



Press Release

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New human ancestor discovered in Europe

Previously unknown primate living twelve million years ago in southern Germany walked on two legs – Upright posture millions of years earlier than believed

Tübingen, 06.11.2019

>>Embargoed

Our upright posture may have originated in a common ancestor of humans and great apes who lived in Europe - and not in Africa, as previously thought. That's the conclusion reached by an international research team headed by Professor Madelaine Böhme from the Senckenberg Center for Human Evolution and Palaeoenvironment at the University of Tübingen in a study published Wednesday in the journal *Nature*. Böhme has discovered fossils of a previously unknown primate in southern Germany. The fossils of *Danuvius guggenmosi*, which lived 11.62 million years ago, suggest that it was well adapted to both walking upright on two legs as well as using all four limbs while climbing. The ability to walk upright is considered a key characteristic of humans.

The researchers say their analysis of the fossils show that *Danuvius* were able to walk on two legs nearly twelve million years ago. Up to now, the oldest evidence of an upright gait is a mere six million years old, and was found on the Mediterranean island of Crete as well as in Kenya. "The finds in southern Germany are a milestone in palaeoanthropology, because they raise fundamental questions about our previous understanding of the evolution of the great apes and humans," says Böhme. Working with the Professor from Tübingen were researchers from Bulgaria, Germany, Canada and the United States.

Ever since Darwin, the early evolution of humans and our cousins, the great apes, has been intensely debated. At the center of these debates is the question of how humans came to walk on two legs. Did bipedal humans evolve from tree-dwelling, monkey-like apes which moved on all fours? From brachiating apes similar to orangutans? Or from knuckle-walking apes like chimpanzees and gorillas? Over the last 150 years

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many hypotheses have been advocated, but supporting fossil evidence has so far mostly been lacking.

The *Danuvius guggenmosi* fossils were discovered between 2015 and 2018. Working in the Hammerschmiede clay pit in the Allgäu region of Bavaria, Böhme and her team excavated more than 15,000 fossil vertebrate bones from the ancient humid and forested ecosystems that were abundant in southern Germany at that time. The new primate fossils include the remains of at least four individuals. The most complete skeleton, of a male *Danuvius*, has body proportions similar to modern-day bonobos. Thanks to completely preserved limb bones, vertebra, finger and toe bones, the researchers were able to reconstruct the way *Danuvius* moved about in its environment. “For the first time, we were able to investigate several functionally important joints, including the elbow, hip, knee and ankle, in a single fossil skeleton of this age,” Böhme says. “It was astonishing for us to realize how similar certain bones are to humans, as opposed to great apes.”

The team’s findings indicate that *Danuvius* could walk on two legs and could also climb like an ape. The spine, with its S-shaped curve, held the body upright when standing on two legs. The animal’s build, posture, and the ways in which it moved are unique among primates. “*Danuvius* combines the hindlimb-dominated bipedality of humans with the forelimb-dominated climbing typical of living apes,” says Professor David Begun, a researcher from the University of Toronto. These results suggest that human bipedality evolved in arboreal context over 12 million years ago. “In contrast to later hominins, *Danuvius* had a powerful, opposable big toe, which enabled it to grasp large and small branches securely,” says Professor Nikolai Spassov of the Bulgarian Academy of Science.

Danuvius was about one meter in height. Females weighed about 18 kg, less than any great ape alive today. The male would have tipped the scales at about 31 kg, also at the low extreme of modern great ape body size. The ribcage was broad and flat, and the lower back was elongated; this helped to position the center of gravity over extended hips, knees and flat feet, as in bipeds. Several key-features of human bipedality have been found on bones from the leg.

These results received support from a recent independent study of a 10 million-year-old ape hip-bone found in Hungary. “That fossil also indicates that the European ancestors of African apes and humans differed from living gorillas and chimpanzees,” says David Begun, who was also involved in the study of the Hungarian fossil. The researchers point out that the ancestors we share with living African apes were as unique as we are today. “This newly identified pattern of positional behavior helps us to understand the starting point from which African apes and humans diverged,” he said, underlining the team’s basic premise.

