

The Origin of ORIGINS

Chapter 1

I grew up assuming that everyone was in love with the beautiful simplicity of scientific ideas. I was so wrong.

I discovered this when John and I returned from graduate studies in Berkeley, California in the 1970s and lived for two years in a commune in Kooyong. Our fellow communards – psychologists, sociologists, teachers – took me to task. Science is hard and boring and downright dangerous. You scientists are always counting things. Nobody cares about your kangaroo sex chromosomes, and your work isn't going to save our wildlife.

I've spent the 50 years since proving to myself that they were wrong. Wrong about kangaroo sex chromosomes (they turned out to be key to understanding human sex) and wrong about conservation (my lab produced many tools for conservation biology). And during this journey I discovered with joy how the natural world works and how it was put together by evolution – and with despair how humans are rapidly destroying it.

But how to address the larger question, how to close that gap between science and art, literature, community? I write a lot for the public (4 million people have read my little *Conversation* articles). I talk at schools and community groups and on the radio, film, TV. Perhaps these efforts help to enhance public understanding of science, perhaps they even soften the “science is hard and boring” preconceptions. But how to transmit more than understanding, how to share the joy and wonder of humanity's most profound discoveries?

Science is a joy and inspiration to me. Another joy and inspiration is music. I am lucky to be a participant in both (thanks to my introduction to choral singing as well as molecular biology in Berkeley). I've sung in choirs in California, Melbourne, Canberra, with conductors including Ozawa, Mehta, Stravinsky. I've sung requiems and masses and oratorios (Bach and Palestrina are favourites). I've loved them – even as I recognised how big, and ever widening is the gap between centuries-old librettos and our current understanding of the world.

Each time I have sung Haydn's *The Creation*, I have thought, “*Somebody* needs to update the Old Testament story of creation. *Somebody* should write a new creation story using the beautiful words and images from astronomy, from genetics and ecology, from anthropology.”

But nobody ever did.

Well, maybe I could? The idea seemed preposterous twenty years ago, so I kept it to myself. But it grew and grew as I read and re-read favourite books about the origin of species (including Darwin's famous “Origin of Species”), the origin of life, the origin of the universe.

Then a few years ago, to my amazement and delight, our choir (the Heidelberg Choral Society, HCS) performed a new work on the Vietnam war, using a libretto fashioned by soprano Leigh Hay from choir contributions, with music commissioned from Nicholas Buc. Maybe Leigh could advise me? Maybe our conductor Peter Bandy would be interested? Maybe Nick Buc would be excited by the concept? The idea grew and grew in my head.

But when would be the right time? Everyone is busy. The choir was about to celebrate its centenary. Concerts were planned far ahead. There seemed no space. And who was I, a humble alto with little formal musical training, to suggest something so revolutionary (and so expensive)? I foresaw rolling eyes and grumbles of “who does she think she is??”

Opportunity came unexpectedly in June with the announcement that the International Congress of Genetics would meet in Melbourne in July 2023. This meeting, “the Olympics of Genetics”, will attract thousands of participants, and has a strong science in the public program. I knew that the convenor, Professor Phil Batterham (a performer and theatre producer and an old friend) would jump at the opportunity to support a premiere of a new secular work including themes of life and diversity.

It was now or never. Now I had to get support from people who know a lot more about music than I do. Convince them that my idea is interesting and worth exploring. Convince them that we can pull it off.

Quoting the last line in the first number (*A Universe from Nothing*) - “the beginning has begun”.

Chapter 2

Now was the time. The time to round up expertise and support to create a new work that could express in music the creation story from science. I was resolved. I would talk to Leigh Hay first; she is a published poet, she crafted the libretto for “When the bugle calls”, she’ll know if it is a goer. Tonight I would talk to her at rehearsal. Well maybe next Monday...

At last I summoned the courage to seek Leigh’s advice. The worst that could happen was that she would laugh uproariously. I suggested she come over to my place for a berry smoothie. “Industrial strength coffee,” she insisted.

And there in the quiet cosy corner of the couch I took the first little leap out of my comfort zone. I described my longing to create, and to sing a work that celebrated the beautiful words and ideas of science. To explore the origins of the universe, of life, of species, of humanity in music.

Leigh didn’t laugh. In fact, she looked as if she’d just unwrapped an unexpected and glorious present. Her voice was soft and exact but her face radiated acceptance and support. She got it immediately. Not only would she support and advise me, but she’d help write the libretto. This was so much more than I had dared to expect; I was overwhelmed. Leigh remembers:

I thought being asked to write the libretto for *When the bugle calls* was a one-off. I was wrong. When Jenny invited me to her home for a berry smoothie and a chat I had no idea what she had in mind. She outlined her plans for a secular oratorio about the story of creation and I felt enormously privileged to be invited, once again, to be part of a highly creative team.

