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Authors
Morris, Kimberly
Blake, Robert

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EPILOGUE:

Virginia Trimble

Physics Department, University of California, Irvine, CA 92697
Astronomy Department, University of Maryland, College Park, MD 20742

Abstract. The organizers had clearly intended that the first day be devoted to the universe as it is here and now, the second day to the universe as it was there and then, and the third day to linking the two in both directions (there/then as boundary conditions for evolutionary calculations up to the present and here/now as calibration for observations reaching out and back). In the event, most speakers mentioned all three topics.

HISTORICAL INTRODUCTION

The electromagnetic spectrum (NOT then so called) first expanded outside the range of human vision in 1800, when William Herschel held a thermometer off the red end of a prism-dispersed solar spectrum and discovered it heated up there somewhat faster than it had when exposed to visible light. The next year, Johann Wilhelm Ritter expanded the spectrum in the other direction by placing strips of paper soaked in silver salts (discovered by Scheele to blacken in the presence of light) off the blue end of a similar spectrum (located, of course, in Germany rather than England). Herschel (1738-1822) remains a living presence in the astronomical community, but Ritter (1776-1810) has nearly been forgotten. He was a protege of Goethe (as were several other contemporary chemists), discovered electroplating, and was the first to show that the electrolysis of water evolved a volume of hydrogen just twice that of the oxygen. He was an exponent of the now-strange-sounding school of Naturphilosophie and the principle of polarity and succombed early to the effects of drugs, so that, like Mozart, by the time he was my age, he had been dead for 18 years. He concluded that infrared were oxidizing rays and ultraviolet reducing rays; the fundamental similarity of all kinds of radiation was not demonstrated until 1847.

The solar spectrum was first photographed using the daguerrotype process in 1842 by Bequerel and using the (wet) negative process in 1843 by John William Draper (father of Henry). George Stokes (of the polarization parameters) obtained tracings of the solar spectrum using fluorescence in 1852 (and is sometimes credited with the discovery of ultraviolet radiation).

Discovery of stellar UV awaited the conflux of reflecting telescopes, quartz optics (remember glass is UV-opaque) and dry plates. Henry Draper (of HD fame) recorded Balmer lines beyond H-gamma in the spectrum of Vega in 1872 and William Huggins the higher Balmer lines and Balmer jump in Vega and other stars in 1873. Other pioneers in the early 20th century included Wright and Yu at Lick Observatory and Barbier and Chalonge in France. The first three-color photometry was achieved by Öpik and Livländer in 1925. Visual and blue light could be separated by using different photographic emulsions. But "blue" plates were also sensitive to UV. They made use of chromatic aberration in the Dorpat astrograph to separate B and U; if one made point images, the other inevitably yielded halos.

In retrospect, pre-war balloons could probably have ascended high enough to extend the UV spectrum well below the ground limit, but, in fact, discovery of vacuum ultraviolet emission from the sun came only on 10 October 1947, when a group from NRL led by Herbert Friedman launched a "borrowed" German V-2 rocket from White Sands, New Mexico. NRL, GSFC, and Princeton followed with Aerobee rockets carrying, first, photometers and later objective grating spectrometers in the 1950s, thereby obtaining the first stellar UV data at shorter wavelengths.

The year 1966 saw the first orbiter, a Hasselblad camera with an objective grating, carried by the Gemini 11 and 12 astronauts (one of whom apparently had buttery fingers, leading to a Hasselblad being the only camera in an independent orbit to this day).

The first relevant satellite was a US product, OAO-2, launched on 7 December 1968. It recorded galaxies and HII regions as well as stars. The ESRO (now ESA) TD1 followed in March 1972 and lasted about two years. OAO-C (Copernicus, a US + UK launch in August 1972) was nearly contemporaneous, followed by two years of ANS (1974-1976), which reported UV excesses in the centers of globular clusters and elliptical galaxies, and brief observing periods from Skylab in 1973-74. The launch of IUE on 26 January 1978 brings us essentially to the modern period, since data recovery ceased only on 30 September 1996 (The satellite is, of course, still there, and one participant suggested that it knows we are all thinking of it).

