# PROPERTIES OF GALAXIES WITH PECULIAR NUCLEI

J. L. SÉRSIC

Observatorio Astronómico
Universidad Nacional de Córdoba, Argentina

AND

M. PASTORIZA

Instituto de Matemática, Astronomía y Física
Córdoba, Argentina

*Received December 16, 1966*

In a former note (Sérsic and Pastoriza 1965) we published the results of a survey of bright southern galaxies which were inspected for peculiarities in their nuclei. Although the sample was small (35 galaxies) it suggested a relationship between the existence of a bar and the presence of abnormal features in their nuclei. One of us (J.L.S.) had the opportunity* of extending the survey to the whole sky by inspecting the Hubble plate collection at Pasadena. The present discussion will be restricted to galaxies brighter than 11.0 photographic total magnitude (de Vaucouleurs 1963) in order to include in the sample the objects previously found in the southern sky.

From 174 galaxies brighter than $m_T = 11.0$, 20 were found to have peculiar nuclei and are listed with magnitudes and morphological types in Table I. In order to avoid selection effects because of low-latitude obscuration and edge-on galaxies showing no nucleus, we retain only the 136 galaxies with latitudes higher than 20° and minor to major axis ratios $b/a$ larger than 0.4. The values of $b/a$ were deduced from the *Reference Catalogue of Galaxies* (de Vaucouleurs and de Vaucouleurs 1964). As 20 galaxies with peculiar nuclei remain after this selection, the fraction of the sample with peculiar nuclei amounts to 14%. Figure 1 is a histogram of the 135 spiral galaxies distributed according to families SA, SB, and SAB

* As Guggenheim Fellow at the Mount Wilson and Palomar Observatories 1965–66.



Reprinted from the *Publications of the Astronomical Society of the Pacific*
(Vol. 79, No. 467, April 1967)

in de Vaucouleurs' classification. Although the most populous family in the sample is SA (with 51 objects, compared with 50 for SAB and 34 for SB) there is no SA galaxy with peculiar nucleus. This result is in agreement with our previous results and also with similar results announced by V. Vorontsov-Velyaminov at the Erevan Conference (May 1966).

TABLE I

GALAXIES WITH PECULIAR NUCLEI, BRIGHTER THAN $m_T = 11.0$

| NGC | Type | $m_T$ |
|---|---|---|
| 613 | SB(rs)bc | 10.7 |
| 925 | SAB(s)d | 10.5 |
| 1097 | SA(s)b | 10.4 |
| 1365 | SB(s)b | 9.9 |
| 1433 | SB(r)a | 10.2: |
| 1672 | SB(s)b | 10.7 |
| 1808 | (R)SAB(s)o/a | 10.8 |
| 2903 | SAB(rs)bc | 9.5 |
| 2997 | SAB(rs)c | 10.0: |
| 3310 | SAB(r)bcp | 10.6 |
| 3351 | SB(r)b | 10.5 |
| 3359 | SB(rs)c | 10.9 |
| 4051 | SAB(rs)bc | 10.7 |
| 4151 | SAB(rs)ab | 11.0 |
| 4303 | SAB(rs)bc | 10.0 |
| 4321 | SAB(s)bc | 10.0 |
| 5236 | SAB(s)c | 7.8 |
| 5248 | SAB(rs)bc | 10.4 |
| 7424 | SAB(rs)bc | 10.7: |
| 7552 | (R')SB(s)ab | 11.0: |

The histogram in Figure 2 shows that there is no correlation between peculiar nuclei and degree of central concentration in the sequence of nebulae forms. The frequency distribution of galaxies with peculiar nuclei simply reflects the frequency distribution of field galaxies in degree of concentration.

