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A list of new nearby dwarf galaxy candidates⋆

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Abstract. To increase completeness of the distance limited sample of nearby galaxies from the Kraan-Korteweg & Tammann (1979) catalogue we undertook a search for small companions of larger known galaxies which have corrected radial velocities within 500 km/s. Based primarely on the POSS-II and ESO/SERC films we found 260 nearby dwarf galaxy candidates with angular diameters $a \gtrsim 0.5$ arcmin. More than 50% of the objects were revealed for the first time. As we suppose, a significant part of them (about 30%) may really belong to the Local Volume sample.

Key words: galaxies: distances and redshifts — galaxies: irregular

1. Introduction

In a study of the general properties and evolution of galaxies it is necessary to have quite a complete and representative sample biased minimally by observational selection. A catalogue of all nearby galaxies with distances $D < D_{\max}$ would be an ideal realization of such "fair" sample. To be representative such a sample must contain at least $(100 - 300)$ objects, which can be achieved at $D_{\max} = (5 - 10)$ Mpc. The knowledge of distances for all nearby galaxies permits both local dynamics and the shape of the gravitational potential field to be evaluated.

Unfortunately, the distances remain one of the most deficient observing parameters for the galaxies even in the vicinity of the Local Group. Being short of distance data, Kraan-Korteweg & Tammann (1979) compiled a catalogue of nearby galaxies with radial velocities V_0 (corrected for solar motion) not exceeding $V_{\max} = 500$ km/s. Their sample (=KKT) contains 179 galaxies (after excluding probable Virgo cluster members which satisfy the condition $V_0 < 500$ km/s due to large peculiar velocities). Then Huchtmeier & Richter (1988, 1989a) and Karachentsev (1994) increased the sample in the number to $N = 215$ by including new objects detected in the HI 21 cm line by different authors. Independent efforts to extend the KKT-sample were undertaken by Schmidt & Boller (1992). However, their catalogue of 289 nearby galaxies contains many questionable cases when the radial velocity refers to a globular cluster or a star projected on a distant galaxy. Moreover, the catalogue of Schmidt & Boller (1992) includes about 40 galaxies without radial velocity, assuming their membership in the nearby groups, but later HI observations did not confirm it.

The galaxy number distribution of the KKT- sample with radial velocities as well as angular diameters show that its expected completeness is $(40 - 60)\%$ only. For instance, a median value of the linear diameter of the Local Group galaxies equals 0.9 kpc (Karachentsev 1996). Being at $D = 3.5$ Mpc (the distance of the nearest groups M 81 and Cent.A), a "median" dwarf system has an angular diameter $a = 0.9$ arcmin. In fact a lot of the faintest objects in the KKT- sample are represented by the galaxies from the catalogues: DDO (van den Bergh 1966), UGC (Nilson 1973), and ESO/Uppsala (Lauberts 1982) with a limiting angular diameter $a = 1$ arcmin. So, we expect that about $(100 - 250)$ smaller galaxies really situated at $D = 4 - 6$ Mpc have not yet been covered by radial velocity surveys (and even have not yet been discovered). The situation is complicated by the presence of the "Zone of avoidance" because of the light extinction in the Milky Way plane.

As experience of the last two decades have shown, the increase in the number of the known galaxies with $V_0 < 500$ km/s grows slowly (with a rate of $2 - 3$ galaxies per year) and a discovery of very nearby galaxies happens in fact by chance. That is a reason for us to make special searches for the nearby dwarf galaxy candidates. We consider this work a part of a more extended program of studying the Local Volume galaxies (Karachentsev 1994).

⋆ Tables 1 and 2 also available in electronic form at CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via ftp://cdsweb.u-strasbg.fr/Abstract.html

