

## PATENTING ART AND NATURE

Jane Clark

In February 1983, Hubert Duprat made an application to the French patent office, the Institut National de la Propriété Industrielle, in Paris, to protect an invention. Following due process, the *Brevet d'invention* was issued on 5 July 1985. Duprat had invented a process for providing specific and specially nurtured aquatic insect larvae with precious materials, enabling the creatures to create encrusted cocoons, with potential use as jewellery or decorative *objets d'art*.

You can download his original eleven-page application from the European Patent Office (EPO) website.<sup>i</sup> Carefully typed are Duprat's nine detailed claims of unprecedented novelty in the classes of rearing and breeding invertebrates (A01K67/033), producing decorative natural ornaments (B44C5/06), and making jewellery (A44C27/00). He describes fourteen families and subfamilies of caddisfly, an order of insects—Trichoptera, with many thousands of species described to date—that he has reared, using particular food, water temperature, oxygenation, and various manipulations of their instinctive behaviour in building protective cases around themselves in their juvenile state. There are scaled-up drawings of six sheath shapes (identified as Sericostomatidae, Goeridae, Helicopsychidae, Thremmatidae, and two from the family Limnephilidae). As he explains, in freshwater streams and rivers, where both caddisflies and their aquatic larvae are well known to trout fishermen as tasty bait, the juvenile insects weave into the adhesive silk excretion with which they build their portable cases a variety of found substrate objects—sand, tiny stones, leaves, twigs, and even snail shells—for defensive camouflage and for stability in fast-flowing currents.

Duprat's invention was causing Trichoptera to 'build' instead with varicoloured gold and gold-alloy flakes, pellets, and tubes, as well as 'diamonds, emeralds, rubies and sapphires, semi-precious stones and pearls'. Spiral forms from the family Helicopsychidae, already covered with precious materials, he added, could be placed in a tank containing Limnephilidae to obtain jewelled sheaths encrusted with jewelled sheaths. His patent expired on 31 December 1993, but his Trichoptera, or caddis project, continues to this day. It is in a sense one work in his oeuvre and it has so far occupied him for more than thirty years. In France, Duprat usually works with members of the family Phryganeidae or with *Potamophylax* species from the Limnephilidae. Here in Australia he has enlisted larvae of an endemic species from the Limnephilid family, *Archaeophylax ochreus*, slightly smaller than its French cousins. These have been sourced by Tasmanian entomologist Dr Varuni Kulasekera, assisted by Sarah Tassell. Samples were also obtained for us by Dr Gavin Rees and Michael Shackleton of the Murray-Darling Freshwater Research Centre, at Wodonga. Although a number of other Trichoptera families are represented in Australia, we have only one genus of Limnephilidae: the *Archaeophylax*, found in Tasmania, Victoria, and New South Wales.<sup>ii</sup> Meanwhile, in a parallel ongoing endeavour, entomologists are now using DNA analysis to determine the exact

relationships between families, subfamilies, and thousands of almost worldwide species within the caddisfly order.<sup>iii</sup> And at least one person, in America, is producing caddisfly jewellery on a commercial basis.<sup>iv</sup>

Duprat was not patenting art. While copyright protection is automatic upon creating an artwork, patenting is different. Indeed, in most jurisdictions works of fine art, as opposed to inventive useful art, are excluded from patent protection. Besides, although Duprat is represented by a number of works in France's national contemporary art collection and has held regular exhibitions in art galleries since the 1980s, he never undertook any training as a professional artist (whatever 'professional artist' may mean in 2013). For Hubert Duprat, the means—the knowing how—is at least as important as the end, the resultant object that may be classified as a work of art, or not.

For now, because his 2013 exhibition is in the Museum of Old and New Art, let us call Duprat an artist. But remember that one of the points of his practice is to pose questions, including: What is an artist? And what is art? He works from a library rather than a studio. He has described himself as an amateur, in the tradition of scholarly enquiry that does not compartmentalise by profession or discipline, and which dates back to classical antiquity via the Renaissance. In fact, Duprat's oeuvre to date suggests that we consider a whole range of important and intricately interrelated questions about the ownership of ideas, nature, and knowledge in general; about transformation and exploitation of the earth's resources, extending to the commodification of our own genetic material; about originality and uniqueness in the digital era; and about taxonomy and more. He is infinitely curious.

