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THE NATURE OF SYMBIOTIC STARS

Edited by Michael Friedjung and Roberto Viotti

VOLUME 95

PROCEEDINGS



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THE NATURE OF SYMBIOTIC STARS

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THE NATURE OF SYMBIOTIC STARS

ASTROPHYSICS AND SPACE SCIENCE LIBRARY

A SERIES OF BOOKS ON THE RECENT DEVELOPMENTS
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VOLUME 95
PROCEEDINGS

This Volume is dedicated to Andrew David

T H A C K E R A Y

(1910 - 1978)

Pioneer in the Spectroscopy of
Southern Hemisphere Emission Line Stars

PREFACE

Many aspects of symbiotic stars have long puzzled astronomers. For instance while most students of the subject have considered them binary, many have at different times supported single star models. The nature of their outbursts is uncertain, while the dividing line between symbiotic stars and novae is unclear. In any case doubts can even be raised as to whether a class of "Symbiotic Stars" really exists.

Much new data has been obtained in recent years, in particular from the study of radiation outside the visual region. Many symbiotic stars have been studied in the UV with IUE since 1978, while X-rays were detected in a few cases with the Einstein satellite. There have been a number of infrared and radio studies, and the number of known symbiotic stars has also considerably increased. Furthermore theoretical ideas have in recent years been considerably enriched by concepts of stellar winds, and accretion phenomena in binaries including accretion disks. It was therefore extremely opportune and timely to hold the first international meeting exclusively devoted to these stars, so as to consider the new results from such a wide range of observations in different spectral regions, and the conclusions which can be drawn for possible models as well as theories of the nature and structure of symbiotic stars.

After a session devoted to new observations in different spectral regions, a session was spent considering some individual stars. This was because there are considerable differences between different stars, and one needs to understand the physics of each star as an individual. It was only after such an examination that a session was devoted to interpretation (classification and possible models). The meeting ended with a session on evolution and internal structure.

Different themes were introduced by invited papers. There were no formal contributed papers, because we wanted to leave as much time as possible for free discussion. However some short contributions summarizing some recent results were presented, particularly on individual stars.

We have tried as much as possible to fully reproduce the discussion, where space allows us to do this. However there are some gaps, in particular where participants did not complete the sheets on which their comments were to be written. It is for this reason that some of the more numerous remarks made on the last day during the examination of classification and models are unfortunately not reproduced. For instance one participant spoke of God having created both man and the devil.

Most participants considered that most symbiotic stars are binary (90 % according to one), but their physics was the subject of lively controversy. Some thought that one should speak of a "Symbiotic Phenomenon" rather than of "Symbiotic Stars". It may be useful to hold another meeting

in a few years, to see whether progress has been made on resolving the different problems.

The meeting was dedicated to the memory of the late Dr. A.D. Thackeray, who in many years of thorough painstaking work provided many basic results concerning southern hemisphere emission line objects, including notably the symbiotic stars AR Pav and RR Tel. Without such a basis, later studies would have lacked secure foundations on which to build. One of us (MF) is fortunate to have known Dr. Thackeray personally, and appreciated his quiet unassuming dedication.

We wish to thank the other members of the scientific organizing committee D.A. Allen, A.A. Boyarchuk, H. Nussbaumer, M.J. Plavec, B. Rudak, J. Sahade, J.P. Swings, and A.V. Tutukov for their active help in the scientific preparation of the meeting. J. Sahade kindly provided us with a historical introduction on the symbiotic stars. The light curves sent us by J. Mattei were very useful during the discussions on the individual stars.

We are very grateful to the members of the local organizing committee Y. Andrillat and Ch. Fehrenbach for making perfect arrangements at the Haute Provence Observatory. In addition a large amount of work was performed for us by the technicians and administrative staff of the observatory; we need in particular to thank the secretaries and the kitchen staff. The beauty of the surroundings and the social events, provided an excellent framework for our scientific discussions. All of us very much appreciated the wonderful concert given by the violinist Nicolas Risler in the dome of the 193 cm telescope.

We are greatly indebted to many people and organizations for their financial support: Dr. Petit as scientific director of the earth, ocean, and space sector of the french "Centre National de la Recherche Scientifique", Mr. Delorme as president of the Conseil Général des Alpes de Haute Provence, and the Executive Committee of the International Astronomical Union. In addition the directors of the Institut Geographique National, Drs. Valin and Serres allowed some of the participants to be lodged in a hostel of the Institute. We finally thank the presidents of IAU Commissions 27, 29 and 42 for sponsoring the colloquium.