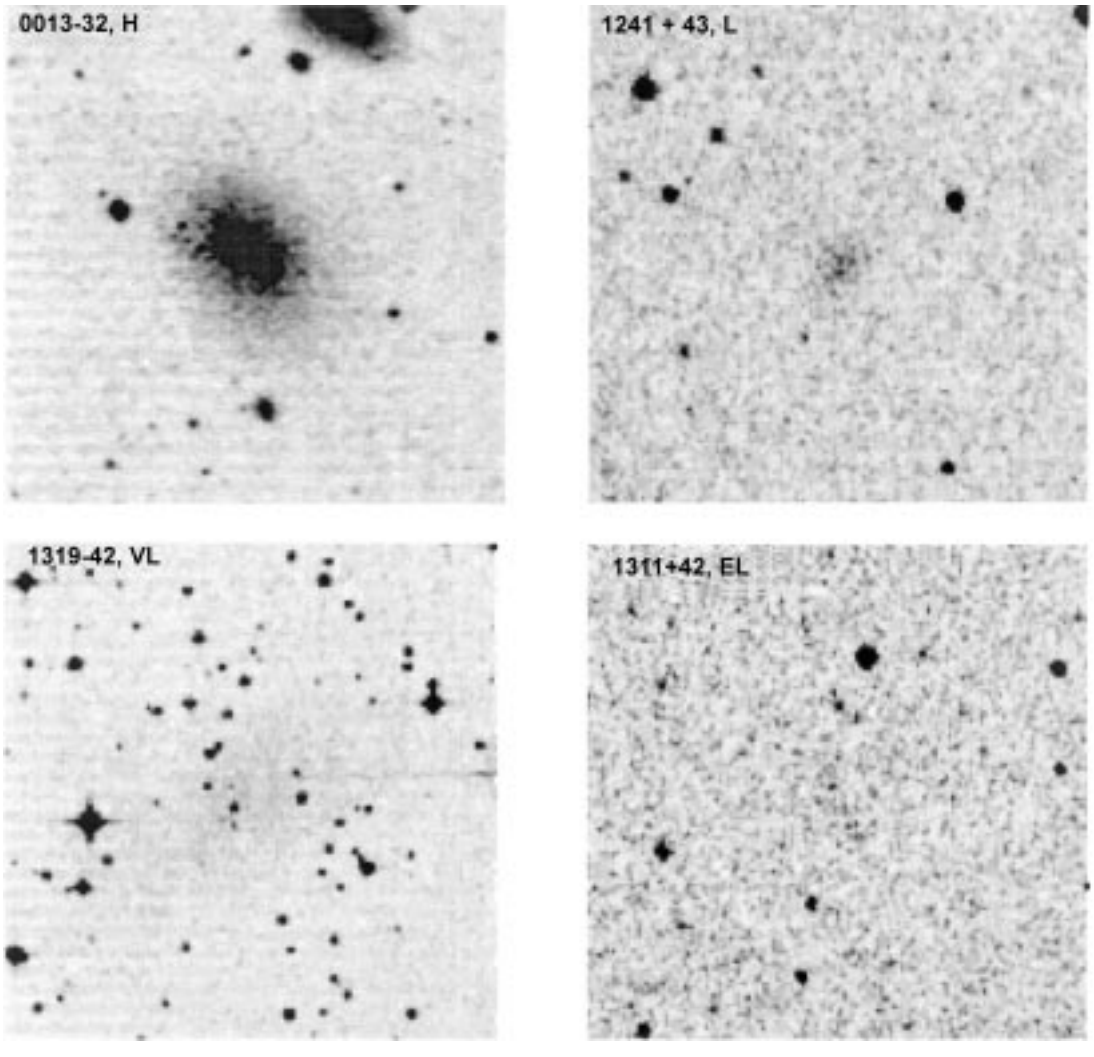

Fig. 1. Reproductions from the digital POSS-I of the objects: $0013-32$ (SB = H), $1241+43$ (SB = L), $1319-42$ (SB = VL), and $1311+42$ (SB = EL). Each chart is 4×4 arcmin, North at top, East at left

2. Approach to the search

The availability of high-quality Sky Surveys, POSS-II and ESO/SERC, made on new photographic emulsions stimulated strongly the present search. The high angular resolution and the sensitivity to low contrast details permit the detection and classification with confidence of galaxies of small angular dimensions, especially low surface brightness objects. Using our previous experience of searching for low surface brightness objects on the POSS-I prints (Karachentseva 1968, 1972, 1973), we undertook analogous searches based on new observational material. Due to the different morphology of dwarf galaxies there are no distinct criteria to distinguish them from a normal distant galaxy of the same angular diameter (or from a part of a reflecting nebula). Typical cases of such visual misclassification were described by Karachentseva et al. (1985). Indeed, a search for the nearby dwarf galaxy candidates seems to be a rather delicate subject. To complete the KKT- sample with new very nearby galaxies we used the following strategy:

1. Dwarf companions of the known nearby galaxies were assumed to be the main supplier of new objects for the Local Volume (=LV). Following this idea we searched on the POSS-II or ESO/SERC two-colour films for dwarf galaxies down to the limiting angular diameter 0.5 arcmin around each of 215 LV galaxies with $V_0 < 500$ km/s from the list by Karachentsev (1994), which is an up-dated version of the KKT-sample. The diameter of the inspected area around each of the LV galaxies was chosen equal to 50 times its diameter. So, for a normal galaxy 20 kpc in diameter the survey area corresponds to a 1 Mpc diameter circle and exceeds the crossing length for the satellite during a cosmological time of $1/H$. Because of the present incompleteness of the POSS-II survey we used in $\sim 15\%$ of the cases the POSS-I prints too.

2. In addition to the inspected neighbourhood of individual galaxies we carried out a total visual examination of wide regions of the well-known nearby galaxy groups: the M 31, M 81, M 101, IC 342/Maffei, Sculptor, Centaurus and the Canes Venatici cloud, indicated in the Nearby Galaxy Catalog of Tully (1988). In case of CnV the survey area was limited to R.A. = [11.5^h, 14.5^h], D. = [+20°, +60°].

3. Using the POSS-II and ESO/SERC films we revised the images of dwarf galaxies from the catalogues of Karachentseva & Sharina (1988), and Arp & Madore (1989). The objects with signs of possible resolution into stars have been included, as a rule, in the candidate list.

4. To fill in the empty cone evoked by excluding all galaxies in the Virgo cluster direction, we inspected the galaxy images of the angular diameter $a \gtrsim 0.5$ arcmin within the boundaries R.A. = [11.5^h, 13.5^h], D. = [0°, +20°]. As an example, we considered the dwarf system GR 8 (Reaves 1983) situated in front of the Virgo cluster.

5. Into our list of the LV candidates there were included also galaxies with recent radial velocity determinations, mainly from the HI surveys (Huchtmeier & Richter 1989b; Shombert et al. 1992; Kraan-Korteweg et al. 1994; Garcia et al. 1994; Gallagher et al. 1995; Huchtmeier et al. 1995; Mattews et al. 1995; Huchtmeier & van Driel 1996; Mattews & Gallagher 1996) when their corrected velocities did not exceed 500 km/s. Note that due to the influence of Galactic hydrogen, the low signal-to-noise ratio or other reasons the small value of galaxy radial velocity would often seem doubtful. That is why our decision to include a galaxy in the list took into account the visual impression about its structure. We used also the available version of the ZCAT (Huchra 1995) which contains 386 objects with $V_0 < 500$ km/s. Of them 215 are in the Karachentsev (1994) list, and 97 objects are members of the Virgo cluster. The remaining 74 ones formed a set of strange cases. Note some typical examples:

- the radial velocity refers to a bright star projected on a distant galaxy (for example, 0232 + 3725),
- the object is a globular cluster, not a galaxy (NGC 2420),
- the velocity belongs to a HII region in M33 or another large galaxy (0130 + 3041),
- the velocity belongs to the Galactic hydrogen in the empty area (0106 + 2137),
- the object is a planetary nebula (NGC 5844) or a cometary nebula (2022 + 3541),
- the small value of the galaxy radial velocity is a result of misprint (2318 − 4200).