Buoyed by Leigh’s support, I resolved to contact our conductor, Peter Bandy. Could this be a big break for HCS? Or a road to ruin? Did he have the confidence that Leigh and I could produce a libretto, that HCS could commission marvellous music in time? That our choir could learn and perform a major new contemporary work next year? I suggested Peter come over to lunch with John and me where I could break it to him gently.

Some weeks passed before we could get together, and Peter was bursting with curiosity by the time he appeared in Eltham. Over ciabatta rolls, cheeses and rosé, I described, somewhat more coherently, what had led me to propose creating and performing a new work. I don’t know what Peter was expecting, but he looked absolutely dumbfounded. But right away I could see the wheels and gears furiously engaging in

his imagination as he looked into the future and saw something that I had hardly dared to imagine – a legacy. Peter described his first reaction:

I was immediately impressed and interested in Jenny's idea. At the same time, we were both also thinking the work may eventually become part of the repertoire of many choirs world-wide. There are not very many large-scale choral works of quality.

Next we needed a composer. I had already set my heart on talented young composer Nicholas Buc; I'd been impressed with his quick and imaginative – and musical and singable – score for *When the bugle calls*, and I liked that we had worked with him before. Besides, I'd known him in his early years, oddly enough as my grandchildren's music teacher at Eltham East primary school, where he is famous for writing the school song.

Leigh had enthusiastically endorsed this choice, and now Peter was saying, "I think Nick Buc could compose a wonderful score. I wonder if he would be interested?" He picked up his phone and Nick answered right away – he happened to be back from New York. He was interested. Very. Nick remembers:

As a composer, receiving the "brief" for a commission usually goes something like "we'd love a work for x-sized ensemble lasting around x minutes, possibly on a theme of x". The phone call regarding *Origins* went something like "You know Haydn's *Creation*? Well, how'd you like to write a new one, based on science!" In all seriousness, Jenny's idea was pretty wild - and I was immediately very interested. The scope was huge, a composer's dream, but also the kind of thing that gives one nightmares due to the sheer enormity of the canvas! Once I received her libretto, written with Leigh Hay, it grew even larger than I imagined. Inspiration started flowing immediately and I'm terribly excited to show everyone something very special indeed.

The positive reactions from Leigh, Peter and Nick so much boosted my confidence level that I felt I was flying. Here was all the help I needed to create the work. Now, before I came to earth again, I needed to garner support from the choir to perform it, and support from the International Congress of Genetics to stage it.

I called my old friend and ex-student Professor Phil Batterham, an evolutionary geneticist who is famous for staging exciting international events, and who is co-convenor of the ICG meeting in July. As well as being a talented researcher, Phil is an actor and theatre director, and I knew he has serious plans to use the congress to bring science to the public. His reaction was immediate and wholehearted. He recalls:

My first reaction was one of great excitement. I was well aware of Jenny's giftedness, passion and commitment to both music and science. I saw this oratorio as a magnificent opportunity to communicate fundamental truths of science to an audience whose perceptions are shaped by music. This universe, our planet and life on it are extraordinary works of art, a glorious symphony that can touch all of our senses.

Now I felt that I really had something I could put before the choir. Uncertainties there were, but in my mind we already could count on a marvellous work and an enthusiastic audience. I wrote a one-page proposal to President Geoffrey Grinton and the HCS committee, co-signed by Leigh and Peter. The response was immediate, excited and warm (although the treasurer admitted that her brain was going into overdrive), and by June we had formal approval – and a date at the Melbourne Recital Centre.

But we didn't yet have an oratorio, or even a libretto. How to even start writing? Should I work on an outline or just plunge straight in (the way I do for my science reviews)? Should I write a first draft in science-ese or verse? How would Leigh and I interact?

Chapter 3

How to begin writing the libretto for *Origins*? It would be a huge task but we had tons of time, having promised a libretto by October, still months away.

Did I even know enough? I gathered hundreds of my beloved old books in stacks on chairs and the floor in my study (they are still there). They had been pretty heavy reading when I first got them, some years ago, some decades ago – suddenly they were my old friends.

Should I write an outline? Or at least list the numbers by title? I'm not very good at outlines: I mean, I write a great outline but I don't follow it at all. The way I write a scientific piece (459 research articles and counting) is more like a plunge into the deep end of a pool and a frantic swim to safety; I start from the beginning and write furiously (24/7) till I get to the end. I know this style is not favoured, and explaining how it works for me is unhelpful to young scientists nervously embarking on their mountainous theses. But I take courage from artist Jenni Mitchell: when I once sat for her for a portrait I observed her first effort was a greenish background with an orangish blob in the middle. "First I cover the canvas," she explained. I was thrilled – that's exactly what I do. Cover the canvas.

