Planktonic Foraminifera (forams) are single celled organisms that form a calcium carbonate shell. Their large populations and short life spans means they are constantly deposited on the sea floor, resulting in an excellent fossil record. This makes them ideal for assessing past climates. Forams are also used to monitor pollution levels and in the search for gas and oil deposits.

**Evolution & Sinking**

Shape, and therefore drag, affect sinking speeds. This in turn affects the rate of deposition of foram shells on the sea floor. Theoretical models of sinking forams have assumed that shells are spherical, but in fact they have a wide range of morphologies. By mapping the changes in sinking speed due to changes in morphologies, on to a phylogeny (see Figure 1) it is possible to answer:

- How do these morphological changes affect sinking speed?
- Have there been transitions to, or from, general morphologies, and are they linked to changes in ecological factors?

**3D Printing**

So the foram shells easily visible they will be 3D printed (see figure 2), from CT scans (see Figure 3) ~35 times larger than life. By dropping these in to a fluid that is dynamically scaled to match Re numbers, the sinking speed of forams can be found.

Using these experimental values, sinking speed predictions of both historical and extant planktonic forams can be made, allowing a better understanding of deposition rates. This promotes the development of a better understanding of previous climates, responses to changes in the environment and pollution levels.

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**References**


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**Figure 1:** Part of the Phylogenetic Tree of planktonic forams; Adapted from 2, CT Scans from 3

**Figure 2:** Formlab’s Form+1 3D printer

**Figure 3:** CT scans from 3