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Going the whole orang: Darwin, Wallace and the natural history of orangutans

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ABSTRACT

This article surveys the European discovery and early ideas about orangutans followed by the contrasting experiences with these animals of the co-founders of evolution by natural selection, Charles Darwin and Alfred Russel Wallace. The first non-human great ape that both of them interacted with was the orangutan. They were both profoundly influenced by what they saw, but the contexts of their observations could hardly be more different. Darwin met orangutans in the Zoological Gardens in London while Wallace saw them in the wild in Borneo. In different ways these observations helped shape their views of human evolution and humanity's place in nature. Their findings played a major role in shaping some of the key questions that were pursued in human evolutionary studies during the rest of the nineteenth century.

1. Going the whole orang

In the nineteenth century contrasts and similarities in human cultures and physical appearances were habitually brought forward in the growing British anthropological and ethnographic literature supporting either a common or a separate origin of peoples around the world. They looked and behaved differently. The question was why? What had shaped human diversity and was there anything bridging the differences? Was it variation or separation? Looking for answers scholars systematically began historicizing humans in a naturalistic context. Consequently, a key challenge was to identify the link connecting the cultural and natural history of humans. Evolutionary theories eventually provided an acceptable framework for bringing things together. But already in the late eighteenth century scholars were looking for clues making the connection. In this context, primates—and in particular the great apes—played a central role. There were many questions as it was not clear who they were and how the relationship to humans should be interpreted.

Charles Darwin (1809–1882) and Alfred Russel Wallace (1823–1913) shared this interest. Despite the different parts of the world to which they travelled, the first living (non-human) great apes seen and studied by both Darwin and Wallace were orangutans. Darwin saw his orangutans in 1838 in the Zoological Gardens in London's Regent's Park. Wallace saw his in the jungles of west Borneo in 1855. But it was not just the vastly different contexts in which they observed their orangutans that distinguished what Darwin and Wallace took from their experiences with the orangutan.

Orangutans come only from the islands of Sumatra and Borneo in Southeast Asia. These are now recognised as two separate subspecies (*Pongo abelii* and *Pongo pygmaeus*) and our closest living relatives after chimpanzees (*Pan troglodytes*), bonobos (*Pan paniscus*) and gorillas (*Gorilla beringei* and *Gorilla gorilla*).[2]

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[2] See Locke et al. (2011), Prado-Martinez et al. (2013) and Tuttle (2014), pp. 42–45.

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The geologist Charles Lyell (1797–1875) wrote in 1859 that accepting evolution fully was to "go the whole orang."[3] This was a play on the expression to 'go the whole hog.' For Lyell going "the whole orang" with evolutionary thinking meant, most painfully of all, linking humans to animal ancestors.[4] It meant that humans were not creations separate from the rest of the animal kingdom. To go the whole orang then, meant not just to treat humans scientifically but to go all the way to making them animals like all the rest. But why should it have been the whole orang? Why not go the whole baboon or the whole chimp? In order to understand that we need to take a closer look at the European history of primates and the deep cultural influence of apes and monkeys on the question of what makes us human. Appreciating how the innate connection between humans and primates builds on themes introduced through centuries of entangled cultural and natural history is crucial to identifying central themes of the human-animal boundary in nineteenth-century attempts to historicise humans. How special humans were, remained a question that was continuously negotiated by comparing humans and apes. Historically orangutans had become the generic term for African and Asian great apes. It was thus culturally highly significant when Darwin and Wallace each met a proper orangutan.

2. The gradual discovery of orangutans

Macaques and baboons, living in the relative vicinity of the Mediterranean and known since antiquity, served as a reflection of mundane bodily functions and desires, and a contrast to philosophical and religious ideals of humanity. Plato (c. 428–348 BCE), Aristotle (384–322 BCE), Pliny the Elder (23–79) and Galen (130–200) discussed monkeys and compared them to humans. In medieval Christian contexts monkeys were seen as degenerate, foolish and obscene, representatives of frivolity and the grotesque. By the end of the middle ages the simian sinner turned into the simian fool as prototype of all-too-human qualities, mostly savage and impulsive, but also sometimes as an idyllic wild man of the woods.[5]

All of these images and connotations continued in the discussion of great apes. Chimpanzees, gorillas and orangutans were gradually discovered by Europeans in the seventeenth and eighteenth centuries following trade and European colonial expansion in Africa and Southeast Asia. Travellers' accounts and specimens of great apes, often in poor condition, put on display at markets and animal gardens, or kept in the menageries of the wealthy complemented the enduring European tradition of mirroring human life in monkeys.

Almost all great apes which reached Europe alive in the seventeenth and eighteenth centuries were juveniles that died young. The increasing scientific interest and resulting anatomical studies also meant the gradual disappearance of the many traditional representations of ape-like creatures originating in classical and medieval texts. Faced with real ape bodies it was easier to detect fiction and fancy in the many sources purportedly reporting meetings with, physical appearances and characters of wild men of the woods. However, they were difficult to distinguish and consistently grouped together under the generic name orangutan.

The Dutch physician Jacobus Bontius (1592–1631) working in Java in the early seventeenth century reported that the local name for the wild apes on the island was "Ourang Outang" or 'man of the forest'. He depicted one as a well-endowed furry female with a mane a bit like a lion. The exaggerated female attributes did not pass unnoticed by later commentators, nor did another human feature, the ability to talk. However, Bontius remarked, the orang-utans had their own very special reason to remain silent: "the Javanese claimed that the *Ourang-Outangs* could talk, but that they did not want to because they did not want be forced to work".[6] The open acknowledgement of the almost human character of the orangutan was not Bontius' only legacy. His report of the Javanese name for the great apes was picked up by his countryman Nicolaes Tulp (1593–1674), a seventeenth-century physician and professor of anatomy and surgery in Amsterdam. Tulp was the first to apply the name orangutan to an ape in Europe, although his was not an orangutan, but a chimpanzee or bonobo from Angola brought to the Netherlands by Dutch traders. His widely read essay "Homo sylvestris; Orang-Outang" (1641) was based on observations of a young female ape held in the menagerie of the Prince of Orange in The Hague.

Following Tulp, later writers used orangutan for any large human-like ape from Africa or Southeast Asia. *Homo sylvestris*, 'man of the forest', was likewise used synonymously. With an origin in medieval folklore it originally referred to hairy, wild and dangerous creatures, half human, half beast, believed to live deep in European forests. Some of these characteristics were also transferred as the name was applied to the great apes of Africa and Southeast Asia. Thus the first studies of great apes in Europe were a complex mixture of empirical observations entwined with traditional religious and metaphysical views, ancient mythology, animal lore, travelogues, and monkey allegories.[7]

The cultural context of monkeys aside it was still difficult to sort out the differences between the various specimens coming to Europe with respect to age, gender and species. Only by the end of the eighteenth century were chimpanzees and orangutans recognized as different animals from Africa and Southeast Asia respectively. The classification of gorillas as a separate species followed in the 1840s and it was not until the 1930s that bonobos were seen as separate from chimpanzees.[8] All of the apes to reach Europe alive were juveniles and thus still much more alike than fully grown adults which in combination with the sparse knowledge about the great apes' anatomy and general appearance is part of the explanation why all were classified as orangutans. They were more similar to each other than they were to monkeys. The question then was how similar were they to humans? Tulp exaggerated the similarity and the humanness failing to notice, for example, that his "orangutan" was incapable of walking fully erect. The physiology, he argued, was almost identical to humans and even the behaviour

[3] "I conceive that Lamarck was the first to bring it forward systematically & to "go the whole orang." Lyell to T. H. Huxley 17 June 1859, Imperial College Archives, Huxley Papers 6:20, partly reprinted in Wilson (1970), p. 262. "When I came to the conclusion that after all Lamarck was going to be shown to be right, and that we must go the whole orang I re-read his book, and remembering when it was written, I felt I had done him injustice." Lyell to Darwin 15 March 1863, Burkhardt et al. (1985-), 11:230–231.

