Determining a limit on its size from the light curve is difficult because of the system's small ($\sim$0·01) radius ratio. The most recently published analysis favoured an $i = 80$, $R_K = 0{\cdot}83 R_\odot$ solution[16], but another study which examined a wider range of possible orientations reported that $i = 70$, $R_K = 1{\cdot}23 R_\odot$ produced as plausible a fit[17].

A much more probable, albeit less efficient, transfer mechanism might be related to the active chromosphere of the K star. Recent *IUE* observations have detected hot plasma extending $\sim 5 \times 10^5$ km above its surface[18], and this must be in contact with the inner surface of its Roche lobe. Flares of considerable magnitude have been observed[19], and flare accretion by the white dwarf has already been predicted[20]. Furthermore, the possibility that the abrupt period changes of the system may be caused by intense mass-ejection events has not been ruled out[19].

It seems unlikely that either mechanism could have deposited enough mass on the white dwarf, but the historical evidence is so suggestive, and the potential advantages of this system (extreme proximity, known age, favourable inclination, *etc.*) are so great that the possibility should be explored. Another good reason for considering this possibility is that if it were ruled out, then the AD 396 transient would become, by process of elimination, a prime supernova candidate. The absence of a readily detectable remnant would presumably be attributable to the unfavourable (gas density and/or magnetic field) environment at $|z| \gtrsim 500$ pc. It might be noted that the first millenium AD, with only two definite historical supernovae, is clearly deficient on the basis of any reasonable Galactic supernova rate.

References

(1) M. M. Shara *et al.*, *Ap. J.*, **282**, 763, 1984.
(2) M. M. Shara, A. F. J. Moffat & R. F. Webbink, *Ap. J.*, **294**, 271, 1985.
(3) J. Patterson, *Ap. J. Suppl.*, **54**, 443, 1984.
(4) D. H. Clark & F. R. Stephenson, *The Historical Supernovae* (Pergamon Press, New York), 1977.
(5) R. F. Green, D. H. Ferguson, J. Liebert & M. Schmidt, *PASP*, **94**, 560, 1982.
(6) D. H. Ferguson, R. F. Green & J. Liebert, *Ap. J.*, **287**, 320, 1984.
(7) F. R. Stephenson, *Q.J.*, **17**, 121, 1976.
(8) G. F. Bignami, P. A. Caraveo & J. A. Paul, *Nature*, **310**, 464, 1984.
(9) J. J. Nugent *et al.*, *Ap. J.*, **284**, 612, 1984.
(10) T.-T. Hsi, *Smithson. Contr. Astrophys.*, **2**, 109, 1958.
(11) Y. P. Pskovskii, *Sov. Astr.*, **16**, 23, 1972.
(12) W. C. Rufus & H.-C. Tien, *The Soochow Astronomical Chart* (University of Michigan Press, Ann Arbor), 1945.
(13) P. Y. Ho, *Vistas in Astr.*, **5**, 127, 1962.
(14) K. P. Hertzog, *M.N.*, **209**, 533, 1984.
(15) O. J. Eggen, *A.J.*, **89**, 830, 1984.
(16) C. Ibanoglu, *Astrophys. Space Sci.*, **57**, 219, 1978.
(17) B. Cester & M. Pucillo, *A. & A.*, **46**, 197, 1976.
(18) E. F. Guinan *et al.*, *BASS*, **17**, 569, 1985.
(19) A. Young *et al.*, *Ap. J.*, **267**, 655, 1983.
(20) E. M. Sion & S. G. Starrfield, *Ap. J.*, **286**, 760, 1984.

NOTES FROM OBSERVATORIES

1H. Cas = AR Cas

By W. B. Somerville
University College, London

The light curve of the eclipsing variable 1H. Cas has frequently been used in textbooks[1–6] as an illustrative example. It is well suited to this purpose. There are two eclipses, of unequal separation and unequal depth, and both are flat (one total and one annular); the light curve is flat also between eclipses. It presents a good contrast to the light curve of Algol, the most frequently used example of all. In preparing some recent teaching material[7], I too decided to use both of these stars.

To reinforce the teaching point that the component stars are too far apart to influence each other's light between eclipses, it seemed a good idea to give the spectral types of the components of 1H. Cas and their separation. But there the trouble started. None of the textbooks gives this information, nor do they refer to an original research paper. Unsöld[5] refers to Baker[1] who simply says the work was done "by Joel Stebbins". Motz & Duveen[4] refer to Struve *et al.*[2] who give no reference at all. Nor do Mehlin[3] or *The Science of Astronomy*[6]; probably all of them copied it from Baker. Now, Stebbins was an active observer over many years and, without knowing the title of his paper, or the journal, or indeed whether he actually ever published these results, to search through all his publications seemed daunting. Nor does the name of the star help, for it is a non-standard form. The textbooks disagree about whether it is 1H or IH, and whether or not there is a full stop after the H, but in none of these forms is it a designation used in modern catalogues. At first glance IH Cas looks like a variable star name, but in fact in the strange rules that are followed the second letter must not be earlier in the alphabet than the first—*i.e.*, IH is not acceptable whereas, *e.g.*, HI or even II is.

Having found the answer, I share it here with anyone else who may wonder about this star, or indeed anyone who notices that the same light curve has a different name in Reference 7 from that in References 1–6. It took hours of searching in the library at the University of London Observatory (and as I did it I felt *this is real research*). The key turned out to be a table of binary stars in Aitken's book[8]. Our star 1H. Cas has period[2] 6·1 days and of all the stars in that table only one has this period—by name AR Cas. Aitken refers to a 1910 paper[9] by Baker, of all people—no wonder he put the star in his book. And Baker calls the star 1H. Cas. So the problem is solved!