3. The list of candidates

The results of our search for new dwarf galaxy candidates are presented in Table 1 where Cols. 1, 2 are the equatorial coordinates (epoch 1950.0); Cols. 3, 4 are the major and minor angular diameters in arcmin measured on blue films; Col. 5 is the morphological type in usual designations ("d" as a "dwarf" was omitted); Col. 6 is the rough estimate of surface brightness (=SB): H — high (equal or brighter than the SB of a normal spiral galaxy), L — low, VL — very low, EL — extremely low (usually invisible on POSS-I but visible on POSS-II); Fig. 1 illustrates the appearence on the digital POSS-I of four objects with the different SB estimates; Col. 7 is the galaxy name or its number in the catalogues/lists : AM — Arp & Madore (1987), FG — Feitzinger & Galinski (1985), K — Karachentseva (1968, 1972, 1973), BK — Börngen & Karachentseva (1985), DDO — van den Bergh (1966), UGC, UGCA (Nilson 1973, 1974), F — Schombert et al. (1992), VCC — Binggeli et al. (1985), MCG — Vorontsov-Velyaminov et al. (1962–1968); Col. 8 contains the data on heliocentric radial velocities and galaxy shape and indicates some notes at the end of the Table 1. In preparing this article two HI surveys of nearby galaxies (Huchtmeier et al. 1997; Cote et al. 1997) revealed 15 our objects to have radial velocities greater than 1000 km/s. A list of them is presented in Table 2 where columns are the same as in Table 1.

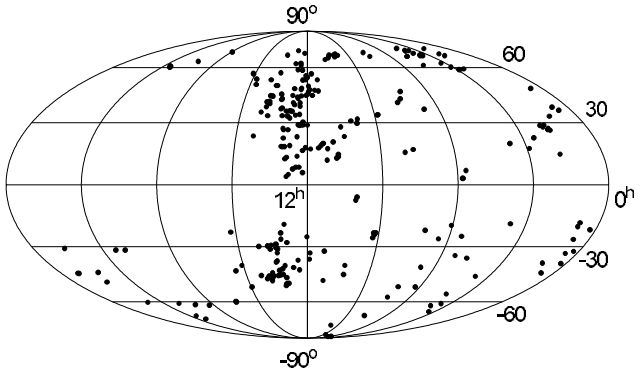

Fig. 2. Distribution of the Local Volume galaxy candidates in the equatorial coordinates

The distribution of 260 galaxies from Table 1 is presented in Fig. 2 in equatorial coordinates. Because our survey does not cover the sky continuously, we do not discuss here the details of this distribution. Note only that the presented distribution delineates clearly the concentration toward the Local Supercluster plane and also the wide empty region coinciding with the Local Void (Tully 1988) around the direction {19.0^h, +15°}.

4. Discussion

As it is seen from Table 1, among 260 galaxy candidates 132 are absent in the previous catalogues and lists. In other words, 51% of our list objects are new. All but one are visible on two different colour films and we suppose they are real objects. From them 33 galaxies have radial velocity data including 7 recent HI measurements made by Huchtmeier et al. (1997).

Obviously, there is no direct way to estimate the resulting efficiency of our searches. We did not meet in the literature a similar attempt just concerning the search for very nearby dwarf galaxies. Binggeli et al. (1990) were searching for dwarf galaxies on deep IIIa-J Palomar Schmidt telescope plates in several sky belts in the range of D.= $[+28°, +57°]$, R.A. = $[9^h, 16^h]$. Among 179 objects considered by them to be dwarf galaxies there are only 2 objects in common with our list.

Schombert et al. (1992) published a catalogue of LSB galaxies found on the POSS-II survey in the declination zone D. = $[0°, +25°]$. Their catalogue contains 369 LSB galaxies with angular diameters greater than 0.5 arcmin. Basing on the results of the HI survey of the catalogue galaxies, Schombert et al. (1992) concluded that most of the detected objects are spirals with $V > 2000$ km/s. Only 4 dwarf galaxies have $V_0 < 500$ km/s.

Impey et al. (1996) carried out a search for LSB galaxies in the equatorial zone covering an area of 786 sq.degrees. Using a combination of both automated and visual examination of glass copies of the UKST IIIa-J survey plates they detected 516 low surface brightness objects with $a > 0.5$ arcmin. For 264 and 160 objects the optical and HI velocities, respectively, have been measured. Our analysis of their catalogue data showed the following:

(a) Only two corrected radial velocities do not exceed the limit of 500 km/s. But in both cases the measurements refer to stars projected on the galaxies.
(b) There are no common objects in the list of Impey et al. (1996) and our Table 1.
(c) Many Impey et al. (1996) LSB objects of irregular shape on their finding charts, looking like nearby dwarf candidates (for example, $0123-0029$, $0129-0024$, $0217+0031$, $0224+0238$, $0224+0233$, $0227+0040$ etc.), are unrecognized absolutely on both (blue and red) films of POSS-II.

In carrying out the search, we found independently all three dwarf spheroidal companions of the M 31: And I, And II, And III which had been discovered by van den Bergh (1972). However, we did not find any new spheroidal nor did we find irregular candidate member of this group. In the zone of strong obscuration in the vicinity of spiral galaxies IC 342 and Maffei 2 we found independently the galaxies Cas 1, Cas 2, MB1 discovered recently by Huchtmeier et al. (1995), Kraan-Korteweg et al. (1994) and McCall & Buta (1995). Moreover we believe that our list contains probably additional members of this nearby galaxy complex.

It should be emphasized that Table 1 does not contain other nearby galaxies which have been presented in their basic list (Karachentsev 1994). This is the reason why LGS 3, GR 8, K 52, and some other well-known dwarf galaxies do not appear in Table 1.

To clarify the nature of galaxies from our list one needs to measure their radial velocities. The pilot HI survey of the sample of 26 objects from this list made by Huchtmeier et al. (1997) shows that about 70% of them are detected in the 21 cm line, and the fraction of very nearby dwarfs with $V_0 < 500$ km/s consists of 1/4.