[4] "If the recognition of the near analogy of the human & the Orang type gives us pain …" Wilson (1970), p. 165.

[5] Corbey (2005), p. 9. Corbey provides an excellent discussion of primates and the animal-human boundary in the history of anthropology.

[6] Bontius (1658), cited in Blancke (2014), p. 33. Edward Tyson also remarked on the ability to talk and the reason not to do it in his *Philological Essay* accompanying *Orang-Outang, sive Homo sylvestris* (1699), p. 37. Commenting on Bontius' figure Tyson remarked: "I can't but think, he indulged more his Fancy herein, than copied the true life" (*Orang-Outang, sive Homo sylvestris*, 19), also making more than one note of the "pendulous large *Breasts*" (pp. 11 and 19). The sexual character of Bontius' female orangutancontinued to attract attention well into the second half of the nineteenth century in, for instance, Daniel Wilson's evolutionary reading of Shakespeare where it was described as "a female animal of human proportions and pleasing features", Wilson (1873), 17.

[7] Corbey (2005), p. 39.

[8] See Blumenbach (1779), Camper (1782), Savage (1847) and Coolidge (1933). Note that Savage still used "orang" as a generic term for gorillas.

similar. For instance it wiped its mouth after drinking and it slept with a blanket with its head on a pillow.[9]

Apparently the first great ape to arrive in England came by boat from Angola in 1698 and was put on display at a freak show in London attracting considerable public attention, including that of the anatomist Edward Tyson (1651–1708). The infant chimpanzee or bonobo died three months after arrival from an infectious wound contracted during the voyage and was meticulously dissected by Tyson. The results were published the following year as *Orang-Outang, sive Homo sylvestris: or the anatomy of a Pygmie compared with that of a monkey, an ape, and a man. To which is added, a philological essay concerning the pygmies, the cynocephali, the satyrs, and sphinges of the Ancients. Wherein it will appear that they are all either apes or monkeys, and not men, as formerly pretended*. Tyson followed the seventeenth-century consensus and called his ape an orang-utan. He assumed that there were no differences between African and Southeast Asian great apes because "some Sea-Captains and Merchants who came to my House to see it, assured me, that they had seen great many of them in *Borneo*, *Sumatra*, and other Parts, tho' this was brought from *Angola* in *Africa*".[10] With no direct comparative experience of his own, the testimony of actual witnesses seemed trustworthy.[11]

In the careful comparison of his "orangutan" with humans and two monkeys he counted anatomical differences and similarities. Tyson noted that the number of similarities were significantly higher with respect to humans than to monkeys with 48 more human-like features versus 34 more monkey-like features. However, the significance of the many features closer to monkeys could not be ignored and he concluded that his "orangutan" was neither human nor monkey, but something in-between. It was not a product of mixed species either, but a species in its own right: "our *Pygmie* is no *Man*, nor yet the *Common Ape*; but a sort of *Animal* between both; and tho' a *Biped* yet of the *Quadromanus-kind* [i.e. four-handed]".[12]

Tyson's "orangutan" was a link in the Great Chain of Being. It had a body and a brain very similar to humans, but yet, it did not cross the Rubicon of language. As such, for all the similarities' worth, they fit the seventeenth-century frame of mind and helped to confirm the gulf between humans and animals. The Great Chain of Being was not a continuous scale, but a discrete ladder of God's creations with the orangutan supplying the step before humans. It was an important step closer to humans, but still a step below. The ape was physically equipped to speak, but lacked the spiritual qualities to do so.[13]

In the eighteenth century the Swedish taxonomist Carolus Linnaeus (1707–1778) took the step Tyson refrained from and placed the orangutan firmly with humans in his great scheme of classifying the living world. In the tenth edition of his monumentally influential *Systema naturae* (1758) he put humans in the order primates, that included the three genera *Homo*, *Simia*, and *Lemur*. In the genus *Homo* he distinguished between two human species, *Homo sapiens* (*Homo diurnus*) and *Homo troglodytes* (*Homo nocturnus*), the latter including *H. sylvestris Orang-Outang*. Thus, Bontius' orangutan and Tulp's and Tyson's chimpanzees narrowly managed not to be included in the crowded genus *Simia*, but instead luxuriated in the exclusive *Homo* genus. It was almost human, not with articulate language, but able to speak using hissing sounds.[14]

Linnaeus' classification, however, generated strong reactions among eighteenth-century naturalists, including Georges-Luis Leclerc de Buffon (1707–1788) and his co-author Louis Daubenton (1716–1799) in France, and Johann Friedrich Blumenbach (1752–1840) in Germany. Central to the debate was the question how human the great apes were? Were they evidence of a continuum fixing humans firmly in the animal kingdom or were they proof of God's creation of separate species, discretely organised with humans at the very top? Buffon and Blumenbach answered the latter in the affirmative. Opposed to Linnaeus' focus on structural morphology, they stressed functional morphology. The defining characteristics were not if a species had certain organs or not, but whether they were able to put them to any use. Buffon did not believe Linnaeus on the question of the orangutans' ability to speak and dismissed them from the inner circles of the human family on these grounds. Forcing a Cartesian dualism on the animal world, humans were saved by language and all that followed. Blumenbach concurred and even questioned previous accounts of bipedality. Orangutans, he claimed, were only occasionally standing on their feet, not at all like humans who used the upright posture as one of the main features and advantages over other animals.

Blumenbach's was more than a scientific interest. He was determined to defend human uniqueness and his emphasis on functional rather than structural morphology was used deliberately to drive home the point. As he wrote to the Swiss anatomist and naturalist Albrecht von Haller (1708–1777) in 1775, Blumenbach would stand up "to defend the rights of mankind and to contest the ridiculous association with the true ape, the orang-utan".[15] The Dutch anatomist Petrus Camper (1722–1789) seized an opportunity to dissect a series of infant orangutans and other non-human primates in the 1770s. He would confirm Blumenbach's distinction between the African chimpanzee and the Asian orangutan. However, while Blumenbach gave new names to the different species—*Simia troglodytes* for chimpanzees and *Simia satyrus* for orangutans emphasising his disagreement with Linnaeus' classification that put the great apes in the same genus *Homo* as humans—Camper kept the orangutan name and merely pointed out the geographical differences. By the end of the eighteenth century more orangutans and chimpanzees had reached Europe creating a better understanding of their physiology and appearances. They were still special and rare, but no longer mythological figures. They had become objects of scientific scrutiny and were now central to ideological discussions about humans' place in nature.

