Review of Ian Tattersall, The Strange Case of the Rickety Cossack
by Kilbee Brittain

A new book by Ian Tattersall is always a cause for celebration, and The Strange Case of the Rickety Cossack is no exception – with a warning:

It's a demanding story of old bones, their finders and keepers, their interpreters slugging it out over taxonomy and ultimate meaning. Not a book for an afternoon at the beach, but one to cherish and chat about with good friends who enjoy a challenge.

The quirky title refers to the strange interpretation of some bones found in the Feldhofer Grotto in Germany's Neander Tal (Valley) in 1856 by miners looking for lime to fuel the booming chemical industry. An alert supervisor saw bones in the rubble workmen were dumping over a cliff. The cache was shown to a teacher, who correctly identified them as ancient. They were passed along to a respected Bonn anatomist, Hermann Schaffhausen, who concluded they were from a barbarous race of Homo sapiens.

The bones were passed on to pathologist Rudolf Virchow, who diagnosed the fossil as having suffered rickets as a youth, the pain being intensified by his life on horseback, which agony caused him to furrow his brow constantly, his perpetual frown causing his bony ridge across his brow. Fellow Bonn faculty member August Franz Mayer concluded that the fossil had been a Cossack soldier in the Russian army rampaging across Germany in 1814 en route France, and, being wounded, crawled into the Feldhofer cave to die.

Darwin's good friend Thomas Huxley had a good time mocking this "absurd story," but did not see the bones as being ancient. But geologist William King announced at a scientific meeting in 1863 that the forehead configuration of the Feldhofer skull represented a distinct human species, Homo neanderthalensis. King's prescient analysis was almost immediately substantiated by George Busk's announcement of a Gibraltar cranium with similar features. But public acceptance of this new human species would take more discoveries over the next 20 years.

As more bones were found, 19th-century Britain was in intellectual turmoil over humans' place in nature, with the biblical idea of man as the ultimate creation. Larger-than-life men stated their views. Alfred Russel Wallace, returned from his strenuous years in Amazonia (including being shipwrecked on the way home and losing all his specimens), left for 7 years in Malaysia, returning with his manuscript proposing "natural selection" as the means of the appearance of new species. He sent the manuscript to his friend Charles Darwin, who had independently formed the same idea on his 5-year trip around the world, and was at work on his magnum opus, The Origin of Species. Darwin was deeply upset at the prospect of being scooped. Huxley set up a debate for Darwin and Wallace at the Linnaean Society.

The resulting ideas, including Darwin's observation that the African apes and humans certainly shared some similar traits, went "viral". The oft-quoted horrified exclamation of the wife of the Bishop of Winchester sums up the Victorian view: "Descended from

the apes! My Dear, let us hope that it is not true, but if it is, let us pray it will not become generally known."

Darwin wrote many influential essays, among them several on sexual selection, emphasizing how important mate choice is in evolution, citing the peacock's flamboyant tail as an example of attraction. In 1871 he published The Descent of Man and Selection in Relation to Sex. Wallace and Darwin agree on much, though Wallace argued that natural selection could not have brought forth the modern human brain.

The Darwin – Wallace dispute over human evolution reflects the dichotomy of views on the origin of human consciousness – gradual or abrupt in its evolution – that still resonates in viewpoints today in intellectual debates.

Darwin's idea of "descent with modification" made sense to people who could see it in their own families. But by what means were traits inherited?

The discovery of genes had been made by Czech cleric Gregor Mendel in 1866, but not recognized until the turn of the century that these were the units of heredity, when Dutch botanist Hugo de Vries discovered and explained mutation, that is, how spontaneous changes may happen in reproduction.

Tattersall then introduces the scandalous fraud of the notorious Piltdown Man, a fossil skull dug up in 1908 in southern England by some workmen digging a pit, who handed the bones to Charles Dawson, a local antiquarian, who studied the skull and other bones and some stone tools. The Earliest Englishman had been found! It took 40 years before the skull was proved to be a broken modern skull, and the jaw had belonged to an orangutan. The culprit was never formally identified. As the late, revered Stephen Jay Gould observed avoiding frauds, "the only palliations are vigilance and scrutiny."

In 1890 the Dutch anatomist Eugene Dubois, with Wallace's years in Malaysia in mind, set out for the Dutch East Indies, and in Java, on the banks of the Solo River near Trinil, found a skullcap (cranium minus lower jaw) which reminded him of an ape (after all this area was home to the orangutan), but was also similar to a Neanderthal fossil in some ways, but with a different shape. In 1892 the workmen found a human-like thigh bone at Trinil. Dubois changed his mind about the apishness of his fossil and published a long monograph naming his fossil Pithecanthropus erectus ("upright apeman"). Later, this fossil was termed Homo erectus.

