A SUMMARY

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This has been a timely conference. Astronomical spectroscopic classification is facing crossroads that make it wise for us to look carefully at where we are now and which way we should go. The on-going explosion in detection techniques for fainter and fainter objects at all wavelengths and the availability of fast analytical procedures are opening up these new roads. It is a tribute to Fr. Patrick Treanor's vision that we have gathered here to take stock of the current status and to consider the future of spectral classification and it was fitting that we did so while remembering the pioneering work of Fr. Angelo Secchi

Besides hearing about many observational results, hopefully at this conference we have learned of new problems and also learned some lessons that will direct our future work. Surely each and everyone of us will see these problems and lessons in a different manner. It is indeed pretentious to try and summarize what has been said here. I can only speak of what I learned myself and offer it to you as a reference frame for your own conclusions. In doing so I'll emphasize problem areas that were mentioned.

We repeatedly heard here that there is an infinite variety of stellar spectral characteristics and that we may even say that each star defines a different spectral type. Nevertheless, it is that same infinite variety that makes spectral classification necessary. The infinity of possible types indeed tells us that spectral classification will always be an important astronomical tool.

Elegant photometric systems and ways of relating photometric measures to stellar physical parameters and to spectral types were

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summarized. The multiplicity of such systems was mentioned as a problem area. It was also emphasized that although photometry can yield accurate information about stellar temperature, luminosity, and other parameters, it is confusing to use the language of empirical spectral classification to describe such results because no spectrum is actually examined in such methods. When a spectral type is derived photometrically we should clearly so indicate. Some participants of this meeting feel that different symbols should be used.

We have reviewed in some detail the MK classification system which has played such an important role in the last thirty five years or so. W. W. Morgan has incisively described the empirical essence of the system. He also told us that the system has no authority other than its usefulness. It has undoubtedly proved to be useful and therefore has carried a lot of weight and very likely will continue to do so specially for the fainter objects that can not be studied in greater detail than allowed by the system. By emphasizing the spectroscopic effects of temperature and luminosity an MK class tells us in a quick way something physical about a star, and combined with photometry the system proved to be, as you well know, a powerful technique in galactic structure and stellar evolution studies. The theoretical interpretation of the MK system illustrates beautifully how progress in classification is made. Refinements are brought about by successive steps of empirical definition based on standard stars, interpretation with the help of theory, and revised empirical definitions based again on standard stars. As we expand the domain of classification into new spectral regions, new spectroscopic dispersions, cover new types of stars, and include additional dimensions in the classification scheme, we must always remember that the approach of empirical definition guided by theoretical interpretation has thoroughly proved its great value.

As was mentioned by various speakers, it is evident that the MK system has shortcomings and improved classification schemes are required with sufficient dimensions to relate to all the significant physical parameters in a stellar atmosphere and to describe the effects of rotation, duplicity etc. The extension of the observable wavelength range from the gamma-ray to the radio spectral regions presents us with the challenge of how to classify spectral features in these new domains. The increase in efficiency of detectors and the use of computers makes it possible to reduce in a dramatic way the time elapsed between the collection of photons at the telescope and our finding out what these photons tell us. The photographic plate can be by-passed.

This brings up the problem of how best to describe in summary form digitized spectral information, and how to preserve it. Another problem is whether, in view of the mass of data already recorded in photographic plates, we should give up photography altogether at least in the optical part of the spectrum. As we reached out from the solar neighborhood to the Magellanic Clouds in our observations, we encountered another problem area in spectral classification, namely how best to describe the spectra of stars that may have evolved rather differently from those near us.

In conclusion let us not forget that any spectral classification scheme really describes our current perception of what nature is like and that imperfections and limitations in that perception will always exist.

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