

# Photosynthesis

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Psyche Inspired – Iron Class  
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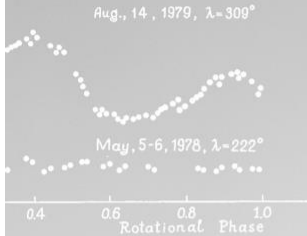


Psyche Inspired serves as a reminder that the arts and sciences are not at odds with one another. It reminds us that the incremental acquisition of understanding through observation can be shared and expressed creatively. These are the fundamental concepts which shaped this project, which began with research about the asteroid's scientific history and to about a dozen scientific articles from the second half of the 20th century describing Psyche in terms of photometric analyses. Thus, Photosynthesis is collection of photographs and scientific articles combined in an attempt to explore similarities between photography and an earlier period of Psyche research. The Psyche mission and the photographs in this project both serve a purpose of acquiring information that may lead to a better understanding and appreciation of our own planet. Trees, which also contain important information in their cores, are the subject of these photographs. Much like the Psyche mission, light brings them to life.



ES AND ROTATION PERIOD

are shown in Fig. 1. No noticeable variation was observed during the rotation period in 1978. It is assumed that the rotational axis of Psyche is oriented along the line of sight, i.e. the asteroid



asteroid 16 Psyche.

As in 1974 (Taylor et al. 1976) the aspect angle differs by about  $90^\circ$  as compared with the 1978 observations, i.e. the aspect angle was near  $90^\circ$  and the longitude of the light curve  $\Delta m = 0.32$  is the same. Under the assumption that in the 1978 opposition the polar coordinates  $\lambda_0 = 222^\circ$  and  $\beta_0 = 5^\circ$  with a certainty of about  $10^\circ$ .

Light curves of Psyche.

$\lambda_0$ (1950)	$\beta$ ( $^\circ$ ) (1950)	Amplitude $m_1 - m_2$	Reference
7	-3.0	0.11   0.02	van Houten-Groeneveld and van Houten 1958
13	1.6	0.32   0.18	Taylor et al. 1976
13	0.5	0.21   —	Degewij et al. 1979
17	4.3	0.03   —	Lupishko et al. 1980
19	1.4	0.32   0.18	Lupishko et al. 1982

The light curves obtained in 1979 it turned out that the light curve of 16 Psyche, found by van Houten-Groeneveld and adopted in the TRIAD file, did not fit our observations. It is found that the longitude of Psyche is found to be  $P = 4^h 11^m 45^s \pm 0^s 1$  previously obtained. It is defined most precisely in 1979, since the light curve on Aug. 14, 1979, at the same longitude and phase angle of the 1974 (Taylor et al. 1976; see Table 3).

Results for the spin parameters of 16 Psyche (Xing-hai and Yang Xiy-yi 1982) on the basis of (1965, 1980) observations:

$P = 4^h 11^m 45^s \pm 0^s 1$ ;  $\lambda_0 = 225^\circ$ ;  $\beta_0 = 5^\circ$ .



made on 1991-12-12, August 1994, 16 Psyche differed from the other two at heliocentric angular distance  $\approx 1.6$  AU. A V magnitude amplitude of  $0.02 \pm 0.01$  mag was observed on this date. These results are published as part of a spectroscopic study of Psyche (Buzzei et al., 1995). The shape of 16 Psyche was derived from its large amplitude and the minimum amplitude variation of  $0.03 \pm 0.005$  mentioned above. The resulting axial ratios for Psyche are:  $a/b=1.43$ ,  $b/c=1.29$ ,  $c=1.76$ .

