



Action Update

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Update on the 3D anatomy project

by **Zennith** on Friday 23rd July 2021

Our ongoing 3D anatomy project aims to establish an end-goal for transformation. Specifically, we want to create a full model of the body's anatomy, with a reasonable physiological basis, in a flexible way. This will let users create and customize new characters that look great and behave realistically - down to muscle movements - from the outside, while being complete CAD models that support analysis and planning by doctors and engineers.

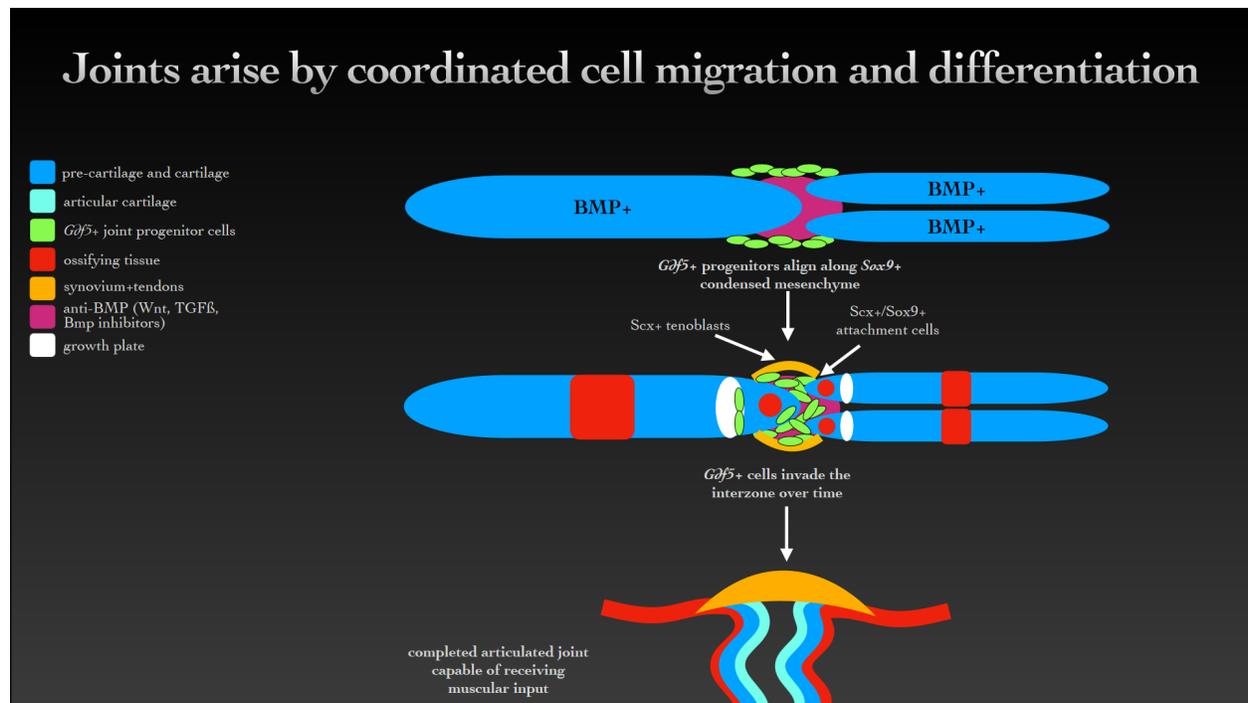
The team has been hard at work figuring out how to represent bones in a way that is

meaningful to a computer. This is far harder than just putting a few vertices into 3D space! Real bones have complex shapes where every single feature has a mechanism and evolutionary history behind it.

We're focusing on the humerus as an example. There's a few interesting properties of humerus bones I'd like to call out! A lot of this work has been driven by Athamanatha and SiberDrac - they've dug up seriously useful information that helps us understand how the computer models need to work.

First, the humerus's length, versus its diameter, is fairly strictly linked across a huge diversity of organisms from small mice through elephants, and across hominid species as well. This means that a computer model needs to "understand" that the ratio of the length versus diameter of the bone is meaningful.

