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● message from the President

As we pass from 2006 to 2007 I can reflect on a successful year completed, and a very active one ahead. In early September I attended the 3rd International Seed Health Conference in Bydgoszcz, Poland, at which the ISSS sponsored the opening Symposium. This was made possible by the efforts of our Representative for Eastern Europe and Russia, Elwira Sliwinska. Thank you. Her report on the Conference is published in this Newsletter.

Being relatively close to the site of our next triennial meeting, in Olsztyn, I visited with the chief organizer, Ryszard Gorecki, and his team, who made an impressive presentation of their progress and plans. The conference facilities at the University of Warmia and Mazury are excellent, and the campus is amiably situated in a wooded area, with a lake, near to the edge of the city. Accommodation both on and off campus is very pleasant and convenient, and a stimulating and enjoyable scientific and social program is being organized. It will be an excellent meeting, so mark the dates: July 6-11th, 2008 in your diaries. My thanks to Ryszard and his colleagues for their hard work, with much more to come!

The year 2007 is going to be a very busy one with many opportunities for our members to attend meetings. There are two major Workshops organized on behalf of the Society, one on the Molecular Aspects of Germination and Dormancy in Salamanca, Spain in July (our AGM will be held at this), and the other on Seed Ecology in Perth, Australia in September. Details on these and other meetings are available on our website. Thanks to Dolores Rodriguez and Kingsley Dixon, and their colleagues for the organization of these workshops. There are also two meetings that have sections sponsored by the ISSS: these are DesWork to be held in Drakensberg, S. Africa in January, and the 11th International Symposium on Preharvest Sprouting in Mendoza, Argentina in November. In addition, there is the ISTA Seed Symposium in Iguassu Falls in Brazil in May, in which there are a number of presentations by invited ISSS members.

I am pleased to welcome Prof. Raza Bhatti of the Shah Abdul Latif University, Khairpur, Pakistan, as our new Regional Representative for Middle and Western Asia.

Now that our affiliated journal, *Seed Science Research*, is published by Cambridge University Press we are in contact with them requesting the continuation of the discount on the journal for all members, and likewise for other CUP publications. Also we have requested that CABI continue with a discount on their publications for our membership. More details will be posted on our website when we hear from these publishers.

And finally, this is the first Newsletter that is solely in the hands of our new Editor, Fiona Hay, to whom I am grateful for taking on this important role.

J. Derek Bewley

seeds at sea

Charles Darwin had a great interest in botany (yes, botany: no plant science or plant biology in his day). Many of us are well aware of his books on insectivorous plants, orchids, domestication and plant movements – especially the latter, as here are the ideas that led to the discovery of the plant hormones. But his work with seeds is generally less well known.

Darwin frequently wrote about seeds to *The Gardeners' Chronicle* and *Agricultural Gazette*, an important 19th century botanical, agricultural and horticultural magazine. In the mid 1850s, his letters and longer contributions covered seed vitality (longevity) and seed treatments (steeping seeds in manure): but his main 'seedy' preoccupation was how well do seeds withstand immersion in sea water? The reason Darwin was interested in this was because of plant distribution – can viable seeds be carried from the mainland to outlying islands, where the vegetation may be very similar?

In his first letter (April 1855) Darwin asks readers for information on seeds in sea water and, in his modest way, states "The results at which I have already arrived are too few and unimportant to be worth mentioning". Just over a month later, a much longer communication appeared in which he presents a justification for his question as to whether or not seeds can be transported in sea water, "whether the same organic being has been created at one point or at several on the face of our globe." In the month that elapsed between the apology for the "unimportance" of his findings and the second letter he appears to have gained some confidence, for he describes the effects of sea water on seeds of 23 species, some of which (e.g. cress, lettuce, carrot, celery) germinated well after 42 days in the saline water, whereas cabbage and five leguminous species fared poorly: and the water in the case of cabbage "smelt offensively to an extraordinary degree".