5. Concluding remarks

Due to the incompletness of the available set of the POSS-II films we did not aim at the global task of search for candidates in the sample of galaxies with $D < 7$ Mpc on the whole sky. The region inspected by us covers about 20% of the whole sky area. However in our list we expect to see the main part of new members of the Local Volume because our search covers the area occupied by all nearby groups. We suppose that a systematic study of these galaxies in the HI line as well as their multicolour imaging up to a deep limit for photometric distance determinations are tasks of current concern for large radio and optical telescopes.

As regards the theories of galaxy formation and evolution, the search for nearby dwarf galaxies outside galaxy groups is very important too. Especially it is reasonable to reveal dwarf systems in the volume of the Local Void, occupying an area of several steradians on the sky (Tully 1988). A survey of the Local Void region on the POSS-II and ESO/SERC is planned as the second part of this project.

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Table 1. List of new Local Volume dwarf candidates

R.A. (1950.0)	D.	a	b	Type	S.B.	Identification	Notes
1	2	3	4	5	6	7	8
00 12 31.6	−38 45 43	0.9	0.35	Im	H	AM 0012 − 384	
00 12 53.5	−21 43 17	2.3	1.3	S0	H	NGC 59	$V = 382$ km/s [1]
00 13 00.0	−32 27 36	1.5	1.3	Ir/Sph	H	FG 11	granul.,undet.HI [2]
00 29 27.4	−33 32 30	0.9	0.8	Sph/Ir	L	FG 16,AM 0029 − 333	
00 32 52.7	+36 13 21	5:	3:	Sph	EL	And III	
00 34 43.3	+47 53 57	0.5	0.45	Ir	L		distant?
00 35 18.6	−43 46 46	0.6	0.4	Im	H	AM 0035 − 434	undet.HI [2]
00 42 56.2	+37 45 51	4:	3:	Sph	EL	And I	
00 46 51.9	−18 20 48	1.2	1.1	Sph	L	K 2	dist.?undet.HI [2]
00 47 56.0	−20 10 44	1.3	1.2	Sph/Ir	L	FG 24	undet.HI [2]
01 06 03.4	−38 28 35	0.9	0.4	Im	H	K 3,AM 0106 − 382	distant?, $V = 645$ [2]
01 13 41.9	+33 09 20	4:	2.5:	Sph	EL	And II	
01 39 29.5	+26 06 57	0.7	0.4	Ir	L		$V = 359$ [3]
01 41 54.0	+27 02 14	1.6	0.6	Ir	L		asym., $V = 420$ [3]
01 43 53.6	+26 33 07	0.6	0.2	Ir	VL		$V = 368$ [3]
01 52 30.2	+27 42 34	0.8	0.3	Ir	L		comp. N 784
01 57 18.1	+28 35 26	0.6	0.3	Ir	L		comp. N 784
01 57 22.0	+67 30 36	1.3	0.9	Sph?	EL		undet.HI [3]
02 02 02.4	+68 45 57	2.2	1.7	Ir	L	Cas 1	$V = 35$ [4]
02 31 39.9	+22 21 45	1.2	0.7	Sph	VL		
02 31 52.2	+59 09 42	2.4:	1.0:	Ir	EL	MB 1	$V = 189$ [5]
02 51 54.1	+58 39 35	1.6	0.5	Ir	EL		
02 53 01.1	+58 42 37	2.0:	0.3:	SB	EL	Cas 2	$V = 112$ [6]
02 53 54.5	+17 15 25	0.6	0.4	Ir?	L		distant?
03 07 59.9	+60 09 28	2.8	0.8	Ir?	VL		refl. neb.?
03 18 53.2	+62 36 27	1.8	0.9	Ir	L		undet.HI [3]
03 20 29.5	−66 30 04	1.2	0.4	Ir	L		EL in R
03 28 35.2	+47 37 28	1.4	0.8	Ir	H	UGC 2773	$V = 231$ [7]
03 33 18.9	−61 15 37	1.8	0.9	Im	EL	FG 82,AM 0333 − 611	resolved
03 37 12.6	+68 02 50	1.0	0.5	Sph?	VL		
03 37 26.2	−18 49 42	0.7	0.6	Ir/Sph	L		EL in R,dist.?
03 37 26.8	+19 35 30	0.8	0.7	Ir	L		undet.HI [3]
03 38 39.9	+67 52 57	0.4:	0.4:	Ir	VL		
03 38 56.9	−45 30 52	1.5	1.5	Im	H	AM 0338 − 453	granulated
03 40 23.7	+67 42 26	2.5	1.7	Ir	VL		res?,undet.HI [3]
03 42 47.0	+67 30 57	1.0	0.6	Ir	L		distant?
03 47 15.0	+70 56 34	0.9	0.4	Ir?	VL	BK 17	
03 58 47.0	−62 38 57	0.7	0.5	Im	H	AM 0358 − 623	
04 00 06.0	+71 20 00	1.1:	0.9:	Ir?	EL		refl.neb?,br.star
04 05 56.0	−55 27 21	1.6	1.0	Im	H	AM 0405 − 552	resolv?,pecul.
04 19 26.7	+72 41 27	3.7	2.1	Sph?	VL	Cam A	comp. N 1560
04 39 44.4	+61 15 47	0.6	0.6	Ir?	VL		dist?,undet.HI [3]
04 45 11.0	−36 00 18	2.2	0.8	Im/Sm	H	AM 0445 − 360	resolved?
04 48 03.3	+67 01 02	2.2	1.1	Ir	L		$V = 75$ [3]
05 21 35.2	−34 37 13	0.55	0.4	Im	H	AM 0521 − 343	resolved?
05 23 05.4	−87 05 14	1.4	0.7	Im	L	FG154,AM0522 − 870	resolved?
05 27 49.0	−87 37 36	1.0	0.45	Im	L	AM 0528 − 873	
05 28 26.3	−24 54 44	1.7:	0.3:	Im/Sm	VL	AM 0528 − 245	
05 39 00.7	+06 39 28	0.7	0.5	Im?	H		$V = 441$ [8]
05 47 25.5	+02 52 10	0.5	0.4	Ir	VL		shreded
05 48 47.9	+02 53 48	2.1	0.5	Ir	EL		obscured
06 02 18.4	−19 37 03	1.2	0.5	Ir	L		$V = 645$ [1]
06 12 51.5	−51 31 41	1.1	0.6	Im	L	AM 0612 − 513	resolved?
06 24 16.7	−26 14 06	0.6	0.3	Ir	H	AM 0624 − 261	$V = 495$ [2],res.?