Astronomical investigation expanded still further blueward with a few observations of stars in the extreme (formerly "unobservable") ultraviolet from Voyager 1 and 2, and, more recently with EUVE and ROSAT.

It is perhaps worth noting that there are almost equal time intervals from Öpik and Livländer to the first V-2 launch, from the V-2 to OAO-2, from OAO-2 to HST, and from HST to the expected prime of NGST. The early historical material presented here has been taken from Hearnshaw (1986, 1997), Brown (1997), Asimov (1989), and Hufbauer (1982); the more recent material is from Friedman (1986) and relevant articles in Maran (1992).

THE FUNDAMENTAL PROBLEM

No one doubts that many large-redshift galaxies, however found, look superficially very different from most nearby galaxies or that, in principle, the differences are guides to understanding the formation and evolution of said galaxies. But before we can make much progress with understanding real, physical changes, it is necessary to deconvolve them from (a) differences due to the wavelength being observed, which is normally rest-frame optical nearby and rest-frame ultraviolet at large redshift (this is called the morphological K correction, to distinguish it from the standard K correction of extragalactic astronomy, which concerns the spectral energy distribution), (b) differences due to much poorer spatial resolution as the apparent sizes of galaxies shrink from a degree of arc to a few arcseconds, (c) differences due to the loss of bits with relatively low surface brightness, which are killed off as $(l + z)^4$ (see Sandage 1988 for an explanation of the four powers of $1+z$), and (d) differences arising from the amount and type of dust present at high and low redshift. This last is, of course, real, and the dust is important to people studying chemical evolution, physics of interstellar material, and so forth. But the attitude of most participants reminded me of a childhood riddle: "What's tall and skinny and green and has wheels and grows around houses?" "Grass." "Grass doesn't have wheels." "Oh, I just put that in to make it more difficult."

High-resolution, high-sensitivity images of nearby galaxies in their rest-frame ultraviolet light are clearly the key to allowing for the first three confounding effects. Relatively few such images (mostly from the Ultraviolet Imaging Telescope and from the French FOCA balloon program, with small but important augmentation from HST) currently exist, and more are clearly needed. This is worrisome, given the range of other demands on HST and the paucity of UV missions in the current NASA, ESA, and other queues. At least in nearby galaxies, UV is a good tracer of moderately young stars (fading in about 10^8 years, where H-alpha emission is useful only for populations less than about 10^7 years old), of some (poorly understood) types of old stars, and of non-stellar activity, though it is not always completely clear which you are seeing, particularly in the case of elliptical galaxies.

Yet one further distinction needs to be made, between temporal changes in appearance of individual galaxies and in classes or populations of galaxies. Starbursts provide an obvious example. A particular galaxy will fade, redden, and otherwise change rapidly after a burst event, but starbursts at various epochs are in general rather similar. This is presumably the main reason that the morphological K correction is much more conspicuous in normal than in bursting galaxies. Hence, also, for instance, the near-constancy of maximum surface brightnesses of bursts back to $z = 3.5$ noted by Meurer.

Virtually every speaker addressed some aspect of this deconvolution problem, but the images shown by O'Connell, Vacca, Fanelli, Giavalisco and in some of the posters were particularly striking. The problem of separating off

UV contributions from old stars was addressed by Ferguson and Deharveng, and the AGN contributions by Heckman.

HUBBLE TYPES AND OTHER SORTS OF CLASSIFICATION

Every science seems to go through (and with luck emerge from) a stage characterized by the activity we associate with the name of Linneaus. Within galactic astronomy, the "tuning fork" classification scheme proposed by Edwin Hubble in the late 1920's has served remarkably well, though it was initially rejected by the IAU commission on nebulae in favor of another classification method less closely tied to evolutionary theory (Hubble's evolutionary scenario was, of course, wrong). Most of us think we can recognize an E, S0, S or Irr when we see one, and perhaps even tell an E1 from an E4 or an Sa from an Sc, despite the fact that, as Roberts pointed out, the only quantifiable parameters that are monotonic with Hubble type are color and spectral type.

