

Hello Professor Hänggi

Thank you for the papers and resources online which you share on Brownian motion history.

I was interested to read the email comment you share by Nicolas Chevalier (www.physik.uni-augsburg.de/theo1/hanggi/History/BM-History.html) questioning whether Ingenhousz could have observed BM in an inert substance suspended in ethanol. As an optical microscopist with a particular interest in encouraging educational studies of BM in both the liquid and gas phase with simple equipment, I agree with Chevalier's comments. The movement by evaporation, even if not the convection cells seen on the larger Petri dish scale by Nicolas, overwhelms the subtle BM.

As Ingenhousz describes, with no coverslip 'everything' i.e. of all sizes are in 'violent' motion by evaporation currents which is not a description of Brownian motion i.e. a gentler jiggling of much smaller particles typically 5 microns in size or less. (Quotes from van der Pas's translation, 1971.)

If Ingenhousz suspected there was an underlying motion, it seems likely that such a careful experimentalist would repeat the experiment using the cover slip he is advocating to remove the evaporative component. He does not report this.

I have made by own studies of the Ingenhousz experiment in case of interest and shared below as videos. For comparison the striking difference between true BM is shown of fat droplets in dilute milk. The Institute of Physics, UK after reading the article linked to in the video, modified their own online account of BM to question the credit to Ingenhousz with the observation.

<https://vimeo.com/135788084>

Video frame field of view 3 mm. Repeat of Ingenhousz expt. - only very low mag is required to show the violent motion of particles and clumps of all sizes as Ingenhousz describes. I repeated with a cold stage to drop temp to a cold winter room temp and had little effect on this motion. A low power hand lens can observe the motion as it is that extreme.

<https://vimeo.com/133345758>

Typical BM of fat globules in very dilute milk, much higher mag required, only particles less than ca. 5 μm jiggle, a slow translational movement with time. Very different to that seen in the Ingenhousz experiment.

As you maybe aware, Beale and Beale, 2011 in their 'Echoes of Ingenhousz' biography discuss and question the van der Pas reinterpretation of 1968 / 1971 and remark that it's 'almost certainly an overenthusiastic conjecture'.

Thank you for your time,
with regards,

David Walker
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