

SPECTROSCOPIC AND PHOTOMETRIC OBSERVATIONS OF GALAXIES FROM THE ESO/UPPSALA LIST SECOND CATALOGUE

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Spectroscopic and photometric observations are presented for a total of about 175 southern galaxies, selected from the ESO/Uppsala Lists Nos. 1-5. Many of the galaxies have emission lines and several are members of multiple systems.

Key words: galaxies – radial velocities – *UBV* photometry – interacting galaxies

1. INTRODUCTION

The present Catalogue contains spectroscopic and photometric observations of about 175 galaxies, selected from the first five ESO/Uppsala Lists (Holmberg *et al.* 1974a, 1974b, 1975, 1977, 1978). The first Catalogue in this series contained data for about 30 galaxies (West 1977; hereafter referred to as Paper I) and we here summarize the observations which were obtained before the end of January 1977. For easy reference, we have included data from five earlier papers, dealing with emission-line galaxies which were discovered in the course of this investigation (West 1976; Westerlund *et al.* 1978; West *et al.* 1978; Borchkhadze *et al.* 1977; Lauberts *et al.* 1978). The programme continues and during several observing runs in 1977, more than 200 other galaxies were observed spectroscopically and somewhat fewer photometrically. It is expected that a Third Catalogue will be ready in 1978.

The galaxies were selected according to the following criteria:

- a) Bright nucleus
- b) Peculiar morphological structure
- c) Interaction with nearby companion,

and, as would be expected, several highly interesting systems were found. Most of these will now be investigated in detail with the ESO 3.6 m telescope with high-dispersion spectroscopy and high-resolution direct photography.

2. SPECTROSCOPIC OBSERVATIONS

The spectroscopic observations were carried out at ESO on La Silla and CARSO on Las Campanas. The ESO 1.52 m telescope with the Boller & Chivens spectrograph was used during four observing runs, mostly with a blue-sensitive image tube and dispersion 256 Å/mm (3500 - 5700 Å). On a few occasions, a red-sensitive tube was used at 172 Å/mm (4000 - 7200 Å). Further details are given in Paper I and by Westerlund *et al.* (1978). The observations at Las Campanas were performed at the Cassegrain focus of the 1 m Swope telescope equipped with the Carnegie image tube spectrograph. Two dispersions were available: 284 Å/mm (3700 - 7200 Å) and 135 Å/mm (4500 - 7500 Å), cf. West (1976). All spectra were unwidened.

The spectra were measured in Geneva with the S-3000 measuring machine (cf. West *et al.*, 1978) or at the Uppsala Observatory with a Zeiss Abbe comparator (cf. Westerlund *et al.*, 1978). The radial velocities,

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corrected for terrestrial and solar motion, are given in table 1, together with the mean error. The number of measured lines is indicated in each case.

Among the many spectra that were obtained, some (absorption-line) were unmeasurable, because of underexposure, bad focus, lack of lines, etc. In order to make future observers aware of the fact that (unsuccessful) spectra have been obtained of these objects, we have listed them in table 2 together with the available information.

3. PHOTOMETRIC OBSERVATIONS

Photoelectric *UBV* observations of many of the spectroscopically observed galaxies were obtained in October 1976 and January 1977 by means of the standard one-channel photometer attached to the 1 m photometric telescope on La Silla. The measurements were reduced on the HP computer system on La Silla with the standard *UBV* reduction programme. In most cases, the largest diaphragm covered the entire galaxy. The accuracy is about $\pm 0^m.02$ in *B* and *V* and somewhat lower in *U*, not including the possible uncertainty from the diaphragm position. Details of the photometry may be found in the paper by West *et al.* (1978).

The photometric data have been collected in table 3. Note that photometry is available for some galaxies which are not included in table 1 or 2, *i.e.* for which no spectra have yet been obtained. Most of the values in table 3 are means of 2-3 observations. Blue magnitudes have been estimated from the ESO (B) Atlas (by the method described in Westerlund *et al.* 1978) for those galaxies in table 1 for which photoelectric measurements were not available.

4. THE CATALOGUE

The data of the Catalogue are contained in tables 1-3. Additional information is given in the Notes after table 1 for those galaxies which were not discussed in earlier papers. They are reproduced from ESO 1 m Schmidt or 3.6 m plates in figures 1-5.

The columns of table 1 are:

- Col. 1 ESO number and other name,* if any. N = NGC, I = IC, Se = Sersic (1974), M = MCG (Vorontsov-Vel'yaminov and Arkipova, 1974).
- Col. 2 Right ascension and declination to equinox 1950.0
- Col. 3 Slit angle θ .
- Col. 4 Identifications of components in multiple systems, cf. figures 1-5.
- Col. 5 Radial velocity $V_0 = V_{\text{obs}} + 300 \sin l^{\text{II}} \cos b^{\text{II}} + 30 \cos \beta \sin (\lambda_{\text{sun}} - \lambda)$ and rms value σ (km s^{-1}).
- Col. 6 Number of emission (*E*) and absorption (*A*) lines which were used for determination of the given radial velocity.
- Col. 7 Linear diameter (kpc) of the object (D_c) and the system (D_s) of which it is a component, assuming cosmological redshift and $H_0 = 55 \text{ km s}^{-1} \text{ Mpc}^{-1}$.
- Col. 8 *B*-magnitudes in the standard Johnson system. The values with two decimals were measured photoelectrically. The values with one decimal were estimated from the ESO (B) survey plates; the zeropoint was set to coincide with that of the standard galaxies of de Vaucouleurs *et al.* (1976). The mean error of one estimate is $\pm 0^m.3$.
- Col. 9 Equipment used for spectroscopy (1) = ESO Boller & Chivens spectrograph, 256 Å/mm, (2) = Las Campanas Carnegie spectrograph, 285 Å/mm and (3) = Las Campanas Carnegie spectrograph, 135 Å/mm.
- Col. 10 References and Notes (after table 1). The following codes were used:
 - (1) West (1976)
 - (2) Westerlund *et al.* (1978)

*The notation has been described by Holmberg *et al.* (1974a) and was adopted for easy reference to the ESO(B) Atlas plates. A key to the field centers may also be found in this paper. The possibility of a supplementary notation (to facilitate the identification of objects for those users who have no access to the ESO(B) Atlas) is being considered for the final Catalogue, summarizing the ESO/Uppsala lists.

- (3) West *et al.* (1978)
- (4) Borchkhadze *et al.* (1977)
- (5) Lauberts *et al.* (1978)

Reference to reproductions are given in the Notes.

The columns of table 2 are:

- Col. 1 ESO number and other name, if any (see explanation table 1).
- Col. 2 Right ascension and declination to equinox 1950.0
- Col. 3 Slit angle.
- Col. 4 Explanation why spectrum was not measured.

The columns of table 3 are:

- Col. 1 ESO number.
- Col. 2 Right ascension and declination to equinox 1950.0
- Col. 3 Identification of components in systems.
- Col. 4 Diaphragm in arcseconds.
- Col. 5-7 V , $(B-V)$ and $(U-B)$.