Other speakers referred to a study coordinated by A. Niam and O. Lahav, in which six experts were asked to classify images of a large number of galaxies at the scale of the POSS, using the de Vaucouleurs numbering system (from -4 to +10 from most elliptical to most Magellanically irregular) with optional words about peculiarity. They gave the impression that there was not a lot of correlation between the types assigned by the various experts nor even much agreement about what fraction of the galaxies could be meaningfully classified. My own interpretation of the published papers arising from this study is slightly different: the experts and the automated neural network system that was trying to "Deep Blue" them all agreed quite reasonably well, given the quality of the images provided.

Finally, it was noted that whether or not you succeed in fitting an exponential (disk-like) or an $r^{\frac{1}{4}}$ (de Vaucouleurs, bulge-like) profile to the light of a given galaxy does not necessarily tell you much about its real type. One is inclined to suspect that de Vaucouleurs profiles are a bit like Freudian analysis and Feynman diagrams – they worked well if (and only if) Freud, Feynman, or de Vaucouleurs used them.

In any case, however well or ill Hubble types serves us for galaxies in our own neighborhood (especially the bright ones), it is clear that they increasingly fail to describe the population as we look to large redshift, unless you are content with 50% or more classified as "other" or "peculiar." In particular, barred spirals and grand design ones become rare (arguably mostly a wavelength effect).

Griffith proposed that galaxies be allowed to describe themselves using self-organized maps to pick out significant aspects of morphology, without predetermined types. Starting with four possible descriptors (including isophotal filling factor and off-centeredness) the images he used arranged themselves in a two-dimensional space. Whether the axes of that space are physically more meaningful than the ones we are used to (bulge/disk ratio or whatever) remains to be determined. And somehow neither the old scheme nor the new one provides a way to say just how remarkable looking Tyson's gravitationally deconvolved pretzel (or theta) galaxy is, even though W. W. Morgan found something rather similar nearby back in 1958.

Are there distinct, recognizable new galaxy types to be found at large z? A late-1995 paper by Cowie et al. identified a class of "chain galaxies." Giavalisco (in print and at this conference) has pointed out considerable similarity between these and some nearby, edge-on, low surface brightness galaxies as seen in the UV (shown also in the A. M. Smith et al. poster). Abraham, however, presented analyses of HDF images indicating that this is not the whole story. The faint, peculiar-looking galaxies are rather a mixed bag, and at least some "chain galaxies" are just recovering from their first bursts of star formation and will evolve into early type systems. I was struck by a strong resemblance between some of the images and the aligned optical emission of powerful radio galaxies (mostly also at largish redshift) shown by Spinrad.

Finally, a handful of visually striking items, many of which are clearly a consequence of "morphological K correction." First, nearby spirals seen in the UV are ringier and messier than their optical counterparts and have generally lost their bars and bulges. Second, the differences between wavebands are much less conspicuous in starburst galaxies. Part of this may be a pattern recognition effect: the loss of regular spiral structure is an easier change to see than rearrangement of blobs. But it is probably also at least in part a real difference between galaxies whose individual properties will change rapidly as they age and galaxies whose population properties are changing. This is closely associated with the third point, that we are also looking back in time when we study nearby galaxies at I, J, and K. Fourth, for a large group of galaxies imaged with UIT, about 80% of the UV is diffuse, rather than being associated with particular HII regions. This is important as an indicator that UV generally succeeds in getting out of the volume where it was radiated, so that dust is not completely dominating what we can and cannot see. Deharving disagreed, suggesting that only 1% of Lyman continuum photons can escape from nearby galaxies, or they would add up to more than current limits on the far UV background.

STAR FORMATION OR METAL PRODUCTION VS. TIME

These two are really the same phenomenon, because UV and all our other standard star formation tracers (H-alpha emission, far infrared, non-thermal radio, HI, and CO; all quite reasonably correlated according to Buat) are sensitive only to roughly the same set of massive stars that produce and distribute heavy elements. A plot of star formation rate vs. redshift due to Madau et al. has been widely reproduced (even by me in a non-specialist article). A number of participants pointed out that the numbers in that plot should be regarded as lower limits, because little allowance was made for dust in interpreting the UV fluxes. This is so even for the local SFR according to Treyer, and the correction factor can be anything from 2 to 40, depending on what you think about dust.

