Reminiscences on encounters with Raimond Castaing

My acquaintance with Professor Castaing goes back to my very earliest days as a research student. The year was 1955. In october 1954 I had started as a research student working with Peter Hirsch as supervisor at the Cavendish Laboratory, the Department of Physics of Cambridge University. Some work on beaten gold foil carried out by Hirsch, Kelly and Menter [1] had suggested that there might be a future in examining thin metal foils directly in the transmission electron microscope, and in particular that there was the possibility of seeing dislocation lines and faults, something which most metallurgical electron microscopists at that time did not believe would be possible. Pioneering work had already been carried out on the transmission microscopy of metals by Heidenreich [2] in the USA and by Castaing [3] in France, but no evidence for defects had been reported. The latter had studied aged Al-4% Cu alloy and had reported evidence for GP zones and precipitation. He had developed an ion-bombardment technique for thinning metal foils which had previously been electropolished. Peter Hirsch said I should investigate Professor Castaing's ion-bombardment technique, and since we did not have our own electron microscope, but only very limited access to a rather poor quality instrument in another department, I spent the best part of a year or more developing my own apparatus for ion-bombardment thinning. Practically everything was built from what was available in the Cavendish Laboratory, including a glass diffusion pump system, a home-made 10 kV power supply and an ion source. We did not have access to Professor Castaing's design of the ion source, so I developed my own from ideas culled from the nuclear physics group of the Cavendish Laboratory. After a year we obtained access to the recently acquired Siemens Elmiskop 1 electron microscope installed in Dr. Cosslett's group of the Cavendish Laboratory, and obtained some electron micrographs of ion-bombarded metal foils, prepared from beaten and etched gold and aluminium foils. I show just one example of a micrograph of beaten gold foil, showing that the ion beam etched crystallographic holes, and that small spots were visible. These may have been the first direct evidence of radiation damage by ions, but this was not understood at the time.

Having worked quite hard on this and having obtained some results, I plucked up courage to write to Professor Castaing. I guess it was late in 1955 or early in 1956. I sent him some micrographs and asked for his opinion. I received a courteous and encouraging reply, which quite honestly I was not expecting, since here was I, a humble research student, daring to approach the experienced researcher who had pioneered the field. As a research student I had little desk or filing space, so unfortunately I have lost since long that first letter from Raimond Castaing. Little did I think at that time that I was soon to meet him. There was a conference on Crystallography in Madrid at Easter in 1956. Although I had not submitted a paper to the conference, Dr. Will Taylor,