Interestingly – and Darwin hazards no explanation for this – ice-cold sea water was less damaging to seeds of several species than was water at about 44°F (7°C). In a longer article in the November 24 issue of *The Gardeners' Chronicle* he refers to even greater survival times, such as 127 days for *Capsicum*. Surprisingly (and I would have expected better from Darwin) he is rather parsimonious in the details he gives of how he carries out his germination tests – did the seeds remain in saline or were they transferred to fresh water? But taking into account the speeds of Atlantic currents, Darwin concludes that seeds might easily be thus carried for about 1400 miles and remain alive. He notes, however, that seeds whose buoyancy he tested sank in sea water, which (he writes) "... seems at first a fatal obstacle to the dissemination of plants by sea currents". But he continues, "It should be borne in mind how beautifully pods, capsules etc, and even the fully expanded heads of the Compositae close when wetted, as if for the purpose of carrying the seed safe to land". But in the November 24 communication, he writes, "...permit me to cry *peccavi*" (I have sinned) for when he tested the floatability of herbaceous species and branches with ripe seed, "with sorrowful resultI have found

that all sank within a month and most of them within 14 days. So that, as far as I can see, my experiments are of little or no use". Perhaps only a great scientist would admit that!

This disappointment nevertheless did not deter him from presenting a paper to The Linnean Society of London, in May 1856 (published in the journal of the proceedings of that society), describing the survivability in seawater of seeds of over 80 species, arranged in groups according to their families. Perhaps we should remind ourselves that while he was carrying out these experiments on seeds, Darwin's mind must also have been occupied with much weightier intellectual matters, namely the theory of natural selection, which finally was revealed to the world in the Darwin/Wallace paper to the Linnean Society in July 1858.

To return to floating and sinking seeds: Darwin wondered what Linnaeus meant when he wrote "... *Fundus maris semina non destruit*" – the bottom of the sea does not destroy seeds. Apparently, Linnaeus was aware that seeds may be washed in the Gulf Stream, even to the coast of Norway. Did Linnaeus assume that these seeds were carried at depth? Whatever the precise meaning, it seems clear that Linnaeus knew that seeds survive immersion in sea water. The seeds that Linnaeus had in mind are likely to include those which today we call sea beans or drift seeds. These are the many types of seeds (a large proportion of them thick-coated legumes), carried from the tropics in Atlantic and Pacific currents and surviving journeys in sea water of over a year. Examples are the hamburger bean (*Mucuna* spp.), nickarnut (*Caesalpinia bonduc*), and the sea heart (*Entada gigas*). Perhaps had Darwin known about these he would have had no need to carry out his experiments, which in any case seem not to have convinced him!



Pictured from left to right: seeds of *Mucuna urens*, *Caesalpinia bonduc*, and *Entada gigas*. Pictures taken from [Seeds: Time Capsules of Life](#) by Rob Kessler and Wolfgang Stuppy. Papadakis Publisher (in collaboration with the Royal Botanic Gardens, Kew) ISBN 1901092666. In the USA: Firefly Books ISBN: 1554072212

For Darwin's letters/articles see <http://darwin-online.org.uk>, and for sea beans see <http://www.seabean.com>.

Michael Black

● seeds on the web

Prompted by a suggestion from an ISSS member, *John Dickie*, Head of the Seed Conservation Department's Information Section, RBG Kew, has compiled a list of top websites for seed information.

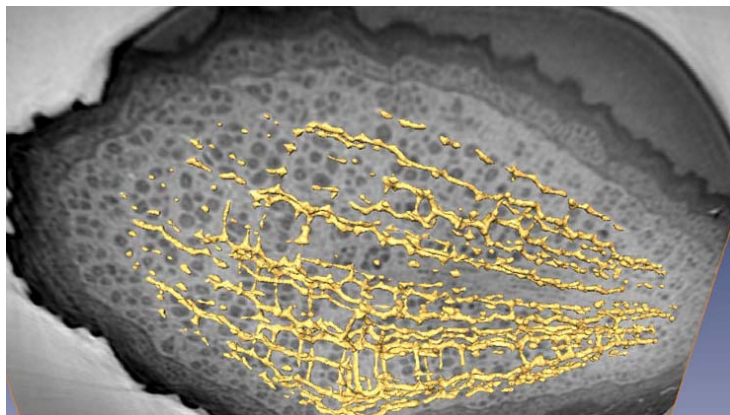
- Undoubtedly 'top of the pops' at present for its content and presentation and recommended by the Science Magazine is the 'Seed Biology Place'. <http://www.seedbiology.de/>