As a result, the integrated star formation at redshifts greater than 2-3 is probably enough to make ellipticals, spheroids, and bulges of the galaxies we see now. The peak rate at z = 1-2 contributes mostly to disks and small galaxies and could even over-produce metals if you make a large dust correction. This problem goes away when you allow for the metals in X-ray cluster gas and in the clouds responsible for QSO absorption lines (which are very widely distributed indeed according to Charlton).

THE UV BACKGROUND AND COSMIC BARYON DENSITY

The intergalactic flux of ionizing radiation is known reasonably well at z = 2 - 3 because of the "proximity effect" seen in statistics of QSO absorption lines (the increase of numbers of lines with z cuts off when you get close to the emission redshift because UV from the QSO itself ionizes away potential absorbing clouds, and the magnitude of the effect is a measure of the ratio between the fluxes provided by the background and by the QSO, which we can see redshifted into visible light from z = 2 upward). The background flux thus found is significantly larger than can be provided by the sum of the QSO's themselves, and there must be a contribution from star-forming galaxies.

Locally we have only limits on the UV background. According to FOCA spectroscopy presented by Martin, local galaxies add up to at least 20-30% of this, and could even exceed it without too much trouble (Deharveng poster).

Understanding the ionizing flux as a function of redshift is of importance in tracking the baryon inventory of the universe vs. redshift and comparing it with the limits from big bang nucleosynthesis, because most of the baryons at z of three or more are still in the sorts of gas clouds that produce damped Lyman-alpha QSO absorption lines. A participant in the discussion following Fukugita's presentation gave the impression that we are somehow short of baryons relative to the expectations from BBN, but most of us are a bit worried about the opposite problem, a baryon excess if the ratio of gas to galaxies in X-ray emitting clusters is typical of the universe as a whole.

OTHER DEGENERACIES AND INCOMPLETENESSES

So far, all attempts to separate the effects of age, metallicity, and reddening (and red leaks where they occur) in ellipticals and other old populations have failed. This can only add to the considerable uncertainty in age that arises even in globular clusters from imperfect knowledge of distances, atmospherical models, and stellar evolution physics. An additional source of error is that most models of the evolving spectral energy distributions of galaxies have been assembled by adding up model stellar photospheres rather than real groups of stars (like M67) that include close binaries, blue stragglers, and so forth, and the effect may be important (Brown). As a result, M32's dominant population can be either 2.75 or 4.5 Gyr old, and a perfectly respectable looking galaxy at $z = 1.55$ can be as old as 3.5 Gyr (a problem for large H_0 and critical density!) or as young as 1.1 - 1.4 Gyr (Bruzual). Woodgate's $z = 2.38$ poster galaxy is similarly indeterminate among age, SFR, and dust (with similar uncertain implications for cosmology).

Even our best tracers don't always find all of what they are looking for. IRAS, for instance, still didn't go to quite long enough wavelengths to see all the cold dust that might be absorbing stellar ultraviolet (and other) radiation, according to Trewhella. The method of finding galaxies at z greater than 3 by looking for their disappearance from U-band images (as the Lyman break redshifts in) has been enormously successful, but it may still not be catching all the vigorous star formers there. One field, surveyed in redshifted H-alpha by Teplitz, reveals a good many more star-formers than expected. These could be second starbursts, late first starbursts, or most likely (and most boringly) evidence of clustering in that particular region of the sky and redshift range, which were selected because of the presence of QSOs. Incidentally, in case anybody is still reading, it is a sound policy, whenever there are several possible explanations for something, to bet on the least exciting. First, this is generally the right answer. And second, if you are wrong, the universe will be so rewarding that you won't mind very much. The same principle applies to reading for the purpose of putting yourself to sleep - pick something you have to read anyway, then at least one objective will be accomplished.

More generally, no one indicator of star formation can be expected to catch everything. Star formation rates are most tightly correlated with total gas content of a galaxy, not with HI or CO alone (Buat); H-alpha fades, UV is absorbed, and $3000 M_\odot/yr$ for one galaxy, a most unlikely result. But it turns out that CB58 is almost certainly gravitationally lensed, which artificially enhances everything pertaining to its center (Pettini).

