

CHIMERA'S CHILDREN

ETHICAL, PHILOSOPHICAL
AND RELIGIOUS PERSPECTIVES
ON HUMAN-NONHUMAN
EXPERIMENTATION

EDITED BY
CALUM MACKELLAR
AND
DAVID ALBERT JONES

Chimera's Children

This book was commissioned by the Scottish Council on Human Bioethics (SCHB). The Council was formed in 1997 as an independent, non-partisan, non-religious body made up of physicians, lawyers, ethicists and other professionals from disciplines associated with medical ethics. The principles to which the SCHB subscribes are set out in the United Nations Universal Declaration of Human Rights which was adopted and proclaimed by the UN General Assembly by resolution 217A (III) on 10 December 1948.

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Continuum International Publishing Group

The Tower Building
11 York Road
London
SE1 7NX

80 Maiden Lane
Suite 704
New York
NY 10038

www.continuumbooks.com

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First published 2012

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

ISBN: 978-1-4411-9580-7

Library of Congress Cataloging-in-Publication Data

A catalog record for this book is available from the Library of Congress.

Typeset by Fakenham Prepress Solutions, Fakenham, Norfolk NR21 8NN

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Authorship

The book has been the work of many hands. Most of the initial drafting has been done by the principal editor, Dr Calum MacKellar with major contributions from Dr David Albert Jones. In addition, Prof. Damien Keown drafted the section on Buddhist perspectives with Dr Sibtain Panjwani and Mr Imranali Panjwani preparing the section on Islamic perspectives.

Acknowledgements

The book is indebted to the following (though it should not necessarily be assumed that they would endorse all of its contents): Dr Elizabeth Allan (Biologist: Member of the Scottish Council on Human Bioethics); Mrs Ann Bruce (ESRC Centre for Social and Economic Research on Innovation in Genomics: University of Edinburgh); Dr Neville Cobbe (Cell Biologist: University of Edinburgh); Dr Kenneth Collins (General Practitioner: Member of the Scottish Council of Jewish Communities, Glasgow); Mr Philip Hannan (Civil Servant in Scotland); Dr Matthew Harvey (Research Fellow with ESRC Genomics Policy and Research Forum: University of Edinburgh); Dr Susan Holloway (Clinical Scientist: Clinical Human Genetics, Molecular Medicine Centre, Western General Hospital, Edinburgh); Sheikh Arif Abdul Hussein (Director of Al-Mahdi Institute, Birmingham); Dr Rhona Knight (General Practitioner and Biomedical Ethicist: Member of the Nuffield Council on Bioethics); Dr David King, (Biologist and Biomedical Ethicist, Member of Human Genetics Alert); Dr Gregory K. Pike (Director, Southern Cross Bioethics Institute, Australia); Mr Adam Ransom (Theology Department: University of Chichester); Ms Hanne Stinson (Chief Executive, British Humanist Association, London); and Dr Agneta Sutton (Biomedical Ethicist: Associate Lecturer at the University of Chichester).

Preface

This book takes its title from a creature of ancient mythology, 'The raging Chimera, she was of divine stock, not of men, in the fore part a lion, in the hinder a serpent, and in the midst a goat, breathing forth in terrible wise the might of blazing fire' (Homer the *Iliad* 6/180). The quotation is from Homer's *Iliad* but evidence exists from earlier Greek pottery that the Chimera and other admixed creatures haunted the human imagination even before written history. The Chimera is of godly origin being offspring of Echidna, the mother of monsters (see Hesiod *Theogony* 319–25). She is powerful and unnerving precisely because she is made of different parts of different animals – lion, snake and goat.¹ None of the Chimera's parts is human but there are other legendary creatures where the human is part of the mixture like the minotaur (part man and part bull). Such myths of monsters performed various functions, but most notably they explored the idea of a beast within and untamed emotion: the violence of the werewolf or the minotaur; the sensuality of the faun and the mermaid. A variant of this theme is revived in H. G. Wells' *The Island of Doctor Moreau*. The Chimera and these other monsters were also symbolic of some frightening disorder threatening both the universe and humanity with chaos (Karpowicz et al. 2005).