Second, the way that bones co-develop with joints and muscles during embryogenesis means that you can't have a bone modeled in isolation. Ever. It's completely unrealistic! During embryogenesis, the zones between joints (the interzones) secrete signaling molecules that cause cells at the ends of bones to divide faster or slower, or to move or



change shape (see diagram on page 1, drawn by SiberDrac). Those signals get more refined as the tissues mature, and combine with mechanical forces and other cues, to create purpose-built structures like the head of the humerus and the trochlea.

Third, fine-tuning of the features of the humerus is done largely by tuning the parameters of the above. One great example of tuning is the deltoid tuberosity, which is the point on your humerus that your deltoids (shoulder muscles) pull on. During embryonic development, shoulder muscles literally pull on the embryonic humerus to form the deltoid tuberosity. Larger muscles pull on a larger area of the humerus, forming a bigger deltoid tuberosity in hominids with bigger shoulder muscles.

Understanding the biology behind anatomy is making it possible for us to develop a realistic, intuitive, and customizable computational model. Rather than asking someone to crudely 'eyeball' every aspect of what a humerus should look like, we can provide users with higher-level properties that handle minutiae in a reasonable way.

[See our new GitLab repository \(we're migrating from GitHub\)](#)

Exploring the World of Futurism

by [Athamanatha Kitsune](#) on Friday 23rd July 2021

Here are a few interesting organisations and groups we have found in the Futurism and Transhumanism realms, in no particular order. Each of these groups is doing something positive towards a future we all want to see.



Projectium is a project-centric business networking platform. It's designed to put collaboration on projects first, and let the work speak for itself.

It's agnostic to the type of organisation your project is run by. It may be very handy as a supplementary platform for the promotion and growth of projects run by grant recipients and partner organisations of the FFF, as well as by the FFF itself.

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A networking group for researchers, advocates, investors and patrons of Lifespan.io, supporters of transhumanism and life extension research.

[The Lifespan Network's website](#)

Podcast: Updates!

by [Athamanatha Kitsune](#) on Sunday 25th July 2021

The 11½th podcast is out, using a new category of Science Chats.

The 3rd episode of the podcast is past halfway for subtitle transcriptions.

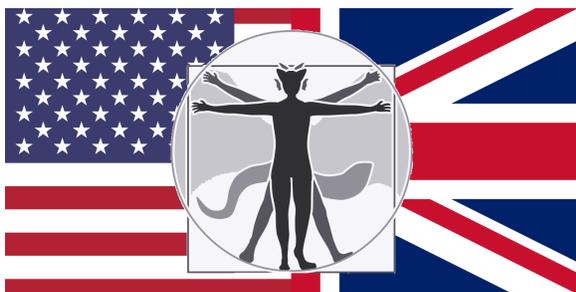
The 12th episode of the podcast (Space: the Final Frontier) is now being edited.

[Catch up with our previous podcast episodes today!](#)

British Expansion

by [Athamanatha Kitsune](#) on Monday 26th July 2021

We have incorporated in England as Freedom of Form Foundation Ltd. This will initially be for tax compliance purposes when paying some of our staff, but will extend to registration as a charitable entity in England, Wales and perhaps Scotland in time too, if sufficient interest in the FFF arises there.



Liz Parrish update

by [Athamanatha Kitsune](#) on Sunday 25th July 2021

It's been a month of editing and back and forth, but we're nearly there now! Liz Parrish at Bioviva has the final cut of our interview with her, ready to review, she has only to find time to review it and let us know if we can publish it. This is, she says, likely to take a couple of weeks due to how busy things are for her.

[Check out Liz's company, Bioviva Science](#)

We're on LinkedIn, Youtube, Soundcloud, Google Podcasts, Breaker, RadioPublic, Spotify, Pocket, iTunes, Anchor, Twitter, Telegram and Discord!

Why not check out our awesome perks on Patreon or if you prefer, drop us something nice via Paypal. You can also add us to your Amazon Smile orders in the USA!

This late edition of the newsletter was brought to you by heatwaves. I'm British, in the UK and I'm buying an air con unit for home. Something is very wrong.

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