I-X-ray ebona izinto ezincane kakhulu ingasetshenziswa ukwenza imephu yezitho zezinambuzane ezincane

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Imininingwane ye-X-ray micro-tomographic yezibungu eziphilayo zebhungane i-Cacosceles newmannii

Abstract

Ukulinganisa izakhiwo zokuphefumula kwezinambuzane kanye nokuhluka kwazo kusalokhu kuyinselele ngenxa yobukhulu bazo obuncane kakhulu.

Lapha sikala ivolumu yoqhoqhoqho lwezinambuzane sisebenzisa i-X-ray micro-tomography (µCT) ukuhlola (ekulungisweni okungu-15 µm) ezibungwini eziphilayo, ezithulile zebhungane le-cerambycid Cacosceles newmannii kosayizi bemizimba ehlukene.

Kuleli phepha sinikeza imininingwane egcwele yevolumu kanye namamodeli e-3D ezipopolo ezingu-12, ehlinzeka ngemininingwane emisha yokuphindaphinda kokuhlaziywa kwezithombe kanye nomehluko wesici se-tracheal wesakhiwo ohlinzekwa ngezindlela ezihlukene zokuhlukanisa izithombe.

Imininingwane inikezwa lapha ngezifunda zomzila we-tracheal ezihlukaniswe ngamamodeli we-3D.

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Ososayensi babheke izinhlelo zokuphefumula kwezinambuzane ngokuningiliziwe besebenzisa indlela yokuthwebula ebizwa ngokuthi i-X-ray micro-tomography.

Ososayensi basebenzisa le ndlela ezinambuzaneni eziphilayo, ukuze baqonde ukuthi izitho zabo ezincane zishintsha futhi zikhule kanjani ngokuhamba kwesikhathi.

Ocwaningweni oluningi, ososayensi bahlola amashubhu okuphefumula, noma uqhoqhoqho, ezinambuzane ezifile.

Ngeshwa, lezi zakhiwo ziyashintsha ngemva kokufa, zigcwale uketshezi, noma zibhidlike.

Lokhu kusho ukuthi ososayensi abakuqondi okubalulekile kokuthi lezi zakhiwo zivame ukukhula kanjani njengoba izidalwa eziphilayo zikhula.

Kulolu cwaningo, abacwaningi bebefuna ukuthwebula izithombe zezinambuzane eziphilayo ezigabeni ezahlukene zokukhula.

Ngokuqondile, babefuna ukubona ukuthi bangakwazi yini ukulinganisa ngempumelelo ubukhulu kanye nevolumu yohlelo lwe-tracheal ezibungwini zebhungane besebenzisa i-X-ray micro-tomography.

Baqoqe izibungu zebhungane elinezimpondo ezinde i-Cacosceles newmannii emasimini omoba KwaZulu-Natal, eNingizimu Afrika.

Izibungu zazigcinwa ziphila elebhu bese ziyalaliswa (zilaliswe) ukuze zihlolwe.

Besebenzisa i-X-ray micro-tomography, abacwaningi bakwazi ukuhlola izakhiwo ze-tracheal ngaphandle kokulimaza izinambuzane kule nqubo.

Abacwaningi basebenzise izipopolo ukwenza imephu yezakhiwo zokuphefumula, futhi bazenze kabusha nge-3D kukhompuyutha.

Baphinde babonisa ukuthi izinambuzane zingahlanzwa futhi zihlolwe ngaphandle kokuphazamisa ukuphila kwazo noma ukukhula kwazo kamuva, okuyinto eye yaba inselela ocwaningweni lwangaphambilini.

Lokhu kuyintuthuko ebalulekile, njengoba abanye abacwaningi sebengakwazi manje ukusebenzisa indlela efanayo ukuskena nokumodela izitho zezinambuzane eziphilayo, ukuze bafunde ukuthi izinambuzane zikhula kanjani, zikhule futhi ziphile ngaphansi kwezimo ezihlukahlukene.

Ngeshwa, abacwaningi bakwazi ukwenza imephu ye-tracheae ngosayizi wama-micrometres ayi-15 (15 μm).

Nakuba lokhu kusekuncane ngokwemibandela yansuku zonke, uqhoqhoqho lwesinambuzane lungaba luncane njengo-1 μm, okusho ukuthi nayo le ndlela ingase igeje idatha ethile ebalulekile.

Ubukhulu bezibungu eziphilayo bubuye basho ukuthi abacwaningi abakwazanga ukuskena ngendlela engcono kakhulu yokuxazulula.

Baqaphela nokho ukuthi usayizi we-15 μm ungahle wanele ukuze uthole imininingwane eminingi ezinambuzaneni ezinkulu, nokuthi izifundo zesikhathi esizayo kufanele zihlole ukuthi kungathuthukiswa kanjani ukuxazulula.

I-Cacosceles newmannii iwuhlobo lwamabhungane endabuko ngezinye izikhathi olutholakala emasimini lomoba KwaZulu-Natal, futhi luyinkathazo engaba yinkathazo yalezi zitshalo ezibaluleke kakhulu kwezomnotho.

Ngakho-ke, ukuqonda isayensi yezinto eziphilayo zebhungane kungase kunikeze izinkomba ezidingeka kakhulu zokulawula izibungu ezitshalweni zomoba.

Lolu cwaningo beluwukusebenzisana kososayensi baseNingizimu Afrika nabaseNingizimu Afrika.