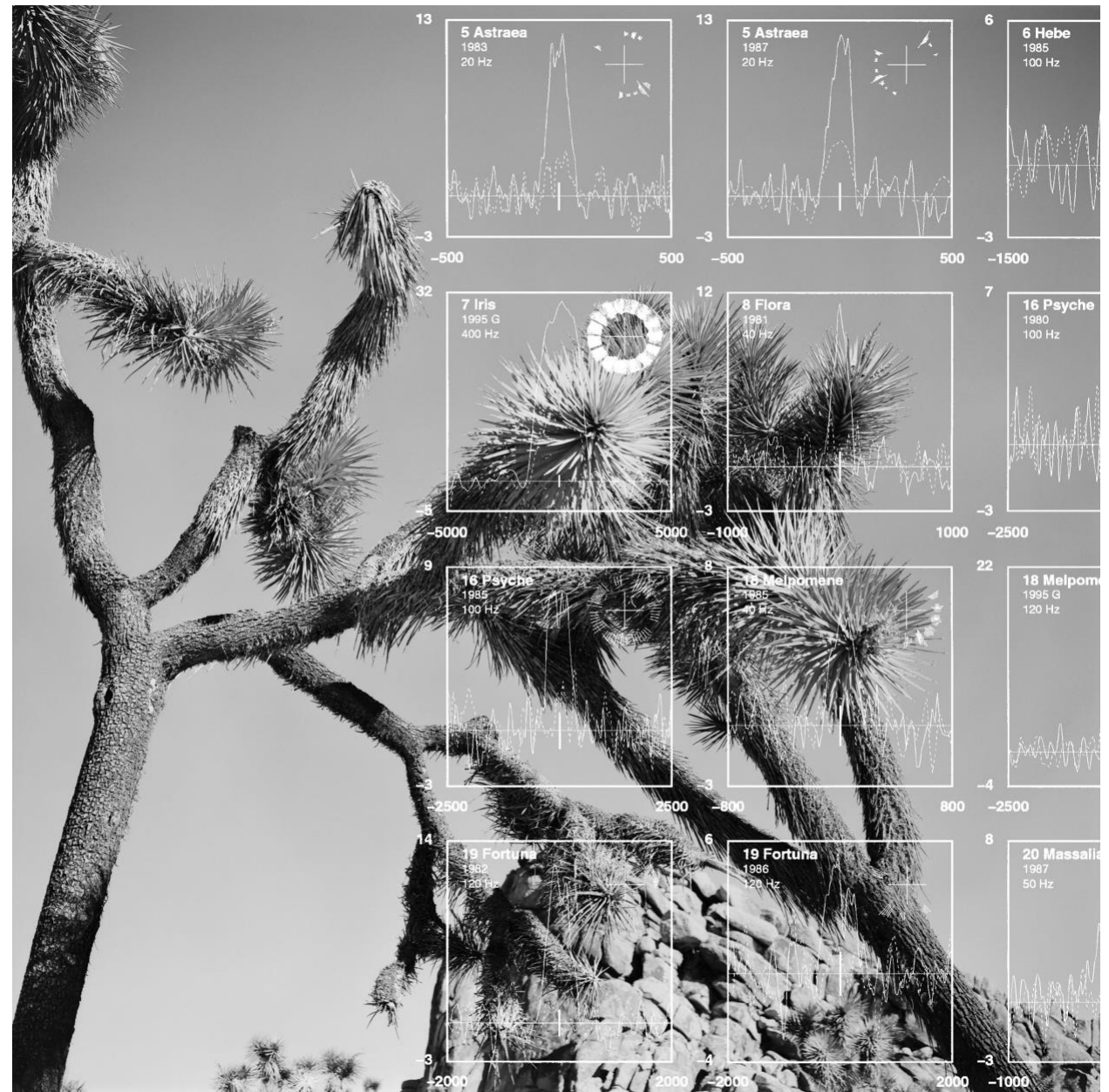
Wagnon, P. (1989). "Pole determinations of Asteroids". In *Asteroids* (R. P. Binzel, T. Gehrels, and M. S.

Date	Elliptic Longitude	Base Angle	Base Angle Error
1/2/93	226°	2.25	10%
1/2/93	226°	3.25	10%
1/2/93	226°	3.25	10%
1/2/93	226°	3.25	10%
1/2/93	226°	3.25	10%
1/2/93	232°	2.25	10.47
1/2/93	232°	3.23	10.80
6/05/93	232°	3.23	10.71
6/05/93	232°	3.23	10.55
6/05/93	232°	3.23	10.92
6/05/93	314°	2.25	9.65

