

An atlas of images of Planetary Nebulae^{*}

S.K. Górný¹, H.E. Schwarz², R.L.M. Corradi³, and H. Van Winckel⁴

¹ Copernicus Astronomical Center, Laboratory of Astrophysics, ul. Rabiańska 8, PL-87-100 Toruń, Poland
 e-mail: skg@ncac.torun.pl

² Nordic Optical Telescope, Apartado 474, E-38700 Sta. Cruz de La Palma, Spain

³ Instituto de Astrofísica de Canarias, 38200 La Laguna, Tenerife, Spain

⁴ KU Leuven, Celestijnenlaan 200B, Leuven, Belgium

Received November 2; accepted December 23, 1998

Abstract. A catalogue of narrowband CCD images of 100 southern and 1 northern Planetary Nebulae is presented. The data are images taken in the light of the H α , H β , [OIII]500.7 nm, and [NII]658.4 nm lines. For each image we give the exposure time, the maximum extent of the nebula, and the seeing measured from the frames themselves. For ease of reference, we have added an alphabetical list of the objects. Our list will be useful for morphological studies of Planetary Nebulae, and is complementary to previously published lists, especially the one of Schwarz et al. (1992).

Key words: atlases — planetary nebulae

1. Introduction

Planetary nebulae (PNe) are of importance to astrophysics for various reasons: they form the spectacular evolutionary end point for most low to intermediate mass stars, they inject a dominant fraction of the enriched elements into the interstellar medium, and they allow us to study many physical problems of plasma dynamics, kinematics, emission line formation including forbidden lines etc.

Recently, the study of the morphology of these nebulae has come of age. Links are being made between the appearance of PNe and their central star's position in the HR diagram, in other words between their evolutionary stage and their shape (Stanghellini et al. 1995); the properties of bipolar nebulae have been shown to be rather special and related to various other physical parameters of the objects (Corradi & Schwarz 1995), and

Send offprint requests to: S.K. Górný

^{*} Based on observations obtained at the European Southern Observatory, La Silla, Chile.

Table 1. Telescopes, CCDs and pixel scales used

code	telescope	instrument	CCD	pixel scale (arcsec)
a	Dutch 0.91 m	Adapter	GEC	0''.36
b	Danish 1.54 m	Adapter	TEK	0''.43
c	ESO 3.6 m	EFOSC	RCA	0''.61

dedicated conferences are being held on the subject of PNe morphology, especially asymmetries (see e.g. Harpaz & Soker 1994). Clearly, it is of importance for any studies like the above mentioned ones to have access to a sample of narrow band images that is statistically as complete as possible.

Previous well-known catalogues of narrowband images have been published by Balick (1987), Schwarz et al. (1992), and Manchado et al. (1996) and there are many others referenced therein. All these catalogues take their objects from the large catalogue of Acker et al. (1992). Here we add some 100 southern and 1 northern PNe to the data base.

2. Observations

The observations have been made at the European Southern Observatory with several different telescopes and instruments, and over a period of a few years. In all cases the detector was a CCD, and the great majority of the images has been secured with the Dutch 91 cm telescope. In Table 1 we list the instrumental parameters for all the observations.

The observations have all been made during the 1993 to 1995 period. Data have been taken through narrow band filters centred on the following emission lines: H α 656.3 nm, H β 486.1 nm, [OIII]500.7 nm, and [NII]658.4 nm. The FWHM of the filters were typically 3 nm, so some contamination of the [NII] images with H α

light is present but at low level (about 5%). Nearly all objects have an H α image but only some have had the other lines recorded. In total we present 198 images of 100 southern and 1 northern PN.

All data were bias subtracted and flat fielded in the usual way but no flux calibration was done.

3. Results

The results are presented in Figs. 1 to 33. A few comments where appropriate have been given below. Note that each image has a size bar superimposed on it, to make scaling of the objects easy. The size of the bars varies but in all cases the projected length is 20". For many objects with a wide dynamical range of emission we plot their images with a double grey scale to show better the details of the bright region. In all cases north is up, and east is to the left.

In Table 2 we list the observed objects. We give: index number, RA and Dec (2000.0), Galactic coordinate name, corresponding Figure No., image sizes and seeing FWHM on the same frame for all filters taken.

In Table 3 we give an alphabetical list of object names to make searching for a given PN easier.

Comments on Table 2:

1. The H β image probably has been taken through an H α filter by mistake, hence the strong similarity between the two images presented.
2. Possible planetary nebulae according to Acker et al. (1992).

Acknowledgements. S.K. Górný acknowledges the Nordic Optical Telescope Scientific Association for providing the opportunity to work on these data at La Palma and financial support from the grant No. 2.P03D.027.10 of the Polish Committee for Scientific Research.

References

- Acker A., Ochsenbein F., Stenholm B., Tylanda R., Marcout J., Schon C., 1992, Strasbourg-ESO Catalogue of Galactic Planetary Nebulae, European Southern Observatory
- Balick B., 1987, AJ 94, 671
- Corradi R.L.M., Schwarz H.E., 1995, A&A 293, 871
- Harpaz A., Soker N., 1994, Ann. Isr. Phys. Soc. 11, Asymmetrical Planetary Nebulae, Oranim, University of Haifa
- Manchado A., Guerrero M.A., Stanghellini L., Serra-Ricart M., 1996, The IAC Morphological Catalogue of Northern Galactic Planetary Nebulae, Instituto de Astrofísica de Canarias
- Schwarz H.E., Corradi R.L.M., Melnick J., 1992, A&AS 96, 23
- Stanghellini L., Corradi R.L.M., Schwarz H.E., 1993, A&AS 279, 521

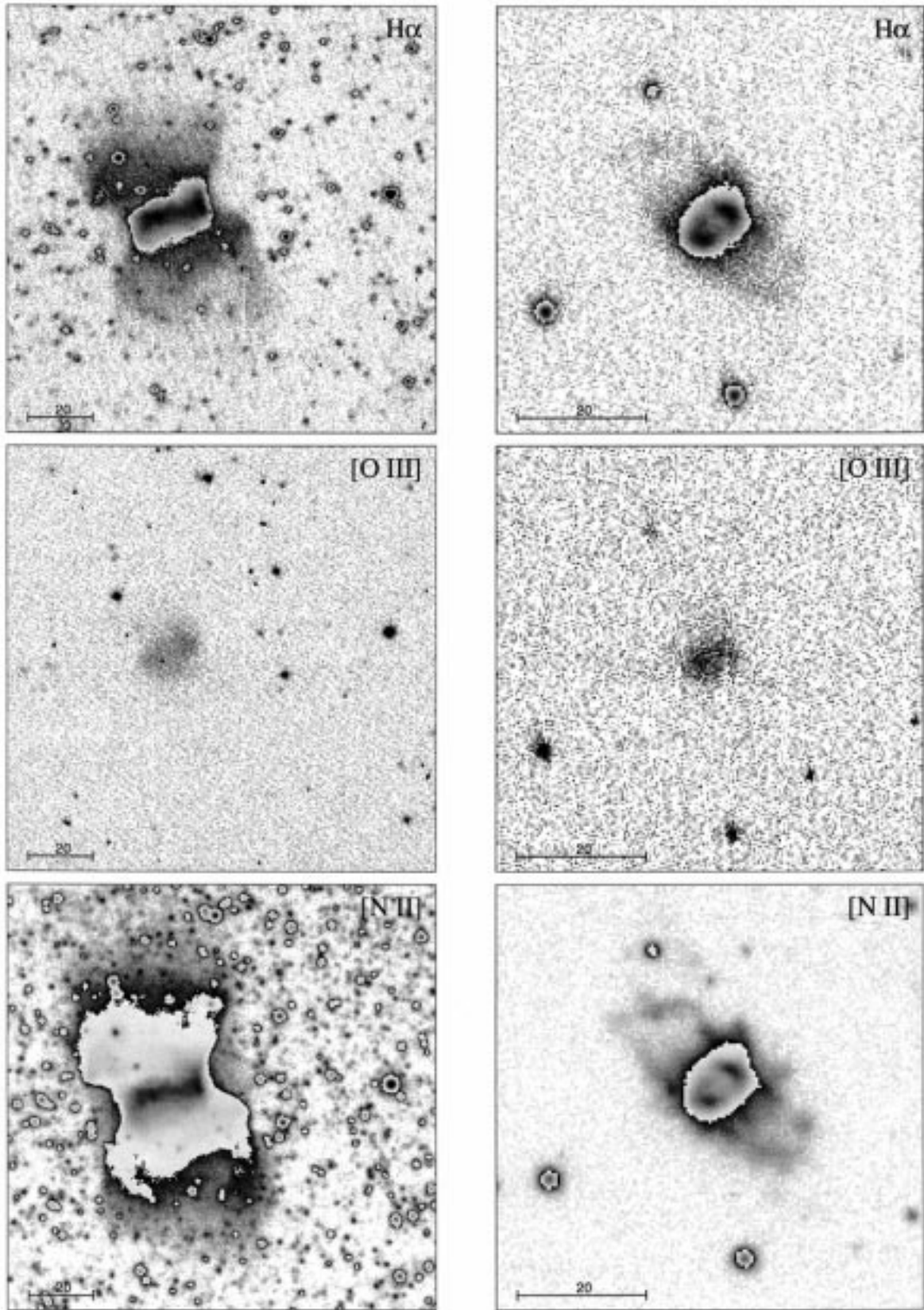


Fig. 1. M 1-28 (left), and M 3-2 (right)

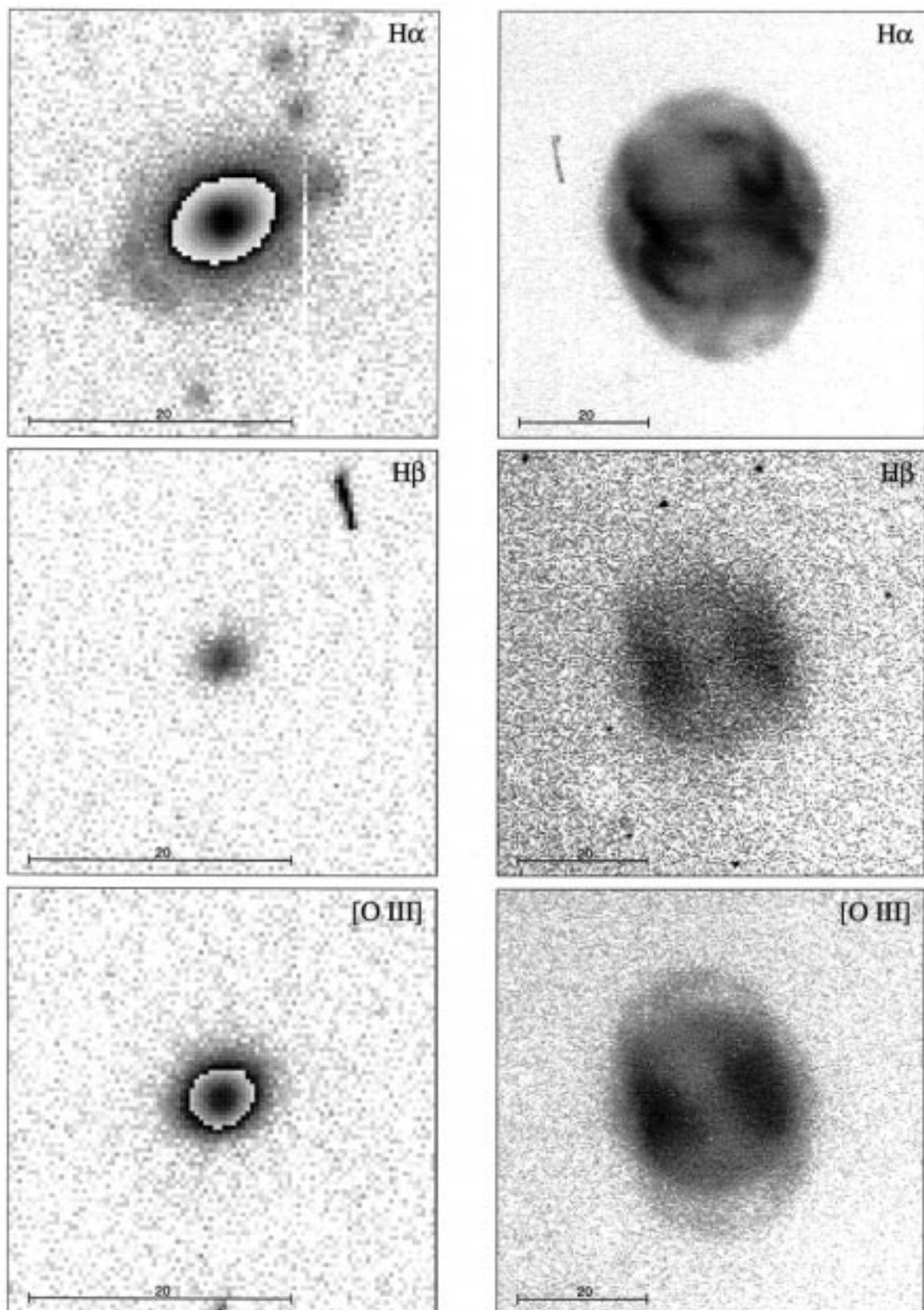


Fig. 2. He 2-67 (left), and NGC 3195 (right)

