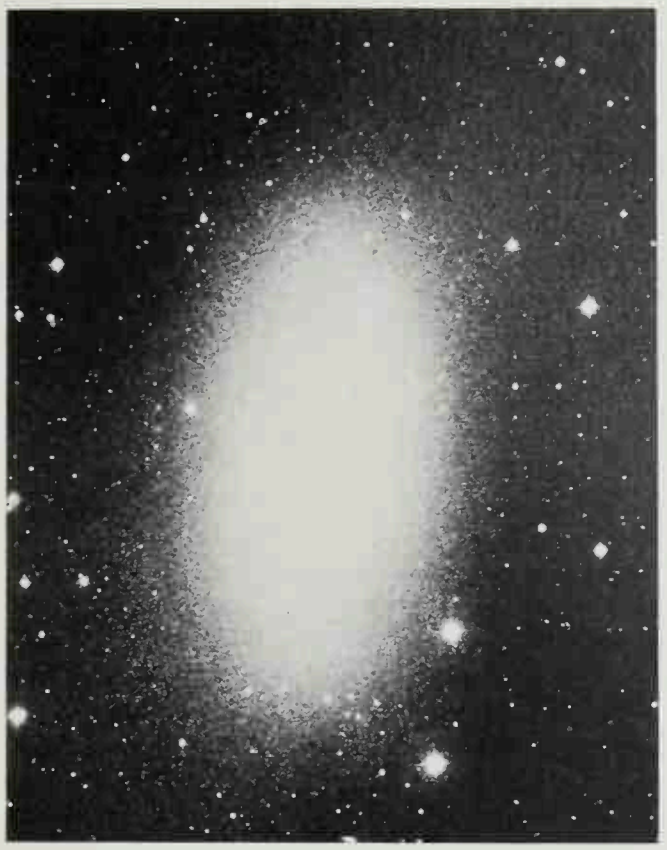
The sequence is continuous, but there are strong reasons to believe that galaxies do not evolve along it, in either direction. One reason is that galaxies of all classes contain highly-evolved stars (red supergiants), so they must all be around the same age, at least 10^{10} years old. Secondly, the giant ellipticals are more than ten times more massive than the largest spirals, and it would not be easy for the difference in mass to be gained or lost. Further, the rotation could not easily be changed to give the different values observed for angular momentum.

Despite these results, galaxies to the left in the sequence (E and S0) are called **early** and those to the right (S and Irr) **late**. This is similar to a terminology used for stars in the main sequence of an H–R diagram, but it has even less justification: late-type galaxies contain more early-type stars.

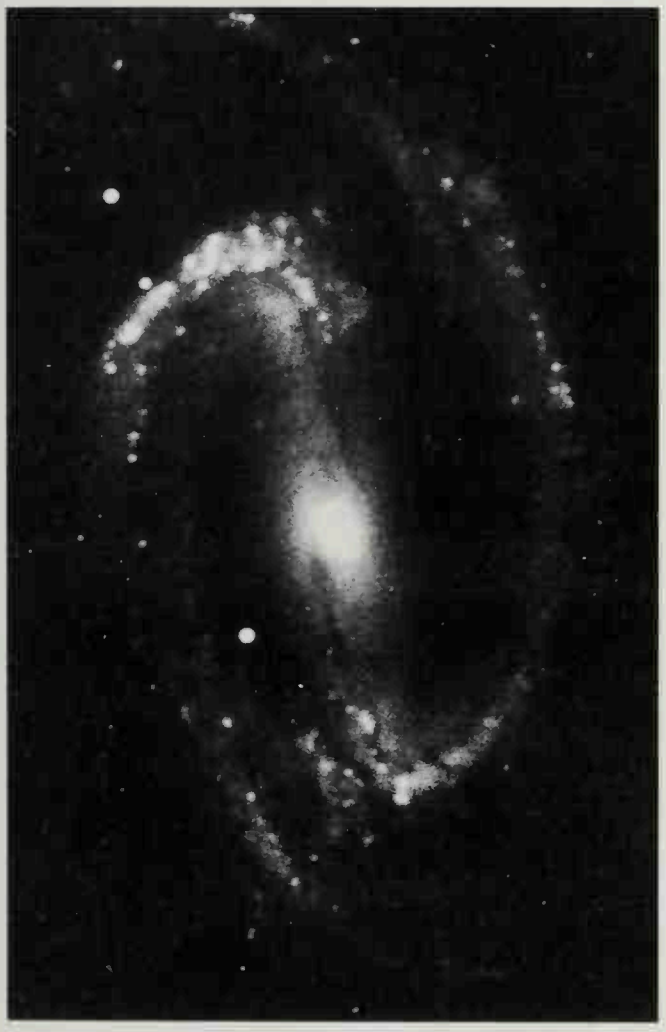
Since the galaxies described in the Hubble sequence are all relatively nearby, the times taken for their light to reach us are much shorter than their ages. There is no question, then, of their appearance being affected by changes occurring within the long ages of a cosmological time scale.