As more and more fossils were found in Africa and Asia, it became evident that a clear-cut system of identification was needed, but still using the Linnaean terminology. In 1942 American Museum ornithologist Ernst Mayr published Systematics and the Origin of Species, proposing that one species could include many varieties, just as Homo sapiens did. Moreover, considering all their similarities, Neanderthals should be included in the same genus as man.

One of Mayr's influential ideas was that a population could be isolated, or divided in two, by natural causes like earthquakes changing terrain, or a river changing course, and during that separation, develop some different physical or behavioral traits, but still be a member of the same species. So "population thinking" became part of Mayr's New Evolution Synthesis.

Mayr also noted that humans became "particularly intolerant of competition", the Neanderthal elimination of some invading Cro-Magnons being an example.

Tattersall writes that Mayr's "broadside had shocked the tiny elite of paleoanthropology into some long overdue introspection."

The year 1950 is Tattersall's choice as "the most momentous in the 20th-century intellectual history of paleoanthropology." The names Mayr, Sherwood Washburn, Clark Howell are familiar to the fans of the subject.

The invention of radiocarbon dating was another gift of 1950, invented by University of Chicago physical chemist William F. Libby, a scientific way of dating fossils to about 40,000 to 50,000 years ago, by measuring the decay of "C" in a sample. The method was used in dating the rock shelter at Les Eyzies in SW France, where sediments revealed a succession of cultures, including "the art-drenched Magdalenian culture."

"In the post-1950 anthropological milieu strode Louis Leakey," Tattersall writes. Kenya-born British archaeologist and anthropologist and his wife Mary, also an archaeologist, had been searching East African hills and vales for decades, for signs of early hominids. They had recently concentrated on Olduvai Gorge in northern Tanzania. In 1959 at Olduvai's lower level of its "layer cake" of time amidst scattered stone tools, Mary found a magnificently preserved cranium (skullcap without mandible, or, lower jaw), with huge molars. Leakey called it Nutcracker Man, a new species, Zinjanthropus boisie. "This weather-beaten, White African couple" had the support of the National Geographic Society, which poured funds into the Leakeys' work, understanding its importance and sensing a dynamic, continuing story. Soon after, the Leakeys found Zinj's missing mandible, which they thought made the skull complete and "a new and truly primitive ancestor of Homo". Louis had a candidate for Earliest Toolmaker!

By using the new potassium argon (K/Ar) dating method on the fossil remains and volcanic ash, a date of about 1.75 million years was determined.

In 1984, Richard Leakey, Louis and Mary's son, and his Turkana team started working more on the western side of the lake. At Nariokotome they found an amazingly complete skeleton of a young male hominid who had died in a swamp, face down about 1.6 million years ago. He wasn't yet adult, but tall, slender, with a small face and teeth, and a large brain. He was an "obligate biped", unlike more primitive predecessors who were

"habitually biped" (that is, whenever they felt like it, but not always). Analysis of his teeth under very high magnification put his death at age 8. He had grown up fast, compared with a modern child, but significantly more slowly than an ape. This kind of find is an interesting description of what humanizes paleoanthropology for its public.

Life in the open savannah brought about physical and behavioral change. Hominids eventually lost their thick coat of hair that apes still have, and would have developed active sweat glands. Hunting prey would have changed from camouflaged attacks to pursuit with projectile weapons. The ability to throw things seems peculiarly human; chimpanzees hit prey with fists or rip with teeth, but do not aim and throw.

Having been mostly fruit and vegetable eaters, hominids would have had serious digestive changes when they discovered how tasty cooked meat is, first discovered, perhaps, after forest or savannah fire killed some local fauna. Controlling, and then learning how to start fires is one of the most major accomplishments of early hominids. Cooking makes more nutrients available, though it's doubtful that early humans would have understood modern humans' fixation with vitamin counts and calories. A delightful book is Catching Fire, Richard Wrangham's account of early hominid's discovery of how to start and use fires for cooking, and how human life changed with the knowledge that eating could be companionable as well as healthy. The first hearths date from about 400,000 years ago.

What we eat leaves a chemical signal in teeth and bones. Paleontologists learn that most of the hominid fossils were omnivores. Before stone tools, they probably tore prey apart to eat it, or perhaps used sharp rock edges before they knew how to hit rocks together and make cutting edges.

In the mid-1990s Maeve Leakey, Richard's wife, and a born archaeologist herself, was excavating on the east shore of Lake Turkana, finding numerous new fossil Australopithecenes. Tattersall's delightful humor shines forth in describing how a new fossil can replace an older one in the public mind, and become a new "hominid du jour". Maeve Leakey's Austropithecus anamensis provided the best evidence for "early hominid bipedality" (p. 169).

