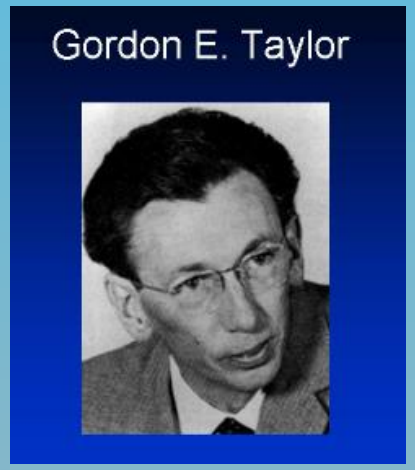

ESOP35, University of Surrey, Guildford, 2016 Aug 19-21

Read by Tim Haymes – *updated Nov 03, 2016

Gordon TAYLOR (*who is now aged 91, living near Herstmonceux, Sussex, England) published planet and minor planet predictions using astrometric updates.

He is Internationally recognised as one of the pioneers in occultation astronomy.

In 2014, Gordon was awarded the David E. Laird IOTA Award “for being the father of Asteroid Occultations, and his Role in prediction of Lunar and Planetary Events since the 1950s”

He was President of the British Astronomical Association 1968-1970

And Director of the BAA Computing Section 1974-2009

http://www.asteroidoccultation.com/observations/Awards/Taylor.htm

G E Taylor autobiography, with illustrations added by Tim Haymes

“After WW2 I was demobbed from the RAF but remained as a civilian meteorologist until I managed to get transferred to the Nautical Almanac Office, working in the occultation section.

The office was in Bath but was transferred to Herstmonceux Castle shortly afterwards late in 1949. A few years later the NAO was absorbed into the ROYAL GREENWICH OBSERVATORY.”

“My rank was a Scientific Assistant. (One cannot get any lower!).

With several others in the Occultation Section, I was using the Occultation Machine to help predict the times of lunar occultations of stars visible from the positions of observatories indicated on a globe of the Earth.

It was also possible to get predictions to a number of keen amateur observers. These observations were used to determine delta T (Ephemeris Time minus Universal Time) caused by fluctuations in the rate of rotation of the Earth.”

“The Occultation Machine” JBAA Feb 2014

Courtesy of Alex R. Pratt

The Occultation Machine of HM Nautical Almanac Office

Alex R. Pratt

In the first half of the 20th century, accurate
great value in monitoring irregularities in the
standard method of estimating the value of
Terrestrial Time and Universal Time. Before
tronic computers, the manual generation o
intensive, involving many hours of repetitive
ious Occultation Machine that simplified the

Introduction

A lunar occultation occurs when the Moon passes in front of a star or a planet as seen by an observer on Earth. During the Moon's journey around the Earth, stars (and occasionally planets) will be seen to disappear at the Moon's eastern (preceding) limb and reappear at its western (following) limb. Because most stars have very small angular diameters and the Moon has no tangible atmosphere, the occultation event will be almost instantaneous. In comparison, occultations of the major planets are relatively long-duration events. An accurate timing of an occultation of a star gives a unique measurement of the position of the Moon against the stellar reference frame.

Figure 1. James Duncan McNeile. *(Courtesy Wellington College.)*

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Figure 9. The Earth globe and Moon lens assembly. *(Courtesy the National Maritime Museum, Greenwich, London.)*

Figure 8. Wescott's metal Occultation Machine. *(Courtesy the National Maritime Museum, Greenwich, London.)*

- Observations of Lunar occultations of stars were received and used to improve the accuracy of the Moon's longitude.

- By 1962 this made me wonder if we could also use occultations to improve our knowledge of the lunar latitude.

- I was having a bath one evening at home when I suddenly thought of a way of doing so. I worked on the method at home, which was to predict grazing lunar occultations and then use the data from the observations.

- Then I presented it to the boss of the NAO (Dr Sadler).