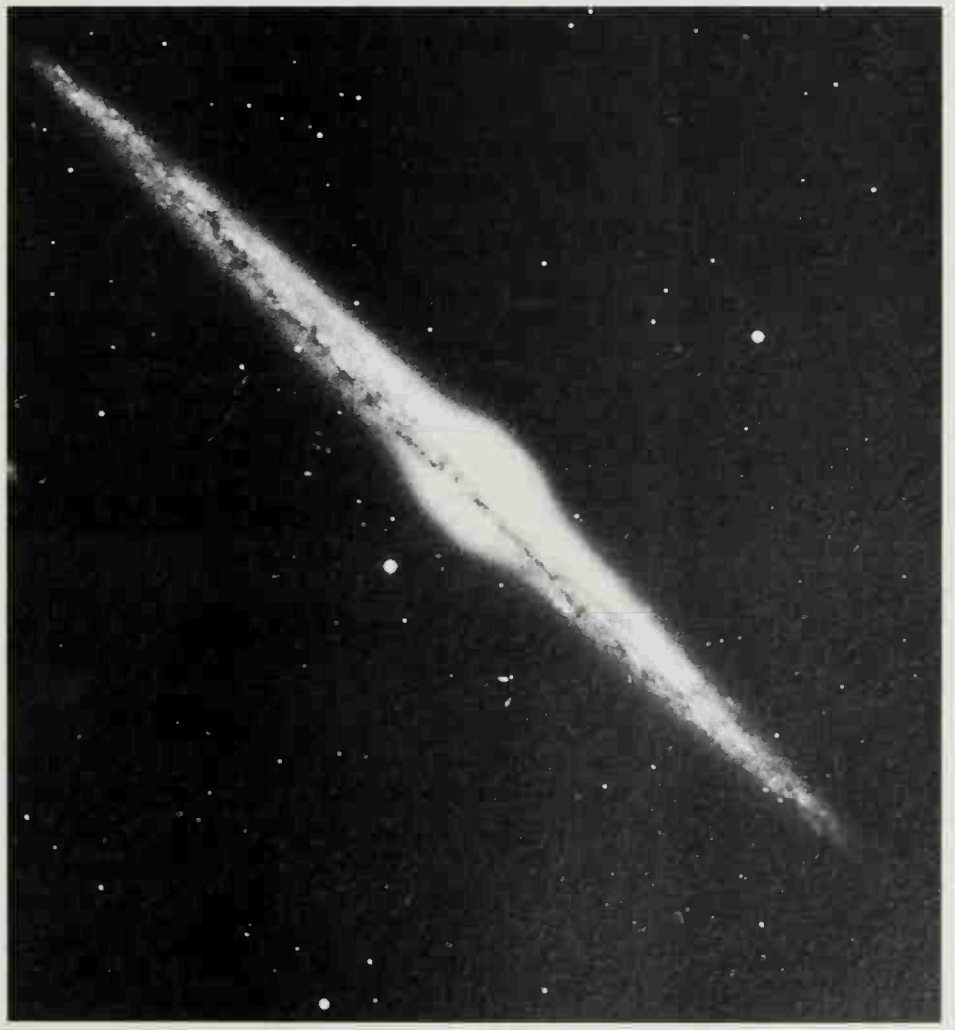


Extensions to the classification scheme

Over the years, more detail has been introduced into Hubble's original classification by various people, including particularly Allan Sandage and Gérard de Vaucouleurs (Fig. 7·2, page 196).

In the sequence between E7 and Sa, the S0 class may be conveniently divided into three (and similarly for SB0); de Vaucouleurs uses the labels $S0^-$, $S0^\circ$, $S0^+$, and precedes these by a class E^+. Considering the relative dimensions of disc and nucleus, the S0 sequence can be regarded as running parallel to the





Four typical galaxies. This page, top: *the elliptical galaxy NGC 205, Class E5, a companion to the Andromeda Galaxy.* Opposite page: *the Sb galaxy NGC 4569.* Above right: *the Sc galaxy NGC 4565, which we see edge on. Notice the strong obscuration by dust, in a narrow belt.* Above left: *the barred spiral SBb, NGC 1300.*