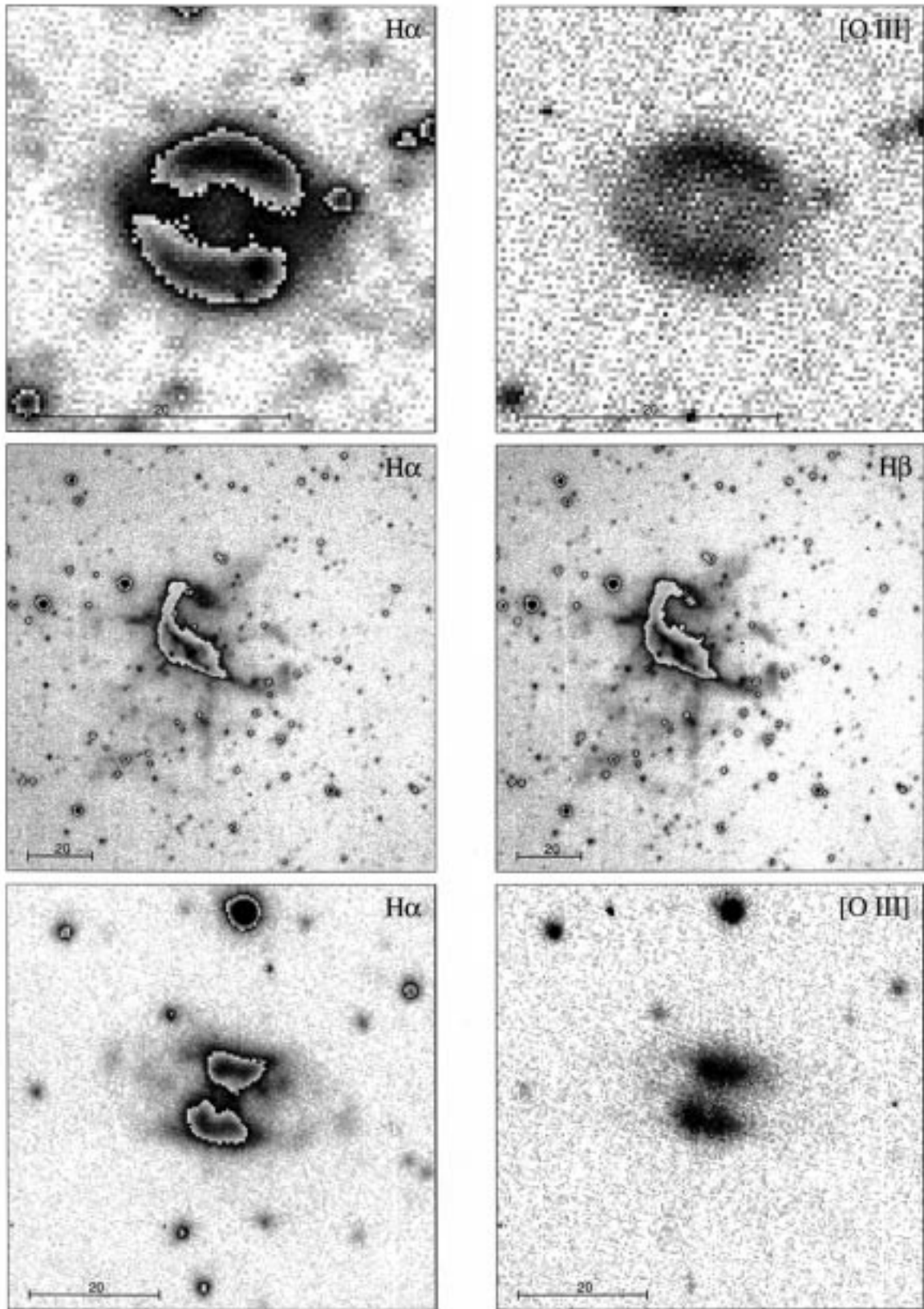


Fig. 3. H 1-51 (top), He 2-70 (middle), and He 2-76 (bottom)

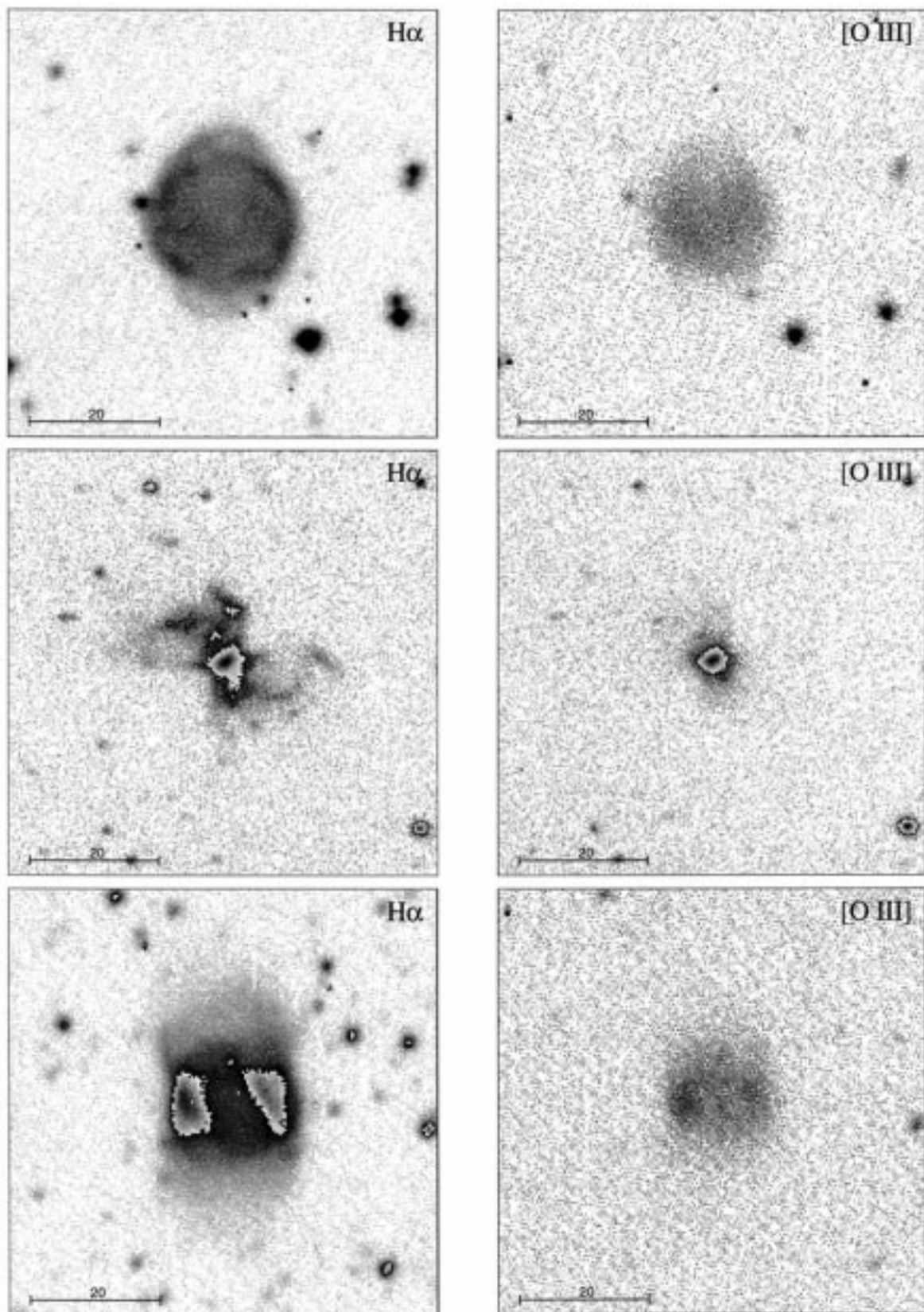


Fig. 4. He 2-82 (top), He 2-84 (middle), and He 2-114 (bottom)

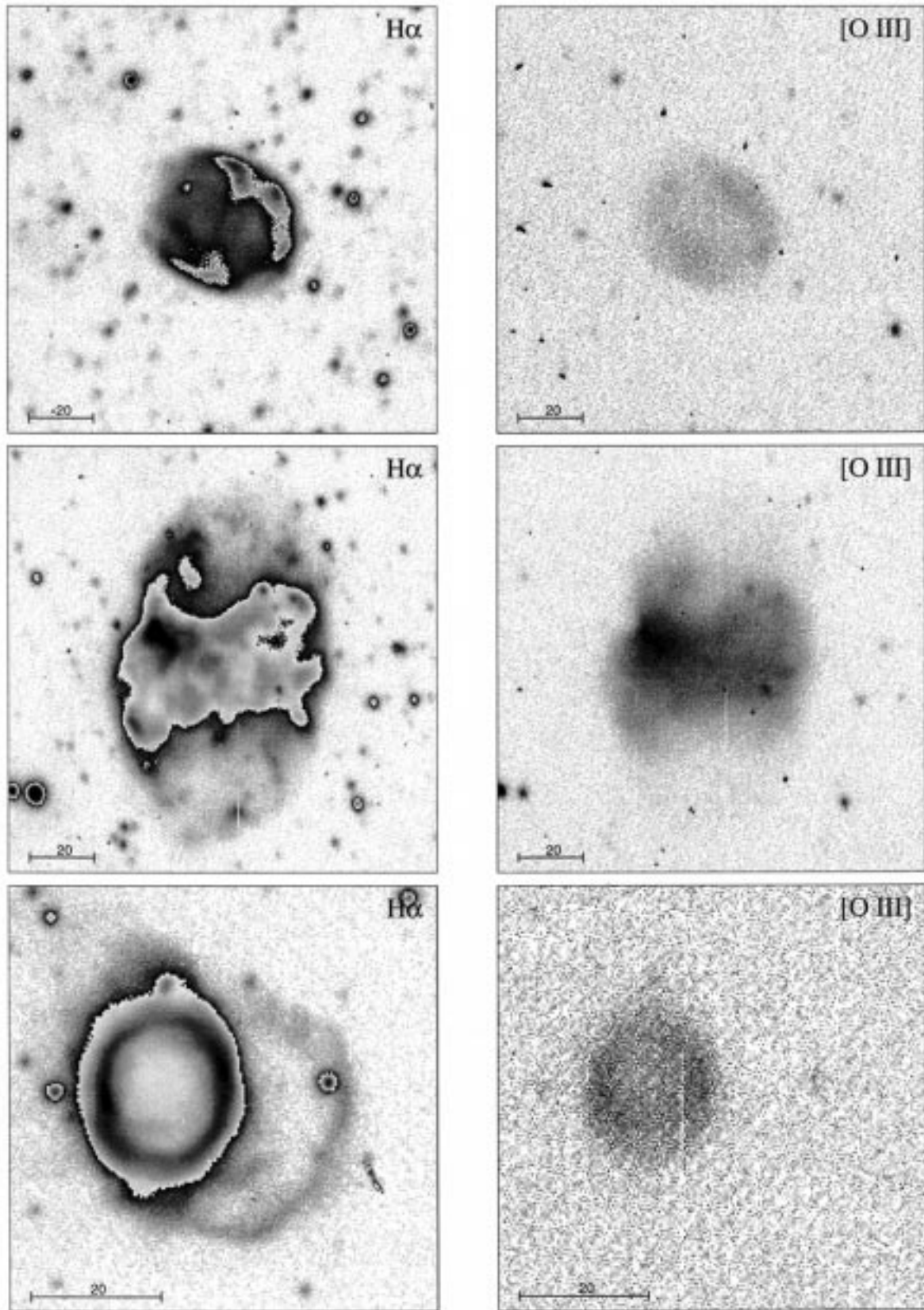


Fig. 5. He 2-116 (top), He 2-119 (middle), and He 2-120 (bottom)

