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UBV OBSERVATIONS OF R ARAE

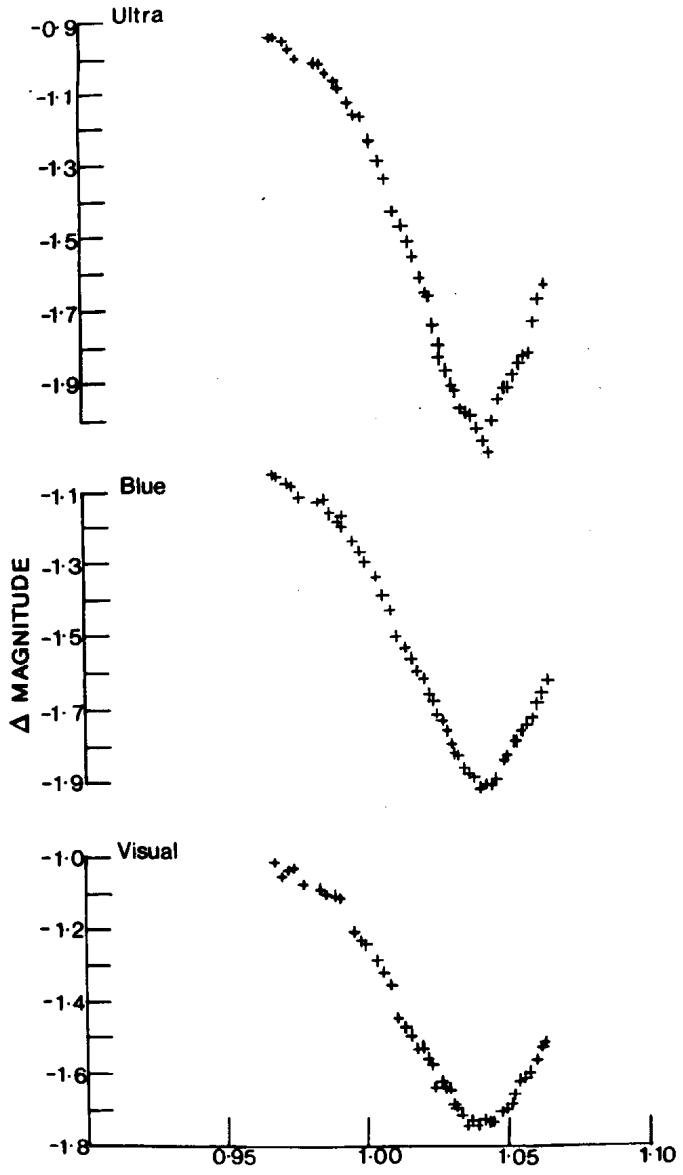
Kondo et. al, (1984) and McCluskey and Kondo (1983, 1984) have drawn attention to peculiarities of the relatively bright (~ 7th magnitude) eclipsing binary R Arae (HD 149730 = HJ 4866), generally on the basis of satellite observations which suggest irregular high energy processes, possibly connected to "mass transfer" events.

Peculiarities are, in fact, hinted at by the ostensible photometric characteristics of the system: though originally designated an Algol type (Roberts, 1894), Gaposchkin's (1953) light curve clearly shows a rounded out-of-eclipse variation, which is more in keeping with a β Lyrae type light curve. The system's 4.4 day period also gives an indication of possible interaction effects, when seen in context of a β Lyrae type light curve (Paczynski, 1971), (although we should remark that the notion of a standard β Lyrae type variation may well be an oversimplification for R Arae).

In this present note, we report a primary minimum of the variable, which was observed using the Ruth Crisp 41cm telescope, at Carter Observatory's Black Birch outstation (near Blenheim, New Zealand). The minimum was followed using the three colour U, B, V photometric system (see e.g., Budding 1985). The main comparison star was HD147977, which was checked regularly against HD150745. A time of minimum was calculated for each colour using the "folding paper method". An estimate of the error in time was obtained from a standard statistical procedure on the various measurements. The time of minimum thus obtained was:

Primary minimum at HJD2446585.161 ± 0.001

More time of minimum observations are urged for this binary. Apart from the evidence such data might have to



bear on the mass transfer process, as discussed by Kondo et al., (*op.cit.*) and McCluskey and Kondo (*op.cit*), there is, more simply, a need to clarify the value of the period. The following values have been either deduced, quoted or used in past literature:

Roberts	(1894,1901)	deduced	$P=4^d.42509$	:
Hertzsprung	(1942)	deduced	$P=4^d.42507\pm0.00003$	:
Payne-Gaposchkin	(1945)	quoted(?)	$P=4^d.42509$	:
Gaposchkin	(1953)	deduced	$P=4^d.425115$	:
Sahade	(1952)	used	$P=4^d.42509$	:
McCluskey and Kondo	(1983,1984)	used	$P=4^d.42509$	:

Thus, if Hertzsprung's or Gaposchkin's periods represent improved values, on the basis of more observations, it seems odd that later workers have not bothered with them; although Hertzsprung's value has been quoted by Sahade (1952) and McCluskey and Kondo (*op.cit*).

In this present work the value quoted by Payne-Gaposchkin has been used for the calculation of phases. From figure (1) we can see that the minimum is appreciably displaced from phase = 1.00. If we use the epoch of Payne-Gaposchkin, as quoted by McCluskey and Kondo (1983) we may derive a mean period, over the last fifty years or so, of $4^d.425132$, bearing out the suggestion of an increase given by Gaposchkin (1953) and noticeably greater than the period used as representative for the first fifty years after discovery. Unfortunately though, there appears to be too little data on times of minimum to enable a thorough study of O-C history of the binary hitherto.

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