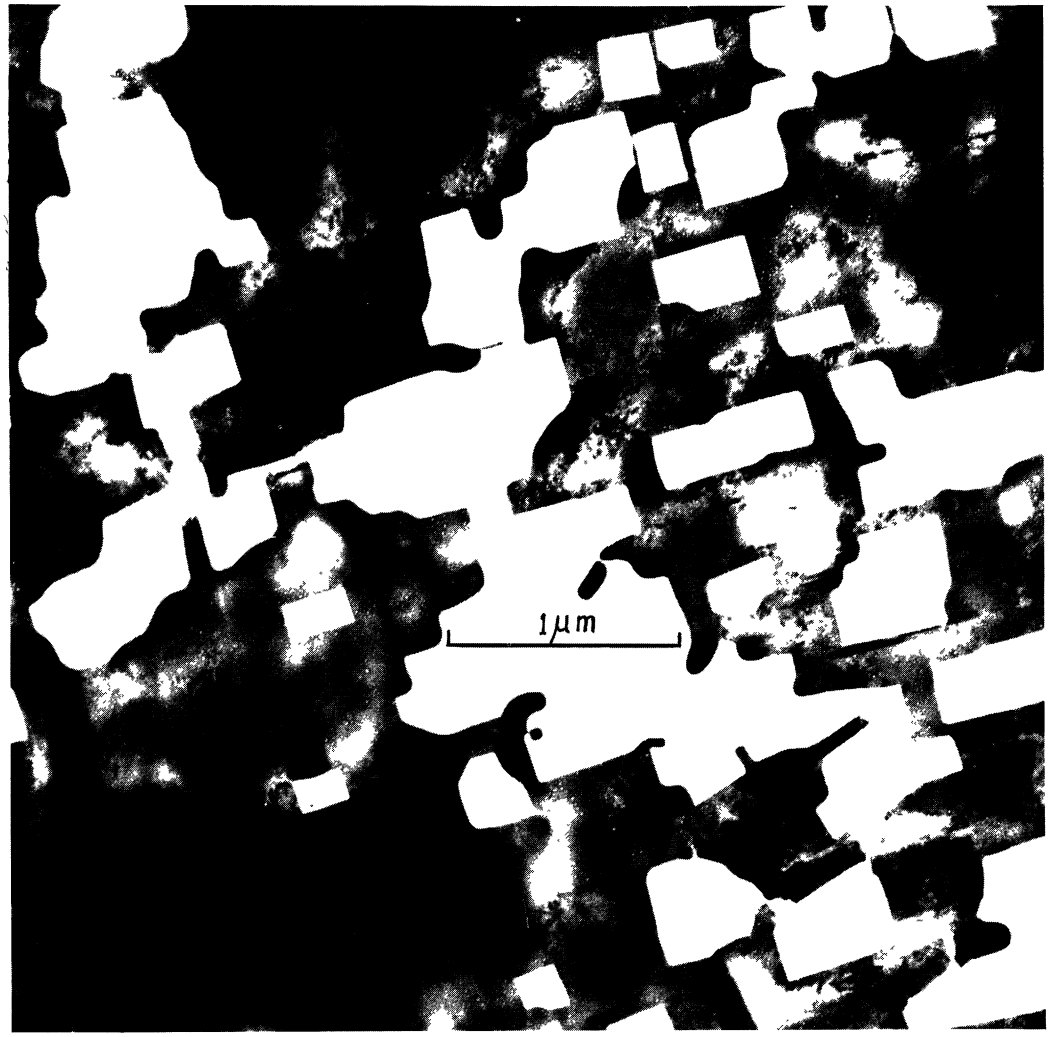

Fig. 1. — Beaten gold foil of initial thickness ~ 100 nm after bombardment with an 8 kV beam of air ions. Micrograph taken by Elmiskop II electron microscope at 60 kV.

Head of the crystallographic group in the Cavendish laboratory encouraged his young research students to attend. There I met Raimond Castaing for the first time. An amusing incident sticks in my mind. He had travelled to the conference in his car, and after one of the conference sessions I found myself being given a lift, to where I do not recall, but I well remember the skilful way he handled the car, which made me hold on tight ! At one point we came to a sudden halt, narrowly avoiding a taxi. The taxi driver looked in our open window and said in French "Monsieur, en Espagne, nous tenons la droite" (or very similar words) !

Over the years since then I recall other occasions of meeting Professor Castaing, and of benefiting from his pionnering work. In the 1960's Allen Metherell, a student of mine at

Cambridge, developed a technique of studying energy losses by combining a Möllenstedt electron velocity analyser with an electron microscope, so that electrons could be energy analysed after the final microscope image. While it was useful for studying small energy losses in the plasmon range, the technique had its limitations. I recall another amusing occasion when Professor Castaing visited us at the Cavendish Laboratory. I had a research student (Steve Cundy) who was fluent in French, and while looking over our apparatus for energy analysis, we were treated to a most remarkable display of Gallic verbal jousting between Professor Castaing and my student, of which we all (except Cundy) understood not much, although we could well share in the spirit !

Following our move to Oxford in the mid-1960's, we decided to build an energy filtering electron microscope of the type pioneered by Castaing and Henry [4]. The design and construction work was carried out by Dr Peter Turner and a student, John Philip, and I know that in the success of their project they owed a great deal to the pioneering work of Professor Castaing and his students, particularly in the design of the magnetic prism and electrostatic mirror system.

To conclude, it goes without saying that we on this side of the Channel wish Raimond Castaing many more productive and satisfying years of retirement.

Michael J. WHELAN
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References

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