The modern name makes a bibliographical search easy. The star was found to be a spectroscopic binary by Frost & Adams[10] in 1903, and Baker[9] obtained the velocity curve and the period. Its variability was discovered by Stebbins[11], who published the famous light curve in 1921[12]—still calling the star 1H. Cas. Frost & Adams give the name as 1 Hev. Cassiopeiae; this makes it clear that the reference is to an entry in the catalogue or constellation maps of Johannes Hevelius (1611–1687)[13]. The 1 is no doubt the number of the entry. However, there is an entertaining coincidence[14]: in his tables, Hevelius marked stars not previously catalogued with his own initials—in the form IH.

It is interesting that the old name continued in use so far into this century, no doubt because the star has neither a Bayer nor a Flamsteed designation, although brighter than some that do. Under the name AR Cas, it has been well studied over the years[15–20], even being featured in *Astrophysical Quantities*[21]! It is otherwise HD 221253 and HR 8926, with V = 4·91. The component stars are B3 IV and A5–A7 V, with separation 35 $R_{\odot}$. It is a well-known variable star. Besides giving a light curve for IH Cas, Motz & Duveen[4] include elements for AR Cas in a Table a few pages later, without making the connection. Actually the star does appear in one modern textbook[22] totally under the name AR Cas, but this is with a light curve obtained[16] by the senior author of the book so it is not in the mainstream tradition derived from Baker[1]. The light curve is only sketched and it would be difficult simply by comparing light curves to identify the star as the one in the other books.

It is fascinating how this star has become fossilized in a succession of textbooks under its old name, while in real life the observational story has continued to unfold. Authors of future textbooks please take note.

References

(1) R. H. Baker, *Astronomy* (Van Nostrand, Princeton), 8th edition, 1964, p. 425.
(2) O. Struve, B. Lynds & H. Pillans, *Elementary Astronomy* (Oxford University Press, New York), 1959, p. 324.
(3) T. Mehlin, *Astronomy* (Chapman & Hall, London), 1959, p. 126.
(4) L. Motz & A. Duveen, *Essentials of Astronomy* (Wadsworth, Belmont), 1966, p. 481.
(5) A. Unsöld, *The New Cosmos* (Longmans, London/Springer-Verlag, New York), 1969, p. 134.
(6) Anon., *The Science of Astronomy* (Harper & Row, New York), 1974, p. 299.
(7) W. B. Somerville & E. A. Moore, *Observing the Stars*, Block 4 of Open University course S256: *Matter in the Universe* (The Open University Press, Milton Keynes), 1985, p. 55.
(8) R. G. Aitken, *The Binary Stars* (McGraw Hill, New York), 2nd edition, 1935, Appendix.
(9) R. H. Baker, *P. Allegheny O.*, **2**, 25, 1910.
(10) E. B. Frost & W. S. Adams, *Ap. J.*, **18**, 383, 1903.
(11) J. Stebbins, *PAAS.*, **4**, 115, 1919.
(12) J. Stebbins, *Ap. J.*, **54**, 81, 1921.
(13) W. D. Heintz, in *Astronomy: a Handbook*, ed. G. D. Roth (Springer-Verlag, New York), 1975, p. 3.
(14) I. Volkoff, E. Franzgrote & A. D. Larsen, *Johannes Hevelius and his Catalog of Stars* (Brigham Young University Press, Provo), 1971, p. 73.
(15) N. Roman, *Ap. J.*, **123**, 246, 1956.
(16) C. M. Huffer & G. W. Collins, *Ap. J. Supp.*, **7**, 351, 1962.
(17) T. Herczeg, *Bull. AAS.*, **6**, 223, 1975.
(18) W. L. Gorza & J. F. Heard, *PDDO*, **3**, 97, 1971.
(19) S. Catalano & M. Rodonò, *A.J.*, **76**, 557, 1971.
(20) K. C. Gordon & G. E. Kron, *A. Sp. Sc.*, **23**, 403, 1973.
(21) C. W. Allen, *Astrophysical Quantities* (Athlone Press, London), 3rd edition, 1973, p. 231.
(22) C. M. Huffer, F. E. Trinklein & M. Bunge, *An Introduction to Astronomy* (Holt, Rinehart & Winston, New York), 2nd edition, 1973, p. 361.

CORRESPONDENCE

To the Editors of 'The Observatory'

Coma and astigmatism in the Newtonian reflector

GENTLEMEN,—

It is well known that the Newtonian or prime-focus reflector suffers from coma and astigmatism, and that coma is the dominant aberration in all practical cases. But are they ever equal?

When coma and astigmatism are present in comparable amounts large enough to mask the effects of diffraction, the image of a star is quite unlike an image with either aberration alone. It is an oversimplification to assume that these two aberrations can be resolved, but perhaps this can be excused by the following rather simple results from 3rd-order ray theory for a paraboloidal mirror without field-corrector lenses and with no central obscuration.

The diameter of the astigmatic circle of minimum confusion is equal to the comatic spread in the tangential direction when the distance of the image from the axis of the mirror is one-quarter of the diameter of the mirror; and it is equal to the radial comatic spread when the distance of the image from the axis is three-eighths of the diameter of the mirror. These results are independent of the aperture and focal length of the mirror.

Those of my colleagues whom I have asked have not been able to recall having seen these results published anywhere in this explicit form. I would be grateful to any of your readers who would write to me if they know of the previous publication of either result.