In 1983, Duprat was unaware that French patent law dates back to the French Revolution. Patents were declared a natural right—one of the *droits de l'homme* instead of a privilege bestowed by the sovereign—less than two years after the storming of the Bastille. While patents for inventions had existed for centuries (the Republic of Venice issued them from at least 1474 and Galileo was granted one for a water pump in 1594), the win-win trade-off of disclosure in exchange for protection was only codified in American and French patent law after their respective revolutions.<sup>v</sup> A patent was a property right in an invention granted with the aim of protecting the inventor's exclusive interests for a limited time while disclosing knowledge for the public good. A clause in the United States Constitution of 1787, 'To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries', was followed by the *US Patent Act* of 1790. From January 1791, the French *Loi relative aux Découvertes utiles* became the model for most European patent laws.

Copyright is a different but related area of intellectual property law, with comparably contested parameters and sources of authority in the contemporary world. In France, authorship of dramatic

performance was legally recognised in the same flurry of revolutionary activity that passed the *Loi relative* in January 1791—a month before the ‘Day of Daggers’, when Lafayette had 400 armed aristocrats arrested at the Tuileries. In July 1793 (six months after Louis XVI was guillotined), the National Convention’s *Literary and Artistic Property Act* recognised the rights of ‘Authors of writings of any kind, composers of music, painters and draughtsmen who shall cause paintings and drawings to be engraved’. Article 7 extended this protection, for life plus ten years, to ‘any other production of the mind or of genius within the domain of the fine arts’.<sup>vi</sup> Unfortunately, sculpture was not explicitly mentioned, and then, as now, exactly what constituted an artistic work gave rise to endless debate.

So, if Duprat wasn’t patenting artworks in 1983, was he patenting nature? In effect, he managed both to some extent. He was concerned that jewellers might use his idea and that, at that very early stage of his career, artists’ copyright might not be enough to protect his work. I wonder whether part of his motive for obtaining the Trichoptera patent was also simply to see whether he could. Certainly, I see the whole application process as an integral part of his decades-long Trichoptera enterprise, with all its evolving ramifications. His fabulous *Last Library*, an exhibition in 2012 and an ongoing collaboration with Christian Besson, attempts to list every published reference to Trichoptera as an imagined repository of all the world’s branches of knowledge in entomology, fishing, conflict, morality, aesthetics, romance, craftsmanship, architecture, marquetry, portraiture, models, decoys, the history of printmaking and macro photography, food and survival, ecology and pollution, rites, tourism, geology, fossils, mimicry, camouflage, and probably more.<sup>vii</sup>

Today, a patent is ‘the legal right of an inventor to exclude others from making or using a particular invention. This right is customarily limited in time, to twenty years from the date of the application submission in most countries.’<sup>viii</sup> A patentable invention has to satisfy numerous criteria, including worldwide novelty and invention and usefulness in the sense that the invention works, among other considerations. So when a patent application is considered, earlier patents, descriptions in published academic or trade literature, and products released to the market are all searched for globally, in both documented and realised form; they are referred to in legal language as ‘prior art’. Early in his own research, Duprat discovered that nineteenth-century entomologists had experimented with caddis larvae; but their interest was purely scientific. When he began his experiments the earliest reference he could find was published in 1834, by François-Jules Pictet in Geneva; he also learned of nineteenth-century French entomologist Jean-Henri Fabre, who gave Limnephilids grains of rice to work with.<sup>ix</sup> Presumably the French patent officers in the 1980s did not know of Elizabeth Mary Smee, of Wallington in Surrey, England, who had written in 1863 to the Keeper of Zoology at the British Museum describing in detail caddis worm experiments very similar to Duprat’s own (Duprat only found out about Miss Smee in the 1990s);<sup>x</sup> nor must they have known of Canon Charles de Labonnefon’s adventures with Trichoptera and glass beads in the 1920s, giving each insect’s sheath

‘the many-coloured appearance of a magnificent Harlequin’s costume’.<sup>xi</sup> If they did, they did not consider these to be patent-preventing ‘prior art’ because neither Miss Smee nor Labonnefon had envisaged a public utility for the colourful end results of their work. Anyway, Duprat’s claims of ‘novelty’ and ‘inventiveness’ were arguably acceptable on the basis of ‘useful difference’: the proposition that his precious encrustations might become jewellery and ‘decorative natural ornaments’.