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REFERENCES

- Borchkhadze, T.M., Breysacher, J., Laustsen, S., Schuster, H.-E. and West, R.M.: 1977, *Astron. Astrophys. Suppl.* **30**, 35.
- Holmberg, E.B., Lauberts, A., Schuster, H.-E. and West, R.M.: 1974a, *Astron. Astrophys. Suppl.* **18**, 463.
- Holmberg, E.B., Lauberts, A., Schuster, H.-E. and West, R.M.: 1974b, *Astron. Astrophys. Suppl.* **18**, 491.
- Holmberg, E.B., Lauberts, A., Schuster, H.-E. and West, R.M.: 1975, *Astron. Astrophys. Suppl.* **22**, 327.
- Holmberg, E.B., Lauberts, A., Schuster, H.-E. and West, R.M.: 1977, *Astron. Astrophys. Suppl.* **27**, 295.
- Holmberg, E.B., Lauberts, A., Schuster, H.-E. and West, R.M.: 1978, *Astron. Astrophys. Suppl.* **31**, 15.
- Lauberts, A., Bergwall, N.Å.S., Ekman, A.B.G. and Westerlund, B.E.: 1978, *Astron. Astrophys. Suppl.* (in press).
- Martin, W.L.: 1976, *Monthly Notices Roy. Astron. Soc.* **175**, 633.
- Rose, J.A. and Graham, J.A.: 1977, *Astron. Astrophys.* **54**, 305.
- Sersic, J.L.: 1968, *Atlas de Galaxias Australes*, Cordoba.
- Sersic, J.L.: 1974, *Astrophys. Space Sci.* **28**, 365.
- Sersic, J.L., Bajaja, E. and Colomb, R.: 1977, *Astron. Astrophys.* **59**, 19.
- Smith, M.G.: 1975, *Astrophys. J.* **202**, 591.
- Vaucouleurs, G. De., Vaucouleurs, A. De. and Corwin Jr., H.G.: 1976, *Second Reference Catalogue of Bright Galaxies*, Austin and London, Univ. of Texas Press.
- Vorontsov-Vel'yaminov, B.A., and Arkhipova, V.P.: 1974, *Morphological Catalogue of Galaxies*, Part V, Moscow.
- West, R.M.: 1976, *Astron. Astrophys.* **53**, 435.
- West, R.M.: 1977, *Astron. Astrophys. Suppl.* **27**, 73.
- West, R.M., Borchkhadze, T.M., Breysacher, J., Laustsen, S. and Schuster, H.-E.: 1978, *Astron. Astrophys. Suppl.* **31**, 55.
- Westerlund, B.E., Bergwall, N.Å.S., Ekman, A.B.G. and Lauberts, A.: 1978, *Astron. Astrophys. Suppl.* **31**, 427.

Table 1 Spectroscopic data and apparent magnitudes

ESO No.	R.A. (1950)	Decl.	Comp.	V_0	σ	Lines	D_C	D_S	m_B	Eq.	Ref.
194 - G08 N 87	00 18 48	-48 54.4	120	3525	47	10E + 4A	13	67	15 ^m 0.3	2, 3	(4)
194 - G10 N 88	00 18 55	-48 55.1	120	3455	50	4E + 2A	12		15.21	2, 3	(4)
194 - G11 N 89	00 18 57	-48 56.6	120	3745	43	6E	23		14.57	2, 3	(4)
194 - IG12 N 92	00 19 05	-48 54.2	120	3420	45	9E	52		14.29	2, 3	(4)
194 - IG39	00 44 47	-52 19.4	085	8127 8088 7987	25 28 30	8E 6E 6E + 1A	12: 40:	64	15.22 16.17	2, 3	(4)
079 - IG13	00 54 50	-63 45.1	057	10240: 10695	90	1E 1E + 2A	65: 25:	70:	14.4	2	Note
079 - G16	01 02 32	-64 23.4	090	5787	27	11E	41		14.89	2, 3	(3)
244 - IG50 N-7-4-10	01 27 41	-42 34.9	044	7520	50	1E + 2A	47		14.2	1	Note
052 - IG17	02 01 11	-69 41.3	097	790 7535	70 60	3A 2A	25 13:	30:	14.9	1	Note
153 - IG16	02 03 07	-55 27.3	119	5830	38	7E	58		16.00	2, 3	(3)
153 - IG21	02 04 50	-55 27.0	052	16334	43	6E + 3A	29		15.60	1	(3)
154 - IG02	02 30 42	-52 43.5	090	6287	30	6E	15	75	14.91	2	(4)
053 - IG13	02 44 14	-69 31.7	138	7060	35	5E	11		15.29	1	Note
053 - IG17	02 47 46	-71 39.3	090	17578 17576	97 88	4E + 1A 2E	46 40:	88	15.8	2, 3	(4)
154 - IG16	02 48 11	-52 35.2	122	13530: 12875	30	1E 3A	43: 55:	75:	15.5	2	Note
356 - IG24	02 56 56	-36 48.6	110	6000	105	2E + 3A	26		16.4	1	Note
200 - IG04	03 18 14	-51 13.7	119	10190:		1E	25		14.37	2	Note
054 - IG15	03 38 01	-71 13.3	147	14335	25	9E	53		15.81	2, 3	(3)
249 - G14 N 1433	03 40 27	-47 22.8	090	890	65	1E + 3A	37		10.8	1	Note
201 - IG26	04 13 58	-51 04.2	027	3610	15	9E	7		15.28	1	Note
251 - G05	04 27 22	-47 04.4	090	4225	90	3A	16		15.4	1	Note
157 - IG35 I 2082	04 27 58	-53 56.1	120	11500:200		3A	18:	63	14.29	2	Note
119 - IG15	04 50 37	-59 19.0	057	15965	70	3A	40:		15.9	2	Note
252 - IG01 M-7-11-2	04 55 25	-42 52.6	092	3320: 3120:		2A 1A	8: 10:	20:	15.7	1	Note
205 - IG03	05 47 08	-47 46.5	145	14880	40	7E	130		15.33	1	Note
121 - IG24 N 2221	06 19 26	-57 33.2	000	2265 2090	35 35	4E 4E	26 3:	51	14.3	1	(4)
121 - IG25 N 2222	06 19 27	-57 30.4	150	2335	11	5E	14		13.8	1	(4)
255 - IG07	06 26 01	-47 08.8	155	11350	20	5E + 4A	54		14.76	1	(5)
121 - IG34	06 29 02	-57 50.8	090	9740	120	3A	40		14.9	1	Note
122 - IG01	06 39 57	-58 28.6	090	2396	30	5E	47	62	13.89	2, 3	(4)
122 - IG02	06 40 00	-58 25.3	090	2471	18	8E	8		16.09	2, 3	(4)
162 - G17	07 14 59	-57 15.2	065	11301:		(3E)	15		14.1	1	(5), Note
208 - G01	07 15 17	-51 59.8	090	2221	20	3E + 2A	7		14.2	2, 3	(1)
123 - IG04	07 19 38	-57 58.1	021	840	15	7E + 3A	7		14.93	2, 3	Note
035 - G07	07 26 56	-75 04.7	090	4179	25	7E + 2A	13		14.8	2, 3	(1)
123 - G11 I 2200 A	07 27 31	-62 15.5	063	2999	25	5E + 2A	23:	49	14.26	3	(4)
123 - G12 I 2200 A	07 27 42	-62 14.8	063	2889	28	9A	25:		14.40	3	(4)
208 - G26	07 34 00	-49 55.8	090	2715	30	6E + 4A	8		14.8	2, 3	(1)
060 - IG03	08 16 48	-71 42.2	081	1185	20	4E + 3A	3.5:		15.4	1	Note
018 - Ga	08 25 40	-77 37.0	090	5060	36	10E + 1A	18		--	2, 3	(1)
036 - G15	08 58 44	-73 07.8	090	675:140		4A	3:		14.6	2	Note
036 - IG16	09 02 33	-73 47.3	090	5424	24	11E	20		15.4	2, 3	(1)
036 - G19	09 07 01	-75 36.3	090	4480	11	7E + 2A	37		14.2	2, 3	(1)
037 - G03 N 2915	09 26 31	-76 24.5	090	177	7	6E + 1A	0.8:		14.1	2, 3	(1), Note
037 - G07 N 3059	09 49 38	-73 41.2	090	1033	33	7E + 1A	14		12.2	2, 3	(1)
264 - IG30	10 38 07	-46 03.9	075	5910 5140 5870	55 70 30	4A 4A 4A	11 9 8	43	15.4 15.6 16.2	1 1 1	Note
215 - G31	11 08 18	-48 49.9	060	2510	40	1E + 4A	38		13.73	1	Note
266 - IG05	11 32 43	-45 06.7	167	4675	85	2E	16:	50:	15.9	1	Note
039 - G05 I 2980	11 55 00	-73 24.4	090	8130	145	1E + 2A	50		14.6	2	Note
267 - IG09	12 00 08	-43 55.9	132	6560 6670 6335	40 80 45	4E + 1A 4E + 1A 4E + 1A	25 a c		15.44	1	Note
039 - G06	12 06 30	-75 11.8	090	1710:		1E	10:		16.1	2	Note
322 - IG32	12 34 29	-38 16.9	125	2720	30	4E	10		14.56	1	Note
322 - IG64 M4622 A,B	12 41 06	-40 26.6	117	4875 4820	85 110	6A 3A	14 12	28	15.1 15.2	1	Note
322 - G67 N 4650	12 41 36	-40 27.5	107	2725	55	1E + 3A	65		13.1	1	Note
322 - IG69 N 4650 A	12 42 05	-40 26.5	066	2635	60	2E + 4A	31		14.5	1	Note
322 - G72 N 4650 B	12 42 30	-40 33.0	090	2310	140	3A	14		14.5	1	Note
269 - IG74	13 11 26	-45 51.3	046	2780	80	4A	4	40	13.6	1	Note