- A new recruit to the computing section, J V CAREY, was given the job of adapting the method for a computer program on our ICL 1909. He did a great job.

Portable Graze Occultation equipment used in the 1970-1980s

An observer with his mobile 6” F/8 altazimuth reflector, at an exhibition in 1976.

In the background are predictions made by the NAO.

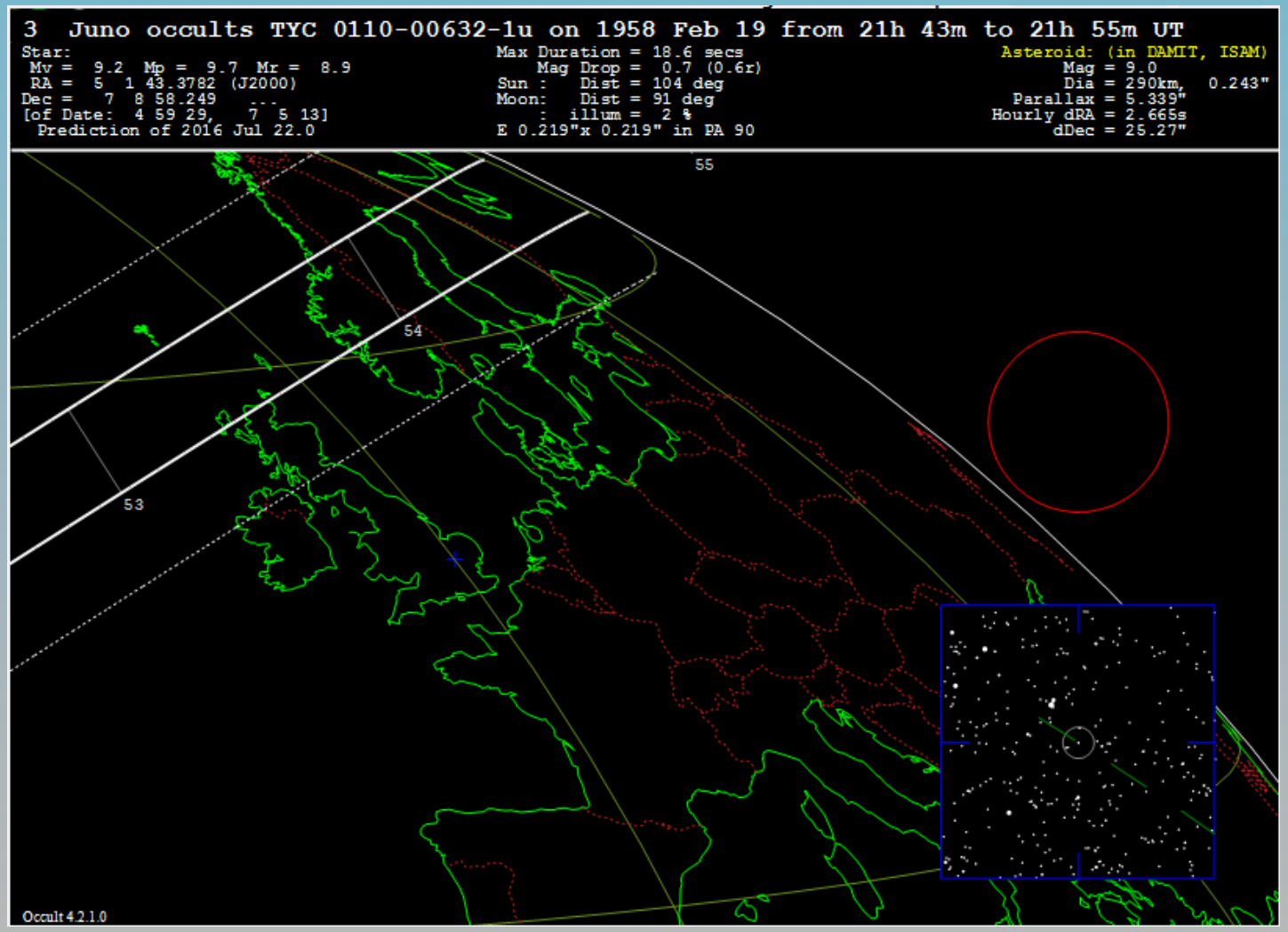
An MSF 60 KHz time receiver and tape-recorder was used for audio/visual recording of Lunar grazing occultations, with an accuracy of about 0.5 seconds.