Parallel to those delineating apes and humans there were others who followed Linnaeus by including the great apes and humans in the same family. The French philosopher Jean-Jaques Rousseau (1712–1778) and the Scottish judge James Burnett (1714–1799), better known as Lord Monboddo, stressed the difference as one in degree, not an absolute boundary. Indeed, the generic orangutans were seen as representatives of humans in their natural state. To Rousseau the orangutans reported by travellers might be "a race of genuine wild men, dispersed in the woods in ancient times without the possibility of developing any of its virtual faculties, without having acquired any degree of perfection, still living in the primitive

[9] Tulp (1641); see Blancke (2014), p. 33.

[10] Tyson (1699), p. 2.

[11] Trust was central in relying on first-hand testimonies for substantiating work in natural history. In nineteenth-century anthropology this was still very much the case. See Sera-Shriar (2013) for a discussion of how observational practices in anthropology developed from natural history, geography, and medicine.

[12] Tyson (1699), p. 91. The comparison of similarities with humans and monkeys appears on pages 92–95.

[13] Corbey (2005), pp. 40–41; Ritvo (2005), pp. 483–483; Blancke (2014), pp. 34–35.

[14] Linneaus (1758); Broberg (1983); Blancke (2014), pp. 35–36; Ritvo (2005), p. 484.

[15] Quoted in Corbey (2005), p. 50.

state of nature".[16] Happy and free, leading the natural uncorrupted life of the golden age of humanity, the exact opposite of the Hobbessian state of a perpetual war of all against all, Rousseau's orangs provided a normative standard for the good and natural way to live.

Monboddo's orangutan was equally human and a model of "natural man" living peacefully in a warm and welcoming climate from the fruits of the earth. The only reason the orangutans had no language was because there was no need for it. Based upon one stuffed orangutan in the French King's cabinet of curiosities, two live specimens in London and a series of travellers' accounts, Monboddo was confident enough to speak with authority on the nature and behaviour of his very human orangutans: "He has the sense of what is decent and becoming, which is peculiar to man, and distinguishes him from the brute as much as anything else". Furthermore, "he has a sense of honour; for he cannot bear to be exposed as a show, nor to be laughed at; and travellers mention examples of some of them having died of vexation, for being so treated. He has also the feeling of humanity in a strong degree; and a sense of justice".[17] But Monboddo did not stop there. The orangutans, he claimed, had also made serious cultural progress building huts, used sticks as weapons, used fire and buried their dead. They were indeed of the same species as humans and one should not be fooled by the fact that they had not yet invented language.[18]

3. Orangutans in England

The literary potential of orangutans did not pass unnoticed and found its way into numerous stories and illustrations. Inverting the idea of the Missing Link as a filthy aberration in *Melincourt* (1817) Thomas Love Peacock (1785–1866) staged his hero Sir Oran Haut-Ton as the impeccable and chivalrous silent rescuer of the proverbial damsel in distress. It did not matter at all that he had not acquired language after arriving in England from his native Borneo. Edgar Allen Poe (1809–1849) on the other hand continued the tradition of the orangutan as a wild brute. It was ultimately revealed that an orangutan committed the extremely violent *Murders in Rue Morgue* (1841). The orangutan was heard speaking in a foreign tongue and using a humanly impossible escape route. Poe's story contrasted the beastly orangutan with the intelligence of the 'detective' Auguste Dupin, later the model for Arthur Conan Doyle's (1859–1930) Sherlock Holmes. The orangutan was once again a divide instead of a continuum between humans and animals.[19] The early nineteenth-century English speaking public and the scientific community alike were well acquainted with "orang-utans" in their African and Southeast Asian forms. They were indeed a familiar image in the public and the scientific imagination when Darwin and Wallace met their first orangs.

It was widely believed that the French naturalist Jean-Baptiste Lamarck (1744–1829) proposed a scandalously direct line of descent from orangutans to humans. In his *Philosophie Zoologique* (1809) Lamarck had indeed proposed that humans had probably come into existence through transmutation from an ape. This would have happened as a quadromanous (four-handed) ape had begun to walk upright and reached superiority over other animals. Lamarck's theory of transmutation of species was radical enough in itself, but the idea that he was thought to suggest the orangutan as an ancestral species to humans was most disturbing. Lamarck still used orang as the name for all the great apes and in fact he argued that of all the "orangs" the apes of Angola (chimpanzees) were more advanced than the eastern "orangs" (orangutans).[20] He was indeed correct in assuming that the chimpanzees were more similar to humans than orangutans. But they were all orangutans to Lamarck.

It was precisely the proposed beastly link with orangutans that made Lyell reject Lamarck's evolutionary theory and devote more than two chapters of *Principles of Geology* (1830–3) to a summary and refutation of it.[21] Lyell mocked Lamarck for proposing a "progressive scheme, whereby the orang-outang, having been already evolved out of a monad, is made slowly to attain the attributes and dignity of man."[22] At the time of writing the *Principles of Geology* the absurdity of linking the orangutan with the human form divine was reason enough for Lyell to dismiss evolution and to expect and receive considerable agreement from his peers.

The same year that Lyell's book appeared, the Zoological Garden in Regent's Park acquired its first living orangutan. The young male lived only three days after its arrival. It was then dissected by the great anatomist Richard Owen (1804–1892).[23] In 1835 he wrote an important paper on orangutans finding that it had fewer anatomical characters that resembled humans compared to chimpanzees and gorillas.[24] In 1836–7 a heated Giraffe House for the Zoological Gardens was built by Decimus Burton (1800–1881). The west end of this building would provide a space for an orangutan cage. In November 1837 the Zoological Society purchased a young female orangutan (c. 3 years) from a sailor named Mr Moss just returned from Borneo. She was named Lady Jane, usually shortened to Jenny. She lived until 28 May 1839 when she died from illness. The Zoological Gardens acquired another orangutan, a male called Tommy, in May 1838, who lived only until October. Another female, also called Jenny, was purchased in December 1839. She lived until October 1843.[25] This Jenny was visited by Queen Victoria (1819–1901) and Prince Albert (1819–1861) in May 1842. The Queen recorded in her diary "The Orang-Outang is too wonderful preparing and drinking his tea, doing everything by word of command. He is frightful & painfully and disagreeably human".[26]

4. When Darwin met Jenny

In 1838 Charles Darwin was back in London, after the voyage of the *Beagle*, working on his collections and starting to develop his theory of transmutation or evolution. He had become a corresponding member in 1831 so he was free to visit the Zoological Society's Gardens and experiment with the animals. In late March he visited the Gardens and described his visit in a letter to his sister Susan:

> I saw also the Ourang-outang in great perfection: the keeper showed her an apple, but would not give it her, whereupon she threw herself on her back, kicked & cried, precisely like a naughty child.— She then looked very sulky & after two or three fits of pashion, the keeper said, "Jenny if you will stop bawling & be a good girl, I will give you the apple.— She certainly