- There are many university sites of a similar standard describing researchers and their projects, but the one at Ohio State University is a good example, with the added bonus of a collection of seed images to aid identification. <http://www.oardc.ohio-state.edu/seedid/>
- Relatively few sites disseminate really substantial amounts of useful data. Graham Simpson's bibliography on seed dormancy and germination is one <http://library.usask.ca/dbs/seed.html> Alternatively, the Thompson and Morgan 'Seed Raising Guide' for horticultural species is re-presented: Backyard Gardener – seed germination database <http://www.backyardgardener.com/tm1.html>
- Continuing a more popular theme, with lots of material that would be useful for schools, etc., Waynes Word does an accessible treatment of fruit types. Some botanists might cry over-simplification, but it's a good start point. <http://waynesword.palomar.edu/fruitid1.htm> See also wind dispersal, for example <http://waynesword.palomar.edu/plfeb99.htm>
- Not really a site, but there used to be lively exchanges on 'The Seed Biology Electronic Mailing List' which was hosted by Ralph Obendorf at Cornell University. Unfortunately it is has essentially been shut down for the time being due to a switch to a new computer system but lets hope a *iss* list server will be re-instated soon.

Finally, I don't suppose it's very British to blow our own trumpet, but the Millennium Seed Bank Project's webpages are currently being re-vamped – watch this space <http://www.kew.org/msbp/> and if it's data you're after, Seed Information Database (SID) v. 7 crept out almost unannounced last October <http://www.kew.org/data/sid/whatsnew.html>

If your organisation provides web-based resources which you think might be of interest to *iss* members – or if there is a website to which you regularly return – please e-mail the editor of the newsletter and we'll let other members know: f.hay@kew.org. Don't forget there are also links from the ISSS website <http://www.SeedSciSoc.org/links.html>

● seeds in 3D



An intercellular air network has been discovered in seeds of *Arabidopsis thaliana*. Researchers at CNRS, the University J. Fourier of Grenoble, and ESRF used synchrotron light to study seeds in 3D, enabling them to look at the 3D organisation of individual cells and leading to the discovery of this air path. The network may be the source of oxygen used by the seed in germination.

Cloetens, P., Mache, R., Schlenker, M. and Lerbs-Mache, S. (2006) Quantitative phase tomography of *Arabidopsis* seeds reveals intercellular void network. *Proceedings of the National Academy of Sciences of the United States of America* **103**, 14626-14630.

meeting report

The meeting 'Microorganisms on Seeds – Harmfulness and Control' organized by the Plant Pathology Section of the Polish Phytopathological Society was held in Bydgoszcz, Poland from September 6-8th, 2006. There were some 70 registrants, mostly from Poland and other eastern European countries (Belarus, Czech Republic, Latvia, Lithuania, Serbia and Montenegro), but also from Austria, Denmark, Egypt, France, Germany, Italy and Scotland. There were oral and poster sessions following and introductory symposium supported by the ISSS. President Derek Bewley was invited to chair this symposium, entitled 'From Healthy Seeds to a Better Economy and Healthy Life'. This also gave him the opportunity to introduce the Society to the participants, explain its objectives and announce upcoming meetings. The keynote speakers at the Symposium were Dr. Jan Torp, from the Danish Seed Health for Developing Countries organization, who spoke on 'The Importance of Seed Health – A Global Perspective', and Dr. Valerie Cockerell, Scottish Agricultural Science Agency, who talked about 'Seed Health and the International Seed Testing Association'. ISSS support used to provide accommodation of presenters from Latvia and Lithuania, and the meeting fee for two keynote speakers, from the Czech Republic and Denmark. The meeting was very successful, with active discussions in the poster sessions, coffee breaks, and at the excellent dinner catered outdoors next to the Botanical Gardens.

Elwira Sliwinska



Eastern Europe and Russia ISSS representative, Elwira Sliwinska with ISSS President, Derek Bewley (above left) and opening speaker, Jan Torp (above right).

meetings and workshops

Numerous upcoming meetings are being sponsored in whole or in part by the ISSS. More information will be posted on the meetings page of the ISSS website as it becomes available.

