H_3^+ IN THE DIFFUSE INTERSTELLAR MEDIUM TOWARD HD183143

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The recent observation[a,b] of H_3^+ in the diffuse interstellar medium toward Cygnus OB2 No.12 has introduced an enigma related to the chemistry of such medium in addition to the long standing mystery of the diffuse interstellar bands (DIBs) and the unexplained abundance of CH^+. In order to accept the large observed H_3^+ column density of $3.8 \times 10^{14}\mathrm{cm}^{-2}$ based on the accepted experimental value of the dissociative recombination rate constant, an extraordinarily long pathlength needs to be assumed. Black proposed[c] that the direction of Cygnus OB2 No.12 is exceptional in that the extraordinary brightness of the star (more than a million times brighter than the Sun) will ionize the surrounding gas through X-rays.

We have continued to search for H_3^+ in the diffuse medium toward closer and less reddened stars and detected a high column density ($\sim 2 \times 10^{14}\mathrm{cm}^{-2}$) of H_3^+ toward HD183143, the well known star for its strength of the DIBs and used by Herbig as the representative star in his discussion of the DIBs. The existence of the large column density toward this more ordinary star demonstrates the ubiquity and more general abundance of H_3^+ in the diffuse interstellar medium. This direction is characteristic in that, in spite of its large extinction ($A_v \sim 4$) and strong DIBs, heavy diatomic species such as CO and C_2 are not detectable. Our observations of H_3^+ and other molecules toward this direction and the chemistry of the medium as well as our detection of H_3^+ in other diffuse clouds will be discussed.

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[a] B. J. McCall, T. R. Geballe, K .H. Hinkle and T. Oka *Science* **279**, 1910 1998.
[b] T. R. Geballe, B. J. McCall, K. H. Hinkle and T. Oka *ApJ.* **522**, 338 1999.
[c] J. H. Black *Phil. Trans. R. Soc. Lond. A* **358**, 2515 2000.