- Also by 1950 I was thinking that lunar occultations of the larger minor planets (Ceres, Pallas, Juno and Vesta) might be useful. Predictions were issued starting in 1955, with little success.
- At almost the same time (1952) I noticed that orbits of minor planets were increasing in accuracy, so I decided to write software programs and issue predictions of them.
- This led to the first one being observed on 19th February 1958 by Per-Ake Bjorklund and Svend Aage Muller of Malco, Sweden, giving a duration of 7.2 seconds at about 21h 54m UT, indicating that Juno should have a diameter not less than about 110km.
- It was not very long before I had written a program that was able to issue planetary predictions. Venus would occult the bright star REGULUS on 7 July 1959, and I published its track across the surface of the Earth.
- My colleagues said I would be thrown into the moat surrounding Herstmonceux Castle if it did not happen. I remained dry!

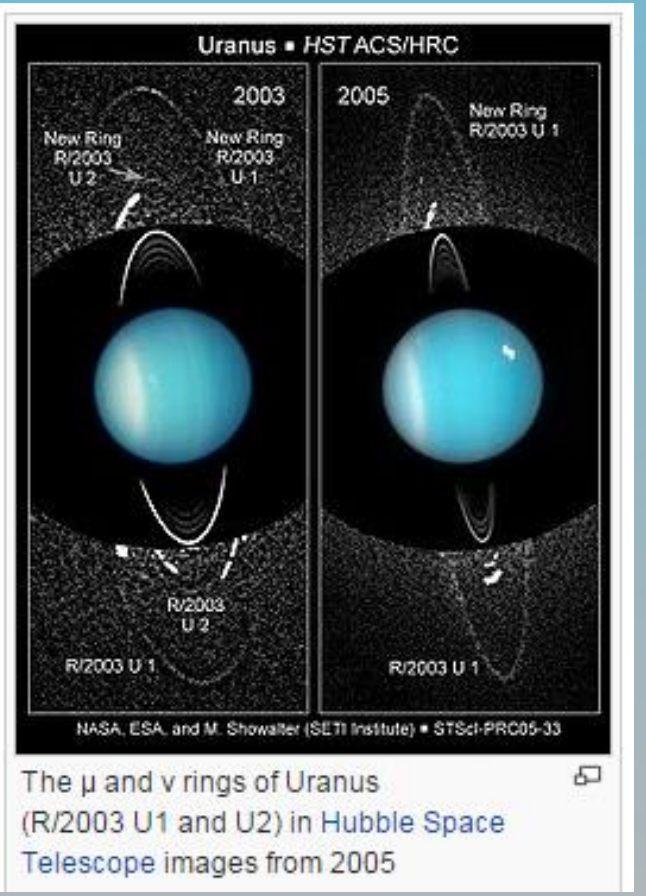
The first observed (3) Juno Occultation [Taylor]

19th February 1958 by Per-Ake Bjorklund and Svend Aage Muller of Malco, Sweden

- Simulated with Occult 4.2.1.0
- dM was only 0.7 ?
- Max 18.6s



- In 1973 I had calculated that Uranus would occult the star SAO 158687, Spectrum K5, Visual magnitude +8.8. The date was 10 March 1977.
- Photographs were made from 3 observatories. Two of them indicated that the occultation would not occur!
- In the USA it had been decided to send the Kuiper Airborne Observatory (KAO) carrying equipment and observers to Australia before the event started.
- quote "*American astronomers are running around like chickens with their heads cut off, and we have already spent $200,000 on our expeditions!*" unquote
- In the end, of course, the rings of Uranus were discovered!



