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phosphatase and protease substrates and their specificities. In addition, Richard Gilbert, from e2v technologies in Chelmsford, Essex, UK, gave a presentation on the laboratory-on-a-chip technology that incorporates Raman spectroscopy and that can be used as a self-contained blood analyzer, needing only 20 nanoliters of sample for analysis. Furthermore, Peter Nilsson, from the Royal Institute of Technology (KTH) in Stockholm, Sweden, introduced an ambitious program that generates an antibody for a representative protein from every gene locus (currently estimated to be 22,221 loci) and that uses the antibodies on tissue arrays to assemble a pathological protein-atlas for normal and disease tissues.

In the category of pathways and systems, Len Pagliaro from BiImage in Soeborg,

Denmark, discussed his company's high-content screening assays based on intracellular signaling as a result of protein translocation. Kristina Busch from metanomics Health in Berlin, Germany, described her company's large-scale metabolite profiling services – capable of >400,000 analyses per 24 h – with particular expertise in plant science. Brian Dron, from Ingenuity Systems in Mountain View, California, gave a presentation on their interactive database of molecular and pathway information taken from published studies in the 32 top journals. Peter Kluge, from EPIDAUROS Biotechnologie in Bernried, Germany, presented details about the value of incorporating pharmacogenetics into drug development to reduce adverse events and increase efficacy. In addition, Paul Rounding, from Artemis Pharmaceuticals in Cologne,

Germany, discussed the ArteMice platform, which enables rapid development of mice with inducible gene deletions or knockdowns.

The breadth of emerging technologies suggested many possible synergies. For example, the potential to move quickly from molecular studies to pathways and animal models (even to therapies and diagnostics) was especially intriguing. Possibly the most important trend in 2005 for biotechnology will be the integration of technologies.

Steven Bodovitz

Principal, BioPerspectives,
2040 Hyde Street,
San Francisco,
CA 94109, USA
e-mail: bodovitzs@bioperspectives.com

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A time for reflection: reviewing objectives and revising strategy

This is an appropriate title because, as the most observant of you should have noticed, my affiliation has recently changed. I have recently retired from AstraZeneca after thirty-one years in Drug Development surviving both a demerger (ICI to Zeneca) and a merger (Zeneca to AstraZeneca). In addition, this is my fiftieth article for *Drug Discovery Today* and its sister journal *Pharmaceutical Science and Technology Today*, now defunct. I first started writing guest editorials in 1998 and in 2000 was given a column. Hence, in accordance with good management practice, it should be time for me to review my progress towards my original aims and objectives and revise my future strategy if necessary.

Early objectives

In a nutshell, to use a well-known idiom, my early objective was to provide an antidote to the serious and scholarly articles in the journal and to write a personalized, light-hearted comment on subject matter of interest to all scientists working in drug discovery and development. I would also use a format that included humor, quotations, poetry (including doggerels and limericks) and cartoons not normally associated with scientific communication in order to stimulate thought, broaden perspective and, above all, raise a smile.

It would appear from feedback from readers in the form of direct correspondence and monthly full text downloads on BioMedNet

A thought-provoking tonic on the lighter side

Column by Raymond C. Rowe, Intelligensys

Please note that these are the personal opinions of the author and do not necessarily represent those of Intelligensys.



(many of my articles appeared in the top ten of the monthly downloads and several achieved the coveted top position) that I have achieved my aim. More people appear to be reading my subjective comments on topics from fortifying the over forties, chewing gum and mnemonics to limericks, cleriehews and songs than ever read my objective conclusions on science and technology in my scientific papers. One article even resulted in an

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invitation to speak at the annual scientific meeting of a learned society, whereas another has led to an invitation to write papers in a scholarly journal. My article on chewing gum [1] was even reviewed in *Chemical and Engineering News* and subsequently ended up as a side-bar on KRFC Public radio in Fort Collins, Colorado.

An essential element of my articles has been the inclusion of humor. Science is often regarded by many as a serious subject in which humor has no place. Some scientists actively promote this idea, viewing humor with skepticism and trepidation, believing that its inclusion will result in the trivialization of their subject. Hence, humor is rarely included in science journals, although the more progressive are beginning to realize that, in this age of increasing sophistication, it is important for scientists to be able to laugh at themselves and to retain a degree of humility about their chosen profession. However, even here the articles are often relegated to the back pages (not so with *Drug Discovery Today*!).

Humor, by providing a different perspective on the imperfections and oddities in science, does reveal a side of the profession that is often lost in technical communication. In some circumstances this could be seen as threatening but the willingness to share this with others often helps in keeping the issues in proportion. Scientists, after all, are humans and humor is an integral part of life. As so aptly stated by Samuel Taylor Coleridge (1772-1834), the poet and philosopher [2]:

‘No mind is thoroughly well organized that is deficient in a sense of humor’.