Table 1 (continued)

ESO No.	R.A. (1950)	Decl.	θ	Comp.	V_o	σ	Lines	D_c	D_s	m_B	Eq.	Ref.
270 - IG02 N 5090	13 18 18	-43 26.6	132		2760 20	4A	30	30	13.3	1		Note
270 - IG04 N 5091	13 18 23	-43 27.5	132		3480 160	3A	45	45	14.9	1		Note
040 - G14	13 32 54	-75 59.3	090		2678 19	10E + 2A	3	3	16.0	2,3		(1)
221 - IG10 Se 1087/2	13 47 48	-48 48.5	022	b	2895 40 2735 13 2680 13	3E 3E + 2A 2E	1 1	1 1	18 12.6	1		(2)
325 - IG37	13 54 47	-38 47.9	005	a	10540 90 10700 80	5A 3A	11 11	67 16.3	16.2	1		Note
326 - IG06	14 08 05	-39 52.2	101		8435 85	4A	90:	90:	15.0	1		Note
042 - G01	15 04 29	-75 49.1	090		2289 40	2E + 2A	3	3	15.3	2		(1)
042 - IG04	15 08 12	-77 04.6	090		2430 11	11E + 2A	6	6	15.8	2,3		(1)
042 - G14	15 48 23	-74 36.0	090		5080 125	1E + 2A	14	14	15.5			Note
043 - IG04 I 4608	16 39 37	-77 23.9	090		2727 30	10E + 2A	8	8	15.1	2,3		(1)
043 - IG06	16 42 14	-72 34.1	125		12650 120	3A	27	27	16.5	1		Note
137 - IG44	16 46 24	-61 43.8	138	a	4370 45 4435 80	8A 4A	28 5	30 16.7	15.0	1		Note
043 - G09 I 4618	16 50 41	-76 54.8	090		2824 27	7E + 2A	22	22	14.3	2,3		(1)
044 - IG02	17 05 16	-74 04.7	090	a	11590 65 12575 75	1E + 3A 1E + 1A	75:	75:	15.1	2		Note
044 - G09	17 10 28	-73 05.5	090		4968 43	9E + 2A	24	24	15.6	2,3		(1)
139 - IG03	17 27 48	-60 42.0	090	a	4955 25 5150 55	12E + 1A 4E	7 15	22 16.2	14.6	1		(2)
141 - IG32	19 08 27	-60 28.2	090		4555 160	3E	21	21	14.83	2		Note
184 - IG32	19 08 41	-53 57.3	005	a	7000 45 7250 110	2E + 3A 2A	13 8	67 15.6	15.9	1		Note
141 - IG45 I 4838	19 12 15	-61 42.2	090		4250 95	2E	25	25	14.63	2		Note
184 - IG65	19 21 35	-53 05.9	090		18504 33	5E	98	98	16.25	2,3		(3)
338 - IG04	19 24 29	-41 40.6	078		2870 20	12E	10	10	14.0	1		(2), Note
338 - IG08	19 26 48	-39 31.0	100	a	2755 30 2950 80 2860 40	7E 4E 6E	10 1.5 7	18 16.2 14.5	14.2	1		(2)
105 - IG11 I 4870	19 32 48	-65 55.5	090		760 29	10E + 2A	9	9	14.54	2,3		(3)
338 - IG13 N 6805	19 33 10	-38 28.1	090		6030 105	2E + 2A	18:	18:	15.42	2		Note
284 - IG08 N 6845 Se 135/3	19 57 22	-47 12.5	017 073	a	6525 102 6286 28 6904 73	4E + 2A 4E 1E + 5A	90:110: 25: 23:	14.28 15.58 15.04 16.64	14.28	1		(4)
233 - IG44	20 08 04	-51 32.3	150		3060 50	2E + 2A	13:	13:	15.02	2		Note
073 - IG32 N 6872	20 11 42	-70 55.3	005		4750 60	7A	250	250	13.4	1		Note
073 - IG53 I 4970	20 11 44	-70 54.2	005		4635 60	4A	15	15	15.3	1		Note
284 - IG41	20 12 50	-44 27.3	135	a	5395 30 5230 60	5A 5A	23 17	57 15.2	14.3	1		Note
073 - IG35 N 6876	20 13.06	-71 00.8	077		3795 105	6A	48	48	13.2	1		Note
284 - IG45 Se 1367/10	20 13 16	-46 41.2	155	a b c	5330 40 5375 20 5360 50	5E + 3A 2A 4E + 3A	5 2 7	38 14.0	14.0	1		(2)
073 - IG36 N 6877	20 13 23	-71 00.6	077		4380 45	5A	35	35	14.8	1		Note
073 - IG37 N 6880	20 14 16	-71 01.0	054		4140 65	5A	51	51	14.6	1		Note
073 - IG38 I 4981	20 14 26	-71 00.3	054		3665 20	2A	20	20	15.9	1		Note
186 - IG45	20 23 43	-55 15.3	050		760:	2A	2:	2:	15.8	2		Note
234 - IG49	20 31 42	-50 02.2	090	a b c	2380 55 4645 65 2085 35	5E 2E 6E	17: 12: 35:	13.97 16.07	13.97	1,2		(4)
074 - IG08 I 5031	20 40 44	-67 43.6	166	a	10223 35 10203 15	5E 5E	55: 35:	77 15.88	15.20	2,3		(4)
074 - G09	20 44 11	-69 16.7	075	a	11275 65	3A	54	54	15.72	1		Note
235 - G08 N 6970	20 48 39	-48 57.9	092	a	5250 30 5450 65	1E + 4A 3E + 4A	36	36	13.34	1		Note
286 - IG19	20 55 09	-42 50.6	123		12783 30	9E	74	74	15.32	2		(3)
286 - IG20	20 56 12	-42 58.1	135	a	9100 47 8850 36	3E 4E	38: 16	66 15.60	16.64	2,3		(4)
235 - IG61	21 03 49	-47 45.4	090	a	4460 55 4587 42	6E SE	30 6:	30 16.17	15.74	2,3		(4)
342 - IG13 M-6-46-10	21 06 51	-37 42.4	165	a	2780 35 2510 50	7E + 2A 5E	5 1.5	21 15.5	14.0	1		(2)
145 - IG01	21 13 10	-59 32.6	166		18040:	1E	53	53	15.6	2		Note
342 - IG32	21 14 22	-41 27.5	000		8370 20	5E	27	27	15.35	1		(2)
342 - IG49	21 24 10	-38 04.4	135		2645 25	6E + 1A	4	4	16.04	3		Note
188 - IG18	21 39 40	-52 55.0	120	a	5238 58	4E + 3A	20	65	15.44	2,3		(4)
108 - IG18	22 08 43	-62 58.3	090	a	8320 10	3E	21	21	15.24	2		Note
289 - IG07 N 7232	22 12 33	-46 06.0	083		1585 55 1725 70	1E + 3A 4A	28	28	13.57	1		Note
289 - IG08 N 7233	22 12 44	-46 05.8	083		1795 20 1770 25	4E + 3A 6E + 2A	17	17	13.44	1		Note
290 - G01	22 38 55	-46 21.3	086		9930 17	10E	37	37	14.80	2,3		(3)
109 - IG22 I 5250	22 44 00	-65 19.3	078	a	3400 50 3490 20	3A 2A	30: 26:	53: 13.9	13.5	2		Note
147 - IG19	22 58 29	-59 34.4	103	a	8903 72 10108 103	6E 6E	60: 27:	90: 16.03	15.48	2,3		(4)
290 - IG51	23 04 06	-43 09.7	175	a	12780 150 12242 65	2A 2A	22: 33:	150 15.5	16.6	2		Note
			175	c	12475 200	2A	44	44	15.3	2		

