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EDITORIAL

I spy with my little eye something beginning with … 'H'

Royston Goodacre

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'I spy with my little eye' of course refers to a game that is often played by children on long car journeys to keep their parents or guardians occupied; or perhaps it is the other way around! Here the 'H' may be inside or outside of the vehicle and for the former could refer to headrest, handle or heater, and for the later hill, house or hail (often seen in the UK, and why the heater is vital!).

The field of metabolomics is also on a long journey: some have been on the road for some time, while others have just joined the highway. There are many words that begin with the letter H that have shaped this field's past and will perhaps direct its future. Some of these are discussed below along with how these have had, and shall continue to have, influence on this journal.

1 History

Whilst we can generally agree that metabolomics is a relatively young field coined in 1998 by Professors Steve Oliver and Douglas Kell (Oliver et al. 1998), followed soon thereafter by the creation of metabonomics by Jermey Nicholson, Elaine Holmes and John Lindon (Nicholson et al. 1999), the field's roots can be traced to the 1940s when MS-based methods were being used in medicine to effect clinical chemistry and where the plant and microbial communities were using similar analytical techniques to dissect primary and secondary metabolism. One might be tempted to ponder that the earliest studies of small molecules being associated with human health were from Chinese doctors in 2000–1500 B.C., who used ants to detect abnormal glucose levels in urine (Oresic 2009), but few of us are around to remember these particular experiments!

2 Hatching

The journal itself is also part of that *History. Metabolomics* was first published in 2005 and this *Hatching* was entwined with the birth of the Metabolomics Society (www.metabolomicssociety.org). The origins of both predate 2005 to two Cambridge Healthtech Institute conferences entitled "Metabolic Profiling: Pathways to Discovery". The first in December 2003 in Princeton, NJ (the year that the biggest snow storm for some time had hit the USA) followed a year later by a second in Orlando, FL (a much more temperate climate!). The Princeton meeting was where I first met Prof. Rima Kaddurah-Daouk, who went on to be the inaugural president of the Metabolomics Society—which was launched at the second meeting in Orlando. At both meetings my friend and colleague Dr George Harrigan joined us for discussions, and at the Orlando meeting Rima introduced us to Prof. Bruce Kristal who joined us to launch the society. Shortly thereafter Prof. Lloyd Sumner and Prof. Masaru Tomita joined us to be Founding Directors.

I fondly remember that George had visited me several years earlier in the UK when I was at the University of Aberystwyth and persuaded me to co-edit the first book on metabolomics (Harrigan and Goodacre 2003). On a subsequent visit in 2003 when I had moved to Manchester (formerly UMIST and now the University of) he successfully convinced me (with a little encouragement from

R. Goodacre (✉)
School of Chemistry and Manchester Institute of Biotechnology, University of Manchester, 131 Princess Street, Manchester M1 7DN, UK
e-mail: roy.goodacre@manchester.ac.uk

Rima) to talk to Laura Walsh at Springer[1] about forming this journal and becoming its Editor-in-Chief.

The growth of the journal is evident from its publication record and impact of the work. The rest of the history of the Metabolomics Society is on record at its web site and for those interested you can learn more there.

3 Growth: *hope*, *hype and harmony*

The growth of any field follows that of a bacterial culture that starts off with a lag-phase, flourishes through an exponential phase and finally enters its stationary phase.

The lag-phase here is where there is great *Hope* in a field. This for metabolomics we can trace for about a decade from 1998. This is when there were relatively few papers that were being published. But some of these helped shape the field and the ones I use to illustrate this when I teach metabolomics are detailed below:

- Fiehn et al. (2000): Metabolite profiling for plant functional genomics.
- Raamsdonk et al. (2001): A functional genomics strategy that uses metabolome data to reveal the phenotype of silent mutations.
- Brindle et al. (2002): Rapid and noninvasive diagnosis of the presence and severity of coronary heart disease using ^{1}H NMR-based metabonomics.
- Kirschenlohr et al. (2006): Proton NMR analysis of plasma is a weak predictor of coronary artery disease.
- Fiehn et al. (2007): The metabolomics standards initiative (MSI).
- Sreekumar et al. (2009): Metabolomic profiles delineate potential role for sarcosine in prostate cancer progression.

