Durand Replies: The Comment by Brand and Pleiner [1] asks an interesting question about the positional ordering of discotic columnar mesophases. Are all those phases presenting the D_{ho} symmetry of true three-dimensional (3D) crystals? To answer this question, let us recall in more detail how the x-ray structural data from these phases have been interpreted.

Some discotic materials do show a 3D crystal structure, such as the hexa-hexylthiotriphenylene mentioned in Ref. [2]. This 3D structure is identified by the existence of (hkl) Bragg peaks, with l and h or k different from zero. These Bragg diffractions demonstrate that molecules are correlated from one column to another. Other discotic materials—and this is the case for the material family we used, hexa-hexyloxytriphenylene (C8HET)—present a poorer Bragg diffraction pattern [3]. They show a hexagonal pattern for the $(hk0)$ lines, demonstrating the existence of a 2D triangular packing of columns, but no (hkl) lines (with l and h or $k \neq 0$); i.e., the discotic molecules are *not* correlated between the columns. One observes only a (001) liquidlike peak.

The l width of this peak is interpreted as the inverse of the finite correlation length of the short-range molecular ordering *inside* each column. It was noticed, in addition, that this width was sometimes resolution limited. This is the case for our compound. The symmetry class was then called D_{ho} (o for "ordered"). In the opposite case, the symmetry was D_{hd} ("disordered"). The classification "o" or "d" was awkward since it is well known that positional ordering cannot exist in 1D. This point was discussed, in particular, when comparing the nature of positional ordering between hexagonal lyotropic and columnar mesophases [4].

Another logical deduction from the narrow (001) line of ordered discotic columnar phases would be to guess that these D_{ho} phases could be 3D crystals. It is certainly an interesting challenge to reanalyze their x-ray diffraction data to find the evidence of intercolumnar molecular correlations. In their Comment, Brand and Pleiner go a step further and, with the one example of Ref. [2], claim that *all* D_{ho} phases are 3D crystals. The point is that this conclusion does not correspond to our present experimental knowledge for C8HET, which does not show (hkl) intercolumnar correlation diffraction peaks. Note also that the authors of Ref. [2] do not make such a general claim. They do analyze, on the contrary, an example of an assigned D_{ho} phase where the l ordering is indeed found to be liquidlike [5].

In conclusion, within our present experimental knowledge, the D_{ho} phase of C8HET is a columnar mesophase and not a 3D crystal. Its apparent 3D elastic behavior, derived from our Rayleigh scattering analysis, remains then to be explained, from column entanglement or any other mechanism. To prevent further misinterpretation of the columnar-phase properties, we suggest abandoning the misleading indices o and d in the symmetry description of the ordering.

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[1] Helmut R. Brand and Harald Pleiner, preceding Comment, Phys. Rev. Lett. **69**, 987 (1992).
[2] E. Fontes, P. A. Heiney, and W. H. de Jeu, Phys. Rev. Lett. **61**, 1202 (1988).
[3] A. M. Levelut, J. Phys. (Paris), Lett. **40**, L81 (1979).
[4] Y. Hendrikx and A. M. Levelut, Mol. Cryst. Liq. Cryst. **165**, 233 (1988).
[5] E. Fontes, P. A. Heiney, M. Ohba, J. N. Haseltine, and A. B. Smith, III, Phys. Rev. A **37**, 1329 (1988).