Evoking the Chimera of classical myth is relevant because that is where the modern scientific term originates, but it functions partly by way of contrast with the issues presented in this book. Interspecies admixed organisms, including part human admixed organisms, are not only a feature of ancient mythology. They represent a real scientific possibility and in some cases, an actuality that is already present.

In a series of dramatic experiments, which took place at the end of the twentieth century, small brain sections from developing quails were taken and transplanted into the developing brains of chickens which, eventually, began to exhibit vocal trills and head bobs unique to quails. This demonstrated that complex behaviours could be transferred from one species to another and emphasised the potential power of embryonic and foetal interspecies combinations (Balaban 1997, Weiss 2004).

¹The chimera was killed by the hero Bellerophon on the winged horse Pegasus (Pearsall and Trumble 1996).

Because of these findings and others like them, the President's Council on Bioethics of the USA indicated, in a report published in 2004, that in the context of actually mixing human and nonhuman gametes or blastomeres (a single cell in a very early embryo), the ethical concerns raised by violating the human-nonhuman species barrier were especially acute. In particular, the President's Council recommended that a bright line should be drawn at the creation of human-nonhuman embryos produced by the fertilisation of human eggs by the sperm of nonhuman animals (for example, chimpanzee), or the reverse. The Council recommended that the US Congress should, therefore, draft legislation to address these biological possibilities and make it illegal to cross this line. This is a position which has, so far, not been altered in the USA, since no moves have been proposed to grant federal funding to create human-nonhuman embryonic and foetal combinations for research even though public policy on human embryonic stem cells has been liberalized.

In stark contrast, however, the UK House of Commons Science and Technology Committee (HCSTC) prepared a report in 2005 which took a very different position from the US President's Council. It recommended that the fertilisation of nonhuman eggs with human sperm should continue to be legal and state-funded in the UK for research purposes (HCSTC 2005: 30–2). In addition, it indicated that the time limit, before which they must be destroyed, should be extended. The same House of Commons Committee re-emphasized this permissive position with its 2007 report by indicating that:

We believe that there is a need to allow research using some forms of human-animal chimera or hybrid embryos, including but not exclusively cytoplasmic hybrid embryos, *to proceed immediately* ... We believe that, in general, the creation of *all types of human-animal chimera or hybrid embryos* should be allowed for research purposes ... [emphasis added]. (HCSTC 2007: 62–2)

There is thus no international consensus on whether to permit or to promote research on human-nonhuman embryonic or foetal combinations. Furthermore, the evidence suggests that in most developed nations public opinion is divided on the issue, with the balance in favour of setting strict limits to this kind of research (BBVA 2008: 28). The issues are complex and in most countries there has been little public debate (Hug 2009). When the possibility of human-nonhuman combinations has been reported in the media there has been a tendency, on the one hand, to hype the prospective benefits and on the other hand to play on irrational fears of possible dangers. In reality, however, there are many subtly different kinds of human-nonhuman combinations and many cultural, ethical and world view perspectives which need to be taken into account.

It may be that reflecting on ancient myths in this area can help inform ethical and philosophical reflection (for ethical and philosophical truths are often conveyed by myths). Nevertheless, whether or not this is true, it is necessary first of all to set aside the fabulous imagery and be clear what is meant or implied by 'chimera' in a modern research setting. In this context, because the chimera represented a combination of different parts originating from different species, the term has actually been appropriated by biologists to broadly describe any biological entity resulting from a combination of materials from two or more different organism (Greely 2003).

The chimeras of modern science are thus very different from the monsters of myth. Monsters were typically regarded as the result of divine intervention, often malign. In contrast chimeras, hybrids and transgenic organisms in bioscience are generally the result of human intervention, using and presupposing the biological powers of nature. Such activities are not arbitrary but are deliberate actions in the pursuit of various goals.