2007. January 14-21. 5th International Workshop on Desiccation Sensitivity and Tolerance in Seeds and Vegetative Plant Tissues. Drakensberg, South Africa. Interest in the phenomenon of desiccation tolerance and sensitivity has grown over the past ten years or so, and is likely to continue growing in the future. To cater for this interest, four previous International Workshops have been held in South Africa, the inaugural meeting being in 1994. A guiding principle of these Workshops has

been to hold them at attractive locations removed from the hustle and bustle of large cities, so that the delegates have time and opportunity to interact and relax in each others company.

The 5th of these workshops will be held at The Nest Hotel Resort and Conference Venue, situated in the foothills of the Drakensberg mountains, adjacent to the Ukhahlamba Drakensberg World Heritage Site. (These dates provide an excuse for northern hemisphere colleagues to escape winter for a few days, and the venue is truly beautiful!)

Although the first four Workshops concentrated on seeds and vegetative tissue, the topic is much wider than that, and contributions from zoologists and microbiologists working in the field of desiccation are welcome.

Further details can be found on the website <http://www.sles.ukzn.ac.za/deswork/> and contact can be made at the address deswork@ukzn.ac.za

2007. May 7-9. ISTA Seed Symposium 2007. Diversity in Seed Technology. Iguassu Falls, Brazil. The **28th ISTA Seed Symposium** will be held as part of the ISTA Congress in Iguassu Falls, Brazil from 7-9 May 2007. The Seed Symposium provides a unique opportunity for interaction between scientists working on basic aspects of seed science and those involved in applying this scientific knowledge to seed quality evaluation and improvement. The theme for the 28th Seed Symposium is Diversity in Seed Technology.

The symposium will consist of six oral sessions and two poster sessions. Each will be chaired by a lead speaker well known for their research in a topic covered by the session. Lead speakers are: **Michael Kruse** (University of Hohenheim, Germany), **Mirian Eira** (EMBRAPA, Brazil), **Gary Harman** (Cornell University, USA), **Roberto Benech Arnold** (University of Buenos Aires, Argentina), **Kent Bradford** (University of California, USA), **Hugh Pritchard** (Royal Botanic Garden, Kew, UK).

We hope to see you in Iguassu Falls!

Alison A Powell
Convenor, ISTA Seed Symposium

2007. July 1-4. 2nd ISSS Workshop on Molecular Aspects of Germination and Dormancy. Salamanca, Spain. Organizers: Dolores Rodríguez, Carlos Nicolás and Oscar Lorenzo. A preliminary program has been posted on the ISSS website meetings page: <http://www.usd.edu/iss meetings.html>. Confirmed invited speakers: **Alison Kermod** (Simon Fraser University, Canada), **Kent Bradford** (University of California, Davis, USA), **Ruth Finkelstein** (University of California, Santa Barbara, USA), **Peter McCourt** (University of Toronto, Canada), **Gerhard Leubner** (Albert-Ludwigs-Universitaet, Freiburg, Germany), **Bill Finch-Savage** (Warwick HRI, UK), **Isabel Diaz** (Universidad Politécnica de Madrid, Spain), and **Gregorio Nicolas** (University of Salamanca, Spain). Registration and housing reservations will begin in October 2006. Contact Dolores Rodríguez at mdr@usal.es or iss07@usal.es for additional information.

2007. September 9-13. 2nd ISSS Meeting on Seed Ecology: Seed Ecology II, an international meeting on seeds and the environment will be held in Perth, Western Australia. Planning for the conference is well advanced and summary abstracts (300 words) are now being called for under the following five topics: 1. *Advances in Seed Dormancy and Germination*, 2. *Dispersal Ecology*, 3. *Conservation and Restoration Seed Ecology*, 4. *Soil Seed Bank Dynamics* and 5. *Applied Seed Ecology*. Abstracts are due by 26th February, 2007. Keynote speakers include **Costas Thanos** (University of Athens, Greece), **Carol and Jerry Baskin** (University of Kentucky, USA), **Peter**

Poschlod (University of Regensburg, Germany), **Robert Marrs** (University of Liverpool, UK), and **Ken Thompson** (University of Sheffield, UK).

