This work was supported by the Office of Naval Research and carried out in cooperation with the Naval Research Laboratory.

Athay, R. G., Menzel, D. H. Pecker, J.-C., and Thomas, R. N. 1955, *Ap. J. Supplement* 12, 505.

*High Altitude Observatory,
Boulder, Colo.*

Baade, W. Planetary nebulae in M 31.

Experience has shown that under good seeing conditions the photovisual magnitude 23.0 can be reached with the 200-inch telescope in exposures of 60 to 80 minutes. Since this magnitude corresponds in the Andromeda nebula to the absolute magnitude -1.25 there seemed to be a good chance that at least the brightest planetary nebulae in this galaxy would be observable.

For a first test the very fast Eastman 103a-D plates were used, which are of nearly uniform sensitivity from $\lambda 4900$ to $\lambda 6400$, where they drop off to zero sensitivity at $H\alpha$. Exposed behind a Schott GG11 filter they record the wave length range from $\lambda 4900$ to $\lambda 6400$, behind a Corning 3484 filter the range from $\lambda 5200$ to $\lambda 6400$. The first of these ranges contains the green nebular lines which are by far the strongest features in such typical planetary nebulae as NGC 6741, NGC 7662, etc., whereas only a few weak lines of He , $[N\text{I}]$ and $[N\text{II}]$ are encountered in the region from $\lambda 5200$ to $\lambda 6400$. On intercomparison of a pair of plates of this sort in the blink comparator planetaries in the Andromeda nebula should therefore appear bright on one plate and faint on the other.

Applying this method to a field 96' south preceding the center of M 31, five planetaries were found in the rich population II which the photovisual plates bring out. They look of course entirely stellar. They are 1.5 to 2 magnitudes above the plate limit on the plate which includes the green nebular lines but are absent on the plate representing the range $\lambda 5200$ to $\lambda 6400$. All 5 planetaries were identified on blue plates for which the magnitude scale is known from transfers of S.A. 68. The following table shows that all are of nearly the same absolute photographic magnitude, $\bar{M}_{pg} = -2.2$.

TABLE I. PLANETARY NEBULAE IN M 31

No.	m_{pg}	M_{pg}
1	22.1	-2.2
2	22.2	-2.0
4	22.2	-2.1
5	22.0	-2.2
6	21.7	-2.5

There has been some disagreement regarding the

absolute photographic magnitude of the planetaries of our own galaxy. The value obtained above is in complete accord with the one derived by Berman (1937) when allowance is made for the fact that for the kind of planetaries here discussed the difference in magnitude between central star and nebula is of the order of 4 to 5 magnitudes.

Berman, L. 1937, *Lick Obs. Bull.* 18, 57.

*Mount Wilson and Palomar Observatories,
Pasadena, Calif.*

W. Baade and Swope, H. H. The Palomar survey of variables in M 31 (First results).

One of the first major programs planned for the 200-inch telescope was a reinvestigation of the Andromeda nebula for variable stars. With its $f/3.67$ correcting lens which provides a field of fine definition 16' in diameter the Hale telescope has proved to be a most efficient instrument for this type of work.

In order to get information about the variable stars in different parts of M 31 the following fields along the major axis were selected:

TABLE I. VARIABLE STAR FIELDS IN M 31

Field	Center	Number of variables
I	15' south preceding nucleus	150
II	35' south preceding nucleus	205
III	50' south preceding nucleus	360

Fields I to III were intensively observed during the seasons 1950-51 on 103a-O plates of 30 minutes exposure giving limiting $m_{pg} = 22.8$. Four good transfers of S.A. 68 for each field established the photographic scales between 18.5 and 22.8. Altogether 711 variables were found. Their distribution over the three fields is given in Table I. Light curves for the variables in Field I and III have been derived by Miss Swope, for Field II by Dr. S. Gaposchkin.

The main results from Fields I and III are summarized in the following statements:

- 1) The distribution of variables according to

TABLE II. TYPES OF VARIABLE STARS

	Field I		Field III	
	No.	Per cent	No.	Per cent
Cepheids	38	32	237	70
Eclipsing	5	4	30	9
Irregular	32	27	20	6
Long Period	8	7	2	1
Novae	7	6	1	0
Undetermined	30	24	50	14
Total	120		340	
Mean period of cepheids:		20.0 days		10.9 days