The present book is offered as a clarification of some of the questions that are pressing and perplexing in equal measure. The book is divided into three parts. The first part looks back from the myths of ancient Greece through recent science fiction to contemporary science and legal regulation. It demonstrates that while the science may be new, the idea of human-nonhuman combinations is ancient. The second part looks towards the future development of different kinds of human-nonhuman combinations. It seeks to move away from science fiction and consider in more detail those combinations that are realistic in the future and those that have already been created. The third part looks at contemporary cultural, worldview and ethical perspectives. It aims to give depth to the current discussion by broadening the context for debate. The topics covered by different chapters (for example, Chapter 2 on legal aspects or Chapter 9 on worldview perspectives) can generally be read independently of one another and the book can be used in this way, as a resource. However the aim of the book is more than this. It seeks to understand the issue synoptically, applying to these novel scientific possibilities principles distilled from a variety of perspectives. There are no easy answers here, but this discussion is offered as a starting point for deeper reflection.

Calum MacKellar
David Albert Jones

January 2012

PART ONE

Background, definitions and current legislation

Introduction

The idea of crossing the human species barrier has always fascinated humanity. In ancient Egypt, Greece and Rome, for example, mythological creatures such as sphinxes (often with human-lion combinations), centaurs (human-horse combinations), fauns (human-goat combinations), harpies (bird-human combination) and the minotaur (a human-bull combination, the mythical result of a sexual union between the Queen of Crete, Pasiphae, and a bull) were portrayed both in legend and in art as being special and endowed with extraordinary powers (McLaren 1976: 1).

Interestingly, although such beings were not considered as being part of the human race, neither were they seen as being inhuman or completely bestial, their distinct and solitary status in mythology sometimes resulting in them being rejected as different and portrayed as lonely monsters. Indeed, Western historical and cultural beliefs often considered the mixing of two separate categories of animals as representing an evil (Bazopoulou-Kyrkanidou 2001). For example, the myth relating to the minotaur portrays the monster as dangerous and malign necessitating its eventual destruction by Theseus. Similarly, pictorial representations of the devil and demons in medieval times include both human but also animal parts such as horns and tails.

One enduring story which was taken seriously for many centuries was the existence of a cynocephalic (dog-headed) race. They were described as having the head of a dog with a human body. They ate human flesh and barked. According to Herodotus (484–425 BC), these creatures lived in the forests of Libya (*History* 4.191). On the other hand, Ctesias, another Greek travel writer and historian of the same period, wrote that cynocephali were to be found in India (as cited in a fragment preserved by Photius (c.815–897)). The same story was still around eight centuries later and is mentioned by Jerome (347–420) (Gordon White 1991). Thomas of Cantimpré cites Jerome on the existence of Cynocephali, in his *Liber de Monstruosis Hominibus Orientis*, xiv. Augustine (354–430) was not convinced that this race actually existed, but was concerned to understand the implications should such a species be discovered.

I must therefore finish the discussion of this question with my tentative and cautious answer. The accounts of some of these races may be

completely worthless; but if such people exist, then either they are not human; or, if human, they are descended from Adam. (*City of God* 16.8)

After Augustine few writers showed his 'tentative' caution. The story of a race of dog-headed people seems to have been widely believed in the early middle ages. Medieval travellers John de Plano Carpini (c.1182–1252) and Marco Polo (1254–c.1324) both mention cynocephali in their writings with the former mentioning a race of dog-heads which lived north of what may be recognised as Lake Baikal.

In a further twist, the myth of the dog-headed race was fused with the legend of St Christopher who lived in the third century. It is said that he was a cynocephalic convert who, on receiving baptism, was rewarded with a human appearance. This story occurs in sources from the fourteenth century and probably existed much earlier. There are even some icons in Eastern Orthodox Churches in which St. Christopher is portrayed with a dog head.

