

A SURVEY OF SOUTHERN COMPACT AND BRIGHT NUCLEUS GALAXIES

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During the 1960's, Zwicky made an intensive examination of the Palomar Sky Survey plates that resulted in his "Catalogue of Galaxies and of Clusters of Galaxies" (Zwicky *et al.*, 1961-1968). In the course of this study, he picked up numerous examples of what he labelled as "compact galaxies and compact parts of galaxies"; five lists were initially circulated and later presented as a catalogue (Zwicky 1971). To Zwicky the "compact" connotation suggested extremely high stellar densities, but line profiles failed to reveal the large velocity distributions expected of such concentrations of stars. Nevertheless an unexpected benefit was that many of his "compact parts" turned out to be the nuclei of active galaxies, particularly Seyfert galaxies. Furthermore, since the nuclei have to stand out to gain "compact part" status, Seyfert nuclei from Zwicky's lists tend to be fairly extreme specimens.

In the mid 1970's, the ESO Quick Blue Survey and later the UK IIIa-J Sky Survey appeared. The author, having examined and observed many of Zwicky's galaxies, started to scan for compact and bright nucleus galaxies in the southern skies. Since spectroscopy was essential for identification of active galaxies, the policy was to scan and select just sufficient for follow up observing. Initially, grating photography (akin to the Grism) offered hope for obtaining multiple slitless spectra from a single exposure, but the accumulation of featureless spectra encouraged the shift to conventional spectroscopy. Turnover was greatly increased with the advent of IPCS and RPCS detectors.

Today, after nearly 8 years, about 200 fields have been scanned and more than a thousand galaxies have been followed up. Starting at the South Celestial Pole, the search has reached the Declination -45° zone in the Southern Galactic Hemisphere and the Declination -35° zone in the Northern Galactic Hemisphere. Results are published in six papers (Fairall 1977 to 1983b). Overall statistics are as follows:

Seyfert 1 galaxies	5
Seyfert 2 galaxies	9
Near Seyfert (but almost certainly Seyfert 2)	23

Narrow emission line galaxies	91
Conventional stellar content (reliable redshift obtained)	619
Conventional stellar content (but no reliable redshift obtained)	279
Superposed stars mimicking bright nuclei	38
Planetary nebula mimicking bright nucleus	1
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Thus the bulk of the galaxies turn out to have normal stellar spectra, and much of the effort of the programme has been the production of redshifts. While exposure times have been compromised against the need to examine as many galaxies as possible, the redshifts are probably good to 200 km s⁻¹ (as suggested by a comparison with galaxies measured by other investigators). Occasional discrepancies do occur, but these are by no means not unique to the present work.

The main incentive behind the programme has been the discovery of Seyfert galaxies, and hopefully, extreme Seyferts that might throw more light on the nature of their enigmatic nuclei. Two discoveries from the present list stand out. F-9 = ESO 113-IG45, the most luminous Seyfert 1 known, is a vital link in the Seyfert 1 = QSO hypothesis (and like other extreme Seyfert 1's it shows anaemic spiral structure which may form a trend towards the even more anaemic structure surrounding quasars). F-427 = ESO 263-G13, an extreme Seyfert 2 galaxy (Fairall 1983c) appears to show rapid variability in its emission lines - currently regarded as controversial (the author has done his best to get rid of the evidence - but it refuses to go away!)

One may question the viability of this technique as a means for finding active galaxies, since objective prism searches and X-ray surveys would appear superior alternatives. The author has also participated in both of these. While the objective prism (Bohuski, Fairall and Weedman 1978) is unquestionably more productive in quantity, it failed to detect two sample Seyferts (F-9 and F-51) from the current survey. Precise X-ray positions are obviously ideal, but searches in boxes can often lead to the examination of many galaxies with negative results - a check of about 70 galaxies carried out by the author in 1981 led to one worthwhile discovery (Fairall, McHardy and Pye 1982). We must conclude that the three separate methods are perhaps more complementary than competitive and that the selection of galaxies solely from their appearance on Schmidt Sky Surveys is still a worthwhile pursuit.

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