Table 1 (continued)

ESO No.	R.A. (1950)	Decl.	θ	Comp.	V_0	σ	Lines	D_c	D_s	η_B	Eq.	Ref.
148 - 1602	23 12 51	-59 19.6	086		13267	24	10E	76		15.21	2, 3	(3)
293 - 1606	23 49 22	-59 17.6	055	a	12545	58	4E	25	89	16.41	2, 3	(4)
				b	12673	50	4E	56		10.81		
293 - 1608	23 50 47	-41.05.3	103	a	9131	61	5E	65	87	14.98	2, 3	(4)
N 7764 A				b	9281	64	5E	20		16.48		
M-7-47-27				c	9051	140	3A	41		16.50		

NOTES TO TABLE 1

- 079-IG13: Figure 1a. H α visible in both components. Strong H and K in component (b). No emission from the ring around the nucleus of (a).
- 244-IG30: Figure 1b. Weak spectrum. [O II] 3727 well visible. Broad H and K lines in absorption.
- 052-IG17: Figure 1c. Two ellipticals in contact. Very strong H and K absorption in both.
- 053-IG13: Figure 1d. Very compact system. Weak emission lines of [O III] 5007 and 4959, H β , H γ and [O II] 3727.
- 154-IG16: Figure 1e. Interacting system. Only H α measurable in component (a). H, K, G in absorption in (b). Note extended envelope around (b).
- 356-IG24: Figure 1f. "Jet" towards south. Faint emission lines of [O II] and H β . Object 15" NW is a galactic star.
- 200-IG04: Figure 1g. Spectrum only obtained of component (a). Comparatively strong H α in emission, but no other lines seen.
- 249-G14: Figure 1h. [O II] 3727 in emission (weak). Large number of H II regions in ring and in spiral arms. de Vaucouleurs *et al.* (1976) give $V_0 = 802 \text{ km s}^{-1}$.
- 201-IG26: Figure 1i. Very strong emission lines of [O III], [O II], H β -He. [O III] 4363, He I 3889 and [Ne III] 3869 present. Lines comparatively broad.
- 251-G05: Figure 1j. Compact. Weak outer ring?
- 157-IG35: Figure 1k. Strong H and K lines. de Vaucouleurs *et al.* (1976) give $V_0 = 11869 \text{ km s}^{-1}$.
- 119-IG15: Figure 1l. G-band, H and K lines.
- 252-IG01: Figure 2a. Underexposed spectrum; only H and K lines visible. Strong interaction.
- 205-IG03: Figure 2b. Strong emission lines of [O III], H β -H δ , [O II], [Ne III], [Ne II] 3869 visible. Note long streamer towards component (b). No spectrum was obtained of (b).
- 121-IG34: Figure 2c. Weak H and K. ESO (B) plate shows very faint arm towards north.
- 162-G17: Comparison spectrum underexposed and velocity based on two comparison lines only. [O III], [O II], H β , H γ in emission.
- 123-IG04: Figure 2d. Morphologically similar to 244-IG30 (Fig. 1b). [O III] and Balmer lines in emission; intermediate strength. Also visible Ca I 4227 line.
- 060-IG03: Figure 2e. Compact with faint outer envelope. Underexposed spectrum shows weak emission lines of [O III] and H β . [O II] 3727 weak.
- 036-G15: Figure 2f. Lenticular galaxy surrounded by ring. The identification of absorption lines is ambiguous; it is probable that this galaxy is superposed by a galactic star of same apparent magnitude at the center.
- 037-G03: This system has been investigated by Sersic *et al.* (1977) who find a distance of 7.2 Mpc.
- 264-IG30: Figure 2g. Although the velocities differ by 800 km s^{-1} , component (b) appears rather disturbed and is probably a member of the system. In cluster Se 77/9 (Sersic 1974).
- 215-G31: Figure 2h. Very bright nucleus with outer, faint ring with opposite spiral arms. Strong H and K. Faint [O II] 3727 and possibly H β in emission.
- 266-IG05: Figure 2i. Underexposed spectrum shows weak [O III] 5007 and [O II] 3727 in component (b). A faint continuum without emission lines is visible for component (a). The 3.6 m photo shows a bridge between (a) and (b). The structure of (b) is complicated: it is possibly a two-arm spiral seen very nearly edge-on.
- 039-G05: Figure 2j. Weak H and K. Very faint 3727.
- 267-IG09: Figure 2k. This galaxy shows a knotty structure. The spectra of (a), (b) and (c) are typical of H II regions. The spatial configuration is unclear.
- 039-G06: Figure 2l. Only H α in emission visible in spectrum. An absorption feature near 5175 Å is probably the Mg I b band.
- 322-IG32: Figure 3a. (b) is a galactic star.
- 322-IG64: Figure 3b. In Cen I group (Sersic 1968). The velocity may be too high to make it a dynamical member. de Vaucouleurs *et al.* (1976) give V_0 (a) = 4539, V_0 (b) = 4421 km s^{-1} .

- 322-G67: Figure 3c. In Cen I group (Sersic 1968). [O II] 3727 in emission. $V_0 = 2397 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976).
- 322-IG69: Figure 3d. In Cen I group. Strengths of H γ and H δ comparable to G-band: H δ and H γ comp. to K-line. The spectrum indicates a high degree of mixture of population types, in agreement with the peculiar morph. type. $V_0 = 2239 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976).
- 322-G72: Figure 3e. In Cen I group. $V_0 = 2262 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976).
- 269-IG74: Figure 3f. Peculiar contact system. Spectrum of (b) underexposed.
- 270-IG04: Figure 3g. Elliptical with large outer envelope. In pair with IG04.
- 270-IG02: Figure 3g. Detached "spiral arm" (?) in the direction of IG02.
- 325-IG37: Figure 3h. In common envelope.
- 326-IG06: Figure 3i. Apparently very strong metallic-line spectrum. The dimension was measured over a faint outer envelope.
- 042-G14: Figure 3j. Weak H α . Knotty structure.
- 043-IG06: Figure 3k. Elliptical.
- 137-IG44: Figure 3l. Outer envelope around component (a): Dust? A θ -galaxy, about 3' west, is probably member of the same group.
- 044-IG02: Figure 4a. Very large system. (b) is apparently connected companion galaxy. H α faint in (a) and (b).
- 141-IG32: Figure 4b. H α , [N II] 6582 and [O II] 3727 of intermediate strength. Multiarmed spiral. Member of NGC 6769 group.
- 184-IG32: Figure 4c. Tilted lines indicate rotation.
- 141-IG45: Figure 4d. Knotty structure in envelope. Rather strong H α and possibly very weak [O III] in emission. Member of NGC 6769 group.
- 338-IG04: Tololo 1924-416. $V_0 = 2880 \text{ km s}^{-1}$ (Smith 1975).
- 338-IG13: Figure 4e. Compact in envelope. Rather strong H α : [O II] 3727 weaker. H and K lines, G-band strong.
- 233-IG44: Figure 4f. Strong H α and [O II] 3727. Possibly weak [O III].
- 073-IG32: Figure 4g. The very large dimension and general morphology indicate mass loss due to interaction with 073-IG33. Associated (?) with 073-IG35, 36, 37, 38. $V_0 = 4554$ (de Vaucouleurs *et al.* 1976) and 4700 km s^{-1} (Martin 1976).
- 073-IG33: Figure 4g. In pair with 073-IG32. Associated (?) with 073-IG35, 36, 37, 38. $V_0 = 4568 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976).
- 284-IG41: Figure 4h. Faint outer envelope around two compacts in contact. Note absence of emission lines.
- 073-IG35: Figure 4i. In pair with 073-IG36. Associated (?) with 073-IG32, 33, 37, 38. The velocity difference gives little support to the interaction interpretation of IG 35, 36. $V_0 = 3803 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976). Large outer envelope.
- 073-IG36: Figure 4i. See 073-IG35. $V_0 = 3984 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976).
- 073-IG37: Figure 4j. Associated (?) with 073-IG32, 33, 35, 36, 38. $V_0 = 3782 \text{ km s}^{-1}$ (de Vaucouleurs *et al.* 1976).
- 073-IG38: Figure 4j. Weak spectrum. Associated (?) with 073-IG32, 33, 35, 36, 37.
- 186-IG45: Figure 4k. Weak G-band, K-line, and possibly Ca I 4227. Very small object.
- 074-G09: Figure 4l. (b) is evidently a galactic foreground star. This is another example of superposition of a star on the end of a spiral arm ("bridge"), cf. Rose and Graham (1977).
- 235-G08: Figure 5a. (a) is the center, (b) refers to a H II region, about 18" due east of center. Rather weak [O II] 3727 in centre (a), but strong in (b) which also shows [O III] and H β in emission.
- 145-IG01: Figure 5b. Bright nucleus with fuzzy arms. Weak H α .
- 342-IG49: Figure 5c. Compact. Emission lines: [S II] 6717/6731, [N II], H α , [O III], intermediate strength.
- 108-IG18: Figure 5d. Very strong H α in emission. No spectrum was obtained of component (b).
- 289-IG07: Faint [O II] 3727 line visible in first spectrum. $V_0 = 1983$ (de Vaucouleurs *et al.* 1976) and 1669 km s^{-1} (Martin 1976).
- 289-IG08: $V_0 = 1814$ (de Vaucouleurs *et al.* 1976) and 1785 km s^{-1} (Martin 1976).
- 109-IG22: Figure 5e. Very low surface brightness of large, diffuse arms towards north and southwest. H and K lines in both components.
- 290-IG51: Figure 5f. (a) and (b) in common envelope. H and K lines of intermediate strength in all three.