It is interesting that the myth of the cynocephali has consistent features from Herodotus to the medieval legends of St Christopher. It frequently associates dog-headedness with savagery and cannibalism. The dog-headed person is a human being reduced to the savagery of the wild animal. They are the 'wild men of the woods', a kind of mythical 'missing link' between beast and man. The medieval idea that dog-headed races existed in remote corners of the world is directly parallel with the modern legends of the yeti or Bigfoot: an elusive semi-human creature who lives in wild places and who provides an image of humanity before civilisation.

These stories, like similar legends of mermaids and werewolves, have been common in many cultures. They reflect an enduring fascination with creatures who mix human and nonhuman characteristics while raising questions about the importance of the human body and human identity (Haddow et al. 2009).

In at least some cases, these mythical semi-human figures seem to be based on human biological dysfunction wrongly assumed to be due to human-nonhuman hybridization. For example, a man might mistakenly be considered to be a werewolf because hair covered his whole body due to a rare genetic condition (Leroi 2005: 268 ff.).

The description of human medical conditions as belonging to a nonhuman form of animal life can still be found in a book written as recently as the 1950s. In *The Sanctity of Life and the Criminal Law* Glanville Williams applies the term 'monsters' to children born with severe disability.

On rare occasions such a monster will live. It may belong to the fish stage of development, with vestigial gills, webbed arms and feet, and sightless eyes. The thing is presented to its mother, who struggles to nurture it for

a few months, after which she sends it to a home. (Williams 1958: 33 on webbed feet see Leroi 2005: 117)

In this regard, a 'monster' would be a being that disturbs and challenges the settled boundaries of nature and which make sense to society (see Jasanoff 2005).

Williams concluded that it was probably lawful to kill this kind of human 'monster'. He claimed that this conclusion was supported by the medieval jurist Bracton, though he admitted that Bracton's opinion was based on the mistaken belief that such progeny were the result of intercourse with animals. Williams argued that 'the same rule might be approved for a better reason', by which he meant the eugenic reason 'of preventing the birth of children who are congenitally deaf, blind, paralysed, deformed, feeble minded, mentally diseased, or subject to other serious hereditary afflictions' (Williams 1958: 82; Keown and Jones 2008). It is extraordinary that these words could be written by a respected English academic only ten years after the Nuremburg trials following the Second World War. Here the myth of the existence of not-quite-human beings seems to endure as a denial of the fundamental moral equality of people with disability.

In addition to the misuse of hybrid imagery by modern eugenicists, another modern mode of discourse on human-nonhuman interspecies entities is the medium of science-fiction. These works have frequently portrayed the difficulties of defining the human versus the nonhuman elements of interspecies beings.

For example, H. G. Wells' (1866–1946) book *The Island of Doctor Moreau*, published in 1896, tells the story of Edward Prendick who is shipwrecked and ends up on a desert island: a place where a certain Dr Moreau is undertaking vivisection experiments to turn nonhuman animals into humans. At first revolted, Prendick later comes to empathize with these created beings, who have the ability to speak, but he is eventually confronted with questions of humankind's own animalistic instincts. The novel allows the exploration of the animal side of human nature and of the implications of Darwin's claims about the origin of man. Moreover, the story explores the idea and implications of the beast-man in addition to examining the hubris of Dr Moreau, the scientist who is driven to pursue his research wherever it leads at whatever cost and who has 'never troubled about the ethics of the matter' (Wells 2005: 75).

A novel which studies the very difficult problems of identifying the moral status of human-nonhuman interspecies beings was written by the French author Vercors (whose real name was Jean Bruller (1902–1991)). Published in French in 1952 as *Les Animaux dénaturés*, it appeared in English in 1976 under the title *Borderline*. The book tells the story of a team of anthropologists looking for the 'missing link' between humans and nonhuman primates

and who actually discover such a species in New Guinea which they name Tropi. The discovery, however, creates a storm which threatens to disrupt the set thinking of twentieth-century society because a creature on the borderline between humans and nonhuman primates seems to undermine the privileged moral status of human beings.