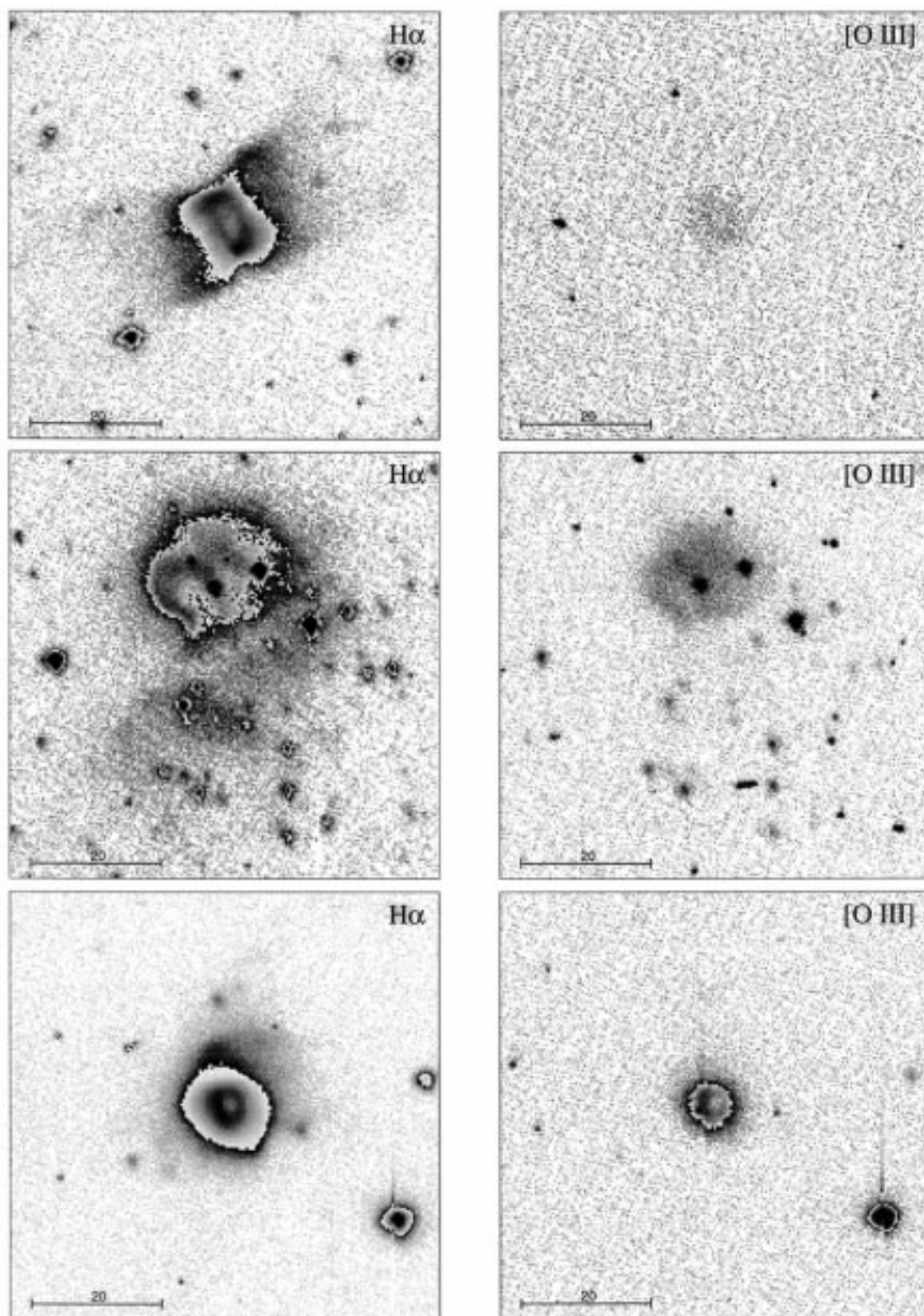


Fig. 6. He 2-145 (top), He 2-146 (middle), and He 2-152 (bottom)

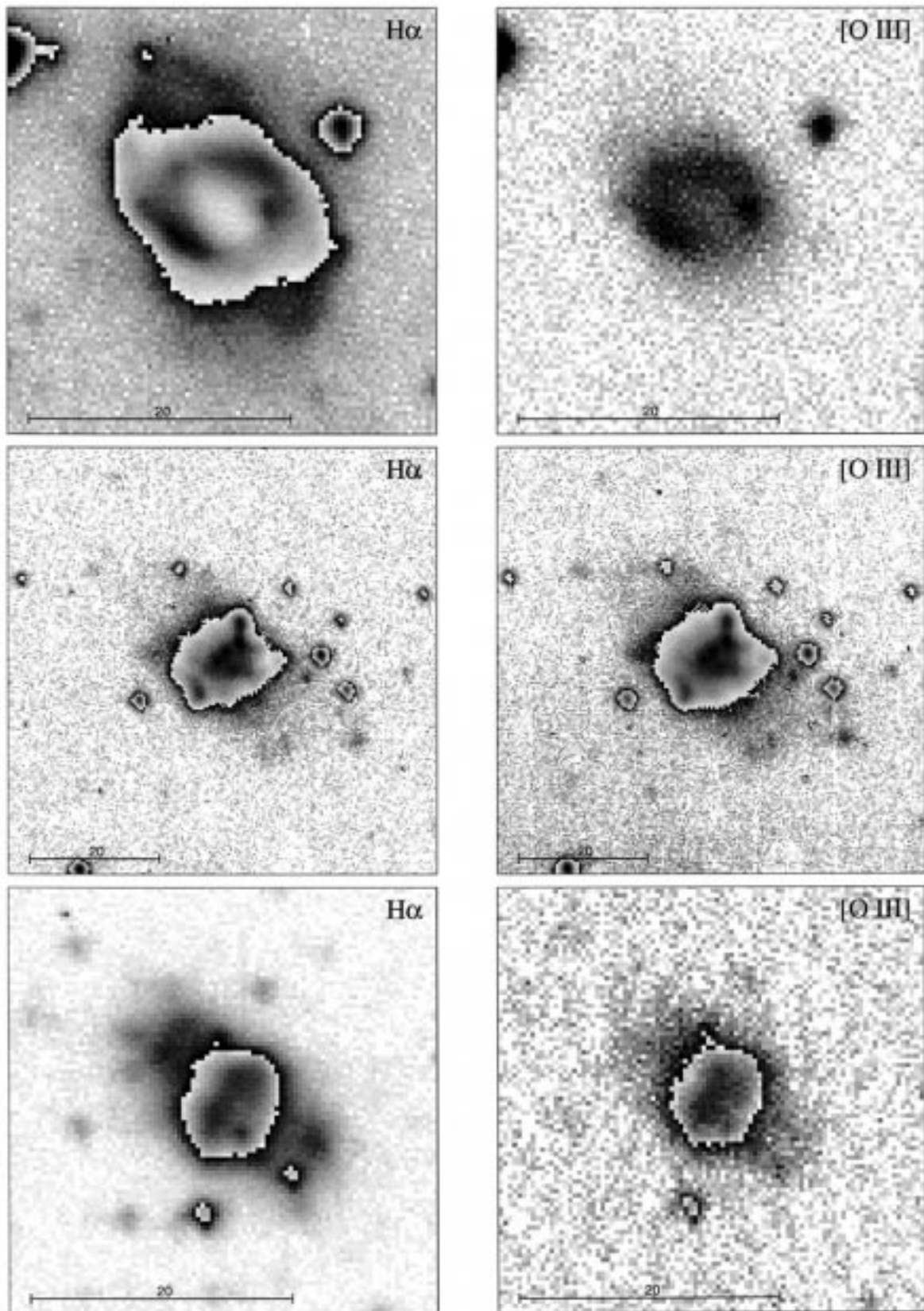


Fig. 7. He 2-153 (top), He 2-155 (middle), and He 2-161 (bottom)

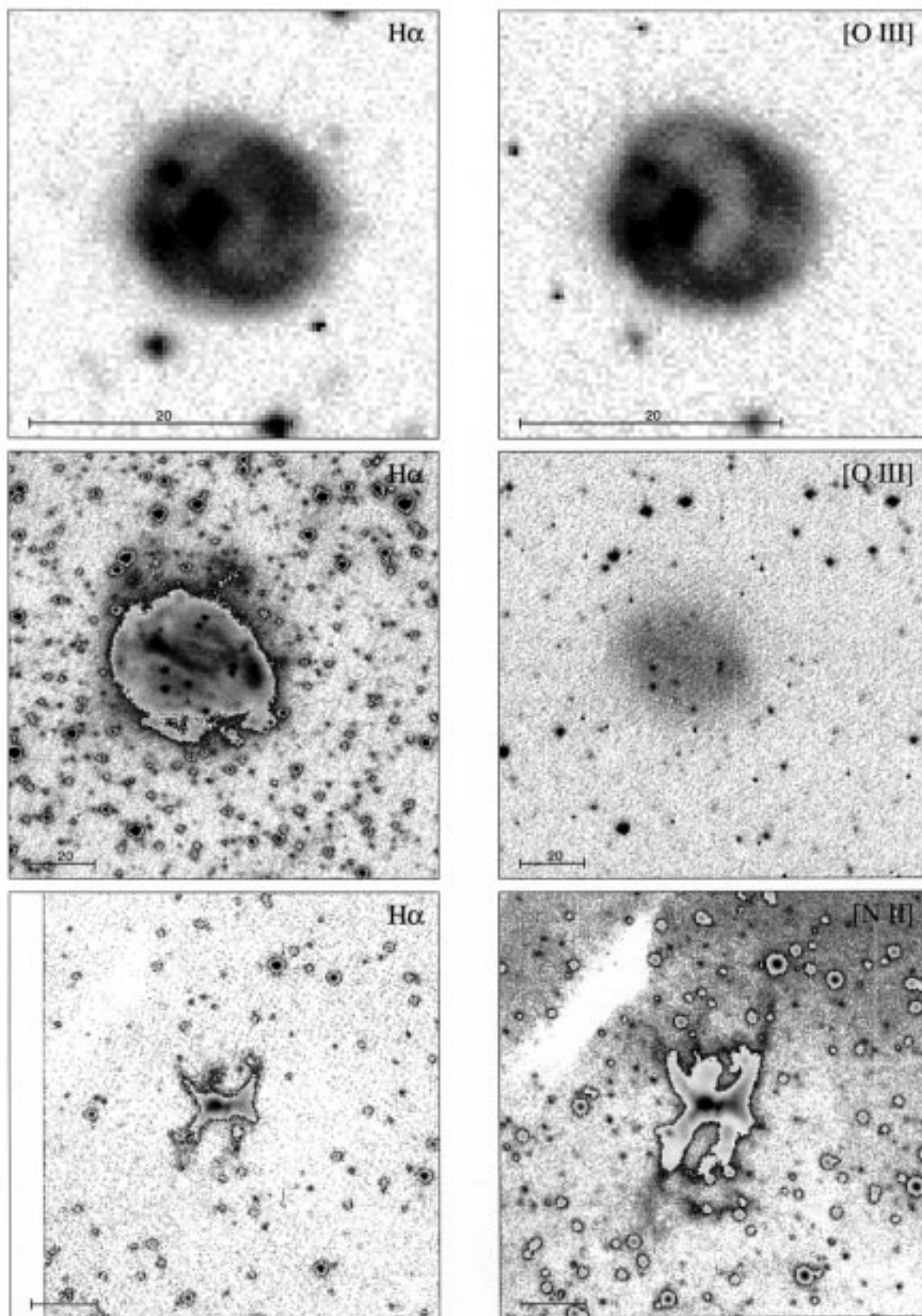


Fig. 8. He 2-164 (top), He 2-165 (middle), and He 2-169 (bottom)

