Three new mini thorn snails described from Georgia (USA), Belize and Panama

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Dr. Adrienne Jochum collecting the new species Carychium hardiei, Georgia, USA. Credit: Dr. Adrienne Jochum

Although computer tomography (CT) is widely used in medicine, its application in micro snail identification is still at the pioneering stage.

However, Dr Adrienne Jochum from the Naturhistorisches Museum der Burgergemeinde Bern (NMBE), Switzerland and her interdisciplinary team of German and Swiss scientists (Dr. Alexander M. Weigand, University of Duisburg-Essen, Estee Bochud and Thomas Inäbnit, NMBE and the University of Bern, Dorian D. Dörge, Goethe University, Frankfurt, Dr. Bernhard Ruthensteiner, Zoologische Staatssammlung

Muenchen, Dr. Adrien Favre, Leipzig University, Gunhild Martels and Dr. Marian Kampschulte, Justus-Liebig University Giessen) have recently applied it in their research, now published in the journal *ZooKeys*.

As a result of their revolutionary approach, the scientists report three new thorn snail species - tiny, colourless and highly fragile creatures that measure less than 2 mm and belong to the genus Carychium.

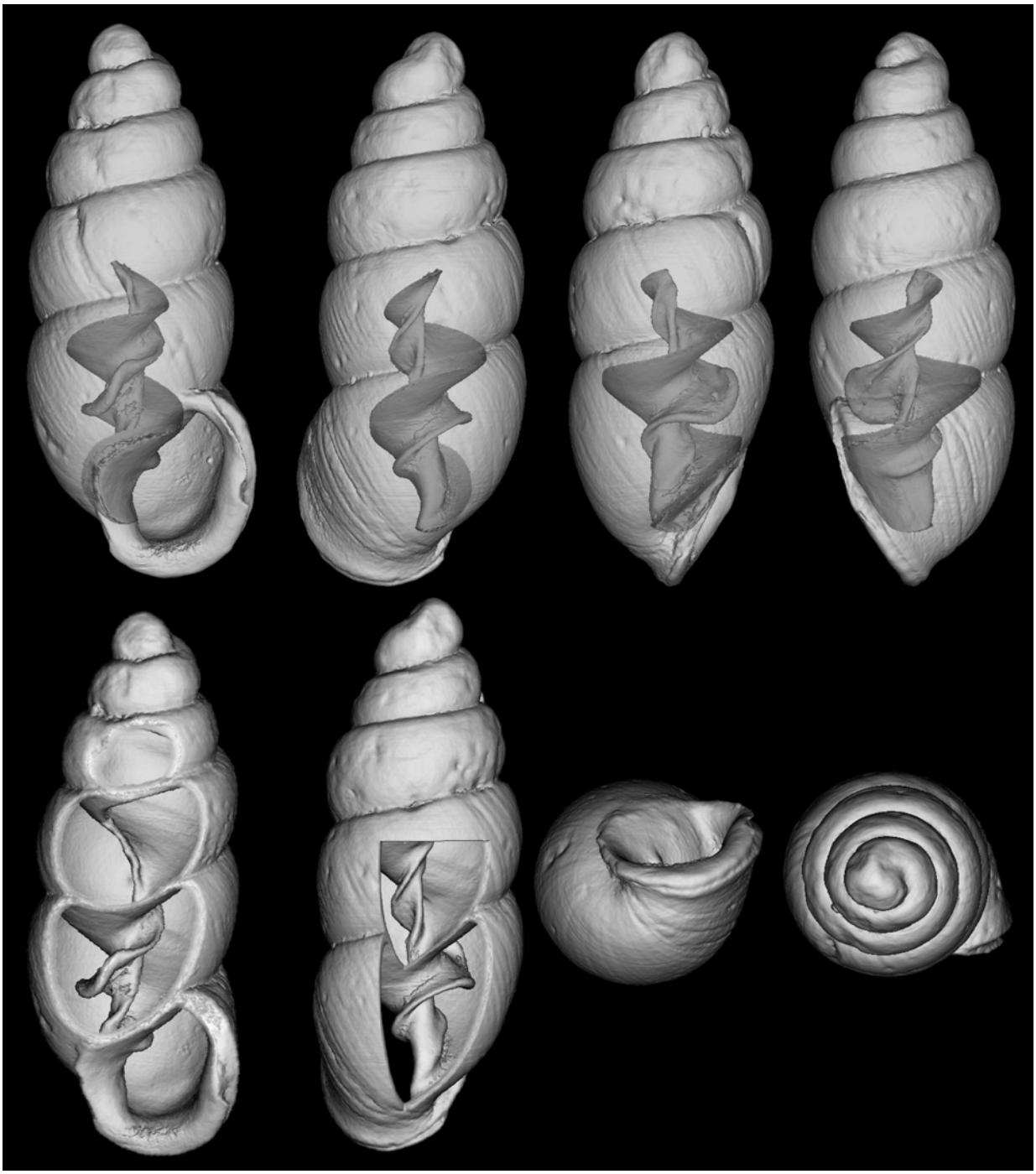
Much like X-rays showing the degree of damage in broken bones, CT scans provide access to snail shells. Differences, such as the degree of sinuosity of the potato chip-like wedge (lamella), elegantly gliding along the spindle-like columella, become visible. These structures provide stability and surface area to exert muscular traction while manoeuvring the unwieldy shell into tight cavities. The alignment and degree of undulation of the lamella on the columella is also used by malacologists (mollusc specialists) to identify different thorn snail species.