In addition to three days of oral and poster presentations at The University Club of Western Australia there will be a welcome reception and conference banquet. The mid-conference field trip will showcase the wildflowers and scenery on Perth's doorstep, the Darling Range. An optional extra is an exciting three day and two night field tour to the north of Perth that will traverse one of the richest wildflower regions on earth and part of the south west global biodiversity hotspot. Visit www.seedecology2007.com.au for all the information and to submit your abstract. The organising committee can be contacted via Seedecology2007@bgpa.wa.gov.au

2008. July 6-11. 9th ISSS Conference on Seed Biology. Olsztyn, Poland. Visit www.seedbio2008.pl/ for further information.

Other meetings of interest to ISSS members

2007. November 5-9. 11th International Symposium on Preharvest Sprouting in Cereals to be held in Mendoza, Argentina. For further information see www.agro.uba.ar/epg/sprout2007/ or e-mail sprout07@agro.uba.ar

news from our representatives around the world

Africa

The 5th International Workshop on Desiccation tolerance and Sensitivity of seeds and Vegetative Plant Tissues will be held in the foothills of the Drakensberg, South Africa from the 14th to the 21st January 2007. The Drakensberg/uKhahlamba constitute a World Heritage Site and the area is truly beautiful. We are really sorry not to host those of you who could not make it, but we are anticipating a very successful meeting.

As regional representative for Africa, I note with some concern that virtually all the ISSS members from Africa are actually from South Africa. Surely, there must be seed scientists elsewhere in the continent. If anybody of seed scientist on the continent, please let me know and I will approach them, inviting them to become members. Food security is a major issue on the African continent, as is biodiversity conservation. Seed science can contribute substantially to both these issues.

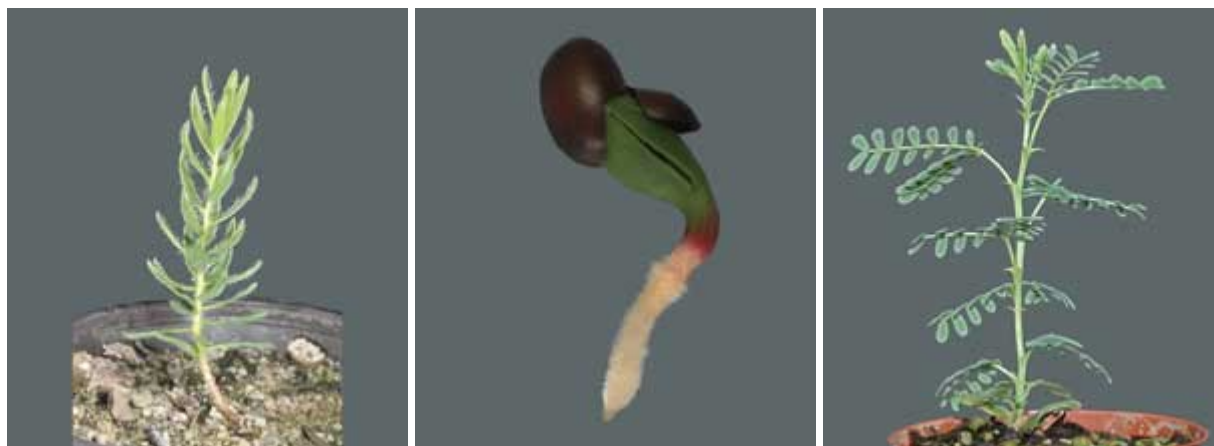


Again, as regional representative for Africa, this next item gives me a certain amount of personal pleasure. The achievements of our members do not go unrecognised: In the South African 2006 Civil Honours List, Patricia Berjak (our President-Elect) was awarded the Order of Mapungubwe, Silver, one of the highest national awards. Pictured is the State President, Thabo Mbeki, bestowing the Award on Pat. (Mapungubwe is the site of the largest historical kingdom in southern Africa, where a highly sophisticated people traded gold and ivory with China, India and Egypt. The award recognises achievements in science, medicine and industry).

