I. Bsuma A. 4. Roberta 3. 2. Ostriker with galaxies but had never previously taken this subject in 1978, I leaped at the chance. Per-

Newton's law of gravitation was universally valid. of the universe on large scales or even whether that no one could understand either the dynamics and kinematics of neutral hydrogen on spiral galaxies, as observed with radio telescopes. These hydrogen clouds extend to great distances—farther than the visible stars—and probe the mass distribution of galaxies out into the regions supposedly occupied by the invisible halos. The early data were showing high rotational velocities and excess mass there, just as the model by Ostriker et al. predicted.2 It therefore seemed that the data were ripe for synthesis and that an enduring statement about invisible mass in the universe might be possible. I in-
vited my long-time collaborator Jay Gallagher to participate, and he agreed enthusiastically. Jay is a very broad astronomer who, more than most, is able to juggle many complex, competing scenarios at one time. We divided the topic in sections according to observational technique: hydrogen ro-
tation measurements, binary galaxies, small groups, and large clusters. We were very skeptical and tried hard to argue away the evidence for invisible matter in each other's sections. Finally, each of us settled on a piece of evidence that he or she felt could not be ignored or argued away: Jay, on the dynamics of dense cores of large clusters, and I, on the outer hydrogen rotation curves of roughly two dozen spiral galaxies. With that, we both became intellectually and psychologically committed to the existence of dark matter in the universe and sat down to write a strong but rea-
soned statement in its favor.

The review served as a kind of watershed. Argu-
ments stopped about whether dark matter exists and began to focus on how much there is and how it is distributed. Additional impetus soon came from particle physics, which suggested that the universe today might be filled with invisible, non-
interacting elementary particles left over from the Big Bang. The marriage between astronomy and particle physics has been very fruitful and has yielded new models for galaxy and cluster forma-
tion and even the Big Bang itself.3 From being an impediment to our understanding of the universe, dark matter has turned in a few short years into one of cosmology's most powerful concepts.