EVOLUTION

The word "evolution" in astronomical contexts is used to mean two rather different things. In the context of stellar structure and evolution it unambiguously means changes with time of individual objects (as a function of their mass, composition, etc.). In the context of quasars and radio sources, evolution has generally been used to mean changes with time or redshift of the numbers or brightnesses of whole populations. These changes are some complicated function of birthrates vs. time and evolution in the previous sense. Use of the statistic V/V_{max} is a frequent marker of the latter sort of evolution (showing that QSOs and radio sources were commoner or brighter in the past, while gamma ray bursters were the opposite).

Both senses of the word appear in the context of galaxies, but I mean here the V/V_m sort of population evolution. There are then at least three questions one can ask: (1) Are there any differences at all in mean properties and distribution functions of galaxies with redshift? (2) Are these larger than or different from what you would expect from the simple dying away of massive stars that were formed more copiously in the past? (the distinction between passive and active evolution), and (3) Are the differences best described as there having been *more* galaxies in the past (at least in some range of colors or Hubble-ish type) or as there having been *brighter* galaxies in the past (also perhaps restricted to some range of something)? The former is called density evolution and the latter luminosity evolution. The alternative of fewer and/or fainter in the past is sometimes called anti-evolution.

Discordant answers to these questions have led to a remarkable amount of unpleasantness over the years, both published and private. I believe that there are three contributors to the fuss and bother that are not really anybody's fault but which, overlooked, are likely to exacerbate the situation. First, galaxy counts make enemies that only redshift surveys can reconcile. That is, model dependence (a general pejorative in this context, though it shouldn't always be taken to be so) is too great to deconvolve without the additional constraint of knowing where/when the galaxies are that you are counting. Second, the local luminosity function is not well calibrated at the faint end, with factors of two or more difference between numbers coming from the APM survey of POSS plates and the CFA and other surveys. A speaker at another recent meeting suggested that the entire fuss about faint blue galaxies might be a result of APM having undercounted the local and overcounted the distant ones! I hope this is an exaggeration.

Third and perhaps most important, if the real N(L) is a power law, then luminosity evolution and density evolution are completely indistinguishable, even in principle. The plots in log N - log L or log N - log S for here/now and there/then are two parallel lines, and the displacement could have been along either axis or a combination of both. The radio astronomy community learned this slowly and painfully a number of years ago. Of course the real luminosity functions of galaxies are not supposed to be pure power laws. Schechter told us so, and we all express agreement by talking about L_* or M_* galaxies. But they are not very different from power laws, especially when you have only the bright end or the faint end is poorly calibrated nearby. I am, therefore, inclined to regard debate about whether the evolution of galaxy populations is mostly density or mostly luminosity evolution as premature at best.

Even after we allow for all these qualifications and caveats, there seems to be reasonable concensus on several points (meaning that most participants would agree with most items; not that any one agrees with them all or that all agree with any one). First, the distribution of N(L, type) is different at redshifts above and below 0.3 (Liu), and this might well be associated with something like rapid infall of most remaining gas into disks at this epoch. Second (Fukugita and others), back to $z = 1$, giant ellipticals, S0's, and (early) large spirals are brighter by at most 1^m. But late type spirals, Sm's, and various Irr galaxies are much commoner, much brighter, or both, at moderate redshift than at $z = 0$. That is, faint blue galaxies exist! Evolution in color with redshift is independently confirmed by Tyson's studies of weak gravitational lensing; the larger the redshift of the cluster that acts as the lens, the bluer are the arcs of light from the galaxies behind.

Current theory can quite happily accomodate all these changes and others. Fading of stellar populations toward the present will make galaxies become fainter, while mergers will make them (temporarily) starburst bright and (permanently) less numerous. And, since nearby galaxies show a considerable range in their patterns of past star formation (as shown by Gallagher), we should also expect a range of patterns of evolution.

