THE
ASTROPHYSICAL JOURNAL

Supplement Series

SUPPLEMENT NUMBER 123
VOLUME XIV · PAGES 1–20 · NOVEMBER · 1966

Atlas of Peculiar Galaxies

BY HALTON ARP

THE UNIVERSITY OF CHICAGO PRESS
CHICAGO · ILLINOIS

limiting-magnitude study, however, that the investigation into the nature of spiral arms was temporarily postponed in order to organize systematically these new phenomena into groups and publish a representative sample of the best objects.

The *Atlas* as it has been realized in the following pages illustrates again that galaxies cannot be characterized as just assemblages of stars, radiation, and gravitation. The following *Atlas* pictures emphasize the importance of dust in some; they particularly imply a much more important role for the gas in general and point to the existence of either new forces or forces which previously have been little considered. For example, the twisted, distorted shapes and curious linkages pictured here attest to the fact that there are viscosity-like forces present that in some cases are dominant. Probably these forces are due to magnetic effects. Vorontsov-Velyaminov has stressed in the past the probable magnetic nature of these effects. Magnetic forces are very difficult to study, but may be very important in our Universe. The recent radio-astronomy discoveries of violent events in galaxies reveal sources of energetic charged particles. These charged particles interact with magnetic fields and offer the hope of mapping, measuring, and understanding cosmic magnetic fields. Exploration of the connection between the plasmas observed with the radio telescopes and the optical evidences of plasma effects pictured in the present *Atlas* is now open to us.

The over-all aim of this *Atlas* is to present a number of examples of various kinds of peculiar galaxies. They are presented in groupings that appear roughly similar, thereby furnishing also a rough, initial classification. Phenomena which each group represent may then be investigated by picking the most favorable members in size or brightness, studying different members of the group in different orientations, and, finally, making some preliminary statistics of certain kinds of phenomena and their relationship to other observable parameters. It is hoped that this investigative procedure will not only clarify the workings of galaxies themselves but will also reveal physical processes and how they operate in galaxies, and ultimately furnish a better understanding of the workings of the Universe as a whole.

It is a pleasure to acknowledge the help of William Miller, who photographically copied the original glass negatives; Lowell Peterson, of Graphic Arts at the California Institute of Technology, who supervised the large-size photographic reproduction of the *Atlas;* Frank Brueckel, who carried out many computational tasks connected with the *Atlas;* and, of course, all those astronomers who suggested candidates for the *Atlas* from their own personal store of knowledge and who gave advice and encouragement.

INTRODUCTION

The *National Geographic Society–Palomar Observatory Sky Survey* was completed in 1956. For seven years the 48-inch Schmidt telescope had surveyed the sky north of $\delta = -27°$. The 1758 highest-quality plates that were finally accepted penetrated about three times deeper into space than any previous survey had ever reached. Astronomers are still studying and cataloguing the information contained in this survey, and will continue to do so for many years to come.

One of the first astronomers to use the prints of the *Sky Survey Atlas* for a systematic study was Professor Vorontsov-Velyaminov of the Sternberg Astronomical Institute in Moscow (2).[1] In 1959 he published positions, with copies of *Sky Survey* pictures, of 355 peculiar and interacting galaxies that he had discovered on *Survey* prints. The publication of this list enabled the undertaking of one kind of project for which the 48- and 200-inch telescopes on Palomar Mountain were originally designed. The fast-focal-ratio, wide-field Schmidt telescope was intended to survey objects of interest. The maximum light-gathering power and resolution of the 200-inch could then be turned individually on the most interesting objects.

[1] For numbered references see the Bibliography at the end of the text.