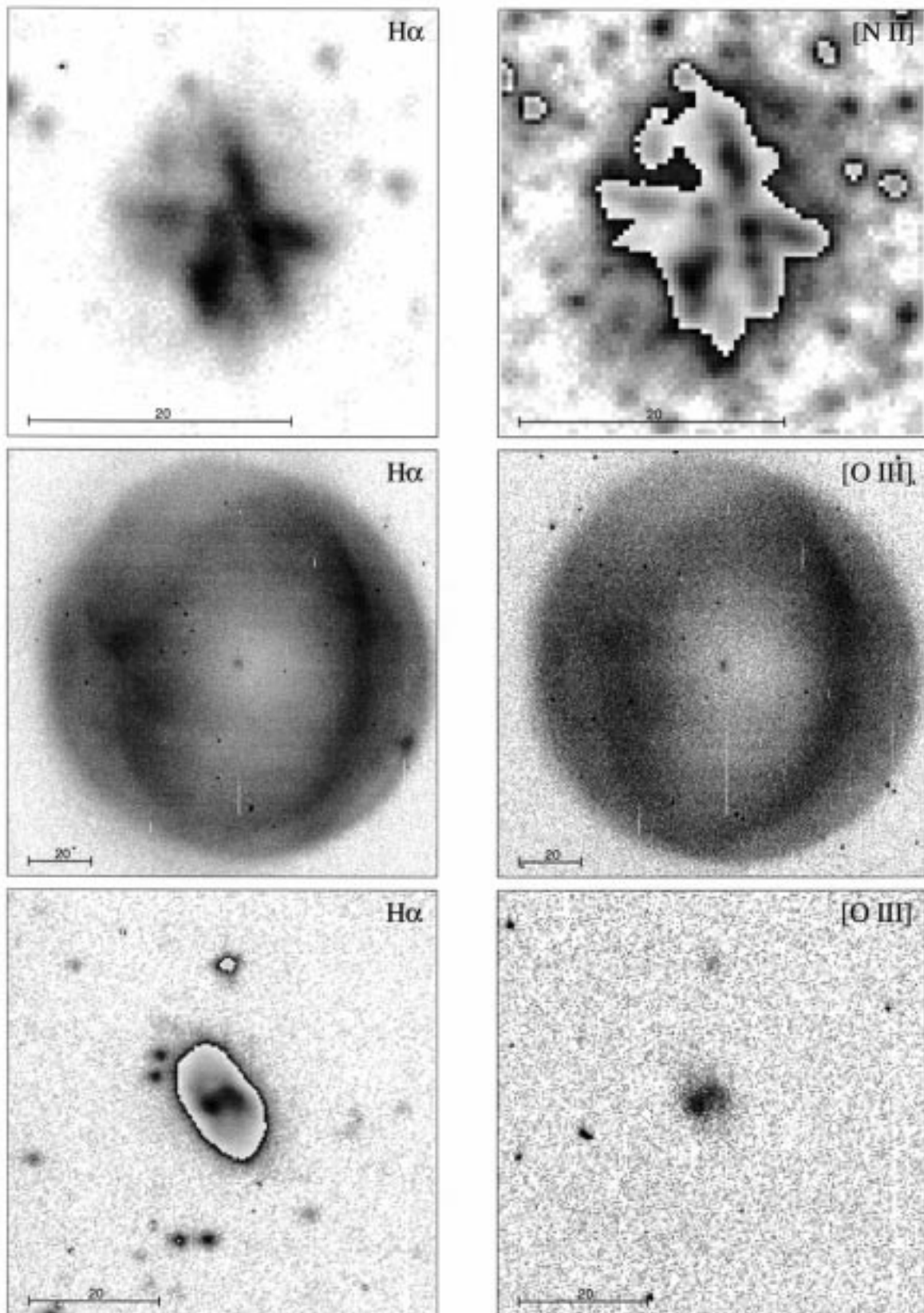


Fig. 9. Hf 2-1 (top), Ic 4148-50 (middle), and M 1-151 (bottom)

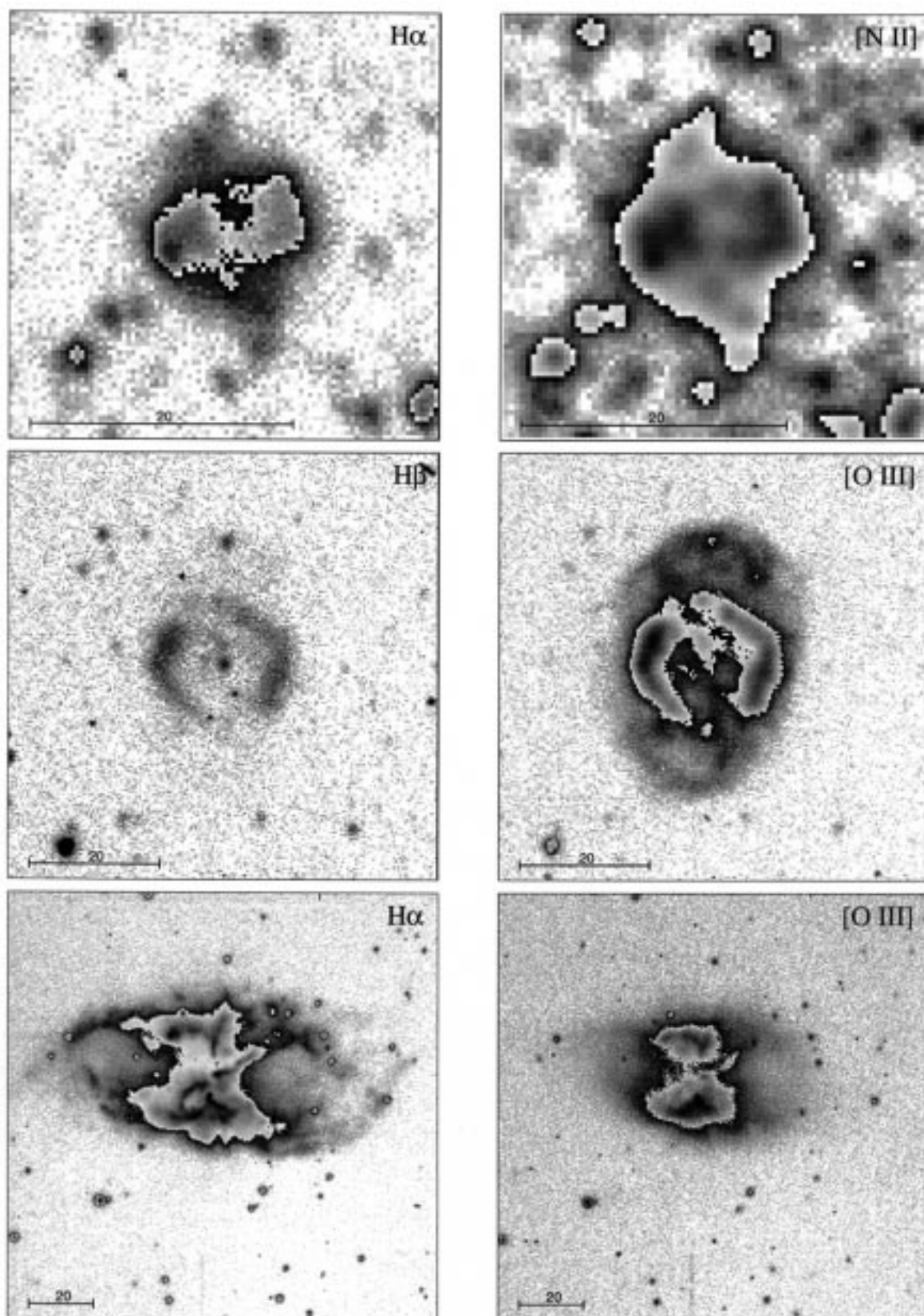


Fig. 10. M 3-51 (top), Mz 2 (middle), and NGC 2818 (bottom)

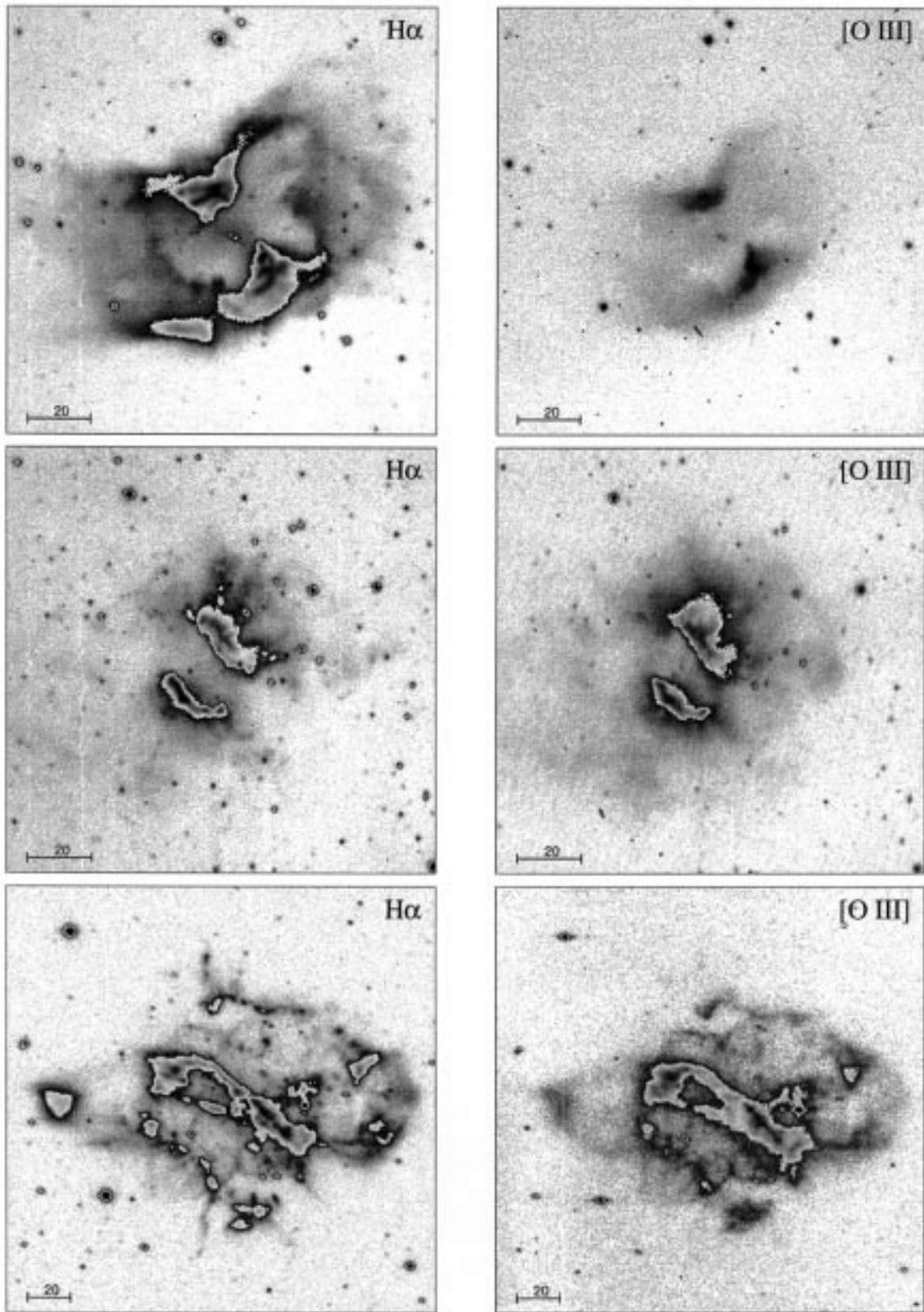


Fig. 11. NGC 2899 (top), NGC 3699 (middle), and NGC 5189 (bottom)