If you have not read the above I would urge you to do so. I shall also leave the reader to decide whether these are the most appropriate ones and I am happy to hear your viewpoints via twitter (@metabolomics).

Following the *Hope*-phase there is the exponential phase and with this sudden growth and interest in an area there can unfortunately be a little *Hype*. This is where studies do not deliver what is promised, and in extreme cases can damage a reputation or a field. This I must stress is not only related to the metabolomics field and a very nice article by George Poste entitled 'Bring on the biomarkers' (Poste 2011) reports that of the $\gg$150,000 papers documenting thousands of claimed biomarkers, fewer than 100 have been validated for routine clinical practice.

I spoke at the Metabolomics Society's Early-career Members Network (EMN) session in Japan last year and did state: "*Metabolomics is Perverse!*". This I explained was related to the fact that we are in a research area where we publish large data sets using methods that only we have access to. We do not generally give access to samples or data. Moreover, we often use data analysis methods that we develop and sometimes do not make available.

This exponential growth phase in an area is correctly associated with an eagerness to publish and it is quite correct that work is published in a timely fashion, and a little hype does not damage a field. One way of ensuring transparency in our studies is to make experimental design, data generated and the means of its analysis available to others. Those of you who have recently submitted work to the journal shall see that we now capture information on several aspects of the study. These include:

(i) Data availability—this journal is working closely with the Cosmos consortium (www.cosmos-fp7.eu) to test and validate a transparent data availability pipeline driven through metabolomeXchange (www.metabolomexchange.org).

(ii) Data analysis—we also ask that any study details the packages used and their availability so that others can use the same data processing approaches.

(iii) Metabolite identification—we require that the authors assign the level of identification for all metabolites according to MSI guidelines (Sumner et al. 2007).

(iv) Article length—this includes a statement of the number of figures and tables (maximum total of 6) and that Harvard reference style has been used.

(v) Conflicts of interest—we ask that *all* authors include statements in their manuscripts (in a section immediately after the Acknowledgements section; before the Reference list) declaring whether there are any conflicts of interest with their article.

(vi) Ethical requirements—the journal also necessitates a section detailing any human or animal rights, and/or where informed consent is needed for the study. This section must appear after the Conflicts of Interest statement. If there are no ethical issues then a statement to that effect must also be included.

These are further detailed in our Instructions to Authors, which can be found electronically through the journal portal (link.springer.com/journal/11306). Failure to comply with the above, and in particular Conflicts of Interest and Ethical Requirements statements, will mean that papers are not sent out for peer review.

[1] Laura was at the time with Kluwer Academic Publishers before they merged with BertelsmannSpringer in 2004 to become Springer. The journal has therefore always been published by Springer.

I shall stress that the journal does not want to tell people how to do their studies and the above is not to be taken as such. As is the ethos of the MSI (Fiehn et al. 2007) the aim of the journal becoming MSI-compliant is not to suggest to anyone how to conduct experiments, but to provide a common language and platform for describing and sharing experimental data. Only through transparency will the field flourish.

It is my view that the field will continue to be in the exponential growth phase for some years yet and as the field matures we shall reach a *Harmonious* phase in which we shall all be very proud to be associated with. This phase rather than being stationary or in decline will be in steady state and shall deliver improved health care, higher quality food, as well as an increased understanding of complex biological systems, and how to use biology to deliver new chemical entities.

4 *Happy* new year!

I shall close by letting you know that in 2015 we will also see the production of a Special Issue entitled 'Pharmaco-metabolomics' which is guest coedited by Prof. Rima Kaddurah-Daouk (an Editorial Advisory Board member) and Dr Nik Rattray (from the Metabolomics Society EMN). If you have anything that you think may be suitable for inclusion I would encourage you to speak to Rima or Nik; their email addresses are:

- rima.kaddurahdaouk@duke.edu
- nicholas.rattray@manchester.ac.uk

Finally, I would like to give all readers a very warm welcome to 2015 and I hope, like me, that they enjoy reading the first issue of the eleventh volume of *Metabolomics*.

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