Table 1. continued

1	2	3	4	5	6	7	8
06 37 55.8	−40 40 24	0.7	0.45	Ir	VL	AM 0637 − 404	$V = 272 + 821$ [9]
06 39 49.0	+36 41 03	1.3	0.4	Ir?	L		distant?
07 04 49.9	−21 57 29	1.9	1.1	Ir	L		$V = +737$ [1]
07 07 56.2	−51 23 08	1.4	1.1	Ir	L	FG 203	
07 17 41.2	−57 19 06	2.1	1.6	Im/Sm	VL	FG 206,AM 0717 − 571	resolved?
07 20 23.0	+46 06 10	1.1	0.4	Ir	L		
07 29 13.1	+66 59 40	3:	2:	Sph	VL	DDO 44	undet.HI [10],comp.N 2403
07 31 50.6	+42 12 13	0.6	0.4	Ir	L		
07 37 20.0	−69 13 38	1.5	0.9	Sph	VL	FG 219,AM 0737 − 691	
07 39 30.0	+69 41 09	0.6	0.2	Ir	L		distant?
07 39 40.2	+16 40 47	0.9	0.5	Ir	H		comp. U 3974
07 44 05.4	+40 18 42	0.7	0.4	Ir	L		asymmetric
08 00 34.9	+15 17 03	1.0	0.5	Ir	L		
08 27 17.0	−84 58 57	1.1	1.0	Ir?	H		$V = 738$ [1],pec.
08 49 44.1	+33 59 13	2.4:	1.8:	Sph?	EL		comp.N 2683
08 52 16.3	+33 45 02	1.1	1.0	Sph?	EL		comp.N 2683
09 06 56.7	−23 09 51	0.45	0.35	Ir/Sph	L	AM 0906 − 231	dist?,undet.HI [9]
09 09 28.5	−23 46 35	0.6	0.5	Sph	L		EL in R
09 10 15.6	−24 02 05	0.9	0.8	Sph	L		EL in R,dist?
09 12 18.0	−23 20 55	0.8	0.4	Im	L	FG247,AM0912 − 232	dist?,undet.HI [9]
09 12 48.9	−25 40 30	0.9	0.6	Ir	L		VL in R
09 38 23.6	−76 21 41	2.1	0.8	Ir	L		refl.neb.?
09 46 08.5	+67 44 25	2.4	1.8	Sph	VL		comp. M 81
09 47 23.6	+31 41 26	0.5	0.3	Ir	H		UGC 5272B [11]
09 50 03.5	+29 32 46	0.6	0.4	BCD?	H		
09 50 45.0	+29 40 57	1.1	0.6	Ir	L		star projected
09 53 00.8	+68 49 47	2.6	2.6	Sph	VL	K 61	comp. M 81
10 00 25.3	−05 57 55	0.6	0.5	Ir	L		
10 01 18.0	+66 48 00	1.7	1.7	Sph	VL	DDO 71,K 63	comp. M 81
10 03 05.8	−07 30 20	1.9	1.3	Sph	L	K 65	comp. N 3115
10 03 09.0	+68 04 19	2.0	1.0	Sph	L	K 64,UGC 5442	comp. M 81
10 05 22.0	+30 44 09	1.0	0.6	Ir?	L	MCG 5 − 24 − 18	v.pecul., dist.?
10 12 37.6	−44 36 08	1.2	1.0	Sm?	H	AM 1012 − 443	
10 13 57.4	−39 44 23	0.9	0.5	Ir	VL	AM 1013 − 394	$V = 263 + 2982$ [9]
10 22 47.6	+67 54 32	2.0	2.0	Sph	VL	DDO 78	comp. M 81
10 26 26.1	+23 01 57	1.0	0.15	Ir/S	VL		distant?
10 31 00.0	+66 16 00	1.0	0.8	Sph	VL	BK 6N	comp. M 81
10 33 30.1	+27 47 52	0.8	0.7	Ir	L		
10 43 45.8	+14 17 16	1.2	1.1	Ir	VL		
10 44 18.1	+13 15 48	1.2	0.6	Ir	VL		near Leo tripl.
10 46 03.6	+64 59 20	2.2:	1.7:	Ir	VL	UGCA 220	
10 47 48.8	+12 37 34	1.2:	0.8:	Sph	EL		near Leo tripl.
10 55 35.3	+20 22 35	0.7	0.5	Ir	L		near edge-on S
11 09 37.7	+17 01 32	0.9	0.4	Sph/Ir	VL	F 640-3	undet.HI [12]
11 11 11.2	−47 46 02	0.35	0.25	Im	H	AM 1111 − 474	
11 11 22.9	+11 36 10	1.2	0.5	Ir	VL		distant ?
11 14 19.1	−32 22 39	0.7	0.4	Sph?	L	AM 1114 − 322	distant ?
11 20 21.2	+19 44 58	0.6	0.4	Ir?	L	F 570 − 3	undet.HI [12]
11 21 03.8	+19 31 52	0.6	0.4	Sph	VL		
11 26 14.5	+18 33 25	1.1	0.7	Ir?	VL	F 571 − 10	undet.HI [12]
11 26 40.7	+46 23 23	0.8	0.5	Ir?	L		
11 27 08.7	+52 40 54	0.8	0.7	Sph?	VL	K 78	
11 31 40.1	+17 26 14	0.7	0.4	Ir	L		
11 37 23.0	+46 45 29	0.7	0.6	Sph?	VL		