A map and locations of previously known and new thorn snail species of North and Central America. Credit: Dr. Adrien Favre

Conventionally, examination of this signatory character requires cutting a hole in the shell with a fine needle under the microscope. This tedious method requires a much patience and dexterity and, all too often, the shell cracks open or disintegrates into dust under pressure. By exposing the delicate lamella to non-manipulative CT scans, Dr. Jochum and her team have found the best method to differentiate not only thorn snails but also many other micro creatures.

Together with G. Martels and Dr. M. Kampschulte, Dr. Jochum described new micro snails for the first time using CT in East Asian hypselostomatid snails in 2014. The first subterranean Asian relative of the thorn snails (Koreozospeum nodongense), was also described by Dr. Jochum thanks to CT scans in 2015.

The scientists studied and compared thorn snails collected from Mexico, Florida (USA) and Costa Rica.



A CT scan of one of the new thorn snail species -- *Carychium hardiei*, Georgia, USA. Credit: Gunhild Martels and Dr. Marian Kampschulte

Curiously, the new species Carychium hardiei was discovered by accident by Dr. Jochum en route to the Atlanta Airport during a rest stop in Georgia (USA). The snail is named after the American naturalist and field biologist Frank Hardie. Another species, Carychium belizeense, was found in the Bladen Nature Reserve in Belize and is named after its country of origin. The third, Carychium zarzaae from Panama, is named after Eugenia Zarza, collector of material for this study, including this species.

In total, there are fourteen species of thorn snails known in North and Central America. Their distribution ranges from as far north as northern Ontario, Canada through North America (including Bermuda and Jamaica) and south through Central America to Costa Rica. Thorn snails also live as far north as northern Sweden and as far south as sub-equatorial Java. Worldwide, this genus spans the Nearctic, Palearctic and Indomalayan biogeographic realms.

Thorn snails live in tropical and temperate forests, meadows and riparian zones, where they comprise the decomposer community in leaf litter of ecologically stable environments.

More information: Adrienne Jochum et al, Three new species of Carychium O.F. Müller, 1773 from the Southeastern USA, Belize and Panama are described using computer tomography (CT) (Eupulmonata, Ellobioidea, Carychiidae), *ZooKeys* (2017). DOI: 10.3897/zookeys.675.12453

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