The μ and ν rings of Uranus (R/2003 U1 and U2) in Hubble Space Telescope images from 2005

- In 1975 I predicted that Mars would occult the third magnitude star Epsilon Geminorum on April 8, 1976. I was using the FK4 position and proper motion of the star and on a recently-computed ephemeris of Mars kindly supplied by the Jet Propulsion Laboratory. The adopted radius of Mars was 3394km.

8” and 6” reflectors pointing at the Mars-eta Gem Occultation in 1976 Photo: Courtesy Maidenhead Astro. Soc

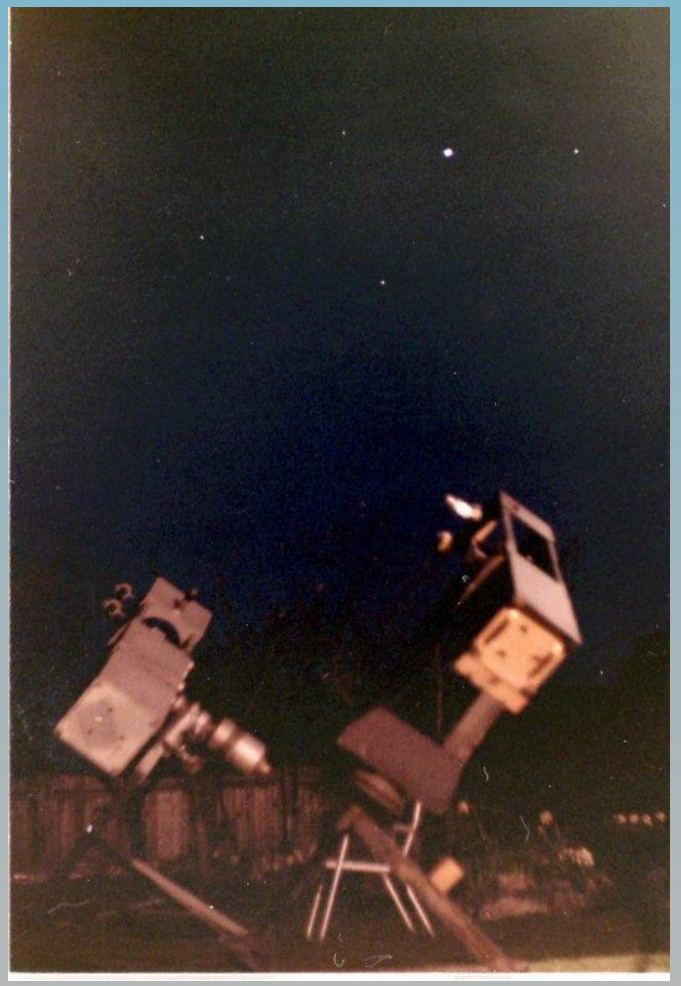
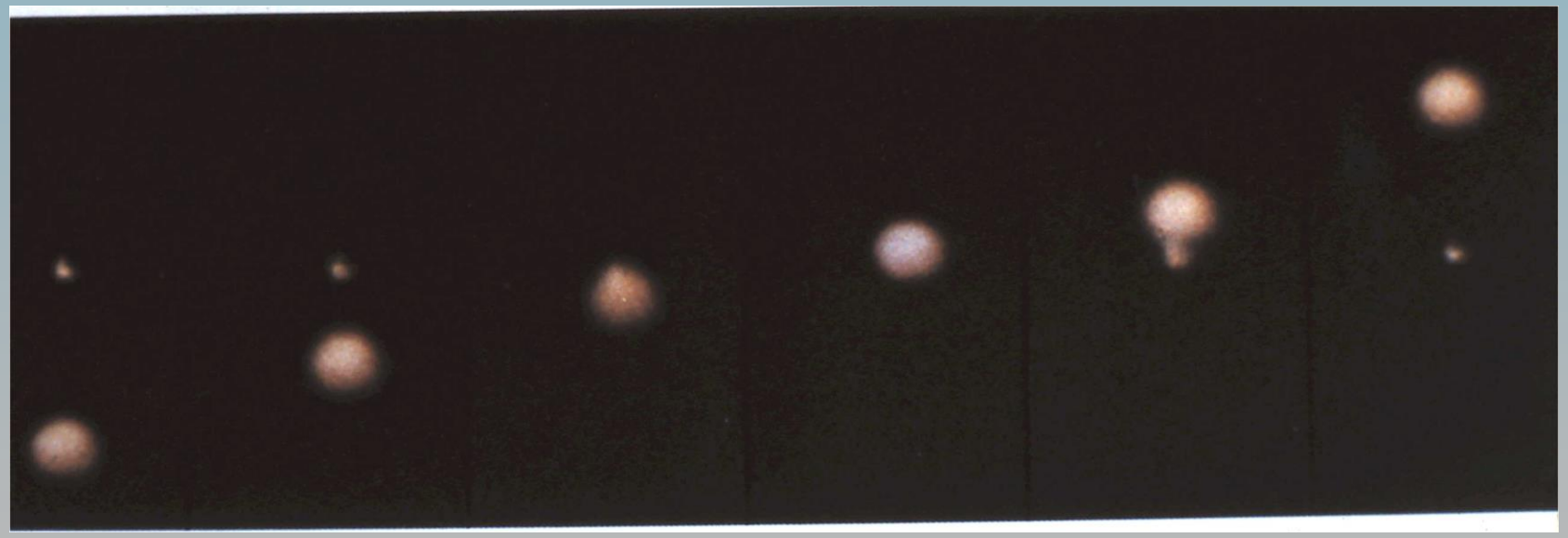