Dust undoubtedly also "evolves" or anyhow changes with time on both long and short time scales. For instance, the 2175 Å feature common in extinction curves within the Milky Way is absent from starburst galaxies (Gordon, Calzetti, and others), and this is an effect, not a cause. That is, radiation from the stars has wiped out whichever dust (etc.) component carries the 2175 Å absorber, not that a change in the galactic gas has caused a starburst. On longer time scales, the gradual increase of average interstellar metallicity and non-solar abundance ratios that we expect from different mixes of stellar masses and supernovae are bound to result in non-Milky-Way conditions, not just in dust-to-gas ratio but also in grain sizes, compositions, and optical properties.

Finally, having encountered the phrase "morphological K correction" for the first time at this meeting, I would like to conclude by emphasizing its importance and by coining the phrase "wavelength dependent Malmquist bias." That is, an ultraviolet-selected sample is likely to be UV-bright.

ACKNOWLEDGEMENTS

It is the traditional prerogative of the last speaker to express the collective thanks of participants to those who have made the gathering possible. We are indeed grateful to William Waller, Michael Fanelli, and their SOC, who contributed to our intellectual well-being, to Joan Hollis and the LOC who contributed to our physical well-being, and, especially, to the sponsoring organizations: NASA's Goddard Space Flight Center and its Director, Joseph Rothenburg, Hughes STX Corporation and its president Ashok Kaveeshwar, and the University of Maryland Astronomy Department and its chair, Marvin Leventhal (all of whom were present at the conference, at least briefly), who contributed to our financial well-being.

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APPENDIX I: DON'T QUOTE ME

Every conference produces its share of (accidental or carefully prepared) remarks that illustrate that having a sense of humor is not entirely inconsistent with doing good science. Here are some of my favorites:

"I don't know if it's typical of a large collaboration, but not many people are doing anything." E. Egami

"The center is probably somewhere near the middle." R.F. O'Connell

"HDF star counts have the right slope but the wrong amplitude, which we blame on John Bahcall." R. Windhorst

"I learned everything I know from the Medium Deep Survey." D. Schade

"I was on the panel that chose the Medium Deep Survey." V. Trimble

"If you've got time to do that, let me know." R. Griffiths

"So we have a 200 Megaparsec telescope, but where do you send your observing proposals?" J. A. Tyson

"The shortest-lived fruit in the sample." R. Windhorst

"I am going to describe the formation of galaxies in 25 minutes." M. Fukugita (this is, of course, a short time scale even by cosmological standards)

APPENDIX II: THE CONFERENCE SONG

A couple of participants suggested that we ought to join in singing some sort of inspirational hymn as part of the formal opening or closing session. I have, therefore, provided the following verse, which is to be sung to the tune of God Bless America (keeping in mind that the tune is still under copyright).

God bless the Ultra-V, band that I love.
Subsidize her; digitize her,
So she goes through the ozone above.
From the quasars, to the clusters,
To the spirals, red with dust,
God bless the Ultra-V, the band I trust...
God bless the Ultra-V, the band I trust.

APPENDIX III: THE POSTER PRESENTATIONS

Every poster display presented at least one interesting idea, of which the following is meant to be a summary. Missing numbers represent missing participants. And several people told me that the item I had picked out was not the one they had intended to highlight! They are in the order adopted by the program booklet, and only the first author is mentioned.

1. Stecher. It's amazing what you can do with a 38 cm telescope (UIT)! 2. Waller. When you look at S and SB galaxies in the UV, they lose their bars and bulges and look like HDF galaxies. 3. D. Smith. NGC 3310 in the UV does not entirely match the bits and pieces we see at high redshift. 4. Allen. A tag-along package on a military spacecraft can be very productive (but UVISI wins the undefined acronym award). 5. Cornett. H-alpha is the first of the starburst indicators to fade. 7. Neff. There are lots of star-forming knots in the antennae galaxy, NGC 4038/9, but whether they will evolve into anything like globular clusters depends on the (unknown) lower part of the IMF. 8. Marcum. UIT galaxy images show an enormous range of morphologies, and you can fit an enormous number of them into $1m^2$ if you are clever. 9. Hoopes. Diffuse ionization is due mostly to late B stars and to local (leakage) UV. 10. Treyer. The local SFR determined from UV comes out bigger than the number found from optical data at $9.3 \times 10^{-3} h M_\odot / yr / Mpc^3$. 11. Donas. UV galaxies in A2111 and in the Coma cluster are less concentrated to the centers of the clusters than optically-selected ones (presumably to first order the difference between S's and E's). 12. Schiminovich. The main problem with the local far UV background is to remove all the foreground distractors well enough to find it (quite different from the X-ray case). Local galaxies already add up to an appreciable fraction of the current limit. 13. Bianchi. M33 has massive young clusters, but it is not clear whether they will age to resemble globular