When a very large textile company seeks to use the tropis as slaves in its factories, the hero of the novel, an English journalist named Douglas Templemore, decides to artificially inseminate a female tropi with his sperm before bringing her back to London and killing the resulting child. This he does in order to force the English legal system (and the UK Parliament) to decide whether or not he has committed a murder. In so doing, the hero would determine, once and for all, the moral status and rights of the tropi. After many intractable arguments, however, the English authorities eventually decide not to attempt to answer the question whether or not a tropi is human until the more basic question of the nature of humankind is defined. But, to the consternation of all, it is discovered that a definition of humankind has never been determined or established in English law. The question 'What is humankind' may have been one which Vercors asked himself when confronted with the racial discrimination of the Nazis towards different kinds of human beings during the Second World War in which he was a resistance fighter in the Vercors region of France.

The theme of intelligent nonhumans is also explored in another French science fiction novel: Pierre Boulle's *La Planète des singes* (1963). This was the basis of the highly successful film franchise, *The Planet of the Apes* (1968, with sequels in 1970, 1971, 1972, 1973, 2001 and 2011). In the book and in the first series of films, the transformation of the apes is the result of training. However, in the latest film, it is a result of a genetically engineered retro-virus, with the implication it may have introduced human genes into the apes. A similar move is made in *Next*, the 2006 techno-thriller by the American author Michael Crichton. He imagines a humanzee being created through the introduction of human genes into the genetic constitution of a chimpanzee. In this story the humanzee has distinctly human characteristics and Crichton uses the plot to reflect his own perspective and concerns relating to new genetic experimentation.

Such stories are important and not entirely unbelievable because the process of interspecies mixing can and does occur when species are genetically very close. The most common and well-known example of a nonhuman animal-animal combination is the mule. This is a true hybrid. In other words, fertilization of a horse egg with donkey sperm produces an animal whose every cell contains chromosomes from both parental species. Conversely, a hinny is obtained when a male horse mates with a female donkey. Donkeys have 62 chromosomes, while horses have 64. Their offspring have 63

chromosomes which cannot evenly divide. Thus mules and hinnies are almost always sterile. There are also other examples of success in crossing animals of different species: a lion with a tiger; a goat with a sheep; a wolf with a dog. Occasionally this also happens without human intervention. In May 2006, DNA tests confirmed that a bear shot in the Canadian arctic was a hybrid of a polar and a grizzly bear. Such a cross (the 'grolar bear') had been known in captivity but the 2006 case was the first confirmed example in the wild. Combinations between biological species are thus relatively rare in nature, and most such entities are less 'fit' than their progenitors.

With respect to human-nonhuman combinations, no evidence of any entities being born has ever been recorded but new developments in assisted reproductive technology, genetics and biochemistry may well make this technically feasible. Human-nonhuman combinations are no longer confined to the domain of mythology but have become a possible object of scientific research. For example, in the mid-1920s the Soviet Union's top breeding scientists Prof Ilya Ivanov tried to impregnate female chimpanzees with human sperm in order to create a human-chimpanzee hybrid (a humanzee). These experiments were unsuccessful but were believed to be feasible by some of the leading scientists of the day (Rossiianov 2002). It was only because of grave ethical concerns expressed by the general public and other commentators at the time that this line of research was eventually abandoned. While such experiments were conducted by Soviet scientists they were also considered but rejected by that other totalitarian movement, German National Socialism. Adolf Hitler expressed indignation about the possible hybridization between humans and nonhumans, believing that the combinations always lead to degeneration (Rossiianov 2002: 310). Despite a lack of sympathy with many aspects of Christianity, Hitler wrote in *Mein Kampf* that: 'The state is called upon to produce creatures made in the likeness of the Lord and not create monsters that are a mixture of man and ape' (Hitler 1939 Vol. 2 Section 2).