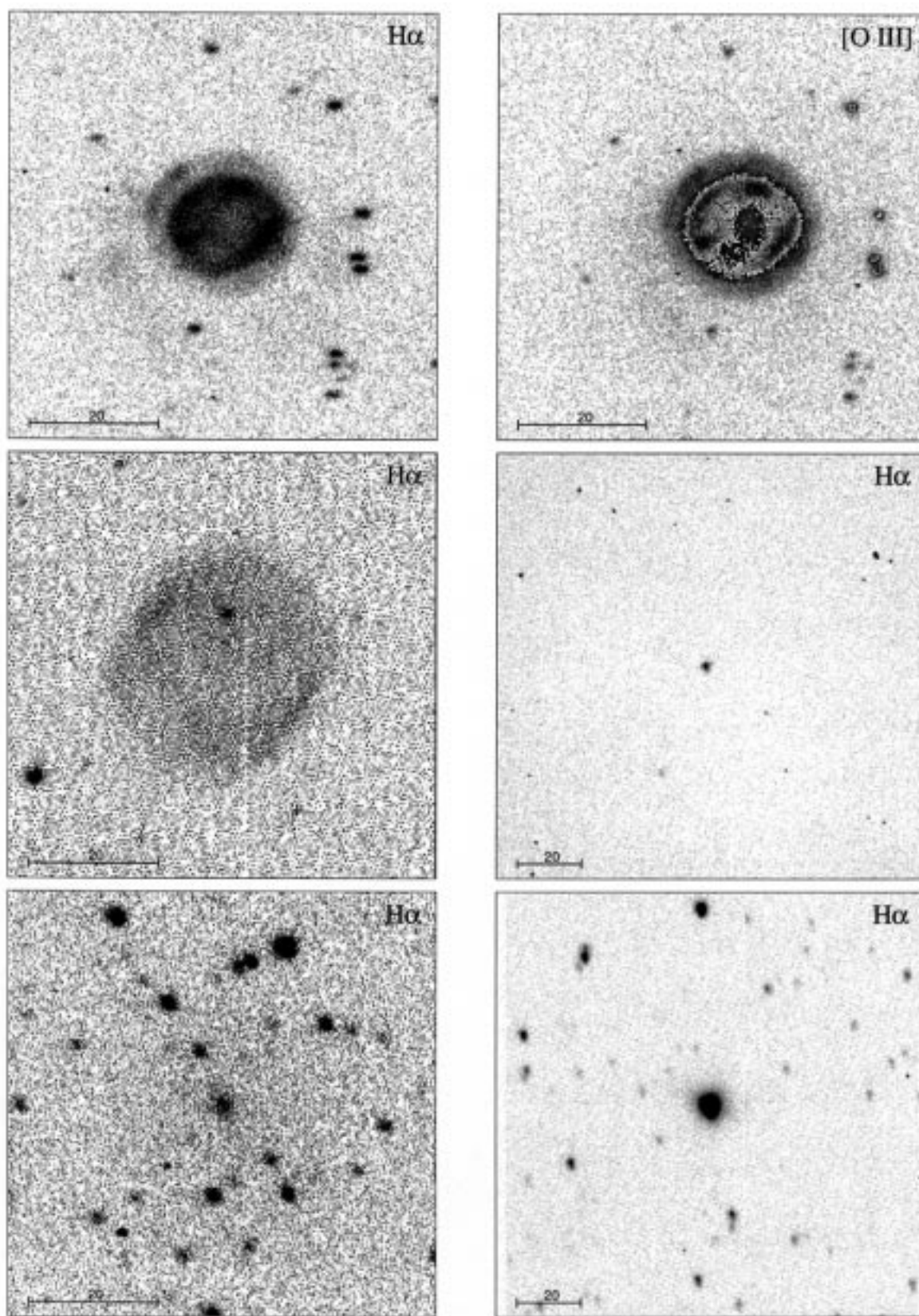


Fig. 12. Pe 1-8 (top), A 26 (middle left), A 7 (middle right), Anon. 19h19m (bottom left), Cn 1-1 (bottom right)

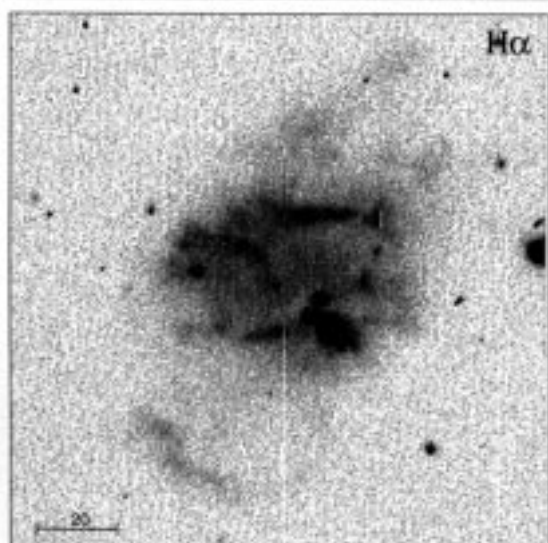
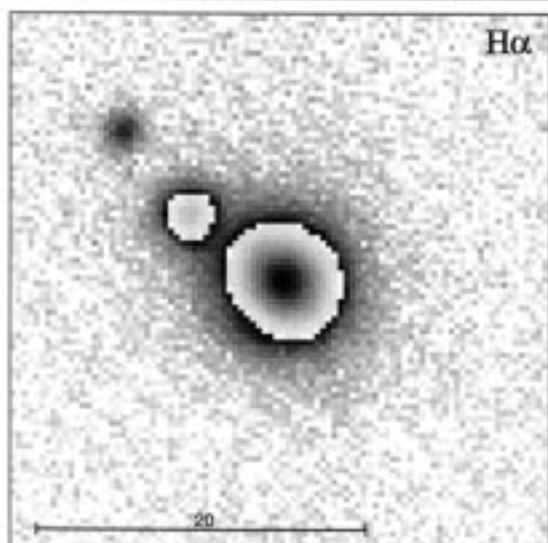
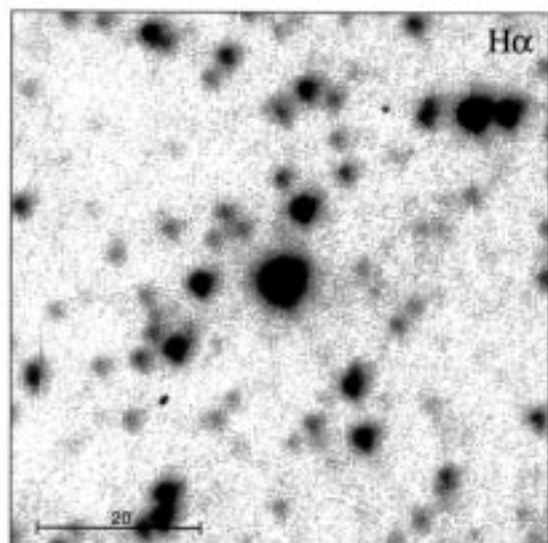


Fig. 13. H 1-43 (top), Hb 7 (middle), and He 2-11 (bottom)

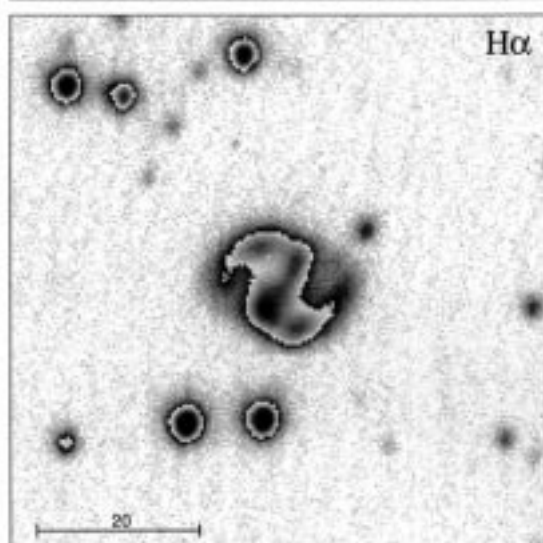
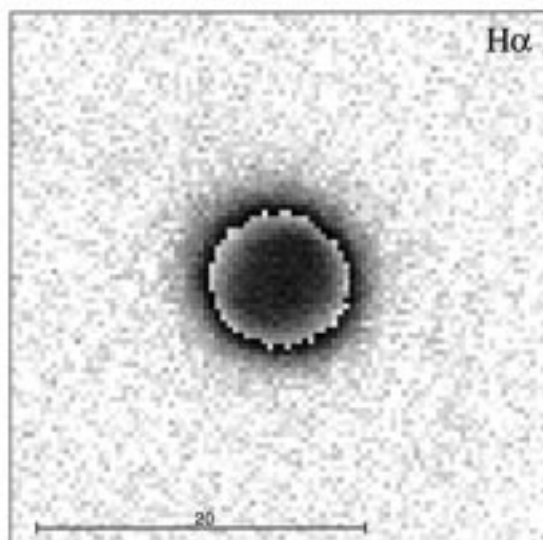
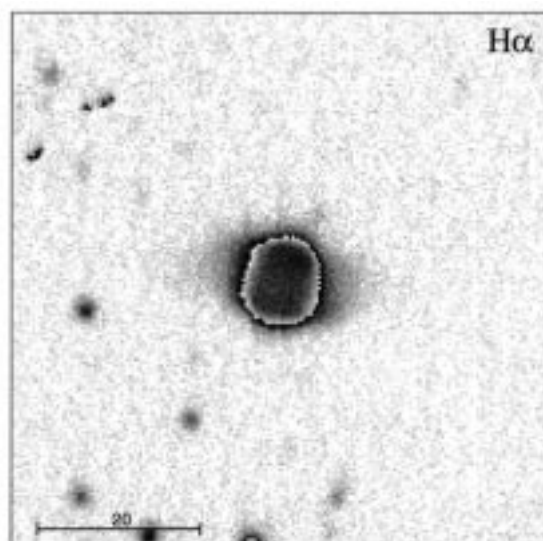


Fig. 14. He 2-18 (top), He 2-28 (middle), and He 2-29 (bottom)

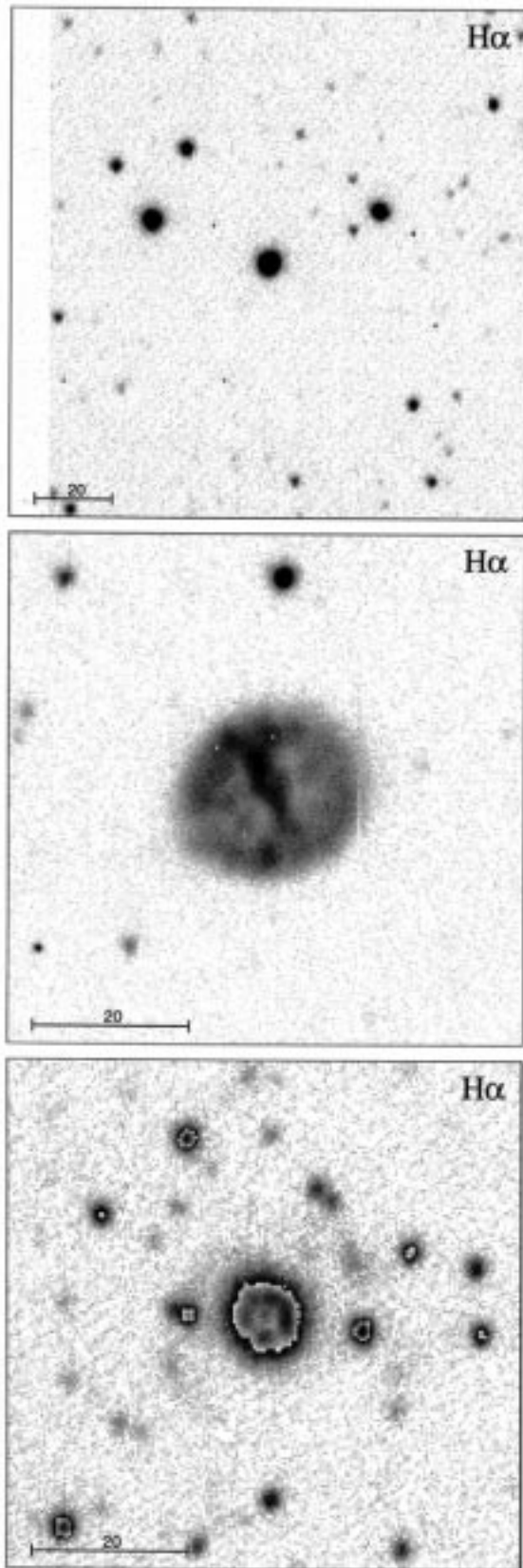


Fig. 15. He 2-35 (top), He 2-37 (middle), and He 2-39 (bottom)