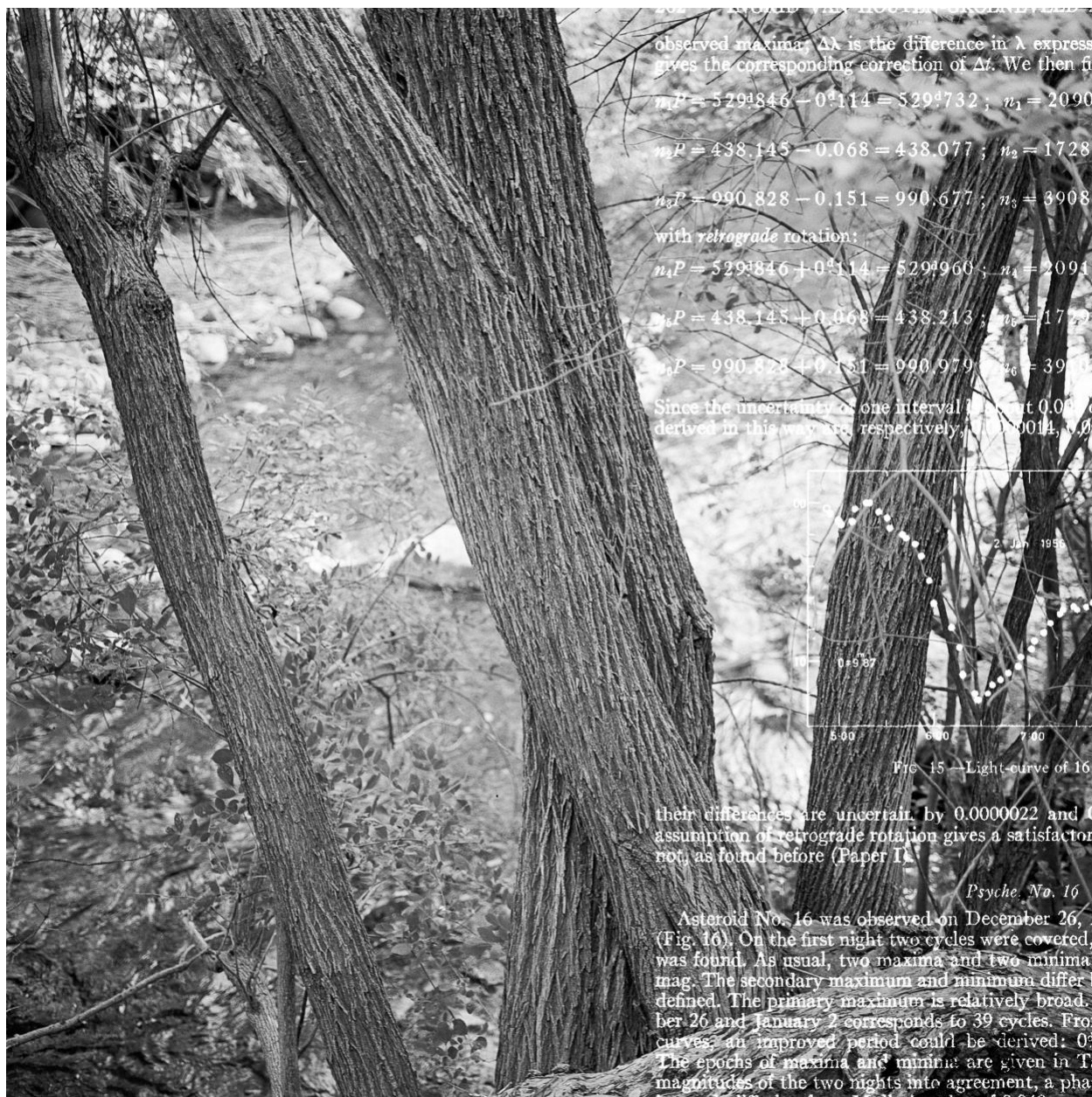
used for identification (Table 1).



Figure 1. Low amplitude lightcurve of asteroid 15 Psyche as measured on 1993 UT Dates May 1, 2, and 3. This low amplitude helps constrain the pole position of Psyche to an ecliptic latitude near 9 degrees.