So I resolved to write a zeroth draft. I already had my beginning line and the ending. I would start by voicing the miracle that is the evolution of the universe from nothing. "Nothing is *not nothing*..." (just typing those words makes my hair stand on end). And I would end with a line I first heard as the reply to a despairing cry of how puny and insignificant are humans within the cold, vast universe. "But *man is the astronomer*." We may be insignificant, but we can *understand* the universe, life and maybe even ourselves. I loved the circularity, starting with the universe and ending with humanity contemplating the universe and our place within it. Enormous but circumscribed.

So I started, as I always start, at the beginning. Seething nothingness, the wrinkle on the quantum quilt, the infinite expansion of our universe, the beauty of our astronomical discoveries (oh, those stunning photos from the new James Webb telescope!), the hellish early earth, the pale blue dot seen from space "no bigger than Neil Armstrong's thumb" ...

Would I write in scientific language? Spare, concentrated, accurate and pierced with shining meaning. But forbidding, inaccessible to non-scientists.

Or verse? I have no experience writing poetry. Well, that's not quite true; I wrote a poem as a teenager, the only poem in my whole life. I wrote it the night before the deadline, and it won the school's major literature award, to everyone's surprise (especially mine). I found it online in the 1958 PGC (now Seymour College Adelaide) magazine, and was amazed at the consistency of my thinking over 65 years.

So I settled for verse, rough but full of words and images that had meaning for me. Heart in mouth, I sent my zeroth draft of the first few numbers to Leigh. I don't know what she expected. Maybe both of us thought that we'd have to write the whole libretto with dubious help /interference from the other; Leigh probably thought she'd have to translate scientese into understandable English and then fashion it into poetry (her first warning to me was "no polysaccharides"!). I thought I might get artsy criticism and severe editing of scansion, rhyme, alliteration, assonance...

It was neither of these. It was immediately the realest of real collaborations. A few days after I sent her my zeroth draft, back came Leigh's draft of the first number. She'd completely refashioned it, combining solos and chorus, integrating my description of the big bang and a paean about the beauty of simplicity of astronomy into a powerful opening blast of solo and chorus.

I was galvanised. Feeling Leigh close behind me panting for the next challenge, I went into my zeroth draft 24/7 mode, diving into the deep end. I hardly slept for a week; I'd gasp out some new idea at dinner and spring out of bed at 4am and scribble notes to myself.

Abandoning any pretence of an outline, I charged from Darwin's little warm pond where life began to the discovery of DNA, the immortal molecule of life, dramatising Watson and Crick's excited exchanges against a plaintive aria from Rosalind Franklin. To first life (Australia boasts the oldest animal fossils as well as living stromatolites). To the flowering of life on earth, Darwin's beautiful description of the "tangled bank" and his grand idea of selection of the "fittest" (the strongest, the sexiest, the best adapted). The great principles of evolution, illustrated by Australian lyrebirds, ants, wallabies. Dramatising Darwin and his hilarious hecklers. And finally, to the "third chimpanzee", the emergence of humanity, becoming the dominant mammal wreaking havoc on the natural world. And the finale. Could I end on a hopeful note with "Man is the Astronomer"?

I couldn't believe the way ideas and images came tumbling out. As though I'd been thinking and planning for a decade. Maybe I have. In little more than a week I nervously emailed the whole zeroth draft to Leigh, then retired to sleep it off for a month.

But a week later Leigh came back with an entire first draft. I was overwhelmed. Not only had she tamed my wild verse, but she had innovated, rearranged, rephrased. She had *got it*. The beauty and truths of astronomy, of evolution, the sadness of human self-destruction, the hope that science and understanding would triumph. I felt an immense bond.

Then the fun began. Leigh crafted my Dance of the Lyrebird into a sexy encounter between a frenetic male and a choosy female. I countered with the languid Ant Queen directing her sterile minions. We bounced ideas back and forth for a Gilbert & Sullivan-esque interaction between Watson and Crick, and our standoff between a calm Darwin and raucous hecklers.

And it was only July! With a complete first draft ready, we had time to sit back and think. We read it through, again and again and told each other, "It's beautiful!" "It's profound, it's fun, it's dramatic, it's sexy." I suggested a few rearrangements, Leigh suggested a few rearrangements, but the whole work didn't change much. We were both in love with it.

Down to the nitty gritty; words. I suggested new wording, Leigh suggested new wording. We both absolutely love words. We met in Leigh's beautiful "Treehouse" to discuss final changes, and got hysterical over our favourite words ("skullduggery" was top). Working with ideas and words was pure joy. Working with Leigh was pure joy.

This is how Leigh remembers it:

"Creating *Origins* has opened my mind to the beauty and truths of evolution and existence. Collaborating with Jenny has been an absolute joy. So pleased she needed a poet".

Origins was born.