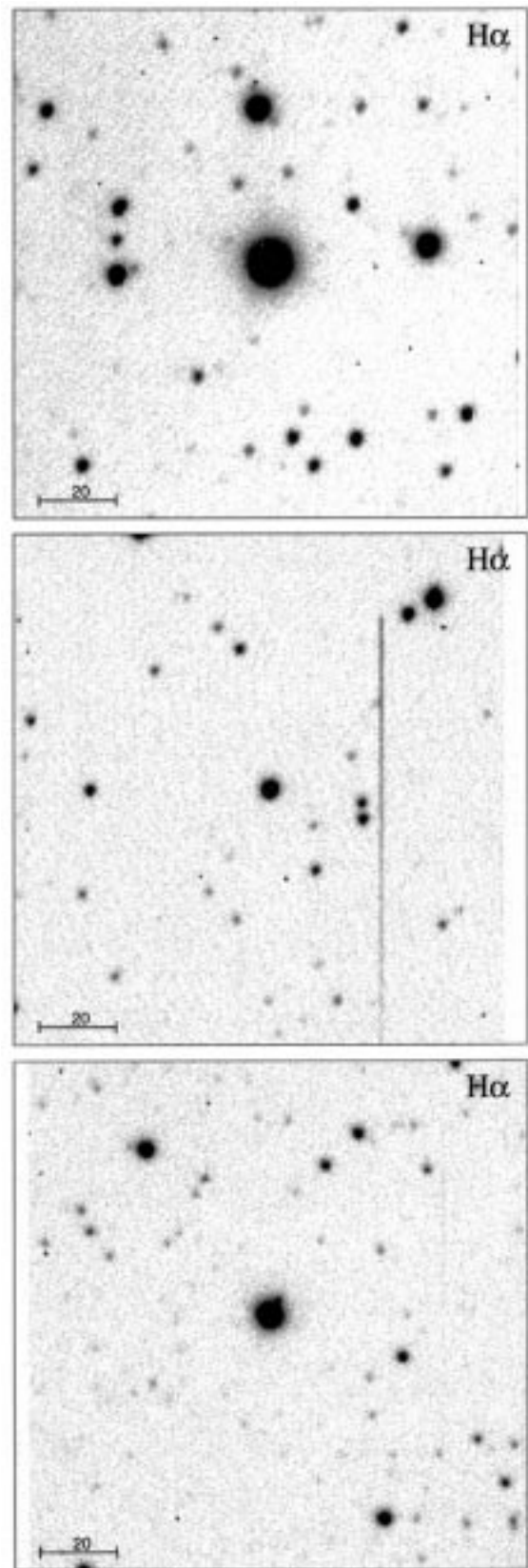


Fig. 16. He 2-47 (top), He 2-63 (middle), and He 2-68 (bottom)

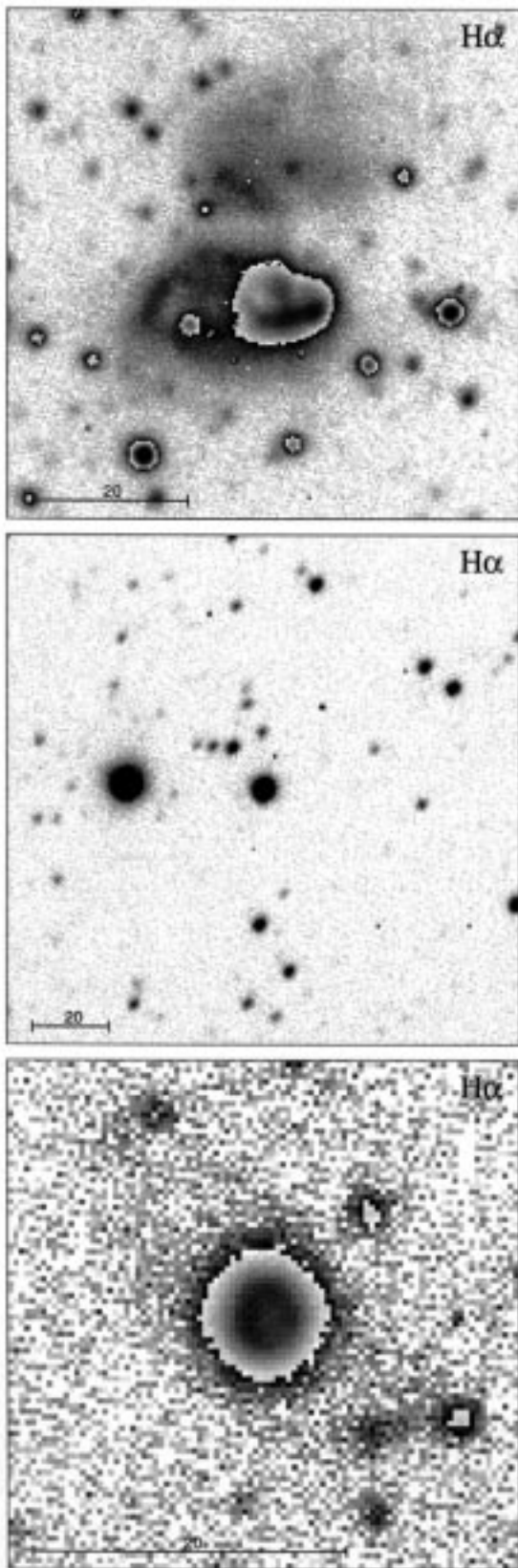


Fig. 17. He 2-77 (top), He 2-78 (middle), and He 2-81 (bottom)

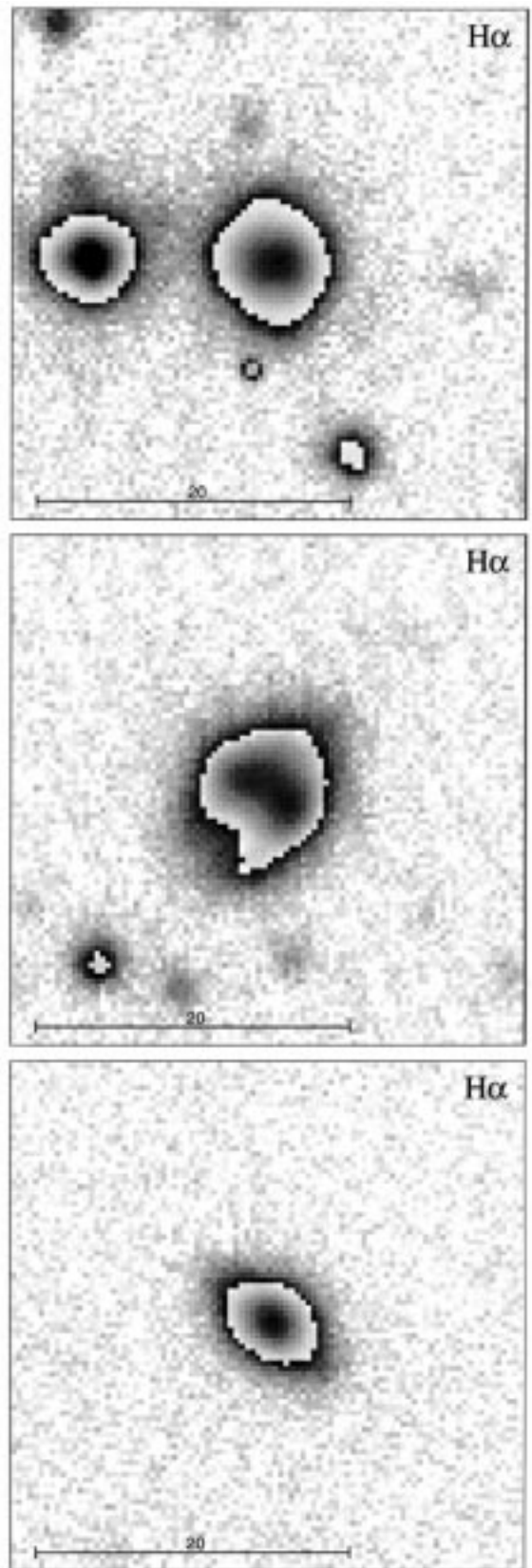


Fig. 18. He 2-83 (top), He 2-85 (middle), and He 2-86 (bottom)

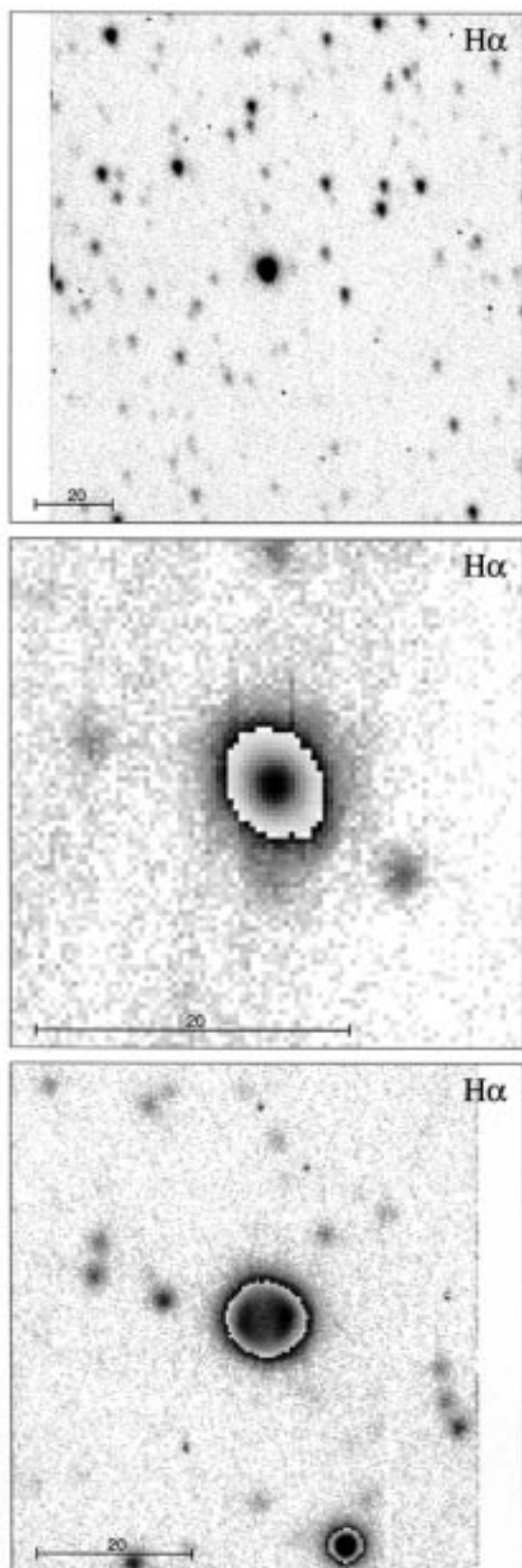


Fig. 19. He 2-88 (top), He 2-96 (middle), and He 2-102 (bottom)

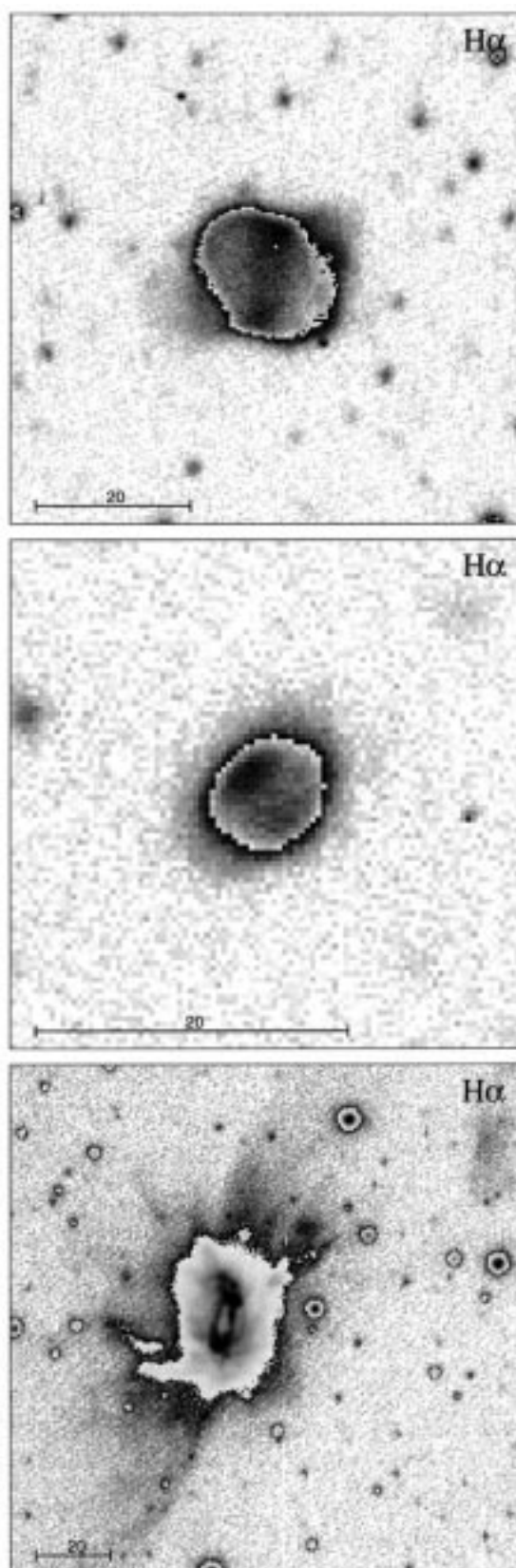


Fig. 20. He 2-103 (top), He 2-109 (middle), and He 2-111 (bottom)

