REAL SCIENCE IN REAL TIME; HOW MICROSCOPY LIVE! HAS INTRODUCED PLANETARY SCIENCE TO A NON-SPECIALIST AUDIENCE. F. M. Willcocks[1], J. T. Mitchell[1], N. R. Stephen[1,2], [1]Plymouth Electron Microscopy Centre, University of Plymouth, Drake Circus, Plymouth, Devon, PL4 8AA, UK (francesca.willcocks@plymouth.ac.uk), [2]The Geological Society, Burlington House, Piccadilly, London, W1J 0BG, UK.

Introduction: The communication of science to society is one of the most important roles of a modern scientist [1] and there is an increasing understanding that geoscience communication to the public is crucial to gain public trust, support and develop scientific work [2]. In planetary science, schemes such as the European Planetology Network (EuroPlaNet) have already incorporated outreach into their operations to improve the level of knowledge and understanding of planetary science within the general public, reaching schools, media and European science policy decision makers [3].

The developments in online communication platforms has meant podcasts, social media and conferencing applications have become a powerful tool in communicating science to a wider audience [1]. Here, we introduce a new online initiative at Plymouth Electron Microscopy Centre (PEMC) – Microscopy LIVE! – and how we have successfully used our platform to introduce planetary science to the general public.

What is Microscopy LIVE!: Microscopy LIVE! is a free, public-facing outreach series launched by Dr Natasha Stephen in October 2021 at PEMC, partnered with JEOL UK. The series aims to introduce electron microscopy to a wider audience and bridge the gap in communication between scientists and members of the public.

Figure 1 – Microcopy LIVE! Logo

Each session is an hour of "*real science in real time*" featuring live imaging and analysis of a wide range of samples from animal hair or mushrooms to meteorites (Fig. 2), hosted online by Dr Jennifer Mitchell and Francesca Willcocks. Audience participation is greatly encouraged and members of the public can ask questions about the analysis, or even remotely control the microscopes to explore areas of a sample during the hour. Anyone can register to attend and each session is recorded and subsequently uploaded to our YouTube channel so that everyone can gain access to the content covered each session. A booklet of all data and images collected during each session is also compiled for each session for attendees to keep, or use for further education purposes. We promote Microscopy LIVE! on a range of platforms with the aim to reach a wider audience, advertisements for all Microscopy LIVE! sessions to date can be seen in Figure 2. Additionally to social media posts, Dr Jennifer Mitchell has recently been a guest on the '5 minutes with…' podcast hosted by the Geological Society of London, and we were also invited to talk about Microscopy LIVE! at the Royal Microscopical Society's EM-UK community meeting, 2022.

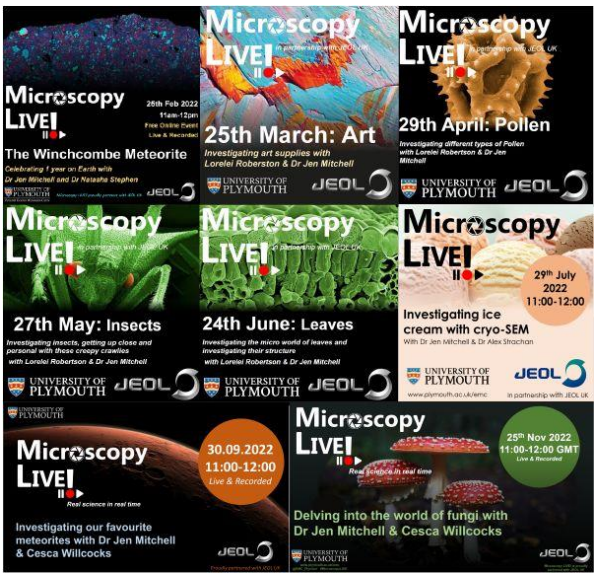

Figure 2 – Examples of social media posts that are used to advertise Microscopy LIVE! on a range of social media platforms.

Planetary Science and Microscopy LIVE!: Since the launch of Microscopy LIVE! there have been two sessions dedicated to planetary geology; the 'one year anniversary of the Winchcombe meteorite' and 'meteorites: exploring our favorite meteorites using scanning electron microscopy'. Both planetary geology sessions have been very successful relative to other topics (Fig. 3), and have had both the highest number of registered

attendees and highest number of YouTube views of all our Microscopy LIVE! sessions to date (Fig. 3).

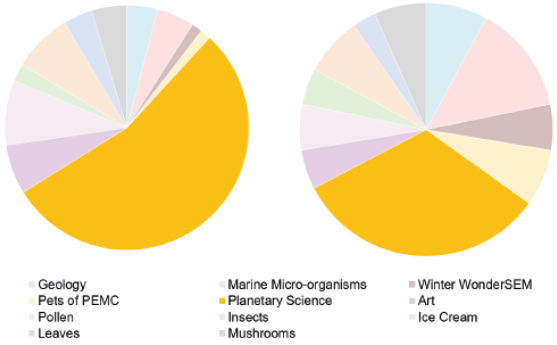

Figure 3 - (left) Pie chart displaying YouTube views for each Microscopy LIVE! session. (right) Pie chart displaying registrations for each Microscopy LIVE! session. The Winchcombe and 'our favorite meteorites' sessions have been combined.

The One Year Anniversary of the Winchcombe Meteorite: As one of our most successful Microscopy LIVE's, the one year anniversary of the Winchcombe meteorite saw 15% of total registrations for Microscopy LIVE! to date (Fig. 3). The session hosted by Dr Jennifer Mitchell, Dr Natasha Stephen and Lorelei Robertson, took place on a JEOL 7001F field-emission Scanning Electron Microscope (SEM) equipped with an Oxford Instruments 50 mm^2 X-Max Energy Dispersive Spectroscopy (EDS) detector and Oxford Instruments Aztec software (v5.1).

During the session, audience members were taken on a tour around a sample of Winchcombe (P30545 [4], BM.2022,M1) and introduced to carbonaceous chondrites. Audience members were also told of the extensive search efforts that were involved in finding Winchcombe, and how the quick turnaround between the observed fall and finding the meteorite has allowed for such a pristine glimpse into the outer solar system [5].

Exploring our Favorite Meteorites using Scanning Electron Microscopy: One of the most recent Microscopy LIVE! sessions saw Dr Jennifer Mitchell and Francesca Willcocks investigating Northwest Africa (NWA) 6414 (polymict eucrite) and Tissint (olivine-phyric shergottite). This session has been our most popular to date, making up 18% of all registrations for Microscopy LIVE! to date (Fig. 3). Additionally, this session is our most watched on YouTube. We hosted this Microscopy LIVE! on the new JEOL IT800F field-emission SEM equipped with an Oxford Instruments 65 mm^2 X-Max EDS detector and Oxford Instruments AZtec software (v6.0), highlighting the ease at which electron microscopy analysis can occur.

During the event, the audience were introduced to the capabilities of EDS as an analytical technique, and were shown a range of geological features including pyroxene exsolution lamellae in NWA 6414 and normal zoning of olivine antecrysts in Tissint[6].

Future Outreach Plans: Since October 2021, there have been twelve Microscopy LIVE! sessions, including two on planetary science. As the series progresses we aim to continue growing our reach, and we are currently working with the University of Plymouth's schools engagement team to promote Microscopy LIVE! sessions to schools across the country.

We also have capabilities to take Microscopy LIVE! to external in-person events using a portable JEOL NeoScope Benchtop SEM. This has already been achieved during outreach events at Dartmoor Zoo and internally at the University of Plymouth. We aim to continue introducing more in-person outreach events as the series continues.

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