

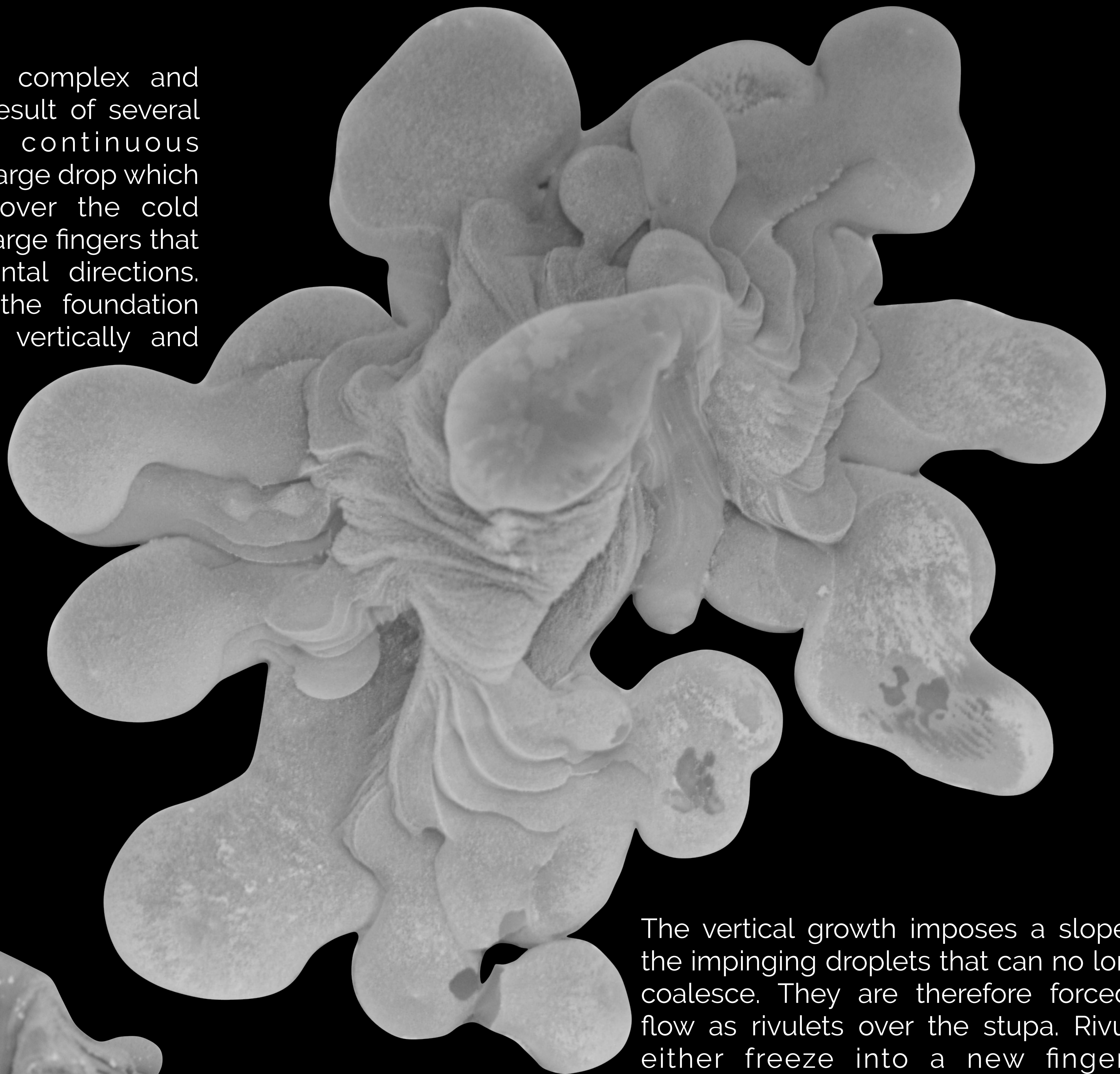
Capillary ice stupas

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Stupas are ice structures used in the Himalayas to store water during winter. They are obtained by freezing atomised water jets in the cold climate. Capillary stupas are obtained in the laboratory through the solidification of impacting droplets on a cold substrate.

Capillary ice stupas exhibit a complex and beautiful pattern which is the result of several growth mechanisms. The continuous aggregation of droplets forms a large drop which ultimately breaks and spills over the cold substrate. The flow freezes into large fingers that randomly spread in all horizontal directions. These frozen fingers provide the foundation upon which stupas can grow vertically and horizontally.



The vertical growth imposes a slope on the impinging droplets that can no longer coalesce. They are therefore forced to flow as rivulets over the stupa. Rivulets either freeze into a new finger or destabilize and rotate in the vicinity of the latest developed finger. This path dependence creates the torsional wrinkling observed on the tip of the stupa.

