

Summary of Final Discussion

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The last session of the Colloquium was Chaired by Harry Nussbaumer and opened with statements from members of a panel comprised of Livio, Mikolajewska, Luud, Viotti, Magalhaes, Slovak, Kwok and Whitelock. Viotti began by comparing the available data for symbiotics historically and since IAU Colloquium 70 in 1981. He emphasized new UV, X-ray, infrared and radio observations. He also sketched the recent history of wavelength specific publications. Whitelock stated that it now seems clear all D-types probably contain Miras and that S-types do not evolve into D-types. Luud stated that his group intends to continue its near infrared observations with the 2 meter at Tartu, and that it is important to confirm conclusions based on IRAS data. He mentioned that masses for the Miras are needed given the discrepancy between observed and evolutionary masses.

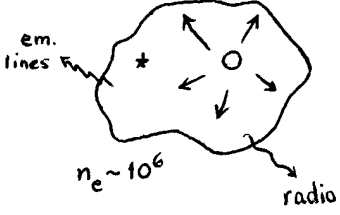
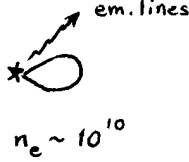
Sun Kwok then presented his synthesis of the meeting in Table 1. This proved both helpful and provocative.

Webbink reminded the participants that it is important to compare symbiotics with related objects, like the Barium binaries. Yungleson added Bq or B[] stars to Webbink's suggestion (cf. Wackerling, in Mem. R.A.S. volume 73). Stencel emphasized the discontinuity in mass loss rates when dust formation begins (can increase the rate by a factor of 100 or more). This lead Stencel to further suggest that maybe the S-types are all first ascent red giants, the D'-types blue loop objects (He core burning main sequence) and the D-types all AGB stars. Whitelock objected, saying it probably is not that simple.

Mario Livio called for measured abundances of ejecta as a way of telling about the nature of the hot object. He complained about the lack of time for polarimetry reports at the meeting, indicating that polarimetry can provide important evidence about disks. Magalhaes answered, agreeing that IR polarimetry particularly could give useful diagnostics. He added that emission lines produced by fluorescence should be polarized and that planned space astronomy experiments like Astro's WUPPE and the Hubble Space Telescope's FOS should detect symbiotics. Schwarz and Viotti both talked about the importance of high resolution and high signal-to-noise spectroscopy to identify which features belong to the hot component.

Slovak wondered whether sporadic mass transfer could create disk instabilities. Cas-

Table 1: Cool Components in Symbiotic Binary Stars

Mira on AGB	M Giant	K or Earlier
M3-M10	M0-M3	
large dM/dt	low dM/dt	very low dM/dt
dusty	little dust	no dust
D-type	S-type	S ² -type
nebular emission from		no radio emission
		
ionized M star wind		neb em from accretion
Outburst Energy		
thermonuclear		gravitational
rapid accretion	low accretion rate	rapid accretion
H-burning steady	H-burning sporadic	
Outburst Interval		
long ($> 10^2$ yr)	short (1 yr)	short (1 yr)
White Dwarf Wind		
strong	weak	none

satella restated that the UV behaviour of these systems during outburst remains a puzzle. Vogel suggested the outburst could also be triggered by an increase in mass loss rate leading to a substantial continuum brightening, according to the ionization model. Seaquist responded, saying you might then expect the radio source to fade then as the ionization volume decreases. Webbink pointed out that the original nova model fits symbiotics nicely. The nova wind matches the orbital speed of the companion in energetics and strongly implies a key role. Solf asked why symbiotic optical and radio outflows however do not look like nova shells.

Nussbaumer exhorted everyone to publish their data, including negative results. Slovak asked whether the theorists could predict mass loss rates from symbiotic star P-Cygni profiles, and provide an interpretation for the high velocity line wings. Luud hoped more accurate distances could be obtained. Stencil suggested everyone use the meeting participant list for distribution of preprints and observation coordination.