THE PRINCETON-PENNSYLVANIA-FLORIDA CARD CATALOGUE OF ECLIPSING VARIABLES

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For many years, the study of close double stars seemed somewhat remote from many astronomical problems. The specialists in the field pursued it with enthusiasm, regarding each light or velocity curve as a particular challenge and each system as unusual and interesting in its own right. However, the relation to most other branches of astrophysics sometimes seemed remote. In favorable cases, masses and radii (and hence mean densities) could be obtained and the mass-luminosity relation could be strengthened; even this advantage was partially negated when it was early realized that in many cases the fainter components were notorious violators of the relation established by visual binaries (i.e., systems well separated compared to those discussed here). Various complexities, connected chiefly with interaction effects between the close components, prevented their use for the extremely precise determinations of limb darkening which at one time seemed possible. Other difficulties have prevented the determination, with the precision once comtemplated, of details of internal structure from the apsidal rotation.

However, in recent years, close double stars have become important in various other branches of astrophysics. At least some x-ray sources have been identified as members of close binary systems. Some are intermittent emitters of radio waves. Most eruptive variables seem to be components of close double stars. The evolution of a star when it is significantly affected by the presence of another is strikingly different at many phases from that of a single star. The net effect of these and other developments has been brought into the field many astronomers who have not previously studied close binaries; the purpose of this communication is to inform them of the existence and nature of this catalogue.

C. Jaschek and G. A. Wilkins (eds.), Compilation, Critical Evaluation, and Distribution of Stellar Data. 147-150.

The card catalogue was started more than fifty years ago at Princeton University by Raymond S. Dugan. It was continued by Newton L. Pierce and then at the University of Pennsylvania and since 1968 at the University of Florida by myself, with the aid of a series of competent graduate students and an occasional post-doctoral fellow.

The stars are listed not only in the conventional variable star designation (e.g., R Canis Majoris, AR Lacertae, etc.) but also whenever appropriate by discovery number (e.g., 77.1929, 255.1930), HV (Harvard Variable), HD (Henry Draper Catalogue number), BV (Bamberg Variable), SVS (Soviet Variable Star), VV (Vatican Variable), OV (Oklahoma Variable), S or So (Sonneberg Variable), and various other designations.

The information listed is of the conventional type: author, journal, volume, page, and year. For a full length paper, either the title or a brief summary of the article is given. New observational data such as depths or widths of minima are of course recorded, as well as new light elements and the results of solutions of light or velocity curves. Individual times of minima are frequently recorded, especially if the publication is one not found in all astronomical libraries.

For some systems, a considerable volume of publication exists. In the case of U Cep, for example, 35 cards (20 cm x 12.5 cm each) have been filled with references and data; to illustrate the modern volume of work, even going back four cards only takes in the work of the past two years. HZ Her, discovered only in 1972, has more than 18 cards of closely written data references and card 19 is now almost filled.

In addition to the published material, a good deal of unpublished material is included. This ranges from completed typescripts sent at the time the paper is submitted to a journal to simple statements that the system has been observed. (Because of experience, we seldom include a statement that someone "plans to observe" normally some observations must actually have been made before a statement is included). Further, abstracts of papers at meetings are noted, and observatory reports are treated in much the same way as letters; we record work actually done or going on, but not expectations or hopes. As a check on the catalogue, we make regular comparisons with the "Bibliography and Program Notes" of Commission 42 prepared under the direction of Gunnar Larsson-Leander and with supplements to the General Catalogue of Variable Stars.

DISTRIBUTION OF DATA

The distribution of information is carried out in three different ways. First, material is distributed in reply to personal requests merely by xeroxing the cards and sending the copies. We emphasize that we make every effort to keep the catalogue complete; it is not intended to be critical. Those using it are presumably professional astronomers, or students working under their guidance; they can read critically the publications and form their own judgments. (It may be well to emphasize the danger of accepting any value without checking the source; see E. W. Weiss, Observatory 96, 9, 1976, on one error perpetuated for years because it was carelessly accepted in a published catalogue.) Our purpose is to give as complete a set of references as possible. Answer to requests have usually gone out no later than the day after the request was received.

A second method of distribution of information has been the publication at irregular intervals of "A Finding List for Observers of Eclipsing Variables". This was initiated by Dugan "as an aid to observers of eclipsing variables in selecting a program rapidly, easily, and without exasperation". Four editions have been published to date. The last by R. H. Koch, S. Sobieski, and F. B. Wood appeared in 1963 (Vol. IX of the Astronomical Series of the University of Pennsylvania), and another is needed. While some changes have been made in the format, we have adhered to Dugan's original plan of giving numerical data on the left hand page and historical references on the right. In addition to magnitudes, spectra, depths and durations of eclipses, and other data, we have listed for each system the most reliable ephemeris available at the time. Most of the columns are self-explanatory; those headed S and P simply indicate whether in the opinion of the authors, further observational work in spectroscopy or photometry is needed (*), or badly needed (!); the numerical superscripts are literature references and are identified on the last few pages. Again, the purpose of this is to aid observers to select rapidly systems of interest to them; it is expected that they will consult the original literature before commencing observation.

Finally, the material has served as the basis for related publications - i.e., publications that could not have been produced at all, or which would have taken very much longer to produce, had it not been for this data source. These include "A Catalogue of Graded Photometric Studies of Close Binaries", by R. H. Koch, M. Plavec, and F. B. Wood, "An Atlas of Light Curves of Eclipsing Binaries" by M. G. Fracastoro, and portions of reports of I.A.U. Commission 42 in 1952, 1964, 1967, 1970, and 1976.

FUTURE DEVELOPMENTS

The continuation of the catalogue at least in its present form is essential. The volume of publication is such that interruption for even a year or two would make its resumption an exceedingly expensive and time consuming task. For example, in the listing of articles of general interest not connected with one particular star - theoretical developments, new methods of solution or models, general summaries, discussions of evolution, etc. - one page (25 x 20 cm.) covered all the material published in 1931 and 1932 (authors, journal references, letters, and occasional abstracts); later, about two pages were required for the general publications of 1951 and 1952; for 1975 and the first four months of 1976, ten full pages were required to list author, journal reference, and title. A similar expansion has been found for many individual systems and especially for those which are x-ray sources.

The time has now come (and indeed is a bit overdue) when the catalogue should be put on punched cards suitable for handling by modern computers. Most of the data is ideally suited for this treatment and even in the "remarks" it should not be difficult to provide coded treatment. (Indeed, I am informed that at a number of observatories, the most recent edition of the Finding List has been so treated.) Ideally, this transformation should coincide with the preparation of a fifth edition of the Finding List. With cards so prepared, the preparation of annual or bi-annual editions should be relatively simple. Shortage of sufficient funding has been the chief reason for not having made the change to date. Meanwhile, we intend to continue the catalogue in its original form and will continue to supply information as requested.

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