Table 3 Photoelectric UBV data

ESO No.	R.A. (1950)	Decl.	DP	V	(B-V)	(U-B)
293-IG48	00 12 09	-39 53.6	32	14.603	0.688	-0.039
194-G08	00 18 48	-48 54.4	32	14.654	0.372	-0.374
			22	15.082	0.285	-0.341
194-G10	00 18 55	-48 55.1	32	14.645	0.569	0.097
194-G11	00 18 57	-48 56.6	32	13.873	0.696	0.180
			22	14.086	0.752	0.080
194-IG12	00 19 05	-48 54.2	32	13.510	0.779	0.103
			22	13.755	0.822	0.184
194-IG39	00 44 47	-52 19.4	22	14.593	0.627	0.103
			32	15.689	0.483	0.160
079-G15	01 02 32	-64 23.4	11	14.382	0.505	-0.226
153-IG16	02 03 07	-55 27.3	22	15.644	0.351	-0.267
			22	17.151	0.415	0.097
153-IG21	02 04 50	-55 27.0	32	15.014	0.585	-0.107
154-IG02	02 30 42	-52 43.5	32	15.313	0.383	-0.314
			44	14.621	0.291	-0.325
053-IG13	02 44 14	-69 31.7	66	14.896	0.397	-0.781
			44	15.019	0.486	-0.254
200-IG04	03 18 14	-51 13.7	88	13.477	0.897	0.036
			88	14.172	0.797	0.110
			22	15.114	0.664	0.131
			22	16.377	0.704	0.201
			32	15.172	0.869	0.191
			22	15.343	0.840	0.057
054-IG15	03 38 01	-71 13.3	88	14.533	0.951	-0.667
			32	15.000	0.813	0.212
			16	15.452	0.945	0.092
249-IG31	03 54 05	-42 30.7	88	12.106	0.385	-0.290
			44	12.716	0.370	-0.370
			16	14.146	0.331	-0.363
201-IG26	04 13 58	-51 04.2	88	15.356	-0.073	-1.026
			44	15.517	0.050	-0.768
			16	15.947	0.180	-0.657
157-IG35	04 27 58	-53 56.1	66	13.255	1.031	0.435
			32	13.630	1.013	0.610
			16	14.376	0.930	0.439
			32	14.896	1.057	0.373
			11	16.255	1.123	0.755
159-G710	05 24 58	-56 26.8	32	10.943	0.920	0.593
			22	10.958	0.916	0.579
			16	10.969	0.912	0.593
			11	11.070	0.930	0.570
			8	11.215	0.947	0.559
205-IG03	05 47 08	-47 46.5	66	14.518	0.812	-1.007
255-IG07	06 26 01	-47 08.8	88	14.129	0.633	-0.137
			16	15.293	0.393	-0.226
			11	15.469	0.458	-0.215

Table 2 Unmeasurable spectra without emission lines

ESO No.	R.A. (1950)	Decl.	θ	Explanation
293 - IG48	00 12 09	-39 53.6	077	Underexposed
153 - IG09 Se 19/1	01 58 35	-56 26.5	131	Diffuse, no lines visible
115 - IG07	02 20 33	-58 50.2	165	High sky background, no lines visible
200 - IG31 N 1356 Se 31/1	03 29 11	-50 28.7	065	Diffuse, no lines visible
118 - IG04	04 07 34	-61 23.9	152	Underexposed
085 - IG05	04 47 49	-63 33.0	080	Underexposed
085 - G07 N 1706	04 52 03	-63 04.0	090	Diffuse, no lines visible
159 - ?10	05 24 58	-56 26.8	147	Galactic star: V(H&K) 0 km s ⁻¹
034 - IG07	06 24 03	-72 33.3	090	Underexposed
034 - IG10	06 40 58	-75 04.0	090	Resolution OK, but no lines visible
161 - IG24	06 43 14	-56 38.2	070	Out of focus, no lines visible
207 - G08	06 52 42	-47 47.0	174	Underexposed
060 - IG26	09 03 51	-71 51.4	090	Diffuse, no lines visible
060 - G27	09 03 57	-71 51.0	090	Resolution OK, but no lines visible
061 - G05	09 15 46	-72 21.3	090	Resolution OK, but no lines visible
037 - IG14	10 18 11	-73 41.2	090	Resolution OK, but no lines visible
038 - G12	11 22 26	-76 53.1	090	Resolution OK, but no lines visible
042 - G12	15 45 11	-74 33.1	090	Underexposed
042 - G13 I 4578	15 47 11	-74 40.6	090	Underexposed
187 - G36	20 53 30	-53 27.3	090	Overlapping galactic star : V(H&K) 0 km s ⁻¹

Table 3 (continued)

ESO No.	R.A. (1950)	Decl.	DP	V	(B-V)	(U-B)
206-IG12	06 26 56	-48 49.8	66	14.415	1.057	0.101
			44	14.624	1.165	0.588
			22	14.959	1.039	0.280
122-IG01	06 39 57	-58 28.6	88	12.563	0.769	-0.042
			44	12.797	0.874	0.024
			44	12.958	0.935	0.025
			32	13.323	0.900	0.156
			22	13.781	0.889	0.226
			16	14.304	0.946	0.234
122-IG02	06 40 00	-58 25.3	32	15.034	1.054	-0.599
			16	15.692	1.124	-0.754
123-IG04	07 19 38	-57 58.1	88	14.526	0.400	-0.073
123- G11	07 27 31	-62 15.5	44	13.387	0.880	0.221
			32	13.590	0.905	0.248
123- G12	07 27 42	-62 14.8	22	13.426	0.977	0.488
			16	13.616	0.974	0.529
263-IG03	10 03 50	-43 59.0	88	13.656	0.587	-0.071
			66	14.090	0.573	-0.257
			22	14.901	0.475	-0.118
			16	15.209	0.452	-0.419
			11	15.397	0.412	-0.447
265-IG38	10 25 43	-43 39.0	88	11.750	0.644	-0.084
			44	12.173	0.629	-0.179
			16	13.071	0.553	-0.384
			16	13.605	0.814	0.382
215- G31	11 08 18	-48 49.9	88	12.883	0.852	0.205
			16	14.016	0.850	0.117
			11	14.320	0.949	0.206
267-IG09	12 00 08	-43 55.9	88	15.081	0.362	0.046
322-IG32	12 34 29	-38 16.9	88	14.071	0.490	-0.176
			16	14.815	0.446	-0.249
141-IG32	19 08 27	-60 28.2	32	14.201	0.626	0.031
141-IG45	19 12 15	-61 42.2	44	13.942	0.691	0.049
184-IG65	19 21 35	-53 05.9	22	15.645	0.601	-0.394
			16	15.730	0.547	-0.264
105-IG11	19 32 48	-65 55.5	32	14.626	0.118	-0.344
338-IG13	19 33 10	-38 28.1	22	14.468	0.950	0.304
185-IG13	19 41 03	-54 22.3	32	14.983	0.173	-0.185
284-IG08	19 57 22	-47 12.5	44	13.596	0.682	-0.043
			32	14.026	1.025	0.624
			22	15.699	0.950	0.605
			32	14.851	0.745	0.026
233-IG44	20 08 04	-51 32.3	32	14.444	0.575	-0.274
234-IG49	20 31 42	-50 02.2	44	13.542	0.431	-0.274
			32	15.056	1.014	-0.267
074-IG08	20 40 44	-67 43.6	32	14.516	0.688	0.015
			32	15.258	0.617	-0.014
074- G09	20 33 11	-69 16.7	22	14.880	0.837	0.128
			16	12.785	0.609	0.091
235- G08	20 48 39	-48 57.9	44	12.780	0.606	-0.037
			22	13.292	0.668	0.073
			11	14.008	0.835	0.283

