Many atomic lines have been identified on the first tracings obtained.

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Mohler, Orren C. and Arthur Adel. Resolution of the carbon dioxide bands at 1.6 microns.

The quantity of CO_2 in the earth's atmosphere permits a band development extending from 15,000Å to 200,000Å in the solar spectrum. The near infra-red members (in the neighborhood and short of 20,000Å) result from transitions to highly excited vibrational levels, and are less intense than the longer wave-length bands.

The four bands of CO_2 near 16,000Å were first identified in the prismatic solar spectrum some ten years ago.¹ The resolution of their rotational structures has recently been achieved for the first time in the McMath-Hulbert Observatory's examination of the infra-red solar spectrum with a PbS cell detector. The customary quadratic expressions have been obtained and serve to correlate the lines. Departures are of the order of hundredths of a wave number, in some instances, a tenth. The precision of the observations may be expected to sharpen the expression for the potential energy of the molecule.

1. Arthur Adel and C. O. Lampland, *Ap. J.* **87**, 202, 1938.

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Nassau, J. J. and G. B. van Albada. Infra-red spectra of M-type stars in the Milky Way.

This investigation deals with the study of red stars in our galaxy. It is based on objective prism spectra taken with our 24-inch 4 degree prism, with I-N emulsion and Wratten No. 89 filter. The spectrum extends from $\lambda 6800$ to $\lambda 8700$ with dispersion at the A band of about 1660 Å/mm. Since the investigation was started only a few months ago our present results are provisional.

Our primary consideration is the study of M-type stars and other low temperature objects. Stars in the Mt. Wilson list provided means for establishing criteria for temperature classification making use of the TiO bands only. The accuracy of our classification is about one-half a spectral sub-division. We have not as yet derived criteria for luminosity classification. Carbon stars are readily identified in this region of the infra-red, although we did not make an attempt at a detailed sub-classification.

The present survey for M-type stars in the galaxy embraces 19 regions from 330° to 70° longitude. Exposures are about one-half hour on ammonia hypersensitized N-plates. The width of the spectra ranges from 0.06 mm to 0.20 mm, secured by permitting differential refraction to do the widening. The plates are uneven in quality and effective exposure, hence definitive quantitative comparison is impossible. However, they show that the number of M stars per square degree is considerable all along the galactic belt with the exception of regions of heavy obscuration. In the Scutum Cloud, we find many times the number of M stars counted in the Cygnus region which is discussed below. The regions west of λ Sagittarii ($l = 334^\circ$, $b = -6^\circ.1$) and south-west of Altair ($l = 10^\circ.0$, $b = -6^\circ.4$) are unusually rich in M stars. It is estimated that the expected number of dwarf M stars included in our investigation is less than one per square degree. This is derived from Kuiper's work on the stars in the neighborhood of the sun and is confirmed by the fact that plates taken at high galactic latitude show a very small number of M stars.

A more detailed investigation of a clear region in Cygnus ($l = 41^\circ.9$, $b = 3^\circ.3$) is in progress. In this region an infra-red magnitude sequence was established from A5 stars and from the red and blue magnitudes of fainter blue stars for which spectra were not available.

About 500 M-type stars have been classified from a total area of 4.4 square degrees and provisional infra-red and blue magnitudes have been obtained for some of them. The limiting infra-red magnitude is about 13 and the corresponding average magnitude for the stars classified is 11.1. The infra-red indices, photographic minus infra-red, are about 3 mag. for M2, 4 mag. for M3, and 5 mag. for M5 stars. In some cases the infra-red index was as high as 6.5 mag. For some of the stars we were unable to secure colors as their photographic magnitudes were fainter than 18, the limit of our plates.

For comparison purposes we obtained corresponding data for SA 39 ($l = 46^\circ.6$, $b = +8^\circ.5$). The number of M stars observed per square degree in this region is 20 as compared to 110 for the Cygnus region. The difference in galactic latitude between the two regions is about 5° .

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