Table 1. continued

1	2	3	4	5	6	7	8
11 44 33.5	+43 56 59	0.6	0.4	Ir?	L		
11 46 01.0	+56 11 44	0.6	0.6	Ir?	L		
11 51 27.3	+16 59 55	0.6	0.45	Ir?	L		Virgo member ?
11 52 10.5	−33 16 47	1.1	0.8	Ir	L	FG 315,AM 1152 − 331	$V = 640$ [9]
11 52 17.9	+47 04 59	0.5	0.3	Ir?	VL		distant ?
11 53 55.1	−36 27 39	0.5	0.35	Im	H		
11 55 37.1	+49 09 34	0.7	0.55	Im	H	MCG 8 − 22 − 48	
11 56 18.5	+46 00 45	1.3	0.7	Ir	L	UGCA 259	$V = 1154$ [10],{*}
11 57 24.6	+44 59 50	0.6	0.6	Ir?	L		
11 58 42.9	+54 03 01	0.6	0.15	Ir	VL		
11 59 13.5	+28 38 26	0.8	0.7	Ir	L		distant ?
12 00 56.2	−25 11 35	2.5	1.9	Im/Sm	L	FG 320;AM 1200 − 251	filaments
12 02 52.3	+43 59 13	1.1	0.6	Ir	VL		
12 04 04.8	+55 02 38	1.0	0.25	Ir	L		
12 04 20.5	+17 37 01	0.9	0.2	Ir	L		Virgo member ?
12 06 16.1	+52 50 29	0.5	0.3	Ir?	EL		
12 10 16.9	+69 12 20	0.7	0.6	Sph?	VL		near br.star
12 10 47.5	+28 41 44	0.6	0.3	Ir	L		asymmetric
12 10 51.5	+30 12 00	0.9	0.25	Ir	H		$V = 152$ [1],{*}
12 11 17.1	+05 37 54	0.6	0.4	Ir	L	GR 5	
12 11 38.9	+16 14 35	1.1	1.1	Sph	VL	K 88,VCC 108	undet.HI [12]
12 15 17.6	+28 45 09	0.6	0.3	Ir	L	K 95	
12 15 58.1	+28 55 31	0.6	0.5	Sph/Ir	VL	K 98	
12 16 38.5	+48 00 25	0.6	0.5	Sph/Ir	VL		
12 17 04.1	+43 39 50	0.4	0.3	Ir	L		
12 17 05.3	+47 43 54	0.3	0.3	Sph?	L		
12 17 09.5	+58 19 18	0.8	0.4	Ir	VL		
12 18 13.5	+47 16 43	0.5	0.5	Sph?	L		
12 19 13.0	+38 15 06	0.9	0.5	Ir	VL	K 105	
12 19 27.0	+28 31 09	0.9	0.5	Sph/Ir	VL		
12 19 37.9	+40 01 23	0.9	0.4	Ir	L		asym., dist.?
12 20 15.7	+08 11 27	0.6	0.5	Ir	L	VCC 584	
12 20 23.2	+34 06 23	0.4	0.3	Ir	L		
12 21 48.5	−42 00 57	1.0	0.5	Ir?	L	AM 1221 − 420	star w.neb.?
12 22 34.0	+61 20 20	1.0	0.7	Ir	L	MCG 10 − 18 − 44	
12 22 58.6	+28 45 33	1.5	0.5	Ir	L		
12 24 18.6	+62 39 23	1.1	0.7	Ir	L	UGC 7544	undet.HI [10]
12 24 19.1	+13 27 15	1.0	0.35	Sm	L	DDO 124	$V = 162$ [10]
12 25 20.3	−37 03 12	2.0	0.25	Im/Sm?	H	AM 1225 − 370	resolved?
12 25 32.4	+22 51 57	0.8	0.4	Ir	H	UGC 7584	
12 26 25.8	+42 27 20	0.8	0.45	Ir	L	MCG 7 − 26 − 11	$V = 408$ [13]
12 27 28.2	+08 12 24	1.1	0.7	Im	L	UGC 7636	$V = 468$ [10]
12 27 57.5	+43 10 38	1.2	0.5	Ir?	L	MCG 7 − 26 − 12	$V = 440$ [13]
12 30 58.4	+33 37 42	1.2	0.4	Ir	H	MCG 06 − 28 − 9	granulated
12 32 44.4	+58 39 45	0.5	0.3	Ir	L	K 162	distant?
12 34 56.4	+39 01 12	0.7	0.4	Ir	H	Arp 211	
12 35 13.0	+07 22 42	1.2	1.0	Ir	L	UGC 7795	$V = 61$ [10]
12 38 09.0	+47 38 21	0.5	0.2	Ir	L		
12 38 31.3	−40 53 03	1.7	0.4	Ir	VL	AM 1238 − 405	
12 39 06.9	+40 05 13	1.1	0.7	Ir	L		granulated
12 40 48.0	+35 41 16	0.7	0.5	Ir?	L		distant?
12 41 35.8	+43 56 15	0.8	0.6	Ir	L		