202. THE LIGHT CURVE OF ASTEROID NO. 16  
 observed maxima;  $\Delta\lambda$  is the difference in  $\lambda$  expressed in degrees;  $\Delta t$  is the difference in  $t$  expressed in days. This gives the corresponding correction of  $\Delta t$ . We then find

$$n_1P = 529.846 - 0.114 = 529.732; \quad n_1 = 2090,$$

$$n_2P = 438.145 - 0.068 = 438.077; \quad n_2 = 1728,$$

$$n_3P = 990.828 - 0.151 = 990.677; \quad n_3 = 3908,$$

with *retrograde* rotation:

$$n_1P = 529.846 + 0.114 = 529.960; \quad n_1 = 2094,$$

$$n_2P = 438.145 + 0.068 = 438.213; \quad n_2 = 1729,$$

$$n_3P = 990.828 + 0.151 = 990.979; \quad n_3 = 3910.$$

Since the uncertainty of one interval is about 0.001, the values derived in this way are, respectively, 0.0014, 0.0015, and 0.0016.



FIG. 15 — Light-curve of 16

their differences are uncertain by 0.0000022 and 0.0000022. The assumption of retrograde rotation gives a satisfactory result, as found before (Paper II).

*Psyche*, No. 16

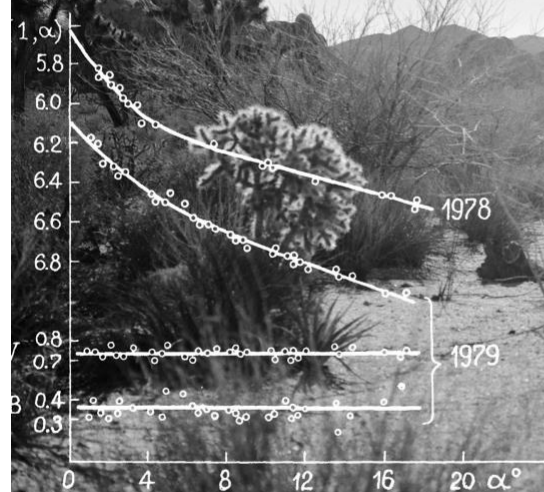
Asteroid No. 16 was observed on December 26, 1955 (Fig. 16). On the first night two cycles were covered, and two maxima and two minima were found. As usual, two maxima and two minima were found. The secondary maximum and minimum differ by 0.1 mag. The primary maximum is relatively broad. The epoch of the primary maximum on December 26 and January 2 corresponds to 39 cycles. From the curves an improved period could be derived: 0.0037. The epochs of maxima and minima are given in Table I. The magnitudes of the two nights into agreement, a phase shift of 0.0037 is obtained, which is 0.0037.



chs of the light curve extrema of 16 Psyche (corrected for  
ht time).

$\lambda$ ( $^{\circ}$ ) (1950)	$\beta$ ( $^{\circ}$ ) (1950)	Extremum	JD(c) = 2 444 000 +
317.7	2.0	M <sub>1</sub>	60.399 $\pm$ 0.003
		m <sub>1</sub>	60.340 $\pm$ 0.003
309.6	1.5	M <sub>2</sub>	95.285 $\pm$ 0.002
		m <sub>1</sub>	95.308 $\pm$ 0.002
308.6	1.4	M <sub>1</sub>	100.261 $\pm$ 0.003
		m <sub>1</sub>	100.202 $\pm$ 0.002
		m <sub>2</sub>	100.306 $\pm$ 0.010
		M <sub>2</sub>	100.351 $\pm$ 0.002
		m <sub>1</sub>	100.376 $\pm$ 0.002

IONS AND SHAPE



se dependences of magnitude and colours of 16 Psyche.

pendences of magnitude and colours of 16 Psyche are shown  
east-square solutions yield the following results:

$$\begin{aligned}
 & m = 5.64 + 0.144 \alpha - 0.009 \alpha^2, \quad \alpha \leq 7^{\circ}; \\
 & m = 6.02 + 0.027 \alpha, \quad \alpha \geq 7^{\circ}; \\
 & B-V = 0.72 + 0.0009 \alpha; \\
 & m = 6.08 + 0.123 \alpha - 0.007 \alpha^2, \quad \alpha \leq 8^{\circ}; \\
 & m = 6.30 + 0.035 \alpha, \quad \alpha \geq 8^{\circ}; \\
 & B-V = 0.74; \\
 & m = 6.36 + 0.0007 \alpha.
 \end{aligned}$$