These days, the EPO states specifically that a patentable invention must be ‘industrially applicable’ and it urges applicants not to confuse patenting with copyright (for ‘artistic works’) or trademarking (for words, signs and logos, such as those that Belgian artist Wim Delvoye boldly appropriated for his *Cloaca* project).<sup>xii</sup> Of course Hubert Duprat was far from confused when he sought his patent in 1983. He learned that the French artists Jean Tinguely and Yves Klein had both obtained patents in 1960: Tinguely for a ‘drawing and painting device’ and Klein—typically more subversive—for the brilliant cobalt paint he called ‘International Klein Blue’, or IKB, used on naked women as ‘living brushes’.<sup>xiii</sup> Duprat was consciously pointing to the ambiguities involved in both his own work and the ownership of creativity, knowing that the very question of authorship is often at issue in intellectual property law. As IP lawyer Colin Golvan advised me, ‘There is here a very fundamental question about authorship and inventorship’. Indeed, because ‘works of artistic craftsmanship’ are among the most elusive of works protected by copyright, patenting was a wise precaution.<sup>xiv</sup> Duprat describes his caddis larvae as expert craftsmen: ‘I create the conditions necessary for caddis to display their talents’, he says. (Key elements of other works are also outsourced; for example, parts of his beautiful, red, neural-network-like assemblage to coral polyps of the Mediterranean *Corallium rubrum* species and then to coral-carving craftsmen in Naples; and his *Coupé-Cloué* (Cut-Nailed) to a team of people sitting in a row wielding hammers.) But even Duprat’s prescient and free-ranging mind could not have foreseen just how confused arguments about patenting in the life sciences would be by now.

Recently, bioengineers have worked with caddisflies in extraordinarily novel, inventive, and useful ways. At the University of Utah, for example, Russell J. Stewart and his colleagues are creating biomimetic synthetic medical adhesives, modelled closely on the protein-based, phosphate-rich molecular structure of the naturally occurring underwater adhesives in caddis worm cases. These synthetic adhesives are comparatively straightforward to patent because they are completely manmade, even though inspired by natural materials.<sup>xv</sup> In contrast, the issue of how far ‘products of nature’ are patentable—especially once isolated from their natural state—remains unresolved and hotly debated. In particular, questions about the patenting of living things, which entangle emergent technologies, law, and ethics, drive a degree of unworkability in a system that has hitherto served the world quite well.

Louis Pasteur patented germ-free yeast, a living organism, as early as 1871, taking out patents in France, England, Italy, and the United States for the yeast itself and for his inventions for its purification and use in the manufacture of beer.<sup>xvi</sup> The transgenic Harvard 'Oncomouse', invented for use in cancer research, was patented in America from 1984, but it became a test case in Europe, with arguments over ethical issues—*l'ordre public*—continuing for another twenty years. An early test case for the patenting of isolated human gene sequences came in 1992, when the Greens in the European Parliament challenged the Howard Florey Institute's patent for the hormone relaxin. It was eventually upheld by the EPO in 2002.<sup>xvii</sup>

As I write, a decision is awaited in the latest Australian skirmish in the international Myriad Genetics battle. This has waged since 1997, when the American diagnostic laboratory began patenting human gene variants linked to inherited breast and ovarian cancers, and is expected to continue for years to come.<sup>xviii</sup> In June 2013, the US Supreme Court decided that Myriad's BRAC gene variants were *not* patentable subject matter because they were products of nature, even though thousands of plant and animal genes have been patented worldwide in recent decades and in contradiction to the European Biotechnology Directive of 1998. Less than four months earlier, in February 2013, the Federal Court of Australia had ruled that the BRAC gene sequence *was* patentable because, isolated outside the body, it was an 'artificially created state of affairs'.<sup>xix</sup> This has been appealed. Through claim and counter-claim—by Myriad, its commercial competitors, scientists, doctors, cancer patients, the EPO, and even the US government—legal arguments have hinged as much on the history of patent law and practice as on science. Defenders of gene patenting point to the 1911 US patent granted for isolated adrenaline derived from animal glands. Opponents offer up even earlier judge-made rulings about 'useful difference', but they also concede that times have changed and that older case law, which tended to intertwine the now-distinct issues of novelty, utility, and inventiveness, is frequently inapplicable.<sup>xx</sup>