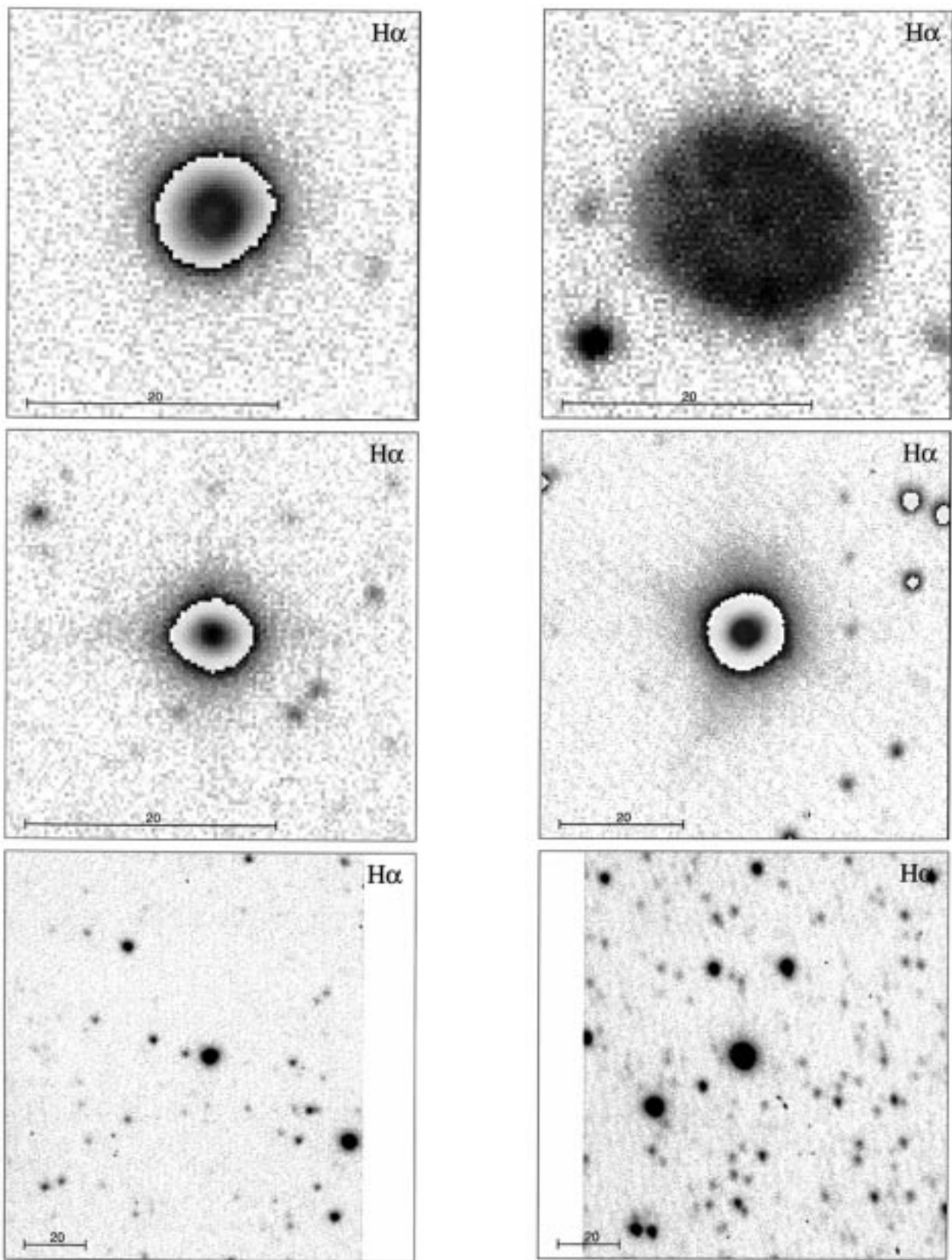


Fig. 21. He 2-112 (top), He 2-115 (middle), and He 2-129 (bottom)

Fig. 22. He 2-132 (top), He 2-138 (middle), and He 2-140 (bottom)

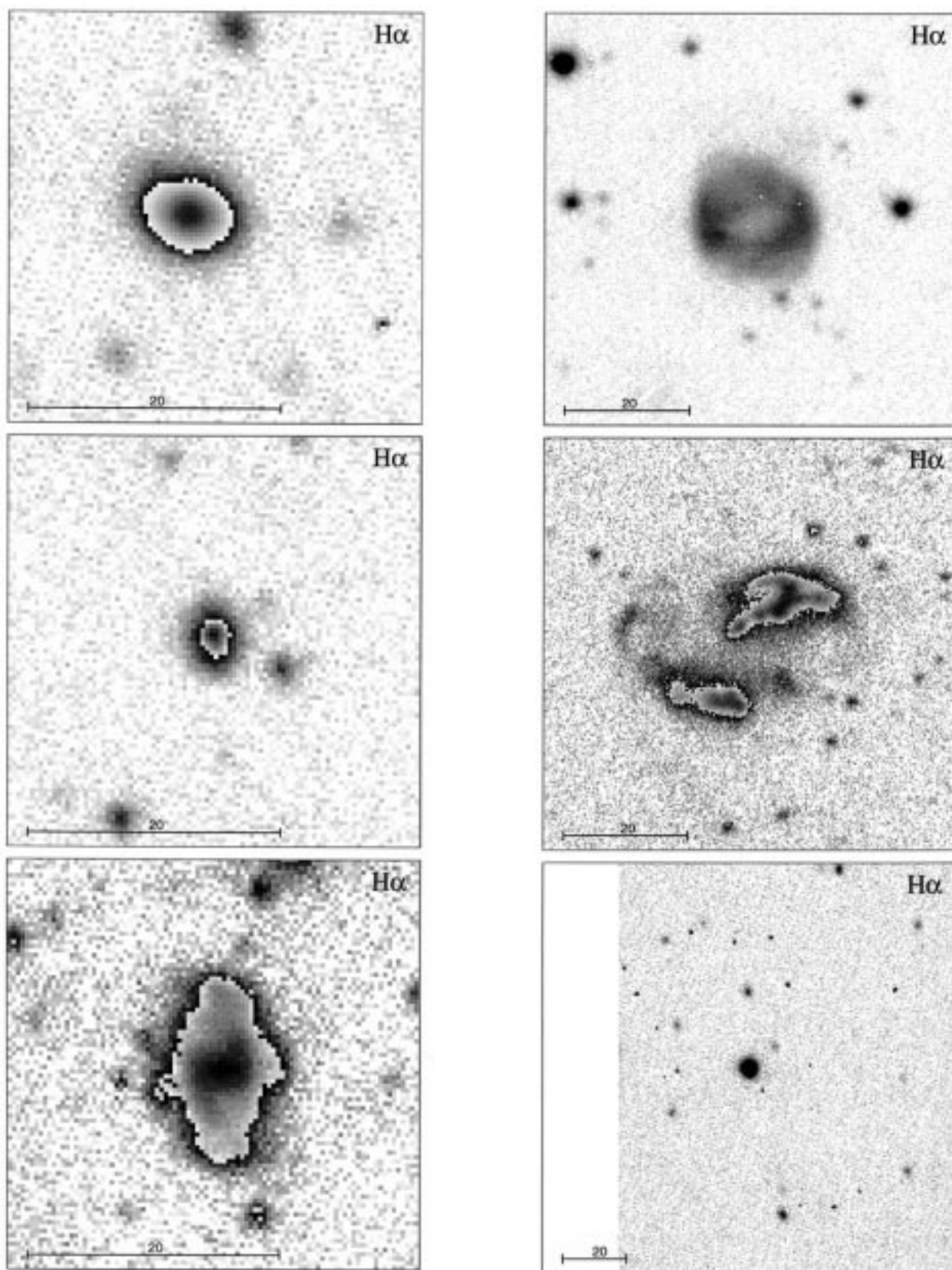


Fig. 23. He 2-143 (top), He 2-147 (middle), and He 2-159 (bottom)

Fig. 24. He 2-163 (top), He 2-207 (middle), and He 2-436 (bottom)