ESO No.	R.A. (1950)	Decl.	DP	V	(B-V)	(U-B)
187- G35	20 53 30	-53 27.3	22	13.197	0.674	0.224
			16	13.236	0.690	0.158
286-IG19	20 55 09	-42 50.6	22	14.788	0.531	-0.016
286-IG20	20 56 12	-42 58.1	22	15.024	0.576	-0.002
			22	15.757	0.879	0.158
235-IG61	21 03 49	-47 45.4	22	15.342	0.401	-0.288
			22	15.824	0.354	-0.303
			66	14.272	0.342	-0.213
			44	14.649	0.676	-0.045
			32	14.829	0.584	0.056
342-IG32	21 14 22	-41 27.5	22	15.057	0.981	0.132
342-IG49	21 24 10	-38 04.4	32	14.665	0.776	0.063
188-IG18	21 39 40	-52 55.0	32	14.961	0.917	0.247
108-IG18	22 08 43	-62 58.3	32	14.654	0.586	-0.080
289-IG07	22 12 33	-46 06.0	44	12.526	1.042	0.521
			22	13.028	1.113	0.522
289-IG08	22 12 44	-46 05.8	66	12.819	0.624	-0.017
			22	13.651	0.547	-0.211
290- G01	22 38 55	-46 21.3	32	14.195	0.607	-0.035
147-IG19	22 38 29	-59 54.4	32	14.982	0.501	-0.177
			22	15.235	0.793	-0.101
148-IG02	23 12 51	-59 19.6	32	14.725	0.484	-0.096
293-IG06	23 49 22	-39 17.6	32	15.953	0.459	-0.119
			32	15.904	0.908	-0.083
293-IG08	23 50 47	-41 05.3	32	14.364	0.612	0.380
			22	14.628	0.645	0.058
			22	15.948	0.533	0.107
			32	15.624	0.877	0.044

Note : For identification of the components in the system 263-IG38, see fig. 5g.

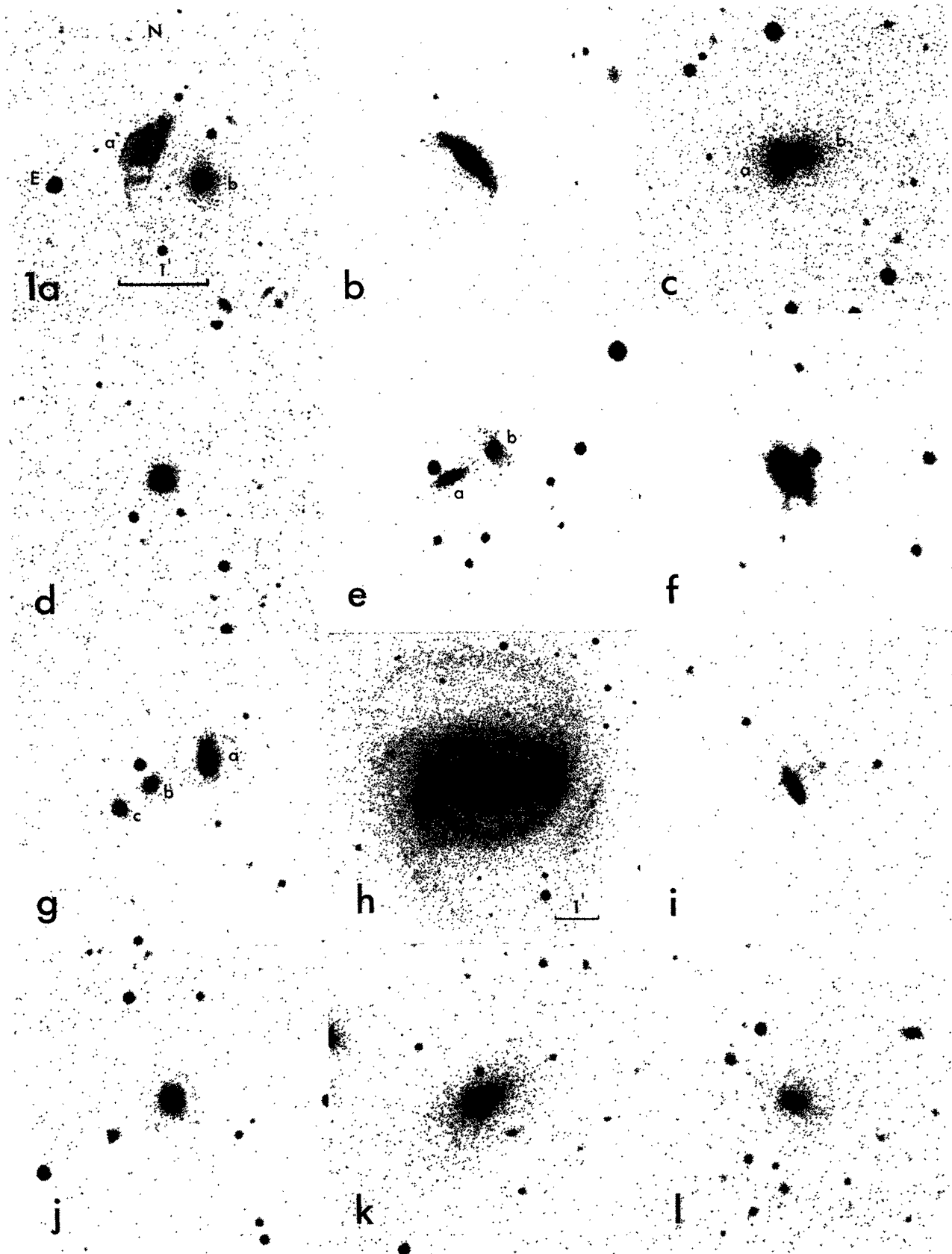


Figure 1 Reproductions from ESO Schmidt plates; exposures 60 minutes on Ila-O + GG385. North is up and East to the left. The scale is the same for all objects, except (h) and is indicated by the one-arcminute bar in figure 1a.
 (a) 079-IG13; (b) 244-IG30; (c) 052-IG17; (d) 053-IG13; (e) 154-IG16; (f) 356-IG24; (g) 200-IG04; (h) 249-G14; (i) 201-IG26;
 (j) 251-G05; (k) 157-IG35; (l) 119-IG15.