Of course, the rush to patent as strategically and aggressively as possible is not necessarily in the best interests of the common weal. The patent system that historically was created to encourage research and innovation now potentially holds things up. Indeed, one of the EPO's most senior officials recently coined the term 'global patent warming' because of the deluge and consequent backlog of complex patent applications in all major patent offices. As early as 1794, lawyer, revolutionary, and future US president Thomas Jefferson warned that patents, as 'government-enforced monopolies', should not be granted lightly and 'should draw a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not'. But neither Jefferson nor Duprat, even just thirty years ago, could have predicted the cascading patents for computer games, algorithms, 3D printing, nanotechnology, human organs grown on pigs, cyborg insects (chip-implanted flies on the wall), and Monsanto's genetically modified food crops. (I recommend Margaret Atwood's novels *Oryx and Crake* and *The Year of the Flood* on some of this.)

China alone files more than a thousand European applications each year.<sup>xxi</sup> Jean Pisani-Ferry, director of the French prime minister's economic policy planning staff, rather gloomily describes the EPO in today's knowledge economy as 'a costly and fragmented system that grants national property rights of dubious quality and uncertain solidity [and] is an unwarranted tax on innovation that is detrimental to both entrepreneurs and consumers'.<sup>xxii</sup>

As well as experiments and inventions, Duprat's oeuvre includes 'ready-mades', somewhat in the tradition of Marcel Duchamp, who, as an artist, exhibited a bottle-drying rack (1914) and a ceramic urinal (1917) as what he called 'artworks which are not "of art"'.<sup>xxiii</sup> At the Mona, Duprat shows two hundred thousand ready-made magnetic polished stone spindles, similar to the pairs of 'Rattlesnake Eggs' sold to children in magic trick shops, which snap loudly together when thrown in the air. But he also completely transforms found materials. Fascinated by what human beings have done through history with the spoils of the planet—exploiting, manipulating, and transmuting—he seeks out materials for his works that range from the rare and precious (gold, pearls, amber, gems) to the everyday (polystyrene and modelling clay).

Like *Homo erectus*, our hominin ancestor, who first made symmetrical stone axes perhaps 1.5 million years ago (proto-art? they were certainly inventions), Duprat—passionate about both geology and archaeology—knows how difficult, dangerous, and sometimes bloody the process of flint knapping can be.<sup>xxiv</sup> His wild beasts shaped in flint by expert stone-workers, *Les Bêtes* (1992–99), are here wall-mounted to suggest the kind of hand-shadow games that prehistoric families surely played in fire-lit caves. In contrast, the cylinders of Iceland spar and iron pyrite 'firestone' are made from crystals—cubist minerals—products of nature entirely shaped by chemistry at an atomic level: respectively, birefringent calcite, which splits beams of light, and iron sulphide, from the Navajún mine in La Rioja, Spain. An attraction to shiny objects seems in-built in many animal species, from magpies and bowerbirds to certain caddis larvae in Nevada, the encrusted sheaths of which are covered with sparkling, bluish, opalised grit (selected from all the pebbles in their riverbed),<sup>xxv</sup> to humans with diamonds and fancy cars. My own reaction to Duprat's crystal cylinders, and indeed to his tiny caddis craft-workers, which change into moving precious objects (alchemy springs to mind), is something akin to awe. These things are so clearly natural and yet astonishingly unnatural, so instantly aesthetically pleasing and still so intellectually fascinating the more they are understood.<sup>xxvi</sup>

Scientific as his interests and processes may be, Hubert Duprat is also supremely poetic in his approach. He reaches few conclusions, proves no ultimate point. His work is, though, a powerful springboard for wide-ranging thought about the world and our place in it. When Duprat first introduced human-made 'found objects' to caddis larvae in the south of France he may not have known that Australian satin bowerbirds had begun decorating their courtship bowers with scraps of blue plastic, as well as blue flowers. He might have seen other birds use waste plastic and fabric in

their nests. But as his Trichoptera project continues, at a time when many twentieth-century certainties are long gone, I am prompted to think also of the estimated millions of marine mammals, sea turtles, and birds that perish every year because they mistake for food the rubbish we discard into the oceans.

Similarly, when Duprat and I were children in the 1960s, we both read voraciously in what we each thought was a wide array of subjects. But now, when almost anyone anywhere can access unassimilable amounts of information from almost any source, we cannot even know which 'cloud' it may be stored in. With digital property, history, morality, concepts of value, and what makes up an artistic canon all global rather than local or national concerns, the results of Duprat's curiosity only gain deeper layers of interest and implication as the future unfolds.