Publications:

Madelaine Böhme, Nikolai Spassov, Jochen Fuss, Adrian Tröscher, Andrew S. Deane, Jérôme Prieto, Uwe Kirscher, Thomas Lechner & David R. Begun. A new Miocene ape and locomotion in the ancestor of great apes and humans. *Nature*

<https://doi.org/10.1038/s41586-019-1731-0> (2019).

Carol V. Ward, Ashley S. Hammond, J. Michael Plavcan, David R. Begun. A late Miocene hominid partial pelvis from Hungary. *Journal of Human Evolution*.

<https://www.sciencedirect.com/science/article/abs/pii/S0047248419300685?via%3Dihub>

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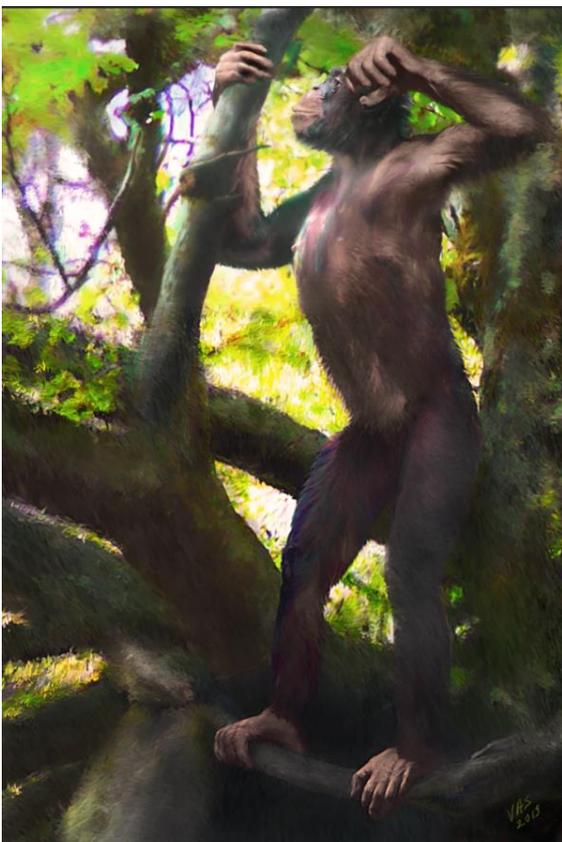
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The following images are available in high resolution at http://www.pressefotos.uni-tuebingen.de/20191106_Danuvius.zip

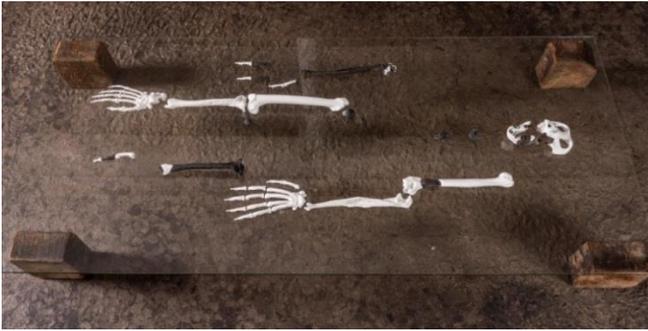
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1.

A male *Danuvius guggenmosi* probably looked something like this.

Artist's impression by Velizar Simeonovski



2.

On the basis of the fossils, the team reconstructed other bones.

Photo: Christoph Jäckle



3.

The 21 bones of the most complete partial skeleton of a male *Danuvius*

Photo: Christoph Jäckle



4.

Part of the reconstructed skeleton

Photo: Christoph Jäckle



5.

Bones from the hand of a male *Danuvius*

Photo: Christoph Jäckle



6.

Reconstruction (white bones) of the skull and lower jaw

Photo: Christoph Jäckle



7.

Two chest vertebrae of a male *Danuvius*

Photo: Christoph Jäckle



8.

The big toe of a male *Danuvius* (white bones reconstructed)

Photo: Christoph Jäckle



9.

Bones from the hand of a male *Danuvius*

Photo: Christoph Jäckle



10.

Professor Madelaine Böhme

Photo: Christoph Jäckle



11.

Professor Madelaine Böhme

Photo: Christoph Jäckle



12.

Professor Madelaine Böhme

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