[16] Rousseau (1755), p. 215; cited in Corbey (2005), p. 55.
[17] Monboddo (1795); cited in Blancke (2014), p. 40.
[18] Blancke (2014); Corbey (2005), pp. 54–58; van Wyhe (2005), p. 95.
[19] Peacock (1817); Poe (1841); See Beer (1992), pp. 21–22.
[20] Lamarck (1809); Bowler (1986), pp. 61–62.
[21] Lyell, (1830–3), Volume 2, p. 14ff. Lyell also used 'orang' for chimpanzees. Lamark himself seems to have meant the Asian animal.
[22] Lyell, (1830–3).
[23] Owen (1830). See Rupke (2009).
[24] Owen (1835).
[25] 'Occurrences at the Gardens, 1839,' MS, Zoological Society of London; LRO, 1: 193–94, 206. No evidence has been found that the remains (hide or skeleton) of any of the orang utans called Jenny were preserved either in the ZSL Museum or elsewhere. We are grateful to Kees Rookmaaker for answering this and other queries.
[26] Blunt (1976), p. 38.

understood every word of this, &, though like a child, she had great work to stop whining, she at last succeeded, & then got the apple, with which she jumped into an arm chair & began eating it, with the most contented countenance imaginable.[27]

During this and subsequent visits in September and October, Darwin made a series of observations and experiments with the orangutans. He made notes based on these visits in his transmutation notebooks and in a previously unpublished document now in the Darwin Archive at Cambridge University Library (DAR 191).[28]

As the notes reveal, Darwin's orangutan observations were clearly part of his interest in evolution and specifically human evolution. Indeed the DAR 191 notes on orangutans were categorized by Darwin as on "Man"—not orangutans. It would have been difficult not to be reminded of humans as Jenny was dressed in human clothes and taught to drink tea and perform other human activities to amuse visitors (Fig. 1). As they have not been previously published Darwin's notes are quoted in full to demonstrate the line and development of Darwin's thinking about orang-utans and human evolution, including his speculations about early human behaviour:

[1] Man[29]

Quoted

Sunday September 2^{d} Zoological Gardens

M^{r} Youatt[30] (great veterinary surgeon) says he has not the slightest doubt that many monkeys, especially the Rhesus, & the great dog faced baboon know women perfectly — show unequivocally. —

Waterhouse[31] & every keeper state the fact to be certain

How wonderful. early men have seen women naked, must then smell & afterwards association by sight — this is most curious, as proof of origin of mankind — the ourang outangs however when first placed together seem to have ~~look~~ trusted to sight & not smell for knowing sexual difference.—

The ourang outang have less expression than the Macacos from not moving the skin of forehead. — & as they have scarcely any eyebrows, the relation may be from want of hair. —

they were like a child when annoyed, — & do not show by expression of countenance pleasure —

Are curious, particularly fond of watching boys bathe

[1 verso] Jenny was decidedly jealous, showing her displeasure by showing teeth[32] & making peevish noise /fist tight/ & ~~re~~ turning her back — just the same as when food was shown her & not given her. —

A Dog when jealous, perhaps should be called envious come up & try to push away the one you are petting. sometime barks &

Fig. 1. In 1838 Charles Darwin made a series of observations and experiments with the two orangutans, Tommy and Jenny, at the London Zoo. Drawing of Jenny sitting on a chair. © *The British Library Board*.

bays but it is a half good humoured way. I do not think I ever saw a dog really cross. though I have seen one jump up & move off.

[2] in canal — most curious to see how Jenny understood when told door open, to give up anything, & to do what she is told, open doors, stand in proper position to be combed.

I saw = make swing of straw in whisp = [33]

In play she arrange straw in row, stuffing it through cage, like silly listless child — Played with two sticks, carrying them climbing up with them & trying to reach them — ~~has~~ is very fond of playing with anything soft, covered ~~itself~~ herself up with two pocket handkerchiefs just like girl with shawl spread them out — considered them as her property would not give them up to me. but the keeper brought them & gave them. followed me & bit me for having taken it away & tried to pick my pocket. —

She is fond of breaking sticks & in overturning things to do this (& she is quite strong) she ~~places~~ tries the lever placing stick in hole & going to end as I saw. — She will take the whip [3] & strike the giraffes, & take a stick & beat the men. — When a dog comes in she will take hold of anything, the keepers say, decidedly from knowing she will be able to hurt more with these than with paw. — this is just as curious as D^{r} Smith's story of throwing stones. — Likes being noticed & if not so will hurt & bite the little male, mainly because keepers think, she does it to vex the keeper as being naughty.

Likes playing with a cat, but dislikes most animals. — The Chimpanzee formerly used to be much frightened at soldiers.

[27] Darwin to Susan Darwin [1 April 1838] Burkhardt et al. (1985-) vol. 2, p. 80.

[28] Barrett, Gautrey, Herbert, Kohn, & Smith (1987).

[29] This document is written on two folded sheets of cream-coloured paper with no watermarks. The writing is in greyish ink except where otherwise noted. Original page numbers in brackets. "Man" is in red pencil or crayon. This indicated that these notes were filed in Darwin's portfolio of notes on human evolution. We are quoting DAR 191 in full as it has never been published. Reproduced with permission of the Syndics of Cambridge University Library.

[30] William Youatt, veterinary surgeon in London and author of books on domestic animals.

[31] George Robert Waterhouse, mammalogist and entomologist. Keeper of Mineralogy and Geology at the British Museum (Natural History) and friend of Darwin's.

[32] Underlined in blue pencil.

[33] I saw = make swing of straw in whip =] *added pencil*.

> She was so vexed & peevish & shook the cage & knocked her head against door because she could not get out. —
> jealous of attention to other. — put her hand out slowly & then seize suddenly what she wanted — made ugly faces (especially at the glass) [4] Does not like being tickled under the arms. Tried to strike me & showed teeth, when I tried to plague her, with showing her food & not giving it her.
>
> Both were astonished beyond measure at looking glass, looked at it every way, sideways, & with most steady surprise.[34] — after some time stuck out lips, like kissing, to glass, & then the two did when they were first put together. — at last put hand behind glass at various distances, looked over it, rubbed front of glass, made faces at it — examined whole glass — put face quite close & pressed it — at last half refused to look at it — startled & seemed almost frightened, & evidently became cross because it could not understand puzzle. — Put body in all kinds of positions when approaching glass to examine it. — [5] The two ourangs sleep together & snore much —
>
> Are attached to two of the keepers & to no one else

These notes make clear that Darwin's observations were aimed particularly at recording evidence that purportedly human behaviours and emotions were present in apes which he took to be our actual relatives, though not direct ancestors.[35] This would allow him to argue that the difference between humans and animals was one of degree, not of kind. Difference by degree could be explained by his nascent theory of branching evolutionary descent. Therefore, human beings were descended from earlier apes. Anatomy alone already suggested some form of relationship. But far more specific and chilling details were evident in their emotions and behaviour. Around April 1838 he wrote in a famous notebook passage:

> Let man visit Ourang-outang in domestication, hear expressive whine, see its intelligence when spoken [to], as if it understood every word said — see its affection to those it knows, — see its passion & rage, sulkiness & very extreme of despair; let him look at savage, roasting his parent, naked, artless, not improving, yet improvable, and then let him dare to boast of his proud pre-eminence. — Not understanding language of Fuegian puts on par with monkeys.[36]

The DAR 191 notes reveal that Darwin saw the orangutans more than anything as "like a child". This suggests that they were rudimentally human. Specifically, they revealed human-like emotions. They expressed that they were "annoyed", "jealous", "peevish" or "cross". But could one not describe a dog in the same way? Further notes on orangutan expression were entered in Darwin's notebooks. He noted the orangutans' ability to pout and whine, to go into "a passion" and an awareness of "fear or shame."[37] Showing our teeth when we smile would later be used by Darwin to declare the obvious derivation of humans from apes.