---

## Notes

I thank Hubert Duprat for his comments, advice, and additional references, and especially for introducing me to Miss Elizabeth Mary Smee. I am also grateful for an expert reading of this essay by Colin Golvan, SC, a Melbourne barrister practising in intellectual property law.

<sup>i</sup> The EPO's worldwide patent search tool, Espacenet, provides free access to more than 80 million patent documents, for inventions and technical developments from 1836 to the present. You can download Hubert Duprat's *Demande de brevet d'invention*, FR 2 540 442 A1 at: [http://worldwide.espacenet.com/publicationDetails/originalDocument?FT=D&date=19840810&DB=worldwide.espacenet.com&locale=en\\_EP&CC=FR&NR=2540442A1&KC=A1&ND=6](http://worldwide.espacenet.com/publicationDetails/originalDocument?FT=D&date=19840810&DB=worldwide.espacenet.com&locale=en_EP&CC=FR&NR=2540442A1&KC=A1&ND=6).

<sup>ii</sup> Identification and Ecology of Australian Freshwater Invertebrates, Murray-Darling Freshwater Research Centre (MDFRC), <http://www.mdfrc.org.au/bugguide/display.asp?type=5&class=17&subclass=&Order=8&family=22&couplet=0>. Australian Trichoptera are being barcoded by the MDFRC at Wodonga, Victoria, a partnership between the Murray-Darling Basin Authority, La Trobe University and the CSIRO; we are enormously grateful to Dr Gavin Rees, MDFRC assistant director, and Michael Shackleton.

<sup>iii</sup> For the global Trichoptera Barcode of Life campaign, launched in mid-2007 with the aim of DNA barcoding an estimated 13,000 species, see <http://trichopterabol.org/>. The Trichoptera World Checklist includes 16,734 records, with 758 Australian species so far identified, not all of which build portable cases; see J. C. Morse (ed.), *Trichoptera World Checklist*, 2013, <http://entweb.clemson.edu/database/trichopt/index.htm>.

<sup>iv</sup> Kathy Kyle of Wheeling, West Virginia, USA, established her business in 1995 and sees it as a 'wonderful opportunity to educate people about the importance of our streams and also to show off the beauty of Nature and our little artisans!', [www.wildscape.com/welcome-to-wildscape.html](http://www.wildscape.com/welcome-to-wildscape.html). Ben Clark, at the State Library of Victoria, Melbourne, kindly sent me this reference.

<sup>v</sup> Mario Biagioli, Peter Jaszi and Martha Woodmansee (eds), *Making and Unmaking Intellectual Property, Creative Production in Legal and Cultural Perspective*, University of Chicago Press, 2011. See also Mario Biagioli, 'Patent republic: representing inventions, constructing rights and authors', *Social Research*, 73, 4, winter 2004, pp. 1129 ff., arguing that the origins of modern patent law parallel 'the demise of political absolutism, the development of liberal economies, and the emergence of the modern political subject'.

<sup>vi</sup> Frédéric Rideau, 'Nineteenth century controversies relating to the protection of artistic property in France', in Ronan Deazley, Martin Kretschmer and Lionel Bently (eds), *Privilege and Property, Essays on the History of Copyright*, Open Book Publishers, Cambridge, 2010, pp. 241–42, 244. Copyright law began with early monopolies and privileges granted to printers of books; and the first ever copyright act was the *British State of Anne* of 1710. Many of the documents mentioned can be readily accessed on the website Primary Sources on Copyright (1450–1900), Lionel Bently and Martin Kretschmer (eds), [www.copyrighthistory.org](http://www.copyrighthistory.org).

<sup>vii</sup> <http://trichoptere.hubert-duprat.com/en/bibliography/trichopteran-literature/>.