It may be noted that many contributions are based on observations by the International Ultraviolet Explorer (IUE) collected at the Goddard Space Flight Center of the National Aeronautics and Space Administration, and at the Villafranca Satellite Tracking Station of the European Space Agency. Finally Marina Mele provided some very appropriate illustrations of our "scientific" discussions.

Michael Friedjung

Roberto Viotti

SCIENTIFIC ORGANIZING COMMITTEE

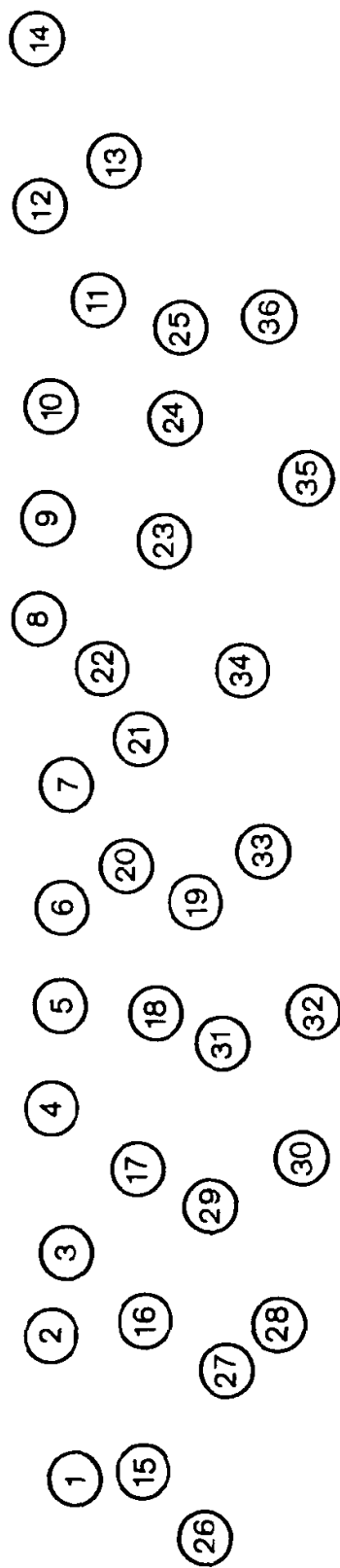
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ADRESSE AU COLLOQUE

Mes chers Collègues,

C'est pour moi un grand plaisir de souhaiter la bienvenue aux participants à ce 70ème Colloque de l'Union Astronomique Internationale sur "La Nature des Etoiles Symbiotiques".

L'Observatoire de Haute Provence, du Centre National de la Recherche Scientifique, accueille avec plaisir les quarante participants venus de 13 pays et qui sont tous des spécialistes des problèmes posés par ces étoiles.

Ces étoiles sont difficiles à comprendre et leur nom même de "symbiotique" provient de la première théorie faite pour les expliquer: l'association d'une étoile chaude et d'une étoile froide. Cette théorie est-elle toujours valable, ou bien avons-nous de nouvelles idées révolutionnaires?

De nouvelles et importantes observations ont été faites au cours des dernières années, notamment dans l'ultraviolet spatial, dans l'infrarouge, dans le domaine des rayons X, et même dans le domaine visible. Il faut interpréter tous ces documents.

Ceci est le but principal de la réunion de ces spécialistes venant de toutes les parties du monde: des Etats-Unis et du Canada, de la Chine et du Japon, de l'Afrique du Sud et naturellement de l'Europe où sont représentés l'URSS, la Pologne, la Tchécoslovaquie, sans parler de nos proches voisins de l'Europe.

Pourquoi ce colloque a-t-il lieu à l'Observatoire de Haute Provence? Une des raisons est que des nombreux astronomes ont travaillé sur ce sujet. Je rappellerai le mémoire du Professeur J. Dufay, du Professeur Tcheng Mao Lin, de Mlle Marie Bloch qui ont fait de nombreuses publications sur ce sujet.

Ce travail est continué par les astronomes français qui observent ici, soit comme visiteurs, soit comme résidents. Madame Andrillat et moi-même collaborons très activement avec nos collègues belges, M. Pol Swings, puis MM. L. Houziaux, J.P. Swings et J.M. Vreux, avec nos collègues italiens de Trieste, avec M. C.C. Huang de Nankin et M. A. Woszczyk de Torun.

Ce colloque est dédié à la mémoire de notre ami A.D. Thackeray, disparu si tragiquement il y quelques années, mais permettez-moi d'associer à son nom aussi ceux de J. Dufay, Tcheng Mao Lin et Marie Bloch.

Charles Fehrenbach

Directeur de l'Observatoire
de Haute Provence

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