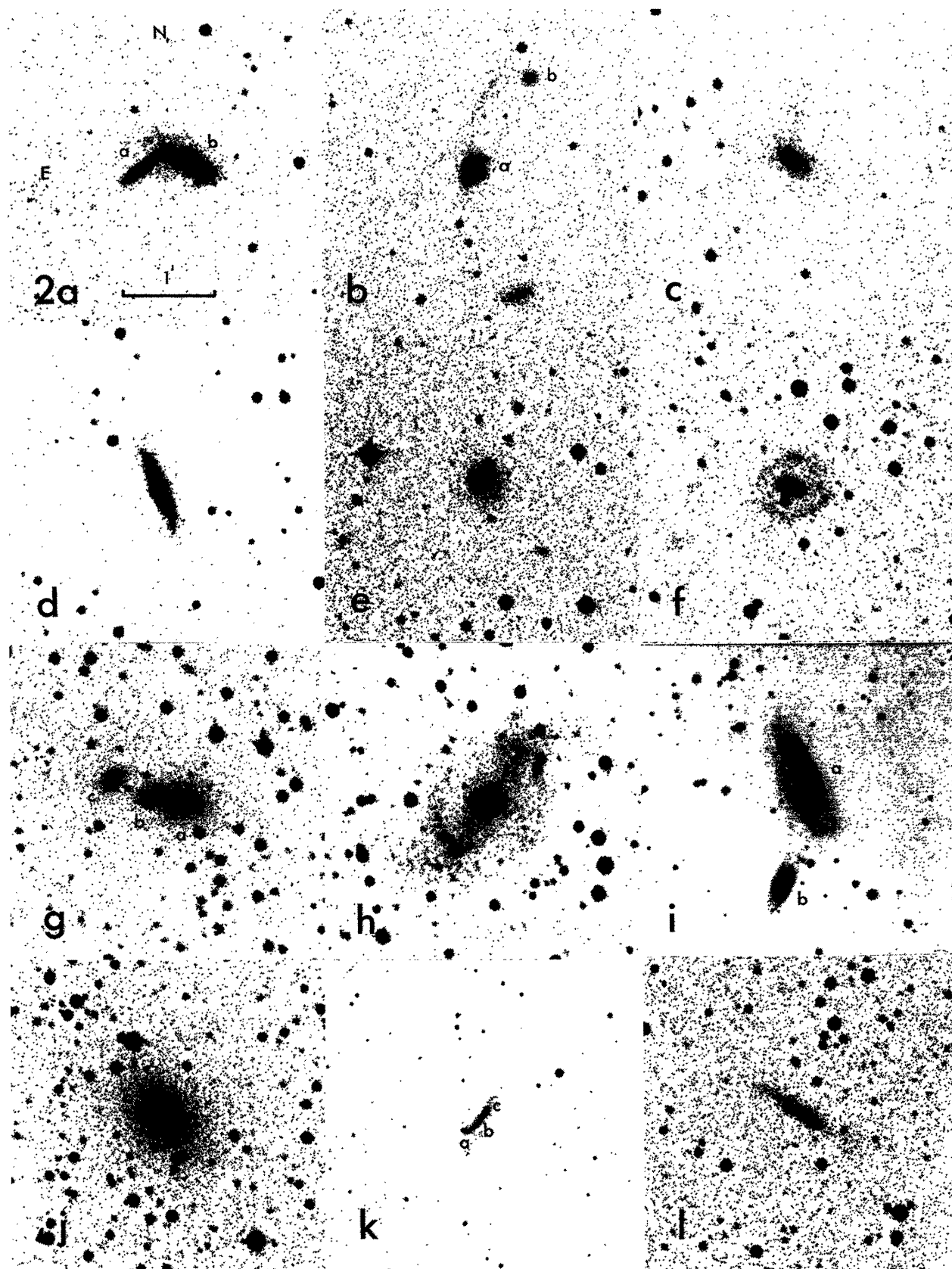


Figure 2 Same as figure 1, except that figures (i) and (k) have been reproduced from IIIa-J + GG385 plates obtained with the ESO 3.6 m telescope. The scale is the same for all objects.

(a) 252-IG01; (b) 205-IG03; (c) 121-IG34; (d) 123-IG04; (e) 060-IG03; (f) 036-G15; (g) 264-IG30; (h) 215-G31; (i) 266-IG05 (40 min.)
 (j) 039-G05; (k) 267-IG09 (10 min.); (l) 039-G06.

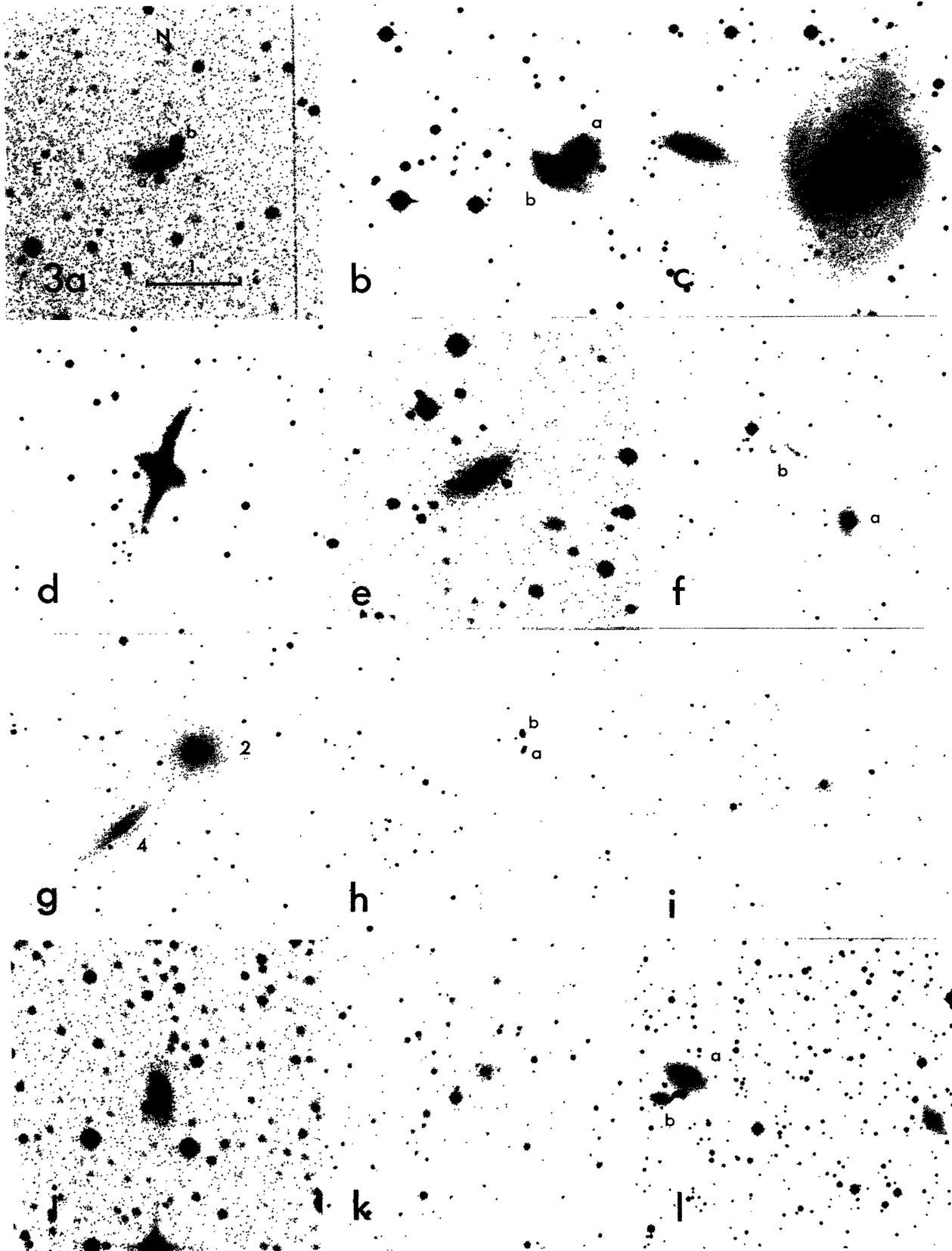


Figure 3 Same as figure 1, (b), (c), (d), (f), (g), (h), (i), (k) and (l) are reproduced from IIIa-J + GG385 3.6 m plates. The scale is the same for all objects.

(a) 322-IG32; (b) 322-IG64 (90 min); (c) 322-G67 (90 min); (d) 322-IG69 (90 min); (e) 322-G72; (f) 269-IG74 (8 min); (g) 270-IG02/04 (10 min); (h) 325-IG37 (10 min); (i) 326-IG06 (10 min); (j) 042-G14; (k) 043-IG06 (20 min); (l) 137-IG44 (40 min).

