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Centenary of the discovery of liquid crystals

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On the 14 March 1888 Dr. Friedrich Reinitzer, lecturer in botany at the German University of Prague, sent a letter of 16 pages handwritten in gothic characters to Otto Lehmann, at that time Professor of Physics at the Technical University of Aachen, later in Karlsruhe. Reinitzer addressed Professor Lehmann by the time-honoured title 'Esquire'. He enclosed two samples of the new substances, cholesteryl acetate and cholesteryl benzoate, which "exhibit striking and marvellous apparitions that I do hope that they will be also of interest to you to a certain extent" (cf. (*a*)). Later on (cf. (*b*)) he described the physical behaviour of cholesteryl benzoate as follows: "The substance exhibits *two* melting points, if one may say so. At 145·5° it melts to a turbid but absolutely fluid liquid which becomes suddenly clear not until 178·8°. On cooling, violet and blue colours appear which quickly vanish with the sample leaving lactescently turbid but fluid. On further cooling the violet and blue colours reappear but very soon the sample solidifies forming a white crystalline mass." Reinitzer concluded his letter with a most servile apology for his bother and expressed his sincerest thanks to Dr. Lehmann for his trouble taken with the possible investigation of the substances (cf. (*c*)).

The 'second melting point' which Reinitzer observed was nothing but the well-known clearing point of cholesteryl benzoate. The discovery of the first thermotropic liquid crystal must consequently be ascribed to him. The terms 'flowing crystal' or 'liquid crystal' however, were introduced by Lehmann a short time later [1]. The colours mentioned in Reinitzer's letter originate from the selective reflection of circularly polarized light by the liquid-crystalline state of cholesteryl benzoate. However, Reinitzer observed, very precisely, the apparition of these colours *twice* on cooling: the colours appearing at lower temperatures are caused by the cholesteric phase [1] whereas those at higher temperatures are actually due to the *blue phase* of cholesteryl benzoate [2]. Therefore, this year we celebrate the centenary of the discovery of liquid crystals as well as the hundredth anniversary of the detection of the blue phase [3].

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