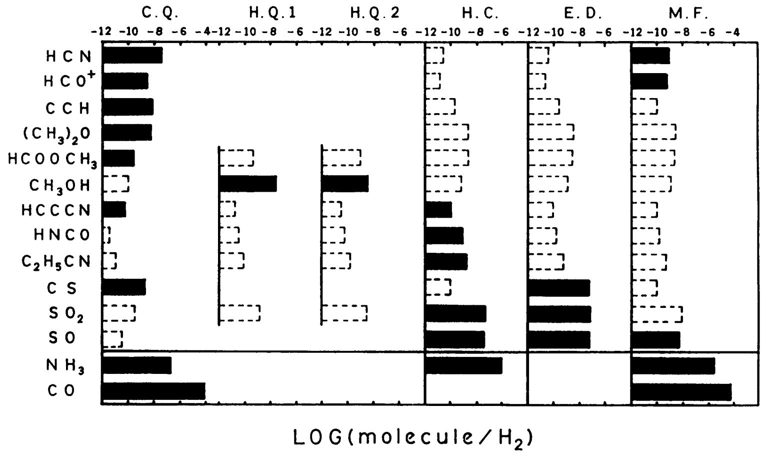

Fig. 2. A histogram showing the relative abundance (painted black) or an upper limit to the relative abundance (broken lines) of molecules to molecular hydrogen for all elements. Data with an asterisk (NH_3 and CO) were taken from Irvine *et al.* (1984).

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^{13}CO(J = 1-0) OBSERVATIONS OF THE ORION MOLECULAR CLOUD

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We present new ^{13}CO(J = 1-0) measurements of the Orion molecular cloud. The data were taken with the 4-m millimeter-wave telescope of Nagoya University with a beamwidth of 2.7'. The high velocity resolution of 0.1 km s^{-1} employed has revealed significant details of the ^{13}CO emission toward the H II region.

The results indicate that an appreciable portion of the molecular gas toward the Orion nebula is interacting with the H II region. In particular, the molecular gas within about 1 pc of the Trapezium stars appears to be interacting strongly with the H II region. There is evidence for a ^{13}CO cavity of approximately 0.6 pc in radius around the Trapezium stars, whose form is fairly anisotropic. The velocity distribution of the material comprising the cavity wall is rather systematic but is as well asymmetric, which does not permit an explanation in terms of the uniform expansion of a simple shell.

Outside the central 1 pc of the nebula, the ^{13}CO emission is extended in a complicated shape. It seems that a significant portion of the extended ^{13}CO emission is also interacting with the H II region. On the northeast rim of the nebula, a belt of ^{13}CO emission is likely to be responsible for the asymmetric expansion of the nebula.

It is not clear if the ^{13}CO features identified represent swept-up material due to the H II region; in some cases, we find that initial inhomogeneities of the undisturbed cloud can explain better the molecular distribution.

We investigated gravitational stability of each ^{13}CO feature by using the virial theorem, taking into account the pressure of the H II region. Most of the ^{13}CO features are found to be in nearly gravitational stable equilibrium, and we find no strong evidence of unstable molecular features which may lead to the formation of OB subgroups.

THE SHOCKED MOLECULAR GAS IN THE ORION BRIGHT BAR

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The Orion bright bar, a bar shaped optical feature, is seen about 2 arcmin southeast of the Trapezium stars in the Orion nebula. Since the bright bar is probably an ionization front seen edge on, this region has an ideal configuration to investigate a shocked region generated by an expanding H II region.

We have observed CO, ^{13}CO, CS(J = 1-0/2-1), HCO^+, HCN and H51α lines across the bright bar using the 45m telescope at Nobeyama. Figure 1 shows the position velocity diagram for the CO, ^{13}CO and CS(J = 1-0 and J = 2-1) lines across the bar. The intensities of all the molecular lines increase rapidly at the southeastern side of the ionization front where the emission peak moves from $V_{LSR} \cong 9$ km s^{-1} to V_{LSR} = 10-11 km s^{-1}. Then the intensity falls off at about 50"(0.1 pc) away from the bright bar with the peak velocity moving back to 9 km s^{-1}. The intensity and velocity variations are caused by the presence of the 11 km s^{-1} molec-

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