matters arising

B-emission stars and X-ray sources

In 1975, an hypothesis of the binary nature of B-emission (Be) stars was proposed[1,2]. Referring partly to this and to the observed association of some X-ray transients with Be stars, Maraschi *et al.*[3] suggested that the classical Be stars, as the optical counterparts of the X-ray transients, could be responsible for the X-ray bursts of these objects. We present here some arguments against this interpretation.

Be stars are essentially normal, rapidly-rotating B stars situated (on average) about one magnitude above the main sequence in the Hertzsprung–Russell diagram. They are enclosed by an extended envelope producing emission (and sometimes also sharp absorption) lines in their spectra. The envelope lines usually exhibit several kinds of variability (for review see refs 1, 2): (1) long term profile and velocity variations, including sometimes even complete disappearance and reappearance of the envelope lines within 1–10 yr; (2) periodic velocity and profile variations with typical periods of 10–100 d; (3) rapid profile variations taking place within several hours or minutes. The main idea of the binary hypothesis of the Be phenomenon is that the Be envelope is formed as an accretion disk enclosing the mass-gaining components of certain mass-exchanging systems and that the high rate of rotation of Be stars is induced by infalling matter. Periodic velocity and profile variations are interpreted as reflecting the orbital motion while the long term changes are understood as consequences of varying rate of mass transfer between components (similar to the Algol binaries). This view is supported by observational data. In every known case, the basic properties of the Be stars recognised as binaries agree well with the theoretical predictions.

Maraschi *et al.*[3] suggested that the X-ray transients represent some later evolutionary stage of the Be binaries after mass exchange. In other words, they implicitly assume that the Be envelope once formed is a long lived phenomenon lasting even after the original mass-losing component has evolved to a compact object. They then interpret the X-ray bursts as a consequence of occasional infalls of matter from the Be on to the compact component controlled by some (unspecified) rotational instability of the Be envelope. There is no observational evidence to support this view. The long term variations of Be stars seem to indicate that the envelopes can dissipate rather quickly without the presence of a continuing supply of matter. Also, practically all known Be binaries exhibit clear signs of continuing mass transfer towards the Be component.

A more serious objection exists, however. It is important to realise that two groups of Be binaries are observed. In many cases, it is indeed the mass-gaining star enclosed by an envelope which dominates in the spectrum. Such a system can then appear as a 'single' Be star (ζ Tau, 4 Her or 88 Her can serve as examples). In other cases, however, it is the mass-losing star, which is the brighter of the two. But even then, some emission lines originating in the envelope around the (now invisible) mass-gaining star (or, alternatively, around the whole system) can be observed. If, at the same time, the mass-losing star is of a B type, such an object is often also classified as a Be star. This is the case of Be binaries HD 187399 (ref. 4) and HD 173219 (ref. 5), which are listed in all catalogues of Be stars. HD 72754, β Lyr, W Cru and probably X Per itself belong to the same category. This classification of Be binaries is convincingly documented by observations. Radical velocities of the hydrogen emission lines of all these objects invariably indicate that in any known case the emitting envelope does not enclose the mass-losing star—in clear contradiction to the expectations of the model of Maraschi *et al.*[3]. The Be stars assumed in that model do not seem to be identical to the Be stars normally observed and only by measuring the emission and absorption velocities of the X-ray transients can the existence of the objects postulated by Maraschi *et al.* be confirmed.

Petr Harmanec
Astronomical Institute of the Czechoslovak Academy of Sciences, 251 65 Ondrejov, Czechoslovakia

1 Kriz, S., and Harmanec, P., *Bull. astr. Inst. Czech.*, 26, 65 (1975).
2 Harmanec, P., and Kriz, S., *IAU Symp.*, 70 (1975).
3 Maraschi, L., Treves, A., and van den Heuvel, E. P. J., *Nature*, 259, 292 (1976).
4 Hutchings, J. B., and Redman, R. O., *Mon. Not. R. astr. Soc.*, 163, 209 (1973).
5 Hutchings, J. B., and Redman, R. O., *Mon. Not. R. astr. Soc.*, 163, 219 (1973).

Environmental effects on alcohol selection by mice

Randall and Lester[1] attempted, by transplanting fertilised ova to mothers of a different strain, to estimate the relative contribution of heredity and environment to alcohol selection by mice. Their experiment was designed to allow the following comparisons of alcohol consumption to be made:

(1) *a*, Offspring resulting from the transfer of C57BL/6 strain ova to DBA/2 mothers were compared with *b*, offspring from C57 ova transferred to C57 mothers (control transplants) and with *c*, naturally bred (untreated control) C57 mice;
(2) *a*, Offspring resulting from DBA ova transferred to C57 mothers were compared with *b*, control transplant DBAs and with *c*, untreated control DBA mice.

The absence of a difference between groups *b* and *c* would imply that the transplantation procedure did not affect offspring and then a difference between groups *a* and *b* would imply that the maternal environment affects alcohol consumption of offspring. This pattern of findings is what they report: DBAs transferred to C57s and C57s transferred to DBAs showed increased alcohol consumption, findings which Randall and Lester conclude "uphold the hereditary basis of alcohol selection in C57BL mice, but show the avoidance of alcohol drinking by DBA mice to be amenable to environmental alteration".

Even if there were no questions about the findings themselves, there is no reason to regard an increase in consumption by one strain as less indicative of an environmental effect than the increase in consumption of the other. Both strains showed a similar effect.

It seems possible, however, that the composition of the *b* groups was not as represented. Randall and Lester state that experimental pups were identified by differences in eye pigment at birth. This method is liable to produce errors in identification, since both strains have pigmented eyes. Even if it was successful in the case of between strain (experimental) transfers it is difficult to see how it could have been used at all in the case of control transfers. The natural progeny of a C57 female mated to a C57 male will be indistinguishable from C57 transplants she has received (and, *mutatis mutandis*, the same problem arises with DBAs). It