Darwin was also convinced that "Jenny understood" human language. Signs of orangutan intelligence were recorded not only from their ability to recognize spoken words but their reactions to a looking glass, ability to untie knots and curiosity about skin colour and pleasure in music.[38] Darwin also noted cases of the orangutans using tools including taking a whip to the giraffes and beating men with sticks![39] He noted that "these cases of commonly using, foreign bodies, for end. most important step in progression". In some now lost notes, Darwin also recorded that orangutans had handedness.[40] Ultimately Darwin's observations on orangutans were published in his books *The descent of man* (1871) and especially in the *Expression of the emotions* (1872).

Darwin's troubling experience of witnessing the hunter-gatherer tribes of Yahgans in Tierra del Fuego may explain his view of orangutans as of such direct relevance to humans and his unusual lack of discomfort to relate apes and humans. The Yahgans had convinced him that the distance between highly civilized humans and the most degraded animal-like savages was narrow indeed. And therefore the much exalted differences between humans and animals were greatly exaggerated. It was thus only a small and painless step further to see great apes as human cousins.

5. Wallace meets orangutans

The circumstances of Wallace's observations of orangutans could not have been more different than Darwin's in the genteel setting of the Zoological Gardens. Wallace was on his second and final collecting expedition. In 1855 he sailed from Singapore to Sarawak, Borneo where he spent 17 months collecting insects, birds, terrestrial shells and mammals. Sarawak was ruled by the swashbuckling Englishman Sir James Brooke (1803–1868), known as the White Rajah. Wallace stayed intermittently with Sir James during this time. One of Wallace's acquaintances in Sarawak later wrote a recollection of Wallace in Sarawak which is often quoted and has proved disproportionately influential. Spenser St John (1825–1910) was Brooke's secretary and from 1851 Acting Commissioner and Consul General, Britain's diplomatic representative in Borneo. St John wrote in 1879:

> We had at this time in Sarawak the famous naturalist, traveller, and philosopher, Mr Alfred Wallace, who was then elaborating in his mind the theory which was simultaneously worked out by Darwin—the theory of the origin of species; and if he could not convince us that our ugly neighbours, the orang-outangs, were our ancestors, he pleased, delighted, and instructed us by his clever and inexhaustible flow of talk—really good talk. The Rajah was pleased to have so clever a man with him, as it excited his mind, and brought out his brilliant ideas.[41]

As so little evidence survives of Wallace's early views, this quotation has for many years filled the gap and led many writers from McKinney (1972) and Brooks (1984) onwards to conclude that Wallace believed humans were descended from orangutans. For example, Desmond and Moore (1992) claimed that Wallace wanted to go to the East: "including Borneo, the land of orangutans, where he hoped to gain clues to man's ancestry."[42] Janet Browne later depicted Wallace as heading to the East to "pursue his ideas about human origins".[43] But there exists no evidence of any kind to support the view that Wallace went to the East to study human origins nor that he thought orangutans would be relevant to such studies prior to his departure. Such claims are an extrapolation solely from St John's retrospective remark.

[34] This experiment is recounted in Darwin (1872), p. 142.
[35] Brief comments appear on human phylogeny in his *Notebook C*, see Barrett et al. (1987), pp. 174, 234).
[36] Barrett et al. (1987), *Notebook C* p. 79.
[37] See *Notebook N* in Barrett et al. (1987).
[38] Skin colour made it into the 2nd edition of Darwin's *Journal of researches* (1845), p. 209. For music see Barrett et al. (1987), *Notebook M*, p. 156.
[39] Barrett et al. (1987), *Notebook M*, p.p 138, 140, DAR191.
[40] Darwin to William Ogle 25 December 1871 Burkhardt et al. (1985-), vol. 19:747: "I found an old memorandum the other day written between 30 & 40 years ago; in which I inferred that a young Orang was right handed from the manner in which it transferred a spoon that I had placed in its left hand to the right hand before using it." The memorandum has not been found.
[41] St. John (1879), p. 274.
[42] Desmond & Moore (1992), p. 467.
[43] Browne (2002), vol. 2, p. 29.

We know that Wallace was persuaded to accept some form of evolutionary theory by reading *Vestiges of the natural history of creation* (1844; see below) in 1845. However, we know almost nothing specific about what Wallace accepted or rejected from his reading. One can probably safely assume that Wallace believed that humans were also part of a natural evolutionary process. *Vestiges* did not have humans come from orangutans, but just from apes in general as suggested by anatomical and embryological resemblances.

The best and most contemporaneous evidence we have of Wallace's views around the time he observed living orangutans stems from a few years after and occurs in a marginal comment in his copy of Darwin's *Origin of species* (1859). Darwin had described how two quite distinct modern species could be derived from a common ancestor: "So with natural species, if we look to forms very distinct, for instance to the horse and tapir, we have no reason to suppose that links ever existed directly intermediate between them, but between each and an unknown common parent."[44] To this Wallace noted in the margin: "So with the orangutan & man."[45] The evidence we have of Wallace's views connecting orangutans with human origins comes from after he formulated his version of natural selection and after reading the *Origin of Species*. Then he viewed humans and orangutans as descended from a common ancestor and did not think that humans were derived from orangutans. In other words, we have no evidence that Wallace was thinking about orangutans and human evolution before going to Southeast Asia. Only in latter years would Wallace make the connection explicitly, which led to an important conversation with Charles Lyell.

