CHANGING EMPHASES IN SPECTRAL CLASSIFICATION

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The definitions and general principles of the MK system given in the statement by Dr. Morgan, which Dr. McCarthy has read to you, are an expression of my views also.

It is mainly in specifying the MK domains that modifications are necessary for the cooler stars - and these for rather obvious reasons. For example, the spectral range has been extended to longer wavelengths, particularly for stars showing strong molecular bands. The lines and bands in the visual and far red regions are particularly useful in defining temperature and chemical composition, but the blue region remains important as having the features most sensitive to luminosity.

The necessity for flexibility in our criteria is shown again by the weak-line stars of types G and K. Most of them are classifiable on plates having the usual classification scale of 80 Å/mm, but in a few of the most extreme halo stars (mentioned by Dr. Gratton this morning) the metallic lines are so weak that we must use spectrograms of higher dispersion in order to see the lines.

It is a characteristic of any classification scheme designed to order large numbers of stars according to several observed variables that there will be certain ranges of these variables (areas in the HR diagram, for example) where the standard technique gives reduced accuracy, leading to a certain fuzziness in placing stars. Then special techniques must be developed for this restricted domain. In spectral classification, for instance, I do not think it makes any difference whether whoever develops those techniques calls the resulting scheme by any name he wants, or con-

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siders it just an extension of a more general existing classification, such as the MK system. In the latter case, however, I think we can agree that for stars at the edge of the domain the new types should be consistent with well-known standards, if we want to avoid a lot of confusion.

Looking ahead to the future, we can see changes that have already begun to take place. Originally, spectral classification was developed because astronomers were impatient. They could not wait for complete physical theories of stellar atmospheres, but used spectral types as short cuts to determine such fundamental physical properties of the stars as temperature and luminosity. Often the regularities brought out in classification pointed the way to needed theoretical developments.

Now, however, we see such rapid progress in the theory of stellar atmospheres that spectral types are often useful primarily for quick interpolation between model atmospheres. This is no mean role, and the tendency will almost certainly increase in the future. It is also one in which automatic methods of classification can prove most effective.

Yet there are limits to automation. If we have learned anything from experience, it is that the complexity and variety of stars is so great that we cannot be certain that unexpected features will not turn up in the spectrum of any star. We must organize our observing programs so that we can examine quickly any spectrum over a sufficient range and with sufficient resolution to identify the peculiarity. Here the duty of the spectroscopist is to keep the computer honest!