T-cell clones can still respond to interleukin-2, which suggests that T3 is involved in initial triggering rather than maintenance of clonal expansion.

While the present results have begun to define a role for T3 in somewhat artificial conditions *in vitro*, its physiological role in triggering resting cells is less clear, as is its exact relationship to the recently defined clonotypic molecules. New biochemical data however show that T3 is a complex of polypeptides of several different molecular weights. While the principal component has a molecular weight of 20,000, other molecular species of molecular weights 25,000–28,000, 37,000 and 44,000 have been reported[8]. Furthermore, at least one polypeptide with a molecular weight of 20,000 seems to be non-glycosylated. How these various forms are related to each other and to the clonotypic structures is not yet clear but peptide mapping suggests that at least one 20,000-molecular weight form and the 25,000–28,000-molecular weight form are distinct polypeptides. That T3 is made up of several distinct polypeptides suggests that there may be more than one T3 gene, a possibility supported by the difficulties encountered in attempts to obtain stable expression of T3 in TK^- L cells cotransformed with human DNA and herpes virus TK^+ gene[9].

The obvious functional importance of T3 has led to much effort in unravelling its structure, physiology and molecular biology, but one additional major problem remains; so far there have been no published reports of homologues in the mouse or rat, although many of the other human T-cell antigens have rodent counterparts. This may be because T3 is a particularly highly conserved molecule so that raising antisera between different mouse strains or mouse and rat is difficult. The recent human data, however, are likely to provoke a more determined search for murine T3. In any event, even if T3 is lacking in mice, in man it is clearly a molecular complex which plays an important part in activation of human T lymphocytes, and the close association of T3 and the T-cell receptor suggests that at the very least T3 is a hallmark of a functionally mature T lymphocyte. □

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Astronomy

Asteroid Thisbe's diameter

from David W. Hughes

OCCULTATIONS yield the most accurate estimations of the diameters of asteroids and the technique is well illustrated by considering the twelve observations taken on the night of 7 October 1981 when the asteroid 88 Thisbe passed in front of a ninth-magnitude star in Sagittarius known as SAO187124.

The prediction of this event was made by Gordon Taylor of the Royal Greenwich Observatory, Herstmonceaux. Using simply the catalogue position of the star and the published ephemeris of Thisbe, the ground track of the event (the region of the Earth from which the occultation would be seen) was found to stretch from west to east across western Canada. Photographic plates taken on 27 September and 4 October 1981 with the 50-cm Carnegie Double Astrograph on Mount Hamilton and on 6 October 1981 with the 155-cm Astrometric Reflector at the Flagstaff Station, USNO, indicated a more southerly track. This was about 300 km wide and stretched from California through Nevada, Utah, Colorado, Wyoming, South Dakota, Nebraska, Minnisota, Iowa and on to Ontario.

Thisbe's 'shadow' moved along the track from west to east. The occultation was expected to last for a maximum of 9.7 s. As Thisbe had a visual magnitude of 11.8 as opposed to SAO187124's magnitude of 9, the change in stellar brightness caused by the occultation was large and easily detectable by visual observers.

Twelve groups set out to make the observation using telescopes ranging from the 60-cm reflector at Sommers-Bausch Observatory to relatively small portable instruments. The results of their endeavours have recently been reported in *The Astronomical Journal* (**88**, 229; 1983). The authors are R. Millis, L. Wasserman, O. Franz, N. White and E. Bowell (Lowell Observatory, Flagstaff), A. Klemola (Lick Observatory), R. Elliott, W. Smethells and P. Price (Casey Observatory), C. McKay and D. Steel (Sommers-Bausch Observatory) and E. Everhart and E. M. Everhart (Chamberlain Observatory).

Ideally the observers should be placed at equal intervals across the path. A footnote to the paper is worth quoting because it illustrates beautifully the difficulties in observing occultations.

"The referee of this paper asked that we explain our strategy for placing two portable telescopes on essentially the same chord. While we might argue that this was done to conclusively establish the reality of any satellites that might be detected, such was not the case. Final predictions, based on USNO plates, were not available for this occultation until nine hours before the event. In the headlong rush to reach the track from Flagstaff, two of our teams lost contact with each other. As a result, they were deployed in accordance with Murphy's Law."

In essence each observer should obtain the time of onset and end of the occultation. Each defines a point on the limb of the asteroid and together the observers give a chord across its Earth-pointing face. Visual observers report times which are systematically late relative to times obtained by photoelectric means but this can be corrected for in the analysis.

The first step is to try and fit a circular limb profile to the chord. This was found to have a diameter of 221.8± 1.4 km. The true limb profile might depart markedly from a circle and unfortunately only limited coverage of the southern hemisphere of Thisbe was obtained during the 7 October occultation. A least-squares fit of an ellipse to the data points gave a semiminor axis of 110.8 ± 1.1 km and a semimajor axis of 115.3 (+3.5, −9.0) km. More north–south coverage is needed to distinguish meaningfully between a circular or elliptical solution, so the authors chose the solution involving the fewest free parameters — the circle — and suggest an uncertainty of ± 4 per cent.

Only the face pointing towards Earth at the time of occultation has had its diameter measured. It is possible that the cross-section of the asteroid varies as a function of rotation and aspect angle. Most well observed asteroids show little or no variation in polarization as a function of rotational aspect and this is taken to indicate that the surface texture and albedo is constant over the body. Thisbe has been assumed to obey this general rule. But the brightness of Thisbe varies by 0.19 magnitudes with a period of 6.0422 h. The 7 October occultation occurred near the time of minimum brightness and therefore minimum cross-sectional area. A 0.19-magnitude variation in brightness is equivalent to an increase in the effective diameter by about 9 per cent. The mean diameter of Thisbe is thus 232 km and the conservative uncertainty is ± 12 km. D. Morrison and B. Zellner (in *Asteroids*, ed. T. Gehrels, p.1090, University of Arizona Press; 1979) estimated the diameter as 210 km by comparing the visual and infrared radiation coming from the asteroid.

Some observations of asteroid occultations have indicated the occurrence of secondary events, which have been attributed to satellites of the primary asteroid blocking out the star light. T. Van Flandern, E. Tedesco and R. Binzel (in *Asteroids*, p.443) have gone so far as to suggest that "satellites are both numerous and commonplace". No secondary occultations were reported during the Thisbe event on 7 October 1981. □

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