In March 1855 Wallace sailed from Sarawak up the coast of Borneo to the Si Munjon river where he lived at a new coal works for eight months. It was a marshy and heavily forested area and home to a flourishing population of orangutans. Most of Wallace's observations and collections of orangutans were made between 19 March and 24 June 1855.[46]

Wallace shot and procured as many orangutan specimens as he could. They were some of the most valuable specimens he collected in the East. To modern readers Wallace's account of firing dozens of small calibre lead balls into orangutans in the canopy makes shocking reading. Wallace, however, seems to have viewed orangutans at the time as more animal than man. His first encounter with a monkey in South America is a good example. A small monkey was shot. "The poor little animal was not quite dead", Wallace recollected, "and its cries, its innocent-looking countenance, and delicate little hands were quite childlike. Having often heard how good monkey was, I took it home, and had it cut up and fried for breakfast".[47]

Wallace preserved his orangutan skins and skeletons for sale by his agent in London. He made measurements of their bodies and recorded details of their behaviour such as their movements through the canopy, diet, sleeping nests and solitary nature. He hoped to settle the current confusion about the number of species in Borneo. In later years hears he would publish a great deal based on his observations.[48]

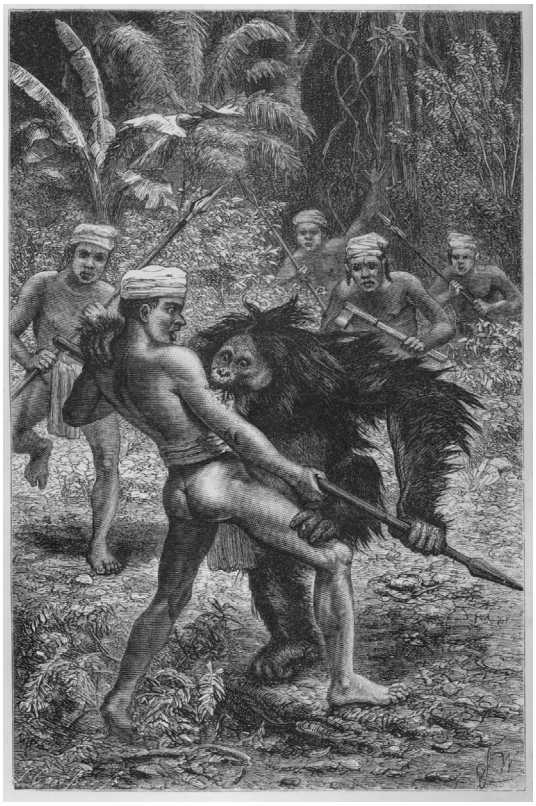

Fig. 2. "Orang Utan attacked by Dyaks" Frontispiece to Alfred Russel Wallace's *Malay Archipelago*, vol. 1 (1869). Drawn by Josef Wolf and engraved on wood by James Davis Cooper. © John van Wyhe ed., *Wallace Online* (http://wallace-online.org/).

But none of these pursuits was unique to orangutans. They were an exotic and fascinating creature to be sure-especially because of their resemblance to humans. But they were also just another animal specimen. He used the conventional language of the times to describe them as monsters. One female he shot was "was running about the tree like a mad woman".[49] Even years later when Wallace published his *Malay archipelago*, the frontispiece to the first volume depicted a savage or enraged orangutan biting open the arm of a native Dyak who had attacked it with a spear (Fig. 2).[50]

Wallace's most prolonged contact with an orangutan was with the infant he found after shooting its mother down from the canopy. He reared the baby for almost three months until it died. Like many of the accounts of Jenny in London, Wallace described his "baby" in mock human terms as a form of humour. The orangutan's expressions were a great "amusement". Wallace carefully observed and recorded the behaviour of the orangutan, which he did not name nor did he record that he spoke to it or that it understood spoken language. Curiously, Wallace also procured a young long-tailed macaque to keep his orangutan baby company. Wallace named the monkey Toby but apparently never named the orangutan.[51]

Most of Wallace's descriptions refer to "its expressive countenance" hence, for him, it could not be a monkey.[52] Wallace found

[44] Darwin (1859), p. 281.

[45] Beddall (1988), p. 283. The note was presumably written in 1860 when Wallace received his copy from Darwin.

[46] For more detail on this part of Wallace's collecting expedition see van Wyhe (2013), pp. 113–133 van Wyhe and Rookmaaker eds., (2013), pp. 32–57.

[47] Wallace (1853), p. 42.

[48] Wallace's principal publications on orangutans are: Wallace (1856a, 1856b, 1856c, 1856d, 1869). See also Wallace's letters which discuss orangutans:

Wallace to G.R. Waterhouse, 8 May 1855; to F. Sims, 25 June 1855; to S. Stevens, 10 March 1856 and 12 May 1856 in van Wyhe and Rookmaaker eds., (2013).

[49] Wallace to Frances Sims, 25 June 1855. van Wyhe and Rookmaaker eds., (2013), p. 48.

[50] A new fully annotated edition of Wallace's book has just appeared, see van Wyhe ed. (2015).

[51] van Wyhe ed. (2015).

[52] Wallace (1856a, 1856b, 1856c, 1856d), p. 326.

that "the workings of its countenance express so many feelings and passions."[53] Wallace recorded despair, disgust, approval, dislike, and satisfaction/contentment. Adults in the forest expressed "rage" when being fired at. Much later he told Darwin "As soon as their laughter ceases, an expression may be detected passing over their faces, which…may be called a smile."[54] Describing his infant orang in the *Malay Archipelago* Wallace wrote:

> it was a never-failing amusement to observe the curious changes of countenance by which it would express its approval or dislike of what was given to it. The poor little thing would lick its lips, draw in its cheeks, and turn up its eyes with an expression of the most supreme satisfaction when it had a mouthful particularly to its taste. On the other hand, when its food was not sufficiently sweet or palatable, it would turn the mouthful about with its tongue for a moment as if trying to extract what flavour there was, and then push it all out between its lips. If the same food was continued, it would set up a scream and kick about violently, exactly like a baby in a passion.[55]

These could all be claimed as anthropomorphic, but one could equally apply these emotions to a dog. After it died Wallace preserved its skin and skeleton as commercial specimens.[56]

We see nothing about a search for human origins in Wallace's observations of orangutans. Indeed although he was actively pursuing his private interests in evolutionary theory at exactly this time, his notes on orangutans contain no mention of human origins or evolution. Judging from his notes, it was the general truth of the grand process of common descent over the course of the history of life on earth that interested Wallace at this time, not the derivation of any particular species, including humans.[57] Thus Wallace took very different conclusions from his contact with orangutans from Darwin's.

6. From Jenny to Java

After the publication of the *Origin of species* (1859), however, things changed and others began to connect extant apes with postulated extinct common ancestors. But the new evolutionary thinking was still often intertwined with traditional ideas of a Great Chain of Being. For critics of evolution the gaps in the fossil record looked like flaws. For adherents, however, they were challenges to overcome. In popular as well as scientific contexts these gaps were described as missing links. When potential candidates from the entire spectrum of the animal kingdom were found they were sensations to the press and successes for science. The *Archaeopteryx*, for example, was celebrated as such after its first discovery in 1861. Richard Owen described it two years later as a primitive long-tailed bird and was thus still able to explain it within his framework of variations of ideal archetypes. Not surprisingly, Thomas Henry Huxley (1825–1895) disagreed. Putting forward his theory of a close relationship between dinosaurs and birds in 1868, the *Archaeopteryx* was seen as an intermediate form between the otherwise widely separated groups. The fossil star, however, was *Compsognathus*. The small bipedal dinosaur discovered in Solnhofen, Germany, in 1859 was seen as most bird-like of all and was thus interpreted as a clear-cut candidate for the title of a missing link.[58]