The redating of Richard Leakey's find of the basically modern skull from Southern Ethiopia was to about 195,000 years ago, the most ancient Homo sapiens known, proving that another modern human was already in Ethiopia not long after 200,000 years ago. But there was the cascading effect of a genetic change in the C-methylation of the HOXD cluster through the whole body, with its "balloon-like head," effecting humans to acquire symbolic cognition, the ability to make connections between an object and its effect on the world, to make the unseen a real part of one's world, to have a symbolic object or mark stand for its meaning. Tattersall gives two examples: grinding ochre and perforating marine shells. Ochre has a long history of human use, in bodily decoration or

in use as an object on which to carve shapes. Perforated shells were used with strings, to make necklaces or other hanging objects.

Smooth ochre plaques with carved geometric designs found in Blombos Cave in South Africa, dated around 75,000 years ago, are thought to be the world's "most ancient symbolic objects" (see drawing, p. 210). Evidence of symbolic thinking was emerging in Africa after about 100,000 years ago. In 2009 researchers started digging in the caves at Pinnacle Point, near Blombos, and in late September 2015 a cave with a mass burial of bones was announced in the same area, featured in the cover story in the October 2015 National Geographic.

What made an already established species, Homo sapiens, begin to use their brains in an entirely new way? A cultural stimulus? Tattersall thinks there is only one candidate: language, which involves creating symbols – whether spoken or written – to stand for something else, and then arranging them in order. Tattersall has made the point that the physical equipment was already present, or else the idea would have had no means of expression. That physical system enabling real language could have been merely the vocal apparatus to grunt, yell, snore, hiss – any number of noises that children use to express themselves without the niceties of pronunciation or grammar.

Most mammals make varied sounds, perhaps without human nuances, but lots of current research in animal behavior emphasizes complexities of meanings – dolphins' varied sqeaks are shown to be conversations within dolphin pods.

An especially interesting point that Tattersall makes it that human speech does not seem to him a long, drawn-out evolved process, but an event, which spread quickly once it got going, like many good ideas.

A second major change after language, Tattersall thinks, is the revolutionary change from hunter-gatherer lifestyle to a settled life which became possible with agriculture. The traditional date for the switch has been 10,000 BCE, but that date gets pushed farther and farther back all the time, with new discoveries of all types, for instance, the domestication of dogs, now shown by burials to be at least 30,000 BCE.

Tattersall calls this event of settling down and growing tools "a Faustian bargain which placed humans in intellectual opposition to Nature, and started human population on its inexorable path to increase." (p.212).

In 1997 another scientific landmark was achieved by a young Swedish man in Allan Wilson's Berkeley lab, Svante Paabo, achieved the first extraction of DNA from a fossil hominid. It was a fragment of arm bone from the Neanderthal of the Feldhofer cave. Tattersall acknowledges this as "an amazing accomplishment because DNA is 'a long and fragile molecule', but a mitigating factor was that mtDNA, maternally passed on, has numerous copies in each cell.

Paabo's success meant that for the first time, direct genome comparison was possible between Homo sapiens and extinct relatives. These data were "crunched" by heavy-duty computers demonstrating that Neanderthals shared with modern man the FOXP2 gene which ensures deficit-free speech.

Paabo's conclusion included the estimate that humans share 99.7% of our protein-coding genome with Neanderthals, compared with the 98.8% humans share with chimpanzees.

Tattersall urges readers to remember "that closely-related species like Homo Neanderthalensis and Homo sapiens are "very leaky vessels", but that "no biologically meaningful melding" occurred. Homo Neanderthalensis "retained its morphological identity until it disappeared."

Our species is extremely young, a short 200,000 years old, with most of our history since we left Africa about 60,000 years ago… We have discarded the idea of human "races" as we have become so mobile (and must guard against its reinstatement). We recognize certain biological markers, and understand that skin color can be a genetic reaction to climate.

In the last 10,000 years, at the end of the last Ice Age, human population has mushroomed and spread, our only barriers now being cultural. But we are not an exception to Nature's rules "We are the pinnacle of nothing, simply one more twig on what was until very recently a luxuriant evolutionary tree…" (p. 222).

Tattersall tells of his first time in Madagascar and the Comores, studying the beautiful and varied lemurs. He writes of their diversity, their beauty, their adaptability: Noting the diversity in their more than 50 species, he notes that it is not unusual among successful groups of mammals. They have been surviving, diversifying all these millennia, evolving as their very special kind of primate, adapting to climate changes and the environmental destructiveness of their only competitors, who arrived on their island just about one thousand years ago.

Tattersall closes his elegantly detailed study by encouraging humans to take note of our imperfect selves as being no exception to Nature's rules, like our primate kin, the lemurs. "Odd we may be," the author admits, "but we are nonetheless an odd primate."