Image sequence, courtesy of Sky & Telescope.



- ASTEROIDS

- As ephemerides of asteroids were improving I was kept busy as chairman of the Working Group on Predictions of Occultations by Satellites and Minor Planets (IAU Commission 20)
- Detailed preliminary predictions were issued to many observatories. Now I was able to use the Astrographic telescope at Herstmonceux to see if it was necessary to issue a revision to the original prediction.
- A fourth-magnitude star, 1 Vulpeculae, was occulted by Pallas on 29 May 1983. The predicted track crossed the Southern States of the USA, from east to west. The event was observable, the magnitude change at the occultation being 4.9 visually and 5.9 photoelectrically. The maximum duration would be 46 seconds.

(2) Pallas / 1 Vul from THE ASTRONOMICAL JOURNAL V 99, No5 May 1990 (The best observed profile at the time)

- Locations: 130
- Derived size: 529.6 +/-1.2 511.2 +/-1.3 Km
- Star was a binary. The PA /Sep was measured

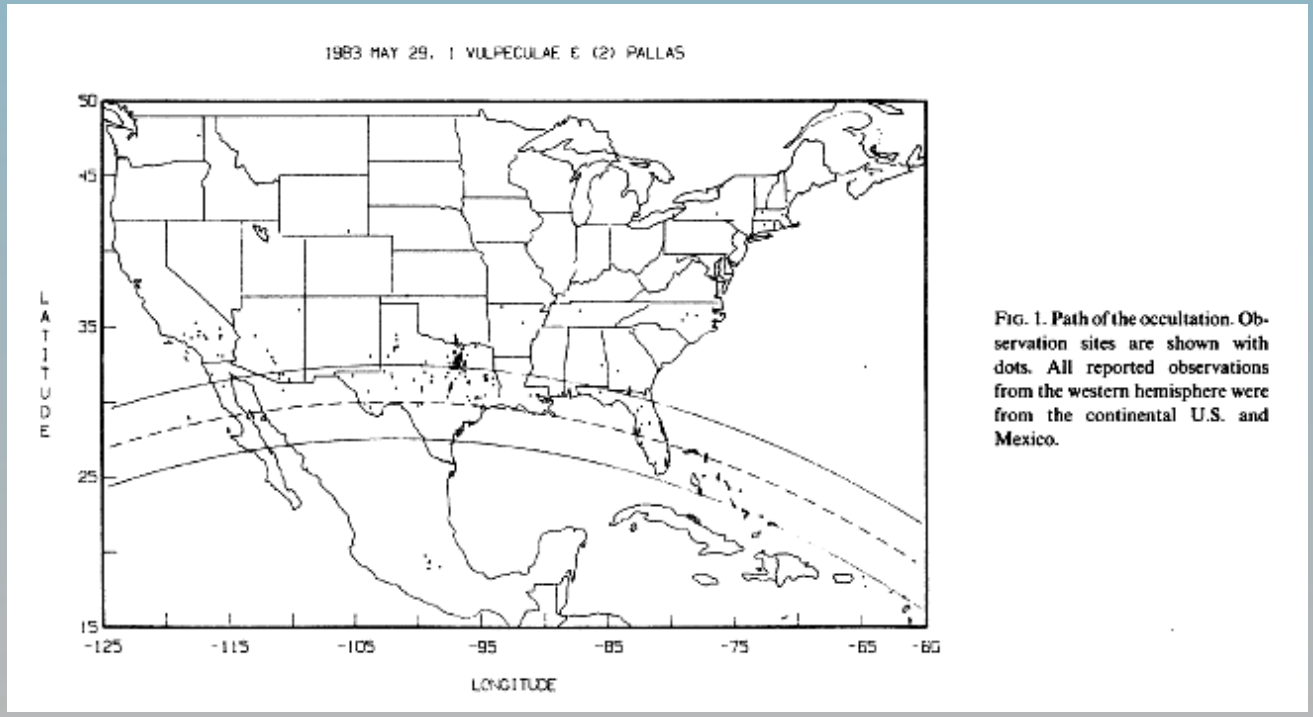


FIG. 1. Path of the occultation. Observation sites are shown with dots. All reported observations from the western hemisphere were from the continental U.S. and Mexico.

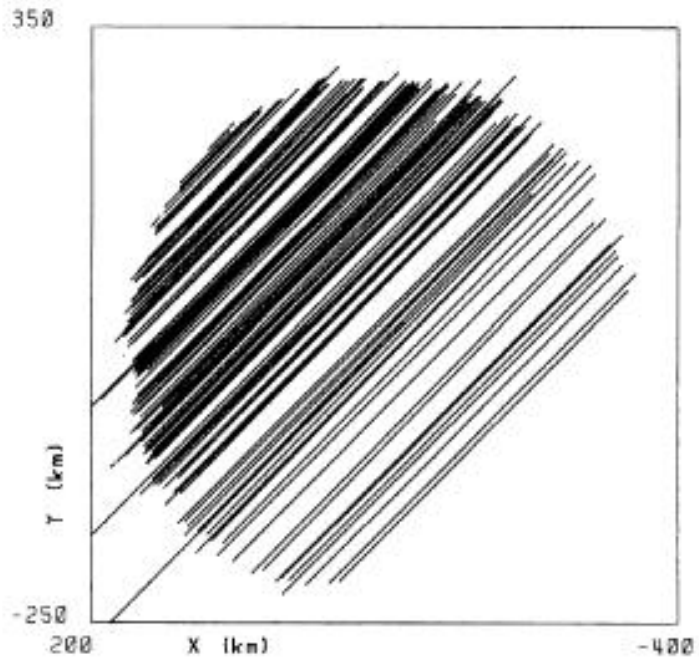


FIG. 2. Raw occultation observations. The valley that caused the second short disappearance at station 76 is evident as a break in its chord in the upper left part of the figure.

This concludes Gordon E Taylor’s autobiography

- Thank you.
- The reader has shortened the autobiography in some places to keep the presentation to 15min, and added some illustrations.
- The full text of Mr Taylor’s contribution is available upon request.