The poetry element

Another very important element of my articles has been the inclusion of verse. I must admit, in my youth, I was never a proponent of poetry but, in latter years, I have begun to see the virtues of being able to communicate concepts in this highly versatile format. In 1812, the same Samuel Taylor Coleridge, when lecturing on Shakespeare to The Royal Institution in London, stated [3]:

‘Poetry is opposed to science.... The proper and immediate object of science is the acquirement, or communication, of truth; the proper and immediate object is the communication of immediate pleasure’.

This assertion is based on that put forward by Aristotle in his treatise *‘Poetica’* written in about 320 BC. In this he proposed that for verse to be poetry it must provide an imaginative picture of life at large rather than a string of facts. Hence, the theory of relativity written in metric form, no matter how technically correct, would not be poetry. Many purists would still agree but, in reality, it is a position that is difficult to defend except at the two extremes and scientific thoughts and ideas generally lie somewhere in the middle. Over the years I have become aware of some really imaginative verse expressing scientific concepts in such a way that is often easier to understand and remember. Several of my articles have included complete poems, others extracts; all, I must stress, written by others. Several times I have asked for submissions by readers but, so far, I have received only one, and that by a colleague, not long retired from AstraZeneca, Roy Gray, a scientist with an extensive knowledge of packaging in the pharmaceutical industry. Entitled *‘Towards Darwin’*, I have reproduced it here with his permission as it serves as an ideal illustration of the points expressed above.

Singleton H,
far from Van der Waals,
atomic Hydrogen smattered through space.
Only gravity calls.

Aeons pass, and more.

Singlet states become pairs
smug, cool, molecules.
The super womb of Hydrogen stirs;
long, mazy swirls.

Aeons pass, and more.

Gravity strikes
millimetres per millennium, or less.
Invisibly warping space/time
for those on the shoulders of Einstein.

Aeons pass, and more.

Matter, mass, Hydrogen
crowing to the universe
from all these gravid nebulae
at 1.4 billion hertz.

Aeons pass, in a flash.

Distant goldmines, deep time,
neutrinos trail the story.
Set telescopes to trawl the skies
capturing a final fury.
Revealing to our wondering eyes
that Maxwell’s war with Newton’s law
let gravity play the aces.
A sudden collapse at iron core
rends the curtain open for;
a hurricane of neutrons, a tidal wave of
light.
Mendeleyev’s children,
supernova ejaculate.

Seconds pass, slowly.

Shockwaves expand,
kilometres per millisecond, and more.
Then condensations abound
where, one day, stars will found.

Ions mass, and charge.
Turbulence and motion
plough the cloud of gas
following the shockfronts
sowing seeds of mass.

Aeons parse.

Alphabet stew gestates,
elements in the mix.
Under gravity’s gentle teasing
inchoate masses bloom as discs.

More millennia pass.

These are matter’s domain,
where hearts contract out
coalescing under Newton’s reign.
To slow their pirouette
they shed angular momentum
as encircling torii.
While deep within
Hydrogen fuses to Helium
and begins the long fight to confine
Maxwell’s self raising power.
Secrets under swathes of plasma
before Burbidges, Hoyle and
Fowler.

While.

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Spin is the refugee
camping in the petals
where planets are conceived.
At Bodian intervals?

Under.

Early embers, first dawn.
Red are the new infant's cries.
The warming glow that signifies
a sun is born.

I must admit, this poem appeals to me in that it stimulates my imagination towards a vision of the origin of the universe and its consequences. I challenge anyone who contends that scientists cannot compose quality poetry on their subject. Surely, there are many more readers who can express their ideas on drug discovery and development in such a format. However, there is one field of verse that scientists and specifically medics

revel in and that is writing lyrics to well-known tunes whether it be for fun or education. Following my recent article on the subject [4], I received so much correspondence including some excellent new examples and even three CDs recorded by Dr Stephen Baird, Professor of Pathology, The University of California, San Diego, School of Medicine, and his band The Opossums of Truth, that I am now considering writing a follow-up article.

Final words

It would appear that it would be a retrograde step to change dramatically the format of my articles other than through evolution in response to further feedback as time progresses. One thing that will change, however, will be my attitude to subject matter on which, hitherto, I have resisted from commenting, due to the fact that my articles have had to be submitted for vetting by my previous employers. Of course, it would be an impossible

task to please everybody all of the time but I hope that at least a fair proportion of you find something of interest in my future articles to stimulate thought and raise a smile.

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Raymond C. Rowe

Chief Scientist,
Intelligensys,
Belasis Business Centre,
Belasis Hall Technology Park,
Billingham,
Teeside TS23 4EA, UK
e-mail: rowe@intelligensys.co.uk