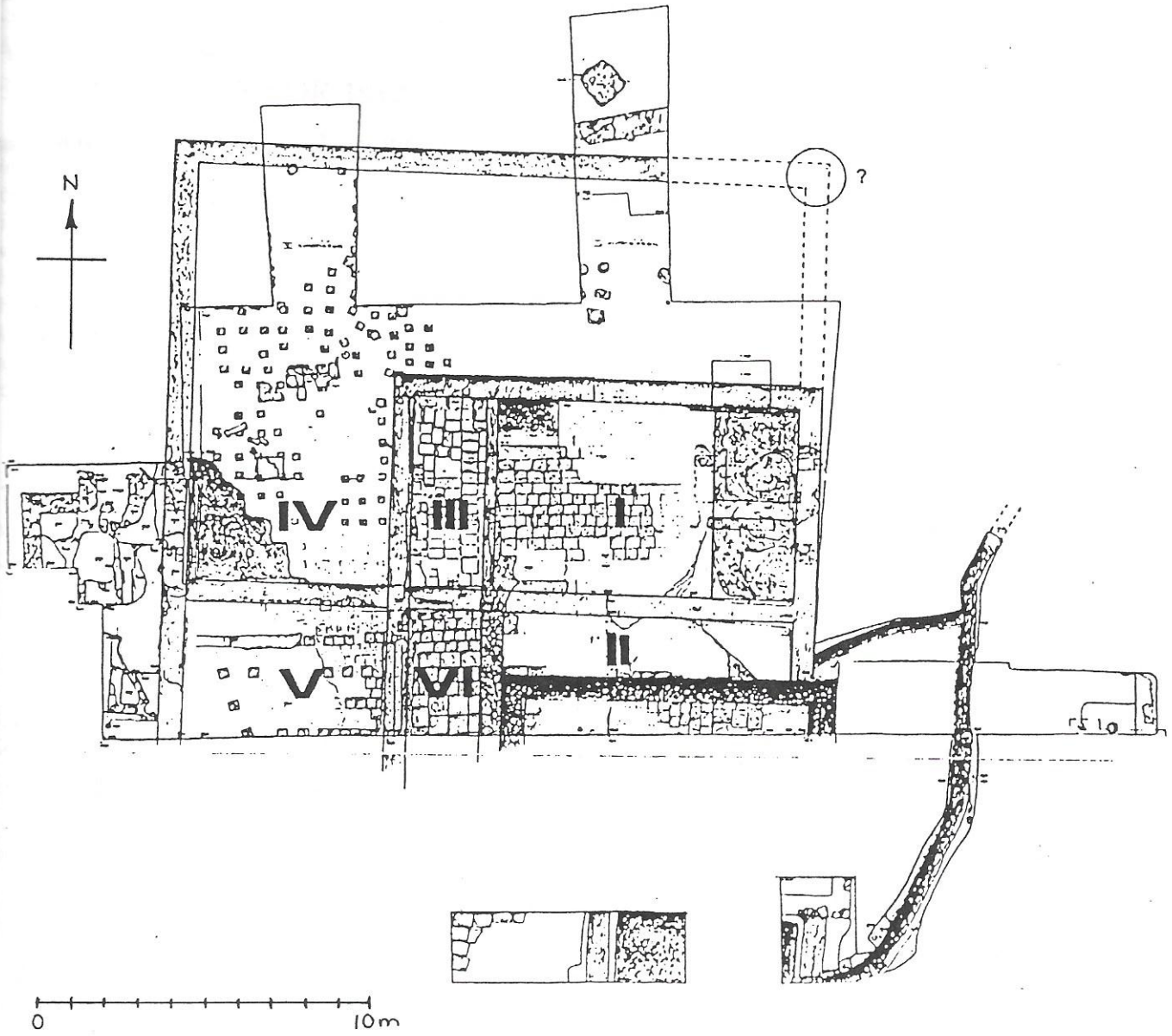

Figure 2. Military Bath, Intercisa. Present-state plan.

HELP!!!