- 
- viii Bronwyn H. Hall, 'Patents', in Steven N. Durlauf and Lawrence E. Blume (eds), *The New Palgrave Dictionary of Economics*, Palgrave Macmillan, Basingstoke, 2008.
- ix Hubert Duprat and Christian Besson, 'The wonderful caddis worm: sculptural work in collaboration with Trichoptera', Leonardo On-line, 1997 (rev. 2004), [www.leonardo.info/isast/articles/duprat/duprat.html](http://www.leonardo.info/isast/articles/duprat/duprat.html). Jean-Henri Fabre (1823–1915) was a pioneer in the study of insect behaviour. Belgian artist Jan Fabre, whose installation *Zelfportret als grootste worm van de Wereld* (Self portrait as the biggest worm in the world) (2008) is at Mona, claims to be his great-grandson.
- x 'Letter from Miss M. E. Smee', *The Annals and Magazine of Natural History*, 3rd series, vol. 12, London, 1863, pp. 399–402, to Dr John Edward Gray, FRS, Keeper of Zoology, British Museum, 19 February 1863 (<http://trichoptere.hubert-duprat.com/miss-smee-1863/>); published further in Elizabeth Mary Smee, 'The caddis-worm and its houses', *The Intellectual Observer*, V, v, London, June 1864, pp. 307–17, including a beautiful hand-coloured illustration of cases built with brass filings, silver leaf, amethyst, coral, jet, glass, and the teeth of a tortoiseshell comb. Duprat points out that keeping freshwater aquaria at home became both more possible and much more popular after examples were included in the Great Exhibition in London's Crystal Palace in 1851.
- xi C.H. de Labonnefon, *Croquis Entomologiques, Précédés d'une Notice sur Henri Fabre et Ses Souvenirs Entomologiques* (Entomological sketches . . .), Maison de la Bonne Presse, Paris, 1923, quoted in Duprat and Besson, Trichoptère, at: <http://trichoptere.hubert-duprat.com/la-bonnefon-1923/>.
- xii [www.epo.org/applying/basics.html](http://www.epo.org/applying/basics.html). Wim Delvoye's *Cloaca Professional* is in Mona's collection; for Delvoye's witty and provocative use of trademarks such as Coca-Cola, Chanel, Louis Vuitton, see David Walsh and Bernard Marcadé, *Wim Delvoye*, Museum of Old and New Art, Hobart, 2011.
- xiii Hubert kindly pointed me to Didier Semin's *Le Peintre et son modèle déposé*, Musée d'art moderne et contemporain (Mamco), Geneva, 2001, especially pp. 31–32. Klein made his first application to the Institute National de la Propriété Industrielle in 1959, when he and Tinguely were working closely together, and they were granted a number of patents. With the increase in technology-based and science-oriented art in recent years, patents for art-related processes have become increasingly relevant. Hubert drew my attention to the Clandestine Construction Company International website, Clanco: The Source for Art & Law, launched in 2005 by Sergio Muñoz Sarmiento in 2005 ([clanco.com](http://clanco.com)); which includes Robert Thill's 'Intellectual property: a chronological compendium of intersections between contemporary art and utility patents in serial form'.
- xiv These complexities are discussed in Justine Pila, 'Works of artistic craftsmanship in the High Court of Australia: the exception as paradigm of copyright work', *Federal Law Review*, vol. 36, 2008, pp. 363–73, <http://flr.law.anu.edu.au/sites/flr.anulaw.anu.edu.au/files/flr/Pila.pdf>, with some reference to the important 'WAC' case, *Coogi Australia Pty Ltd v Hysport International Pty Ltd* (1998), in which Colin Golvan was involved.
- xv Their most recent paper is Nicholas N. Ashton, Daniel R. Roe, Robert B. Weiss, Thomas E. Cheatham III and Russell J. Stewart, 'Self-tensioning aquatic caddisfly silk: CA<sup>2+</sup>-dependent structure, strength, and load cycle hysteresis', *Biomacromolecules*, 14, 2023, pp. 3668–81; Professor Stewart's team is also working on adhesives from the marine sandcastle worm, [www.bioen.utah.edu/faculty/RJS/LabSite12/](http://www.bioen.utah.edu/faculty/RJS/LabSite12/). I am most grateful for his advice.
- xvi P. J. Federico, 'Louis Pasteur's patents', *Science*, 86, 8 October 1937, p. 327.
- xvii See 'Bioethics and patent law: the case of the Oncomouse', *WIPO Magazine* (World Intellectual Property Organization), 3, June 2006, [www.wipo.int/wipo\\_magazine/en/2006/03/article\\_0006.html](http://www.wipo.int/wipo_magazine/en/2006/03/article_0006.html); and 'Patentability of animals', Information for IP Professionals, Chartered Institute of Patent Attorneys, UK, April 2008, [www.cipa.org.uk/pages/info-papers-animals](http://www.cipa.org.uk/pages/info-papers-animals). For relaxin in the EPO see [www.epo.org/law-practice/case-law-appeals/recent/t950272eu2.html](http://www.epo.org/law-practice/case-law-appeals/recent/t950272eu2.html).
- xviii US Patent 5693473 was issued in 1997 to Myriad Genetics Inc. of Salt Lake City, Utah, for the BRAC1 genetic variant and methods of isolation, diagnostic tests and therapies. That patent was invalidated in March 2010, but the saga continued. For a helpful timeline to June this year, see Jennifer K. Wagner, 'Looking back at Myriad: a user's guide', *Genomics Law Report*, Robinson Bradshaw & Hinson, <http://www.genomicslawreport.com/index.php/2013/06/19/looking-back-at-myriad-a-users-guide/>.
- xix *Cancer Voices Australia v Myriad Genetics Inc.*, Federal Court of Australia (FCA 65, 15 February 2013), [www.judgments.fedcourt.gov.au/judgments/Judgments/fca/single/2013/2013fca0065](http://www.judgments.fedcourt.gov.au/judgments/Judgments/fca/single/2013/2013fca0065); see also *Genes and Ingenuity: Gene Patenting and Human Health*, Australian Law Reform Commission Report 99, 2004, last updated July 2012, <http://www.alrc.gov.au/sites/default/files/pdfs/publications/ALRC99.pdf>.



