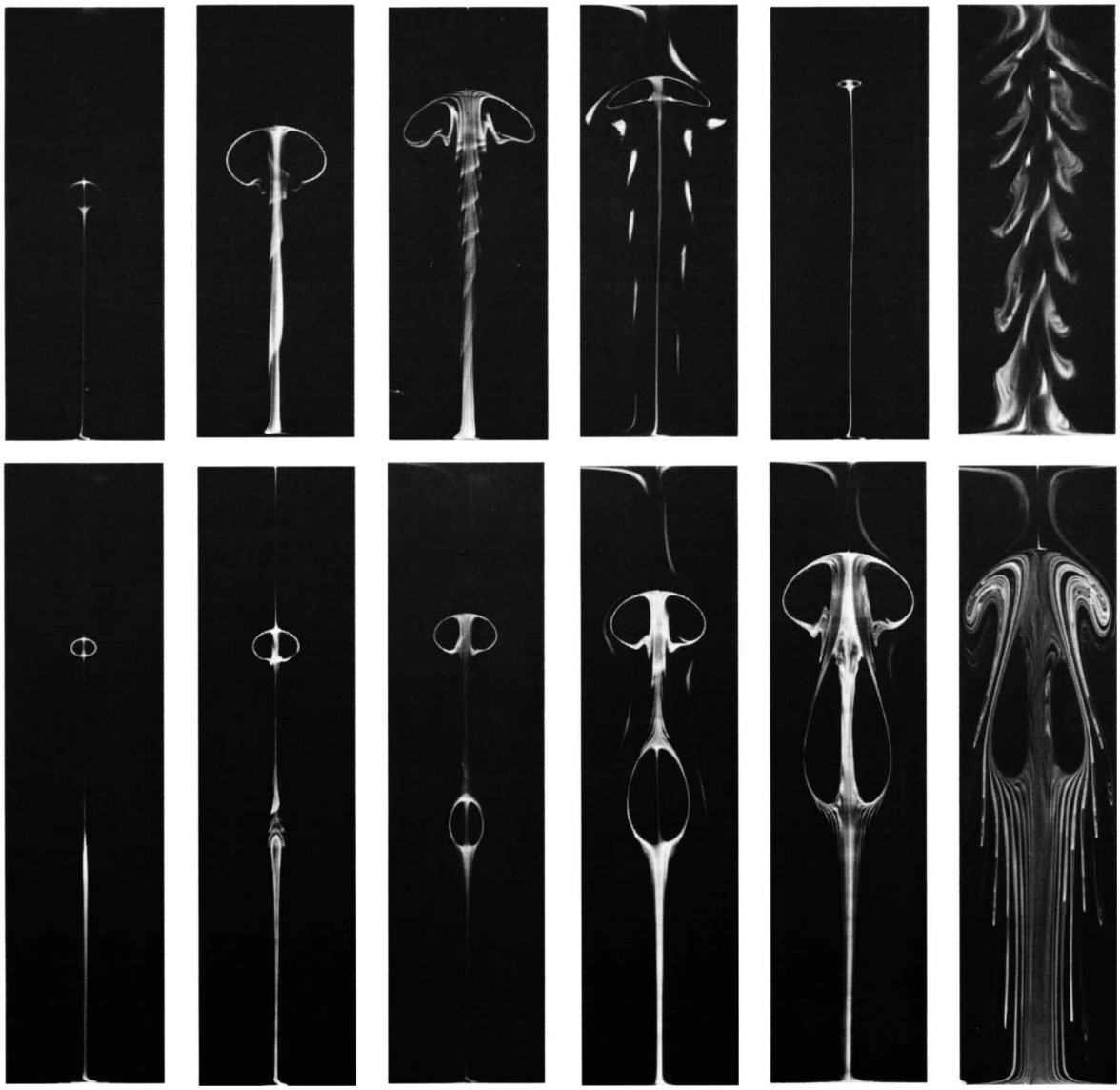

## SWIRLING FLOW IN A CYLINDRICAL CONTAINER

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This figure shows changes in vortex structure with increasing $\Omega R^2/\nu$ for $H/R = 1.75$ (upper row) and 2.5 (lower row). (By permission of Springer-Verlag, New York).

We produced the flow in a closed cylindrical container completely full of a glycerine–water mixture by rotating one endwall. We made a diametral plane visible by using laser-induced fluorescence. The two sequences of photographs above show the structure of the central core of the flow (30% of the total diameter). For a given value of the height-to-radius ratio $H/R$ ($> 1.2$), there are upper and lower limits to the rotation Reynolds number $\Omega R^2/\nu$ between which one, two, or three vortex breakdown bubbles occur on the axis of symmetry. For $\Omega R^2/\nu > 2500$ the flow becomes increasingly oscillatory and eventually turbulent. A complete description of the experiment has been given elsewhere.[2]