clusters. 14. Gonzalez-Delgado. Starbursts are not enough to reionize the IGM at z near 3, and we know it must be reionized from considerations of galaxy formation and Gunn-Peterson absorption. 15. Lauroesch. The answer to the question "Are QSO metal absorption lines due to halos or to dwarf galaxies?" is "Yes." 16. Dorman. The interpretation of thermal UV radiation has lots of age-metallicity degeneracy. 17. Ohl. The amount and color of UV upturn in early galaxies is not (just) a function of Fe/H; there must be some second parameter, arguably age, as in globular clusters. 18. Brown. In an HR diagram of M31 or M32, you can envelop all the stars with evolutionary tracks for either young (hot, massive) stars or old (extended horizontal branch etc.) stars, but the distributions of luminosity and color are wrong for the speed of evolution along the tracks in both cases; neglect of close binary evolution may be a significant factor. 20. Zirbel. A comparison of the UV properties of FR I and FR II radio galaxies is not inconsistent with unification models. 21. Yi. when you allow for the UV excess in early type galaxies moving through U, B, V color bands with increasing redshift, you get bumps and wiggles in color vs. z that constitute a test of passive evolution. 22. Hill. Galaxy counts at 3000 Å in the range m = 16-20 seem to anti-evolve, presumably as a result of incompleteness. 23. Teplitz. An H-alpha survey of one field finds more high z galaxies than implied by UV dropout, which is most easily explained by clustering, since the field was selected next to a QSO at the redshift being examined. 24. Woodgate. One $z = 2.38$ galaxy is either very dusty and has an enormous star formation rate or is older than 1 Gyr. 25. J. Liu. The contribution to the UV background from recombination in QSO line-absorbing clouds is less than previously found. 26. Deharveng. The probability that Lyman-continuum photons escape from local galaxies is less than 1% (or you overproduce the local background), but things may be different at high z. 28. Schulte-Ladbeck. Blue compact dwarf galaxies are the tail of the population of dIrr's not a separate class. 29. Burgarella. Considerations of the age and evolution of globular clusters indicate that the Milky Way probably formed inside out. 30. Gordon. Dust in starburst galaxies has no 2175 Å feature, but is not the same as SMC dust either. 31. Varosi. The structure of the ISM can be described in fractal terms. 32. Trewhella. The cold dust primarily responsible for absorbing UV light has a scale height larger than that of the stars, and you need wavelengths longer than $100\mu m$ to see it all, so IRAS missed some (and so did not entirely settle the issue of "opaque spirals."). 33. Borne. Galaxies in the HDF look a lot like IRAS galaxies. 34. Gardner. Morphological K corrections rule! 35. Burg. Faint E and S0 galaxies seen with HST are rounder than local ones, which could be either an evolutionary or a wavelength effect. 37. A. M. Smith. Edge-on galaxies seen in UV look a lot like chain galaxies. 39. E. P. Smith. NGST will see UV radiation (redshifted) from VERY far away. 40. Heap. COS is a potential UV instrument to be installed on the 2002 return to HST. 41. Bowen. Early results from STIS show all is going well, including the once-worrisome MAMA detectors. 42.

Sasseen. The optical/UV monitor of XMM can be used to study galaxies. 43. Buat. UV extinction does not totally dominate what we see. 44. Deharveng. The FOCA balloon-borne telescope has also yielded interesting observations of stars. 45. Linder. LSB galaxies must contribute to QSO absorption lines or one ends up with too many baryons for BBN. 46. Neff. Presentation of the IRIS concept.