Among the many different and exciting potential gap-filling contestants the ultimate prize would nonetheless go to fossil humans or intermediate forms documenting pre-human ancestors.[59] The Neanderthal looked promising for a while following its discovery in 1856. But Huxley dismissed it's status as a missing link and concluded after a lengthy comparative study of human and fossil bones in *Evidence as to Man's Place in Nature* (1863) that "In no sense, then, can the Neanderthal bones be regarded as the remains of a human being intermediate between Men and Apes". Looking to the living great apes he asserted that "there is no existing link between Man and the Gorilla".[60] But one should be careful not to exaggerate this point as there were no transitional forms between the gorilla, the orangutan and the gibbon as no fossil apes had been found at this stage, and yet the close family ties between the great apes were not disputed. Comparing ape and human brains Richard Owen was clinging to the idea that human uniqueness could be found in the superior and exceptional human brain. He even suggested not only to leave humans alone in a separate order, but in an entire subclass of mammals called *Archencephala* which he justified on the basis of humans' mental powers. A consensus was forming against Owen in the early 1860s. Multiple studies of primate brains including orangutans' confirmed similarities not differences between humans and apes.[61] Huxley's own comparative studies of primate and human anatomy were part of that wave. In the chapter "On the natural history of the man-like apes" Huxley meticulously recorded the history of discovery of the great apes of Africa and Southeast Asia. His historical sketch was followed by a thorough investigation of everything known about the anatomy and behaviour of gibbons, orangutans, chimpanzees and gorillas, including a fairly balanced evaluation of Owen's contributions and misapprehensions. The gibbons were the best documented, but the African apes were the least studied. And it was the latter, which, according to Huxley, "most nearly approaches man".[62]

Still, it was the orangutan that got most of the attention. Wallace was seen as a leading orangutan expert and his accounts taken on authority.[63] As a field naturalist Huxley had the greatest respect for Wallace and, explaining to his readers how reliable scientific knowledge came about, put that respect in print: "Once in a generation, a Wallace may be found physically, mentally, and morally qualified to wander unscathed through the tropical wilds of America and Asia; to form magnificent collections as he wanders; and withal to think out sagaciously the conclusions suggested by his collections".[64] Huxley's orangutan narrative was built upon multiple sources, but few were praised like Wallace although it remained unclear exactly what about the nature of the orangutans came from him. Although Huxley did not think the Neanderthal fossil discovered in 1856 to be a fossil ancestor—a point confirmed by Lyell in the same year (1863) and later by Edward Clodd (1840–1930) looking back at the nineteenth century's research on "primitive man"—the interest in finding one did not wane.[65] The question was where to look.

Huxley concluded his essay undecided. In the *Descent of Man* (1871), Darwin tentatively suggested Africa because there were more species there that were related to humans than in Asia.[66] Lyell

[53] Wallace (1856a, 1856b, 1856c, 1856d), p. 326. http://wallace-online.org/content/frameset?pageseq=1&itemID=S030&viewtype=text.
[54] Reported in Darwin (1872), p. 132.
[55] Wallace (1869), Volume 1, pp. 68–69.
[56] On Wallace's orangutan specimens see Cranbrook, Hills, McCarthy, & Prys-Jones (2005).
[57] See Wallace (1864).
[58] Owen (1863); Huxley (1868); see also Wellnhofer (2010), pp. 241–242.
[59] For an introduction to the idea of the Missing Link in human evolution in a popular and scientific contexts see Bowler (1986); Beer (1992); Goodall (2002); Gundling (2005); Clark (2009); Kjærgaard (2010, 2011, 2012a); Reader (2011).
[60] Huxley (1863), pp. 157 and 104.
[61] Wilson (1996).
[62] Huxley (1863), p. 70.
[63] Huxley (1863), pp. 31–34.
[64] Huxley (1863), pp. 24–25.
[65] Huxley (1863); Lyell (1863), chap. 5; Clodd (1895), pp.62–63.
[66] Huxley (1963), p. 159; Darwin (1871), vol. 1, p. 199; Kjærgaard (2011), p. 84.

had eventually and reluctantly been convinced of the correctness of evolutionary theory, even including humans. In *Antiquity of Man* (1863), published a few months after Huxley's *Man's Place in Nature*, Lyell cautiously remarked on the likelihood of finding "records of the missing links alluded to"—the absence of gradational forms of recent and extinct mammalia. To search for human ancestors one would have to look in either the tropical parts of Africa or in Borneo or Sumatra in Southeast Asia. Based on the geological and palaeontological record Europe and the Americas were ruled out.[67] In his correspondence with the American naturalist George Ticknor (1791–1871), Lyell was enthusiastic about the prospects of taking the next big step in understanding the ancestry of humans following a private suggestion from Wallace to take a closer look at certain limestone caves in Borneo: "I hope to get extinct Ourangs, if not the missing link itself".[68]

Nothing but enthusiasm for the idea came out of this, however. But it fuelled the interest to look towards Asia for the fossil ancestors of modern humans. Wallace was not convinced about the African theory and more inclined to think about Asia as the most likely birthplace of humanity. In his *Darwinism* (1889), he argued that it was understandable that "we have as yet met with no traces of the missing links", because of the vastness of the area and that "no part of the world is so entirely unexplored by the geologist as this very region".[69] As Huxley had suggested in *Man's Place in Nature*, for Wallace it was merely a matter of time before the evidence would appear. And indeed only a few years later a discovery was made in Java, suggesting that Wallace might be right after all. The orangutan and the gibbon suggested an approximate geographical location for the common ancestor of humans and great apes. Now it was a matter of finding fossils that would fill some of the gaps.

Asia had gradually attracted more attention as the cradle of humankind. Already twenty years earlier in the anonymously published and notorious *Vestiges of the Natural History of Creation* (1844), for example, the Scottish journalist and publisher Robert Chambers (1802–1871) speculated among many other things about the evolutionary origins of humankind. He was undecided whether or not humans had one or multiple ancestors. Africans, for instance, he thought so different from the rest of the world's population that they might have had an independent origin. In the end, he favoured Asia, specifically the north of India as the cradle of humanity. Under the assumption that humans did indeed constitute a single species, he traced the migration patterns of what was known about different populations and tribes, languages, religions and other cultural signifiers. Adding origin myths to what was known about the great apes, he concluded: "we should expect man to have originated where the highest species of the quadrumana [primates] are to be found. Now these are unquestionably found in the Indian Archipelago".[70] This was the usual name for the Malay archipelago. Chambers criticised the ornithologist William Swainson (1789–1855), who had used orangutans to argue against the idea of comparing the order of nature to links in a chain, for not seeing that the similarity between orangutans and humans implied at least "a certain relation". This did not pass unnoticed and *Vestiges* was publicly ridiculed for suggesting that humans sprang from monkeys or ourangutans.[71]

In the second half of the nineteenth century the game had changed. The actual family relationship between humans and apes was no longer disputed among evolutionists, but the scientific investigation of the family resemblances and the search for fossil ancestors had entered an entirely different mode from earlier speculations. With so few humanlike fossils there was still plenty of space and need for imagination in constructing hypotheses of human origins. The German naturalist Ernst Haeckel (1834–1919) was not shy about making bold claims. In *The History of Creation*, published in German in 1868 and in an English translation in 1876, Haeckel argued that what he saw as the four humanlike apes each had something most in common with humans. With the orangutan it was the brain, with the chimpanzee it was the skull, with the gorilla the feet and hands, and for the gibbon it was the thorax. It was impossible to determine on this basis which ape was most closely related to humans. Following Darwin, he was sure that none of them were ancestral. There had been, Haeckel maintained, an intermediate stage between tailless apes and humans that had now gone extinct and would be represented somewhere in the fossil record. These ape-like men, a higher order than the man-like apes, differed from humans in the sense that they would have lacked the ability to speak. Haeckel therefore named his hypothetical Missing Link connecting humans with the deep evolutionary ape past *Pithecanthropus alalus*, speechless ape-man.[72]