Table 1. continued

1	2	3	4	5	6	7	8
12 42 10.0	+71 03 52	1.1	0.7	Ir?	L	K 195	
12 42 57.3	+18 34 25	0.9	0.7	Ir?	EL		{*}
12 43 37.6	+62 14 21	0.9	0.4	Ir?	VL		
12 45 26.9	+04 42 24	1.1	0.6	Ir	H		distant?
12 46 27.6	+32 14 33	0.7	0.7	Ir?	L		
12 46 49.5	+35 53 05	1.7	1.0	Sph	L		
12 49 17.8	+26 22 56	0.8	0.5	Ir?	L		distant?
12 50 37.8	+03 42 44	0.5	0.4	Ir?	VL		
12 50 41.3	+12 54 24	0.8	0.6	Ir	L		
12 52 11.5	−28 04 12	0.8	0.6	Im	L	AM 1252 − 280	$V = 645$ [14]
12 53 03.1	+33 15 22	0.7	0.6	Ir?	L		distant?
12 54 14.0	+12 12 10	1.3	1.0	Ir	L	UGC 8061	
12 56 07.5	+18 04 58	0.7	0.45	Ir	L		Virgo member?
12 56 29.7	−49 21 08	2.2	1.6	Ir	L	FG 363	$V = 1895$ [10],{*}
12 56 38.7	+35 45 03	0.6	0.4	Ir?	L		
12 57 17.1	−19 08 26	1.7	0.7	Sph/Ir	VL		EL in R
13 00 15.2	+22 16 02	0.8	0.7	Sph?	VL	F 575 − 1	undet.HI [12]
13 00 32.8	+26 20 46	0.8	0.3	Ir	L	F 508 − 1	
13 00 40.5	−46 19 07	1.2:	0.9:	Sph	L	FG 367,AM 1300 − 461	comp. N 5128
13 02 02.1	+18 01 37	1.4	0.7	Sph/Ir	VL	F 575 − 4	undet.HI [12]
13 02 09.2	+27 02 31	0.7	0.6	Ir	L	F 508 − v1	
13 02 12.8	−39 48 54	1.0	0.55	Ir	L		fan-like, $V = 619$ [2]
13 04 14.8	+18 16 08	0.6	0.45	Sph?	L		
13 06 15.0	−50 44 46	1.9	0.4	Ir	H	AM 1305 − 501	distant?
13 06 36.8	+33 28 07	0.6	0.5	Ir	L		
13 07 03.5	−23 16 35	0.7	0.3	Im	H	AM 1307 − 231	
13 07 23.3	−26 19 43	1.0	0.8	Im	H	AM 1307 − 263	granulated?
13 08 47.7	+37 26 39	0.9	0.6	Ir	L		
13 09 53.2	−41 34 01	1.0	0.6	Sph?	VL		EL in R, comp. N 5128
13 10 14.6	−44 37 28	2.7	1.7	Sph	L	FG 373,AM 1310 − 443	comp. N 5128
13 11 24.8	+42 18 31	0.8	0.7	Sph?	EL		comp. N 5055
13 12 02.7	+36 50 08	0.7	0.5	Sph?	L		
13 13 16.4	+41 45 55	0.6:	0.6:	Ir/Sph	EL		
13 15 07.3	+44 39 44	0.6:	0.4:	Ir?	VL		
13 18 20.5	−31 16 05	1.3	0.6	Ir	VL		EL in R
13 18 49.9	−44 48 05	0.6	0.4	Ir?	L	AM 1318 − 444	
13 19 06.8	−42 16 20	1.5	1.1	Sph	VL		comp. N 5128
13 20 07.0	−33 18 23	0.6	0.5	Sph?	L	CEN 8	
13 20 31.4	−28 56 34	0.4	0.35	Ir	EL		
13 21 48.1	−30 42 43	1.3	0.8	Im	H	K 15,AM 1321 − 304	$V = 490$ [14]
13 22 20.0	−37 21 50	1.3	0.7	Ir/Sph	VL	AM 1321 − 372	near br.star
13 22 37.7	−29 00 39	0.6	0.45	Ir	L		
13 24 29.6	−45 05 36	0.5	0.5	Ir/Sph	L	AM 1324 − 450	
13 25 28.7	−37 54 37	1.6	1.1	Ir?	L	FG 393,AM 1325 − 375	
13 26 46.8	+67 53 28	1.2	0.5	Ir	L	UGC 8509	undet.HI [10]
13 31 18.6	+49 21 30	1.0	0.6	Ir	H	MCG 8 − 25 − 18	
13 31 31.6	+56 45 26	0.6	0.4	Ir?	VL		
13 33 46.5	−29 19 00	6::	2.5:	Ir	EL		{*}
13 35 52.8	+49 22 26	0.4	0.25	Ir	L		
13 37 31.2	−31 26 47	1.4	0.6	Im?	L	FG 403	distant?
13 39 03.4	−44 57 11	1.2	1.1	Sph?	L	AM 1339 − 445	comp. N 5128
13 39 12.6	+43 32 31	0.8	0.6	Ir?	L	MCG 07 − 28 − 51	distant?
13 40 34.6	−43 31 04	0.6	0.3	Sph?	VL		EL in R
13 40 44.0	−45 29 41	0.75	0.4	Ir	L	AM 1340 − 453	distant?