A missing 'samovar'

In her article "I bagni nelle prime ville romane" (CronPomp 2, 1976, 98 note 90), E. Fabbricotti mentioned the "excavation" of the so–called "samovar" system in the baths of the Villa San Marco at Stabia by Lord William Hamilton. The metal tank of the "samovar" was taken to the ship "Colossus" to be transported to England, but during the voyage the "Colossus" was sunk. According to Prof. Fabbricotti the wreck was explored about 1975–76 by British archaeologists. Can anyone tell me if the metal tank of the Villa San Marco "samovar" was found, and if so, what has happened to it?

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Bath Gardens

A publication, The Gardens of the Roman Empire, by Wilhelmina F. Jashemski, is now in preparation. It will be encyclopedic in character, containing interpretative chapters followed by a descriptive catalogue with bibliography, plans, drawings, and photographs of every garden in the Roman empire known from excavation, literary sources, epigraphy, the Marble plan of Rome, wall painting and mosaics. Each example will be discussed by the scholar who has excavated or made a special study of the particular garden or subject. Readers of Balnearia are invited - indeed urged - to locate and report on any garden or garden decoration in the baths they are excavating or studying, even if they are only identifiable by their architectural context. Reports should be sent to the Editor, who will forward the information to Professor Jashemski.

GREEK AND ROMAN BATHS AND BATHING BIBLIOGRAPHY FOR 1992

Note: This bibliography follows the classification given in H. Manderscheid, *Bibliographie zum römischen Badewesen unter besonderer Berücksichtigung der öffentlichen Thermen* (Munchen 1988), with some modifications. Any headings for which there are no entries are omitted. Abbreviations are those of *Archäologisches Biliographie* 1992, ixff. and *Archäologischer Anzeiger* 1989, 721ff., 729ff. n.v. = *non vidi*. My thanks to Janet DeLaine and other colleagues for sending me bibliographical details.

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INTERNATIONAL ASSOCIATION FOR THE STUDY OF ANCIENT BATHS

DRAFT CONSTITUTION

1. NAME: The name of the Association shall be "INTERNATIONAL ASSOCIATION FOR THE STUDY OF ANCIENT BATHS" (hereafter "the Association").

2. PURPOSE: The purpose of the Association shall be the promotion of the study of baths and bathing customs in the ancient Greek and Roman worlds, their precursors, and their successors in the medieval, Byzantine and Islamic worlds, by facilitating communication between all relevant disciplines and by the dissemination of information through conferences and the publication of a bi–annual newsletter, to be known as "*Balnearia*".

3. MEMBERSHIP
(a) Ordinary membership shall be open to all persons interested in the purposes of the Association.
(b) Affiliated membership shall be open to organisations and libraries. Affiliated members may be represented at General Meetings by one member of their staff.
(c) Persons or organisations wishing to join the Association as Ordinary or Affiliate Members shall apply to the Membership Secretary and Treasurer and on admission shall receive an up–to–date copy of the Constitution of the Society.
(d) An annual subscription shall be payable on the 31 March in each year by Ordinary and Affiliated Members and shall be at a rate proposed by the Committee and approved by the General Meeting.
(e) The Committee may from time to time propose to a General Meeting of the Association the election of Members *honoris causa* who shall pay no subscription.
(f) Members shall receive the newsletter of the Association without charge and shall be entitled to vote at General Meetings.
(g) Members in arrears of dues for two years shall be excluded. Members may exceptionally be exempted from the payment of a subscription by approval of the Committee.

4. OFFICERS AND COMMITTEE
(a) The Committee of the Association shall consist of a President, a General Secretary, a Membership Secretary and Treasurer, an Editor, a Bibliographer, and one ordinary Member, whose duties and terms of office shall be as prescribed below.
(b) Members of the Committee shall be elected at General Meetings of the Society and shall serve for that interval between General Meetings which shall most closely approximate to three years. No officer shall serve in the same post for more than two consecutive terms of office. The Officers shall serve without pay.
(c) The procedure for election of Members of the Committee shall be as follows:

The General Secretary shall give notice of any vacancy not less than six months before the General Meeting at which the vacancy is to be filled and shall call for nominations.

Nominations shall be made in writing to the General Secretary not less than three months before the General Meeting at which the vacancy is to be filled.

If a vacancy arises between General Meetings, it may be filled temporarily by the Committee but only until the next General Meeting.
(d) The Committee may nominate sub–committees for special purposes.