- 
- <sup>xx</sup> Christopher Beauchamp, 'Patenting nature: a problem of history', *Stanford Technology Law Review*, 16, 2, winter 2013, pp. 257ff. is a fascinating account of precedents, including synthetic coal tar dye, cellulose from pine needles and aspirin, back to the 19th century when chemistry rather than bioengineering was 'one of the hotbeds of patent law'. In the Myriad cases, American judge-made law has run contrary to recent decisions in both Australia and Europe; the tests for whether an invention is 'patentable subject matter' tend to be more stringent in Europe, Japan and Australia than in the USA.
- <sup>xxi</sup> Bruno Van Pottelsberghe's very informative *Lost Property: The European Patent System and Why it Doesn't Work*, Bruegel Blueprint Series, vol. IX, Breughel, Brussels, 2009, p. 22, and quoting Jefferson, p. 42, [www.bruegel.org/publications/publication-detail/publication/312-lost-property-the-european-patent-system-and-why-it-doesnt-work/](http://www.bruegel.org/publications/publication-detail/publication/312-lost-property-the-european-patent-system-and-why-it-doesnt-work/). For 'global patent warming', see Ciáran McGinley, 'Urgent call to ease patent backlogs', *IP Review Online*, 16 September 2008, cited by Van Pottelsberghe.
- <sup>xxii</sup> Foreword to Van Pottelsberghe, *Lost Property*, p. vi. Professor Pisani-Ferry was then director of Breughel, a Brussels-based economic think tank.
- <sup>xxiii</sup> 'Peut-on faire des œuvres qui ne soient pas "d'art"?', note from 1913; Michel Sanouillet and Elnor Peterson, *The Writings of Marcel Duchamp*, Da Capo Press, New York, 1989, p. 74. In 1935, Duchamp took a booth at an inventions show in Paris, with the whirling animated drawings he called *Rotoreliefs*; see Didier Semin, *Le Peintre et son modèle déposé*, p. 31; and Christian Besson, in this book, p. XXX.
- <sup>xxiv</sup> For demonstrations of flaking flint by hand, google 'video of flint knapping'. Duprat worked with expert craftsmen for several years to create these works, far larger than your average Neolithic spear point.
- <sup>xxv</sup> Charles T. Brues, 'Jewelled caddis-worm cases', *Psyche*, December 1930, pp. 392–94, <http://trichoptere.hubert-duprat.com/charlesbrues-1930/>.
- <sup>xxvi</sup> Paul Bloom, Professor of Psychology at Yale, suggests that awe is felt when there is too much information to process at once; see *How Pleasure Works: The New Science of Why We Like What We Like*, The Bodley Head, London, 2010, p. 218. He also cites Alison Gopnik's comparison between 'the satisfaction of orgasm as a spur to more sex and the satisfaction of a good explanation as a spur to further exploration', in her 'Explanation as orgasm and the drive for causal knowledge: the function, evolution, and phenomenology of the theory formation system', *Explanation and Cognition*, F. C. Keil and R. A. Wilson (eds), MIT Press, Cambridge, Ma., 2000.