cm^{-2} (*cf.* Carswell 1988). They are almost certainly due to gas clouds intervening along our line of sight to QSO and cosmologically distant from the QSO; however, their origin and distribution is largely unknown (*cf.* Sargent 1988).

(2) Damped Lyman-α lines. These lines exhibit very high column densities of neutral hydrogen, $N(H) \sim 10^{20-22}$ cm^{-2}, which causes the damping wings to dominate the shape of the Lyman-α absorption line. They are probably associated with the disks of galaxies lying along our line of sight to the QSO (for example Wolfe 1988).

(3) Intervening metal lines, $z_a \ll z_e$. These absorption systems exhibit low- and high-ionization metal lines with total widths of $\lesssim$300 km s^{-1}, and are sometimes observed to be made up of components with widths of $\sim$10 km s^{-1}. These lines have column densities which suggest $N(H) \sim 10^{17}$ cm^{-2}. The absorption redshifts range from zero to the emission line redshift (z_e) of the QSO. This means that the systems are almost certainly due to intervening gas clouds, and are probably due to clouds in the halos of intervening galaxies. Many cases of galaxies near the position of the QSO with redshifts equal to the absorption redshift in the QSO have been found. See Lanzetta and Bowen (1990).

(4) Associated absorption-lines, $z_a \sim z_e$. These lines are similar in velocity width to the intervening metal line systems, but their redshifts tend to cluster near z_e. The existence of this category of absorption system is mainly statistical. Observers have claimed to detect an excess of narrow metal lines near the QSO emission redshift, relative to the number of lines with $z_a \ll z_e$ (*cf.* Foltz 1988). Since cosmologically distant intervening absorbers should be distributed with redshift with no preference for the QSO redshift, the excess of lines near the emission redshift is evidence that these gas clouds must be associated with the QSO, its host galaxy, or its associated galaxy cluster.

(5) Broad absorption-lines. These systems are categorized by lines with relatively large velocity width ($\sim$10,000 km s^{-1}) which occur blueward of the high-ionization QSO resonance emission lines.[†] The breadth and positioning of these lines suggest an intrinsic

[†] For reviews about BALs and BALQSOs, see Weymann *et al.* (1985), Turnshek (1988), and references therein.