5. DUTIES OF OFFICERS
(a) The President shall exercise general supervision of the welfare of the Association and may speak or write in the name of the Association. He/she shall preside at Meetings of the Committee and at General Meetings and shall present the report of the Committee to General Meetings.
(b) The General Secretary shall assist the President in the conduct of the Association's affairs and shall act on behalf of the President in his/her absence. He/she shall keep a proper record of Committee Meetings and of General Meetings of the Association. He/she shall where possible provide such assistance to the organiser of any conference of the Association as may be requested, including assistance with publication of any conference proceedings.
(c) The Membership Secretary and Treasurer shall have charge of the Society's funds. He/she shall prepare a statement of account for each General Meeting of the Association and shall present it at the meeting together with a report on the financial

affairs of the Society. He/she shall maintain an up–to–date list of the names and addresses of members of the Association.
(d) The Editor shall edit and circulate to all members the bi–annual newsletter *Balnearia* in June and December of every year. The newsletter shall act an organ of the Association in promoting its aims by the dissemination of information regarding the Association and other items of interest to its members. The Editor may also provide such assistance with the publication of any conference proceedings as may be requested by the organiser.
(e) The Bibliographer shall prepare a bibliography of items relating to ancient baths and bathing published in the previous calendar year, and forward this to the Editor in time for publication in or with the December issue of Balnearia. Bibliographical up–dates shall also be prepared and published from time–to–time.

6. REGIONAL REPRESENTATIVES
(a) In addition to the Committee, there shall be Representatives in any region or country in which there are subscribing Members.
(b) The duties of the Representatives shall be as follows:
1) To promote the purposes of the Association in their region or country by acting as a liaison between members within their region or country and by representing the interests of their region or country to the Committee when necessary.
2) To bring to the notice of the Editor new discoveries or other items of interest from their region or country for publication in *Balnearia* .
3) To bring to the notice of the Bibliographer new publications originating from or relating to their region or country.
4) The term of office and procedure for election of the Regional Representatives shall be the same as for Officers, except that the limit on reappointment shall be waived where no other candidate is nominated.
5) Regions or countries for which there is no Representative shall communicate directly with the relevant Officers as and when necessary.

7. CONFERENCES AND GENERAL MEETINGS
(a) Conferences of the Association for the exchange of views and the reading of papers shall be held usually at intervals of not more than three years.
(b) At every Conference there shall be a General Meeting at which the following business shall be transacted: 1) Receive and approve the report of the Committee 2) Receive and approve the report of the Treasurer 3) Approve the rate of the annual subscription 4) Election of Officers and Regional Representatives 5) Any other business, including proposals for the hosting of the next Conference.
(c) Notice of a General Meeting together with a list of proposals to be voted upon at the meeting respecting the election of Officers and Committee Members or alterations to the Constitution shall be sent in writing to all members of the Association at least three months before the date of the said meeting. Any member who will be unable to be present at the meeting may vote upon such proposals by expressing his/her wishes clearly in writing to the Secretary before the meeting. A final notice of the business to be transacted at a General Meeting shall be displayed in a prominent and appropriate place at least twenty-four hours before the time appointed for the meeting.
(d) Members who wish to propose motions for discussion at a General Meeting shall give notice to the secretary at least two months before the meeting.
(e) Decisions made by a General Meeting of the Association shall be by a simple majority. In the event of an equality of votes the President shall have a casting vote in addition to his/her ordinary vote. Any decision shall be valid only if the total number of votes cast in person or in writing is not less than one twelfth of the membership of the Association.

8. AMENDMENT
This Constitution may be amended by a resolution (notified as in Article 7c) supported by a two–thirds majority of the members voting in person or in writing at a General Meeting, provided that the total number of votes cast in person or in writing is not less than one twelfth of the membership of the Association. Amendments may also be proposed by mail ballot and shall be deemed valid if supported by a two–thirds majority of those members who have replied within two months of the issuing of a notice proposing such an amendment. Notice of the passing of any amendment shall be issued to all members within six months of the event.

9. DISSOLUTION
Dissolution of the Association may be decided in the same manner as alterations to the Constitution in Article 8. The remaining property and assets of the Society may be given to any member institution interested in the promotion of the aims of the Association, at the discretion of the President in office at the time of the dissolution.

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