More recently, new procedures have been developed by scientists which combine human and animal biological elements to such an extent that it questions the very concept of being entirely human (Robert 2006: 838–45). In the light of this research, concerns about human-nonhuman combinations were raised in 2001 by the UK Animal Procedures Committee. This indicated that, in addition to questions about the fate of such human-nonhuman combinations, a deep repugnance may exist at the thought of their very creation. Indeed, the committee indicated that the main opposition to human-nonhuman combinations would probably arise from 'those who wish to maintain real boundaries between human and nonhuman animals, and who retain a conviction that "kinds" are separate creations, each – as it were – designed to embody a particular beautiful form'. Thus, confusion of 'kinds'

may be something which raises concern in a large section of society even though no certainty exists as to the exact identity of these 'kinds' (Animal Procedures Committee 2001: 18–20).

Generally, the term 'kinds' is not so much used in biology as in folk-taxonomy. From a biological perspective, living organisms are classified not into kinds but into species (that is, into groups which do not normally interbreed). Nevertheless, in moral and political discussion it is common to speak of human beings as belonging to the same 'kind'. This is important, for example, for the concept of universal human rights. It is unlikely that the idea of a shared human kind or a common human nature would be undermined if it were discovered that some human beings technically belonged to a different biological species (that is, that members of this population were not able to breed successfully with other human populations and vice versa). This would be biologically interesting but would not, normally, undermine their claim to equal respect as human beings (Animal Procedures Committee 2001: 18–20).

Moreover, there is considerable debate about the reality of biological species or whether they are the product of humanly imposed classification schemes which are empirical and pragmatic. For instance, one can classify species into groups in which organisms reproduce sexually if this mode of propagation is deemed to be the most significant criterion. But this raises the question of whether bacteria, because of their ability to transfer genetic material between themselves through cell-to-cell contact, can or should be divided into species, and whether reproduction criteria provide the most compelling reasons to draw lines between organisms. It is arguable that this and other classification schemes are sometimes formulated based on subjective human interests (Karpowicz, Cohen and van der Kooy 2004: 331–5, De Sousa 1980). This would mean that species categories were never real, ontological entities or natural kinds (De Sousa 1984). Nevertheless, while the category of biological species may not be universal or immutable it does serve a useful function and is hard to jettison altogether. Boundaries may be blurred at the edges but they still help to identify different characteristic forms of life – characteristic physiology, characteristic behaviour, characteristic place in the ecology. In the case of the human species these shared specific characteristics have moral and political significance.

On the other side of the Atlantic, the President's Council on Bioethics of the USA considered the topic in 2004. It concluded that crossing the human-nonhuman boundary was, in some respects, quite complex and subtle but that the combination of human and nonhuman tissues and materials was not in itself objectionable.

This means that, in the context of therapy and preventive medicine, the President's Council accepted that the transplantation of nonhuman animal parts to replace defective human ones could be considered as ethical.

Moreover, the Council had no specific objection to the insertion of nonhuman-derived genes or cells into a human body – or even into human fetuses – where the aim would be to address a serious disease in the patient or the developing child.

Similarly, in the context of biomedical research, the US Council did not oppose the practice of inserting human stem cells into nonhuman animals. However, in the context of procreation – of actually mixing human and nonhuman gametes or embryonic cells at the very earliest stages of their development – the Council indicated that the ethical concerns raised by crossing this boundary were especially acute. Thus, the drawing of clear lines limiting permissible research should be specifically considered.

Consequently, the President's Council recommended that one bright line should be drawn at the creation of human-nonhuman embryos, produced by the fertilization of human eggs by nonhuman animal (for example, chimpanzee) sperm or the reverse. This is because the Council accepted that society should not be asked to judge the humanity or moral worth of such ambiguous hybrid entities (for example, a 'humanzee', the analogue of the mule). Furthermore, the Council made it clear that it did not want to leave open the possibility of a human being having other than human progenitors (for example, having a monkey as a parent). The Council, therefore, recommended that the US Congress should draft legislation to address these biological possibilities and make it illegal to cross this line.

However, a more permissive approach to the creation of human-nonhuman combinations, especially in the realm of the embryo, was considered in a report entitled 'Human Reproductive Technologies and the Law' prepared in 2005 by the UK House of Commons Science and Technology Committee. In this report it is somewhat surprisingly indicated that,

while there is revulsion in some quarters that [human-nonhuman] creations appear to blur the distinction between animals and humans, it could be argued that they are less human than, and therefore pose fewer ethical problems for research than fully human embryos.