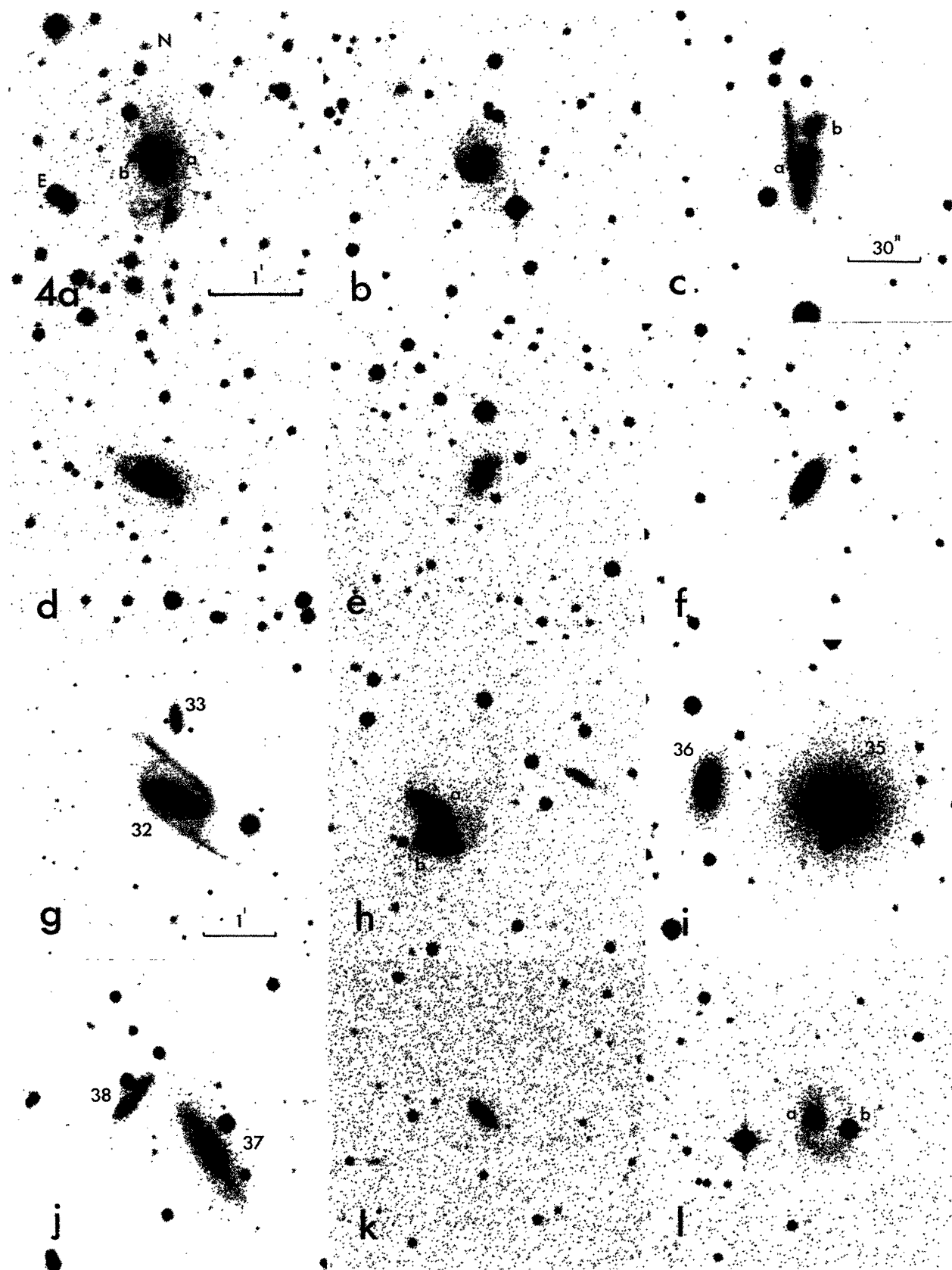


Figure 4 Same as figure 1. (c) and (g) have been reproduced from IIIa-J + GG385 3.6 m plates. The scale is the same for all objects, except (c) and (g).

(a) 044-IG02; (b) 141-IG32; (c) 184-IG32 (30 min); (d) 141-IG45; (e) 338-IG13; (f) 233-IG44; (g) 073-IG32/33 (60 min); (h) 284-IG41; (i) 073-IG35/36; (j) 073-IG37/38; (k) 186-IG45; (l) 074-G09.

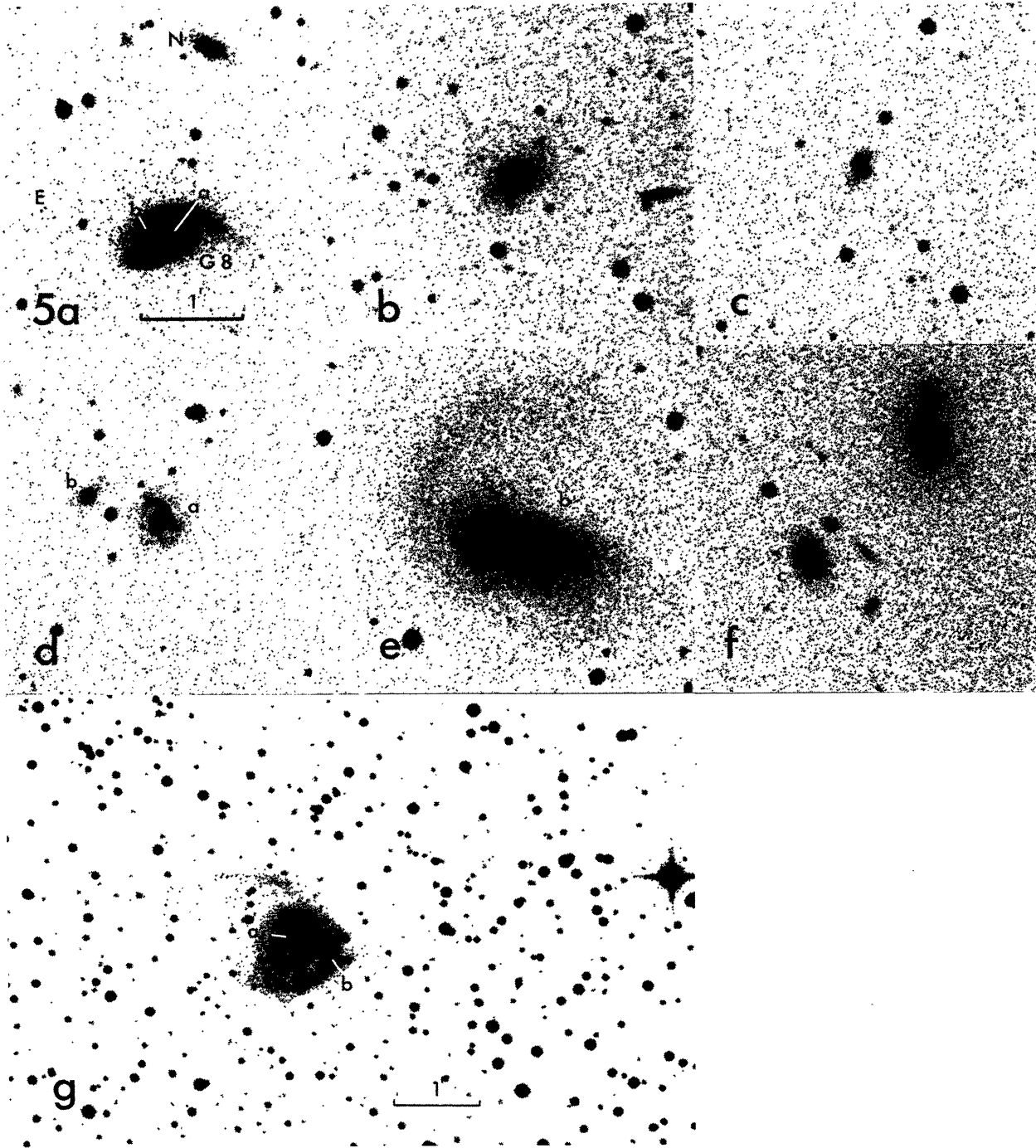


Figure 5 Same as figure 1. The scale is the same for all objects, except (g).
 (a) 235-G08; (b) 145-IG01; (c) 342-IG49; (d) 108-IG18; (e) 109-IG22; (f) 290-IG51; (g) 263-IG38.