A comparison of the $\log N$, $m_T$ relation for our sample with that

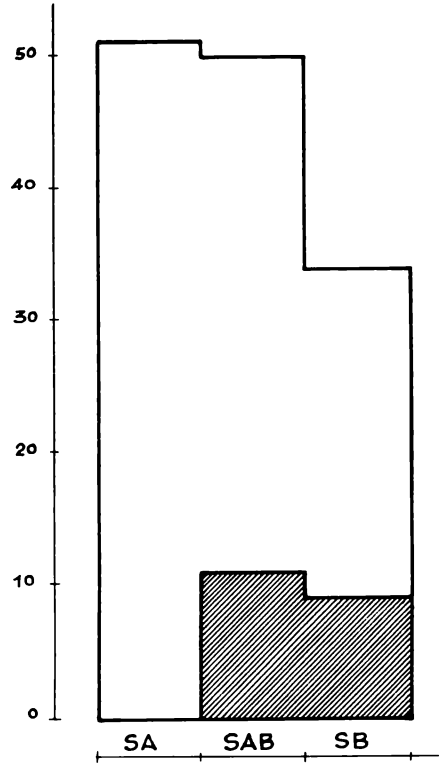


FIG. 1 — Histogram of 135 spiral galaxies in de Vaucouleurs' families SA, SB, SAB. Shaded areas indicate frequency of peculiar nuclei.

found by Holmberg (1958) for field galaxies allows us to write for the number of galaxies with peculiar nuclei

$$\log N_p\,(m_T) = -5.1 + 0.6\,m_T\,.$$

This relation predicts the total number of galaxies with peculiar nuclei up to the limiting magnitude $m_T = 11.0$ as $N_p\,(11) = 32$. If we assume similar absolute magnitudes for normal and peculiar-nucleus galaxies, the average absolute magnitude is $-19.9$ (de Vaucouleurs 1963) from which follows that there is one galaxy with peculiar nucleus per 2900 cubic Megaparsec.

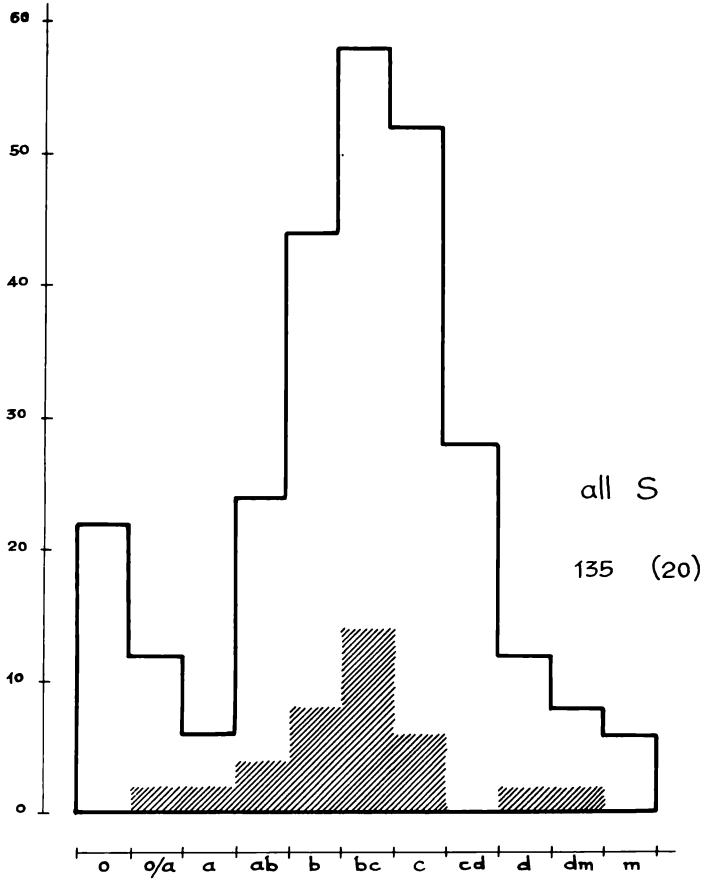


FIG. 2 — Frequency distribution of all sample galaxies (solid line) and of galaxies with peculiar nuclei (shaded) along the degree of concentration.

## REFERENCES

Holmberg, E. 1958, *Medd. Lund Obs.* Ser. 2, No. 136.
Sérsic, J. L., and Pastoriza, M. 1965, *Pub. A.S.P.* 77, 287.
Vaucouleurs, G. de 1963, *Ap. J. Supplements* 8, 31 (No. 74).
Vaucouleurs, G. de, and Vaucouleurs, A. de 1964, *Reference Catalogue of Bright Galaxies* (Austin, Tex.: The University of Texas Press).