With regard to the geographical location of the origin of humankind, and there would be only one, he thought, Haeckel did not rule out Africa. However, he strongly favoured southern Asia among the existing continents. However, there was a third option. The English zoologist Philip Sclater (1829–1913) had suggested the existence of a sunken continent between Asia and Africa in 1864, which he called Lemuria, to explain zoological resemblances between Madagascar and India. For Haeckel, Lemuria was the most likely place for "the cradle of the human race", which he also referred to as "Paradise".[73] Haeckel's promotion of Asia served as the direct inspiration to the Dutch physician Eugène Dubois (1858–1940) to set out to find the Missing Link during his service as an army doctor in the Dutch East Indies (now Indonesia). Dubois was strengthened in his conviction by Richard Lydekker's (1849–1915) discovery of a fossil ape in the Siwalik Hills in 1878 in the present day border between India and Pakistan.[74] Dubois was successful and famously identified a femur and skullcap of what turned out to be the discovery of *Homo erectus* remains found by forced labourers on Java in 1891–92. Dubois was in no doubt. He had found Haeckel's Missing Link and confirmed Southeast Asia as the place of human origins. He named it *Pithecanthropus erectus*, emphasising the erect posture over speechlessness.

Not everyone agreed and Dubois' Missing Link was seen by many as merely an ape or simply as fully human.[75] Haeckel, on the other hand, loved it. In a lecture at the International Congress of Zoology at the University of Cambridge in 1898 he celebrated the discovery: "He [*Pithecanthropus erectus*] is, indeed, the long-searched-for 'missing link', for which, in 1866, I myself had proposed the hypothetical genus Pithecanthropus, species Alalus". Building an enlarged series of stages of human evolution Haeckel now had large apes in orangutans and gibbons, and a fossil human ancestor to conclude that for humans "the place of origin was probably somewhere in Southern Asia".[76] By the end of the century

[67] Lyell (1863), p. 498.

[68] Charles Lyell to George Ticknor (28 April 1864), in Lyell (1881), pp. 383–384; George Ticknor to Charles Lyell (31 March 1863), in Ticknor (1876), vol. 2, pp. 460–461.

[69] Wallace (1889), p. 460.

[70] Chambers (1844), p. 296.

[71] Swainson (1834), p. 198; Chambers (1844), p. 266. For the criticism of linking human origins in *Vestiges* to monkeys and orangutans see Secord (2000), pp. 319–320.

[72] Haeckel (1876), pp. 272–276 and 292–295.

[73] Sclater (1864); Haeckel (1876), pp. 325–326.

[74] Lydekker (1879); Theunissen (1989), p. 34; Kennedy & Ciochon (1999).

[75] Bowler (1986), pp. 24–25 and 67–69; Theunissen (1989); Shipman (2002); Kjærgaard (2012b), pp. 349–350.

[76] Haeckel (1899), p. 26 and pp. 71–73.

everything was falling into place. The apes were sorted and fossils had been found. The human-like behaviour of Jenny in London and the fossil evidence of walking upright in Java provided two links in the great chain of being leading to modern humans. Everything pointed to Asia as the cradle of humankind. Lamarck, *Vestiges*, Wallace and Huxley were right. The closest vertebrate ancestors of humankind were a series of extinct primates. Honouring the pioneers of evolutionary thinking in the nineteenth century, Haeckel concluded: "Looking forward to the twentieth century, I am convinced that it will universally accept our theory of descent, and that future science will regard it as the greatest advance made in our time".[77] The natural history of the generic orangutan that eventually through Darwin, Wallace, and others placed the real orangutan in a shared human and ape ancestral history, provided crucial evidence furnishing a foundation for Haeckel's hopes.

7. Conclusions

Janet Browne (1950-) has drawn attention to the great transformation in descriptions of gorillas from the mid-nineteenth to the late twentieth centuries.[78] Early accounts such as those by the American adventurer Paul du Chaillu (1835–1903) portrayed gorillas as ferocious monsters, the embodiment of wild, untamed savagery. By the 1970s when millions of television viewers saw David Attenborough (1926-) nestled in the grass with a family of wild mountain gorillas, the gorilla's image had come a remarkable full circle to gentle giant, wrongfully maligned and killed by its more violent cousin, mankind. The image of the chimpanzees, bonobos, and orangutans has undergone a similar transformation from violent beasts to vulnerable cousins, for all the great apes not least because of the work by the charismatic founding mothers of contemporary primatology, Jane Goodall (1934-), Dian Fossey (1932–1985), and Birutė Galdikas (1946-), also known as the Trimates.[79]

Unfortunately from the perspective of comparing Darwin and Wallace's observations of orangutans, Darwin spent time with tamed young adults that he could touch, interact with and experiment on whereas Wallace saw only wild adults from a distance and was only able to closely observe an infant which could not provide the same sort of behaviour. Nevertheless the different conclusions of Darwin and Wallace seem to derive much more from their theoretical interests than from their contexts of observation. Darwin's observations were infused by his evolutionary theory and particularly by his interests in human evolution. And thus the clues he derived from orangs in the 1830s found their way into his influential evolutionary publications. Wallace too recorded similarities with humans but to that point in time had made no surviving notes on human origins or human evolution. Hence Wallace's observations were of an extraordinary animal, and not initially about human evolution.

Wallace, despite being the younger of the two and the only one to see them in the wild, still saw orangutans in the traditional manner. They were the "strange creatures, which at once resemble and mock the 'human form divine,'—which so closely approach us in structure, and yet differ so widely from us in many points of their external form."[80] Despite their similarity to humans, they were still animals, and even sometimes "monsters". Darwin, possibly because of his early shock with the (for him) animal-like Yahgans in Tierra del Fuego, treated orangutans as close cousins and therefore as good sources of evidence of human evolution.

But both men, in their different ways, were profoundly effected by their encounters with orangutans and together they brought the theory of evolution of natural selection into the scientific community. Human evolutionary studies received a massive leap through Huxley's *Man's Place in Nature* and Darwin's *Descent of man* and *Expression of the emotions* and through Wallace's influence lead to the discovery of the first fossil hominin remains in Java.

Like many of their contemporaries, Darwin and Wallace were ultimately trying to piece together the history of life on earth. Their fascination with evolution, palaeontology and biogeography are all related to the same mystery. The history of life an earth had been very long and very complex. Many fragments of the greatest jigsaw puzzle on earth had already been found. But the way events had unfolded was still very far from clear. All the living species were just the tip of the iceberg. And the solitary and durian-loving orangutan quietly exercised a disproportionate influence on both Darwin and Wallace and the story of our evolution that they helped reveal.

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