Table 1. continued

1	2	3	4	5	6	7	8
13 40 45.2	−45 39 22	0.5	0.5	Im	L	AM 1340 − 453	
13 41 24.2	+43 42 43	1.1	0.5	Ir	H	UGC 8688	
13 43 13.4	−45 26 06	1.0	0.9	Sph	L	AM 1343 − 452	comp. N 5128
13 43 48.7	−29 43 47	1.7	0.7	Sph?	VL		comp. N 5236
13 45 21.9	+39 37 26	0.7	0.4	Ir?	L		
13 45 22.2	+33 27 25	0.8:	0.7:	Ir	L		
13 45 40.5	−46 44 54	1.5:	1.0:	Sph?	EL		near br.star
13 46 04.9	−47 57 21	0.5	0.4	Ir/Sph	L	AM 1346 − 475	
13 46 07.8	+40 48 08	0.4	0.3	Ir?	L		granulated?
13 46 52.8	+43 50 54	1.0	0.4	Ir	L		distant?
13 52 51.5	+37 55 42	0.45	0.3	Ir	L		
13 53 01.2	−45 24 47	1.1	0.7	Ir	L		
13 54 03.7	+40 32 50	0.7	0.45	Ir	L		comp. N 5371?
13 57 21.1	+52 36 16	0.9	0.8	Ir?	L	UGC 8914	undet.HI [10], dist?
13 59 54.3	−46 51 45	0.8	0.6	Ir	L	AM 1359 − 465	
14 05 01.5	+35 18 09	0.6	0.5	Ir	VL		
14 15 34.6	+23 18 21	0.8	0.3	Ir	L		arched
14 40 48.0	+50 01 40	0.9	0.5	Ir	VL		patchy
14 45 51.4	+53 02 31	1.1	0.7	Ir	L	MCG 9 − 24 − 40	br.star projected
14 57 13.6	−51 31 55	1.7	0.6	Ir	VL	FG 434	
15 03 11.2	−39 42 36	0.8	0.6	Ir	L	FG 438	distant?
15 04 09.5	+56 03 24	0.9	0.7	Sph?	VL		
15 06 46.1	+56 27 03	0.7	0.5	Ir?	L	K 233	
15 11 59.0	−22 56 23	0.8	0.6	Im	L	FG 458,AM 1511 − 225	
15 25 33.2	−42 36 36	1.9	0.7	Ir	L	FG 444	
16 22 23.0	−59 50 33	2.9	0.7	Sm?	L	ESO 137 − G27	
16 22 59.4	−60 20 53	1.6	1.0	Ir	VL	FG 447	
17 54 26.1	+70 07 09	0.8	0.6	Sph?	EL		comp. N 6503?
18 18 05.0	−62 17 44	0.9	0.6	Ir	L	FG 458,AM 1818 − 622	
19 09 20.3	−61 59 57	0.45	0.45	Sph?	L	AM 1909 − 615	
19 16 17.0	+63 52 54	1.5	1.2	BCD	H	NGC 6789	$V = -157$[1],{*}
20 00 48.0	−31 49 24	1.2:	0.5:	Ir	VL	FG 492	
20 04 51.7	−61 12 30	0.9	0.6	Ir	L	AM 2004 − 611	
20 22 46.0	−71 34 23	0.8	0.4	Ir	L	FG 499	distant?
20 25 58.8	−31 51 07	0.8	0.4	Ir	L	AM 2025 − 315	distant?
20 29 14.4	+60 16 22	1.8	0.8	Ir	VL	UGC 11583	$V = 129$ [3]
20 29 31.9	+60 11 03	1.6	0.8	Ir?	VL		$V = 126$ [3]
20 30 33.5	+60 38 34	0.9	0.9	Sph?	VL		$V = 132$ [3]
20 33 30.7	−69 21 58	1.0	0.9	Ir	L	AM 2033 − 692	
20 33 46.2	+60 55 12	1.5	0.9	Ir?	EL		undet.HI [3],{*}
21 54 21.4	−60 32 42	2.5	1.2	Ir	L	FG 532,AM 2154 − 603	
22 09 04.6	−43 25 29	0.6	0.5	Im	L	AM 2209 − 432	
22 19 25.2	−48 39 26	2.2	1.3	Ir	L	FG 545	
22 37 56.3	−31 03 40	1.6	0.8	Ir?	L	K 20,FG 554,AM 2237 − 310	
23 09 36.4	−44 03 01	4:	2.2:	Sm?	L	FG 569	
23 11 46.9	−43 52 39	4.5	1.8	Ir	VL		{*}

[1] Huchra J. (1995)
[2] Cote S. et al. (1997)
[3] Huchtmeier W.K. et al. (1997)
[4] Huchtmeier W.K. et al. (1995)
[5] Huchtmeier W.K. & van Driel W. (1996)

Table 1. continued

[6] Kraan-Korteweg R.C. et al. (1994)
[7] Huchra J.P. et al. (1997)
[8] Michel A. & Huchra J. (1988)
[9] Mattews L.D. et al. (1995)
[10] Huchtmeier W.K. & Richter O.G. (1989b)
[11] Hopp U.& Schulte-Ladbeck R.E. (1991)
[12] Schombert J.M. et al. (1992
[13] Garcia A.M. et al. (1994
[14] Mattews L.D. & Gallagher J.S. (1996)

{*}:
1156+46. $V = 1154$ km/s and W=350 km/s contradict to the galaxy morphology.
1210+30. In spite of $V = 152$ km/s, the galaxy looks like distant.
1242+18. The object looks like an emulsion defect.
1256−49. $V = 1895$ km/s conflicts with the galaxy morphology.
1333−29. Perhaps it is an outer part of M 83.
1916+63. Resolved into stars with the 6-m telescope.
2033+60. May be a reflecting nebula.
2311−43. The system discovered by R.Cannon; near NGC 7531 with $V = 1598$ km/s; perhaps a case similar to the LSBD "0110+008" near NGC 428 (Smoker et al. 1996).

Table 2. Other candidates selected in the visual search and rejected after a velocity measurement

R.A. (1950.0)	D.	a	b	Type	S.B.	Identification	Notes
1	2	3	4	5	6	7	8
00 38 30.5	−26 32 28	0.6	0.3	Ir	VL	SC 27	$V = 2694$ [2]
01 43 55.7	+14 26 33	1.0	0.7	Ir	H	UGC 1242	$V = 7389$ [3]
01 47 10.5	+28 40 03	0.7	0.5	Ir	L		$V = 3841$ [3]
02 01 46.3	+72 30 23	0.8	0.8	Ir	L		$V = 2918$ [3]
03 29 09.1	+67 56 36	2.0	0.8	Ir	L	K 37=BK 7	$V = 1372$ [3]
03 33 44.4	+67 26 00	2.0	0.7	Ir?	L	BK 8	$V = 1434$ [3]
03 38 25.0	+68 06 11	2.2	0.3	Ir?	L	BK 12	$V = 1320$ [3]
03 53 22.5	+69 08 24	1.1	0.6	Sph?	L	BK 19	$V = 1302$ [3]
03 59 34.8	+71 25 44	1.2	0.5	Ir	VL	BK 21	$V = 1734$ [3]
04 06 44.0	+70 38 33	0.9	0.4	Ir	L		$V = 1159$ [3]
04 46 40.8	+67 04 29	0.6	0.4	Sph?	L		$V = 1581$ [3]
13 03 33.1	−49 33 38	1.6	0.6	Ir	L		$V = 1281$ [2]
13 41 52.9	−29 48 19	0.7	0.7	Im	H	FG 405,AM 1341 − 294	$V = 4620$ [2]
14 06 37.4	−30 02 30	0.8	0.6	Im	H		$V = 2629$ [2]
14 16 00.0	−45 05 15	1.2	0.6	Im	H	AM 1415 − 450	$V = 1653$ [2]