The report went on to recommend (HCSTC 2005: 30–2) that new legislation should:

- a)** Define the nature of these creations,
- b)** Make their creation legal for research purposes if they are destroyed in line with the current UK 14-day rule for human embryo cultures, and
- c)** Prohibit their implantation in a woman.

This position was re-emphasized by the same House of Commons committee in its 2007 report entitled 'Government Proposals for the Regulation of Hybrid and Chimera Embryos' in which the Members of Parliament stated that:

We believe that there is a need to allow research using some forms of human-animal chimera or hybrid embryos, including but not exclusively cytoplasmic hybrid embryos, *to proceed immediately* ... We believe that, in general, the creation of *all types of human-animal chimera or hybrid embryos* should be allowed for research purposes... (HCSTC 2007: 62–3, emphasis added)

As a result of these scientific developments in the creation of human-nonhuman combinations, the Scottish Council on Human Bioethics prepared an extensive report, in 2006, on the ethical issues associated with human-nonhuman interspecies embryos. This was one of the first reports in Europe on the subject and sought to emphasize the ethical complexity and serious risks relating to such experimentation. However, not all commentators were prepared to be so categorical in their assessment of human-nonhuman interspecies embryos. Bioethicists such as Jason Scott Robert and Françoise Baylis for example, were unwilling to draw a specific line concerning such interspecies combinations (Robert and Baylis, 2003, Robert, 2006). They asserted that they took 'no stance at all' on whether 'animal-human mixtures should be forbidden or embraced' asserting that 'the arguments against ... creating novel part-human beings ... are largely unsatisfactory'.

This was reflected by Hugh McLachlan, a professor of applied philosophy in Scotland, who indicated that although the idea was 'troublesome', he could not see any ethical reasons to oppose the creation of humanzees. He argued that 'If it turns out in the future there was fertilisation between a human animal and a non-human animal, it's an idea that is troublesome, but in terms of what particular ethical principle is breached it's not clear to me', adding 'I share their squeamishness and unease, but I'm not sure that unease can be expressed in terms of an ethical principle' (Haworth 2008).

Finally, some commentators, such as zoologist Prof Richard Dawkins have even admitted to a 'frisson of enjoyment' at the prospect of having to question the hitherto unquestioned issue of the creation of human-nonhuman interspecies entities. He acknowledged at the beginning of 2009 that the successful hybridization between a human and a chimpanzee would change everything, adding: 'Even if the hybrid were infertile like a mule, the shock waves that would be sent through society would be salutary ... It cannot be ruled out as impossible, but it would be surprising' (Rabderson and Dawkins 2009). In this regard, he also indicated that:

If there were a heaven in which all the animals who ever lived could frolic, we would find an interbreeding continuum between every species and every other. For example I could interbreed with a female who could interbreed with a male who could ... fill in a few gaps, probably not very many in this case ... who could interbreed with a chimpanzee. We could construct longer, but still unbroken chains of interbreeding individuals to connect a human with a warthog, a kangaroo, a catfish. This is not a matter of speculative conjecture; it necessarily follows from the fact of evolution. (Rabderston and Dawkins 2009)

Author, James Hughes, in his 2004 book, *Citizen Cyborg*, has also indicated that he would welcome the creation of a human/chimpanzee hybrid that could interbreed with both species, and thereby 'break the species' barrier. This, he wrote, would prove that humans are not special and undermine what he calls 'human racism'.

From the above comments, it is easy to see how the topic of human-nonhuman interspecies entities relates to some of the most fundamental questions facing humanity. Not only does it ask questions about the moral status of new biological beings but it also forces humanity to reconsider and re-evaluate itself in the context of these beings. In other words, the ethical considerations run very deep and are extremely complex. It was in order to seek some clarifications, where possible, relating to the scientific, philosophical, cultural and religious perspectives that the present volume was prepared.