Norman Pammenter

UK and Eire

Researchers from the Seed Conservation Department of the Royal Botanic Gardens, Kew have germinated 200 year old seeds discovered in The National Archives. Roelof van Gelder, a guest researcher from the Royal Dutch Library, found 32 different species of seeds in 40 small packets stored in a red leather-bound notebook. The notebook was inscribed with the name Jan Teerlink, a Dutch merchant who is believed to have collected the seeds during a trip to the Cape of Good Hope in 1803. Seeds from three of the 32 species have germinated (pictured from left to right: seedlings of *Liparia villosa*, *Leucospermum* sp., and *Acacia* sp.).



● recent publications on seeds

The Encyclopedia of Seeds. Science Technology and Uses.

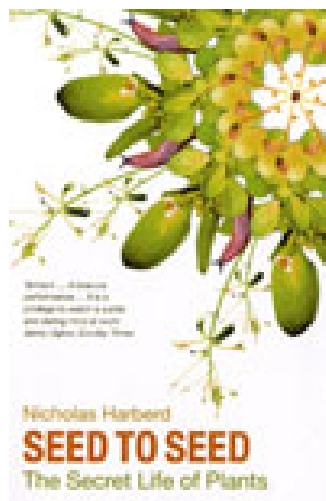
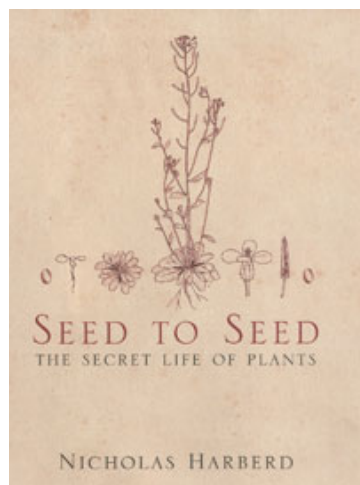
M. Black, J.D. Bewley and P. Halmer (Eds.). CABInternational. September 2006.
828 pages (and 3.3 kilos!)

This is the first scholarly reference work to cover all the major scientific themes and facets of the subject of seeds. It outlines the latest fundamental biological knowledge about seeds, together with the principles of agricultural seed processing, storage and sowing, the food and industrial uses of seeds, and the roles of seeds in history, economies and cultures. For details of purchase visit: <http://www.cabi-publishing.org/bookshop/BookDisplay>, and go to Plant Sciences, then Crop Science and Plant Biology

Seed to Seed. The Secret Life of Plants

Nicholas Harberd. Bloomsbury Publishing. 2006. (Hardback ISBN 9780747570394; paperback to be published in 2007 ISBN 9780747585619)

This is a chronicle of the life of an *Arabidopsis* plant in an East Anglian churchyard, recorded in a diary. The invisible molecular events driving the changes that occur as the plant grows and reproduces are explained in an understandable way.



● upcoming publication on seeds

Seeds: Biology, Development and Ecology

Steve Adkins, Sarah Ashmore and Sheldon Navie (Eds). CABInternational.

The proceedings from the ISSS 8th International Workshop on Seeds held in Brisbane in 2005 should be available shortly. All full registrants of the Workshop will be receiving a copy using the address provided at the meeting. If people have new addresses please advise Steve Adkins as soon as possible (s.adkins@uq.edu.au).

● reminder to renew your membership

ISSS Secretary Karen Koster reports that renewal notices have recently been sent to those of you whose memberships expired at the end of 2006. If you have not yet done so, please send your renewal forms promptly to ISSS Treasurer Ken Thompson, who will process your payments. Ken would be most grateful if you would type your information into the form before sending it on to him, as it ensures that we have your contact information correct. Further reminders will be sent to individuals at the end of January. Our “four years membership for the price of three” offer is still in effect, so be sure to take advantage of this offer. Not only does it save you money, it also saves you the trouble of submitting membership forms every year!

● editors note

Thank you to everyone who has contributed to this issue of the ISSS newsletter. If you have any suggestions for the newsletter please send them to me: f.hay@rbgkew.org.uk or to your regional representative (see <http://www.SeedSciSoc.org/execcomm.html>)

Fiona Hay