Bravo Ian Tattersall, for putting us in our place with erudition, flair, and in such good company!

Notes and bibliography

In this indispensable section, each chapter is briefly summarized, followed by an alphabetized list of sources with relevant page numbers.

The index gives alphabetized subjects and pages.

The text does not include footnotes.

Illustrations are black-and-white drawings. Skulls and skeletons are explained; the artists are named.

See especially the comparison of Neanderthal and modern human skeletons (p. 204) and the fossil trees of hominids, as of 1993 and 2012, pp. 216-217.

Reviewer's Comments

Tattersall makes no mention of Jane Goodall in his text or even in the index.

Not even in his chapters on the Leakey family. Goodall is celebrating her 55th year of the chimpanzee project at Gombe Steam National Park in Tanzania. Dr. Leakey suggested the study as a project for Goodall when she asked his advice soon after her arrival from Great Britain in 1957. She went to the forest, taking only a native cook and her own mother. Soon she had assembled a small staff and had attracted the attention of the National Geographic, which has featured her work there in numerous articles. Among her many scholarly findings, one stands out as most revolutionary; On November 4, 1960, she watched a male chimp (whom she had named David Greybeard) pick an 18-inch long grass stem, pluck leaves to make the stem smooth, and insert it carefully into one of the winding tunnels of a nearby termite mound, then withdraw it, all covered with termites, and swipe it through his lips to chew up the crunchy insects. He did this numerous times. On subsequent days she saw the same behavior, and cabled Leakey, who cabled back, "Now we must redefine 'tool', redefine 'man', or accept chimpanzees as human".

Commenting about Goodall's work Stephen Jay Gould wrote, "(Her) work with chimpanzees represents one of the Western world's greatest achievements."

David Hamburg of Stanford U. School of Medicine, wrote, "Once in a generation there occurs a piece of research that changes man's view of himself.".

Quotes above are from Goodall, In The Shadow of Man, rev. ed. 1971 intro, pp. v and ix.

FOOTPRINTS vignette

Laetoli is not far from Olduvai, which Louis and Mary Leakey had visited in the 1930's. When Mary returned in 1974, she found "an ancient trackway" preserved in fossilized ash from an eruption of a volcano still to be seen on the horizon. The trackway is 88 feet long, with countless animal tracks, from giraffes to hares, and 70 hominid prints, escaping the eruption. The human prints are in two parallel tracks, heading in a straight line for Olduvai. One pair is larger, and a little blurred; the other is smaller, and sharply defined. They are not ape feet; the big toes are parallel to the others.

The most probable picture is of a man and a woman, walking side by side, possibly carrying something. The National Geographic published a painting of the scene. The woman is carrying an infant (thus the extra-well-defined prints of the smaller set). Scientists estimate the evidence for sexual dimorphism and bipedality at 3.7 million years ago. The public has a more emotional reaction when they look at the painting, or the diorama. The scene is depicted in the small museum at Olduvai; people take in the scene quietly, thoughtfully, and usually spend some quiet minutes looking at the nearby gorge, the volcano on the horizon, and taxidermic animals looking so cheery.

"LUCY" vignette

Exploration in Ethiopia began to open up with Emperor Haile Selassie's visit to newly-independent Kenya in 1966. He met Louis Leakey, who arranged for him a royal invitation to return and explore.

"The aging Leakey" gave the responsibility for such a venture to his American colleague Clark Howell.

The chosen area to explore was the Omo River, where it emptied into Lake Turkana, after many fossil finds indicated that the area had been home to early hominids.

In 1972 Howell's student Donald Johanson and his team found a "paleontologist's wonderland" at Hadar in an area of endless badlands. In that Afar Triangle, Johanson and his team found "Lucy", who (as he told the avid reporters later), was "a young female who died all alone in the Ethiopian bush 3.2 million years ago." Enough of her skeleton was preserved to give viewers a mental image of her.

"Lucy" became famous. Johanson held numerous press conferences to clarify her status: upright walker, only three-and-one-half feet tall, with pelvis much like a human's, no one had found her bones in over 3 million years. It was the human interest story of the times, much more than "your 15 minutes of fame".

By 1975 Ethiopia was in revolutionary turmoil. Johanson and his team went on excavating, leaving with an unprecedented trove of 200 fragmentary fossils. A dozen or more seemed to have died together; the team called them "The First Family". Returning again in 1976, they found more bones and stone tools in an area dated 2.5 million years ago.

"Lucy" had done wonders for paleontology. People could envision what her life might have been like. They flocked to see her on her museum tours (including the Los Angeles Natural History Museum), photographs of the bones and depictions in dioramas were seen worldwide.