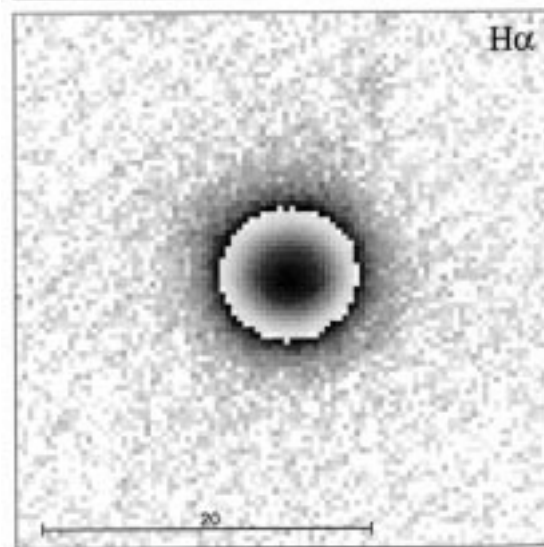
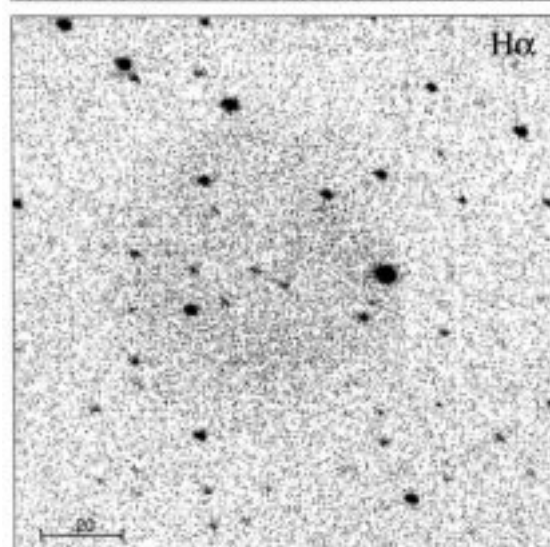
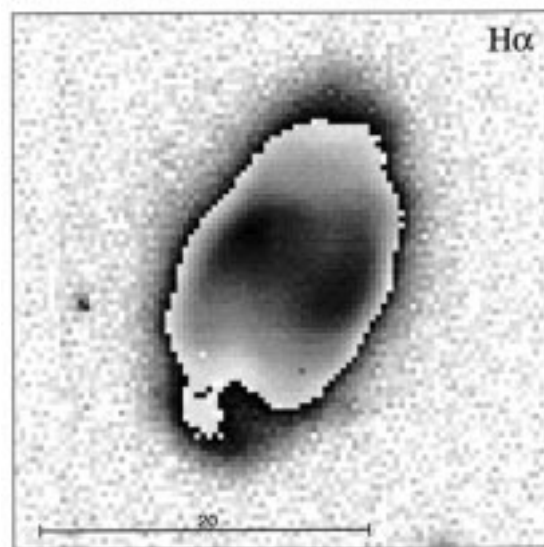
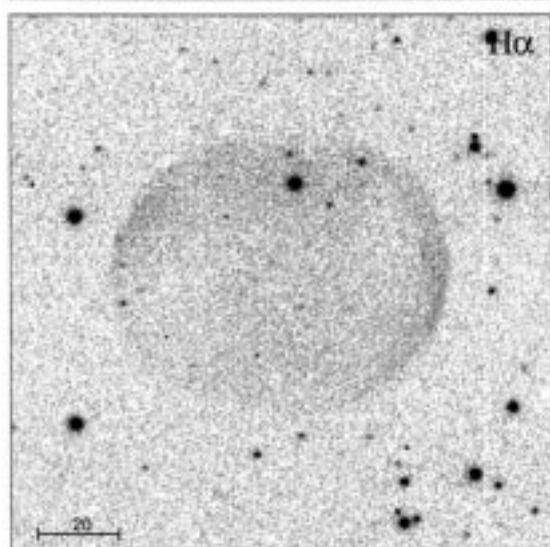
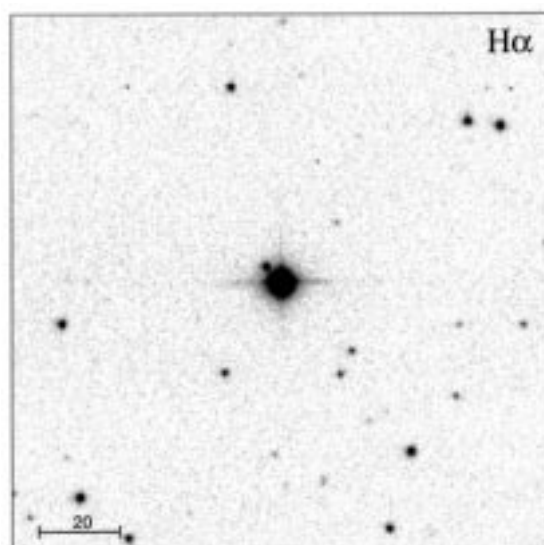
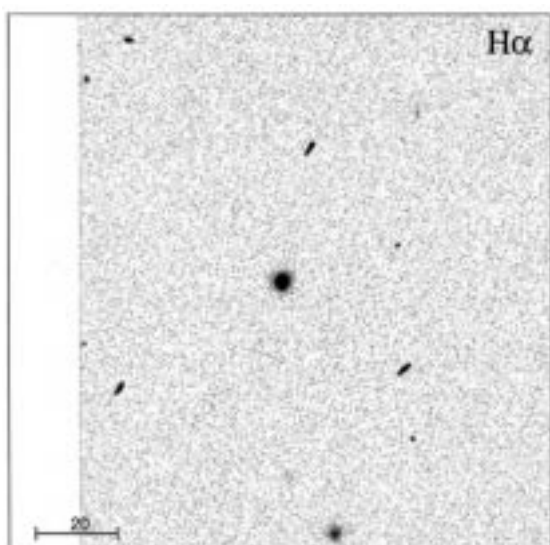


Fig. 25. K 2-7 (top), Lo 12 (middle), and Lo 13 (bottom)

Fig. 26. Lo 14 (top), M 1-13 (middle), and M 1-14 (bottom)

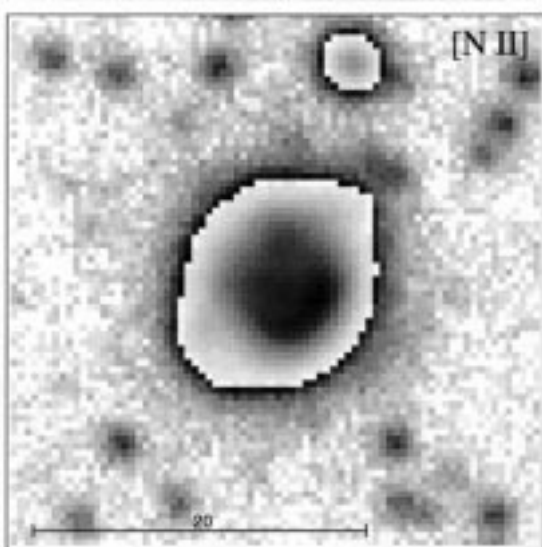
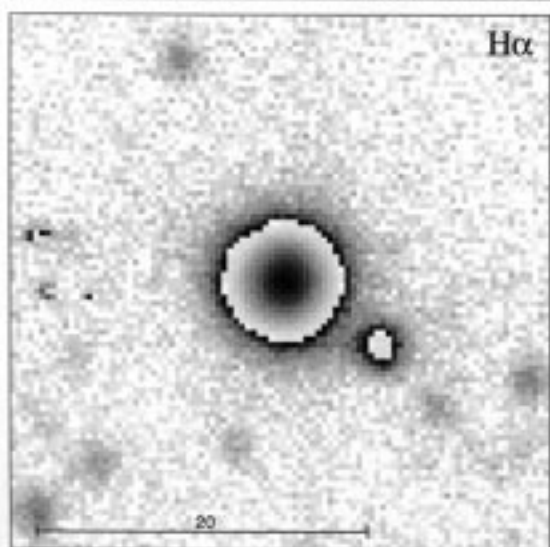
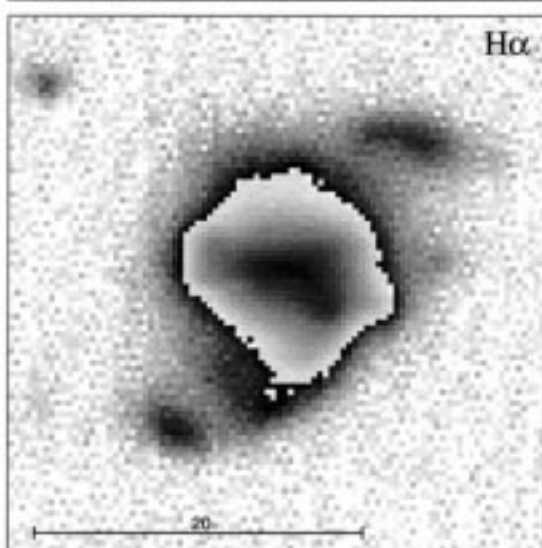
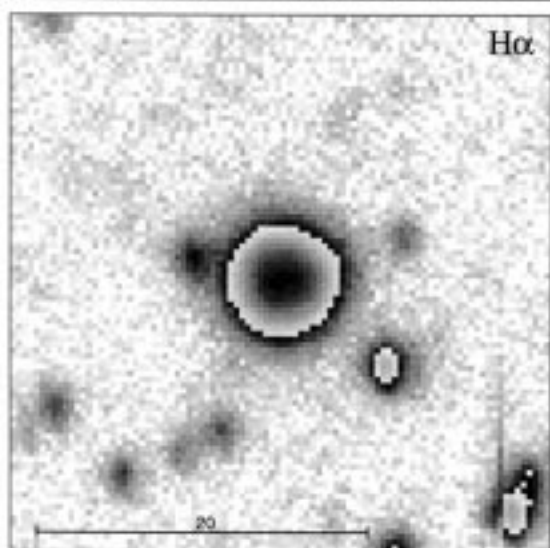
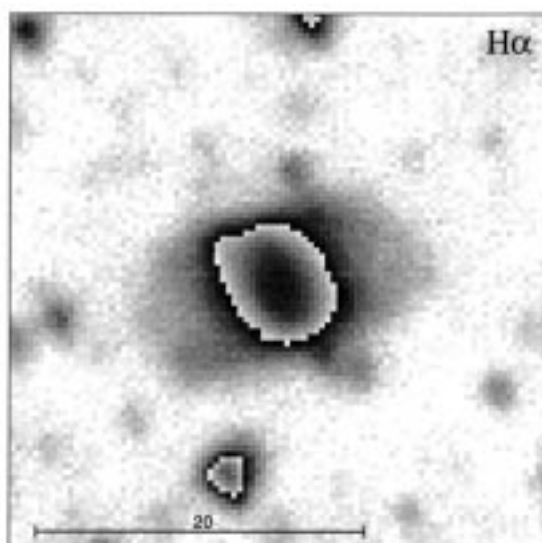
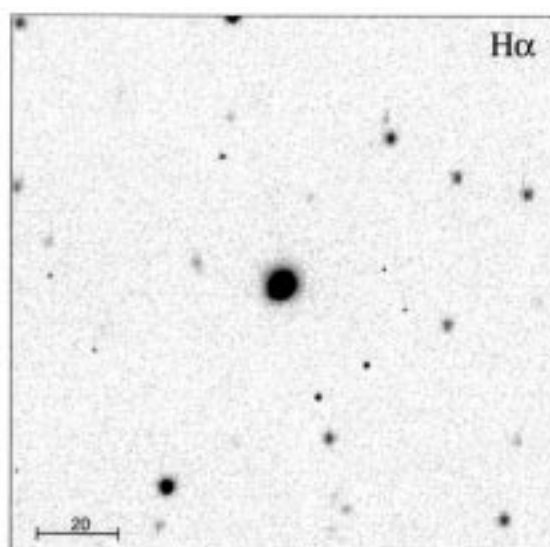


Fig. 27. M 1-17 (top), M 1-47 (middle), and M 1-62 (bottom)

Fig. 28. Me 2-19 (top), M 3-1 (middle), and M 3-29 (bottom)

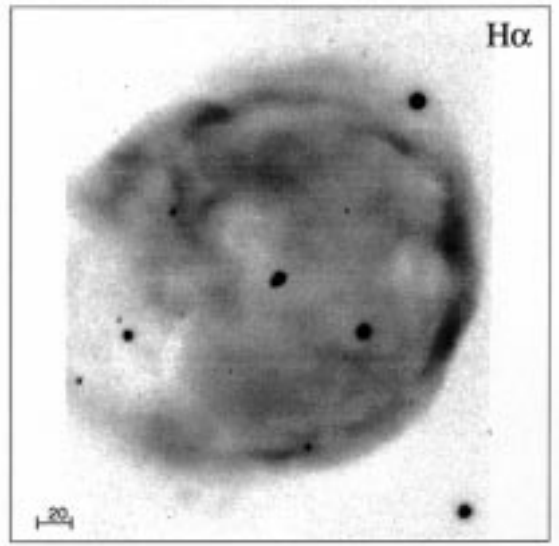
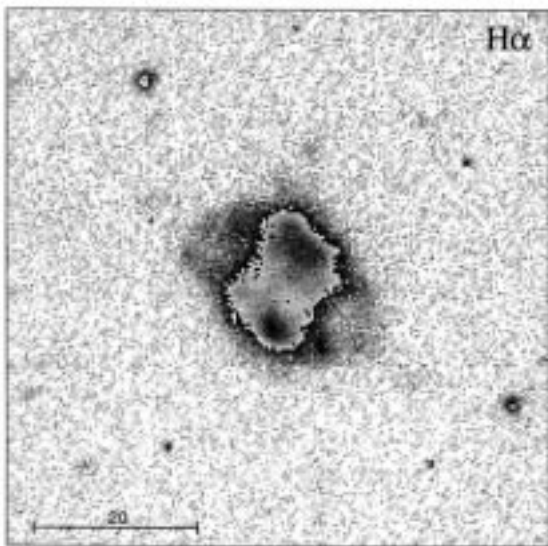
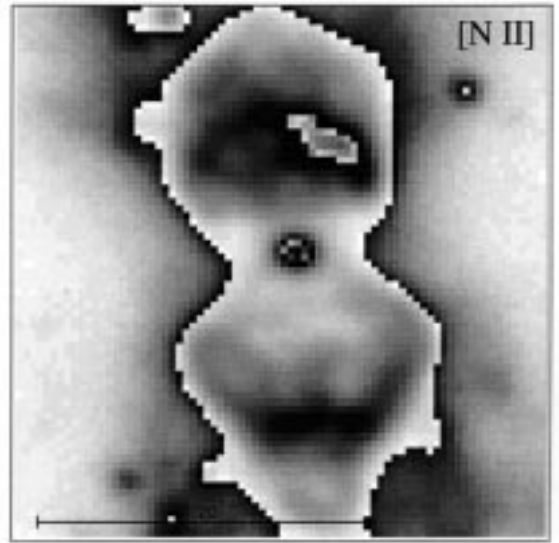
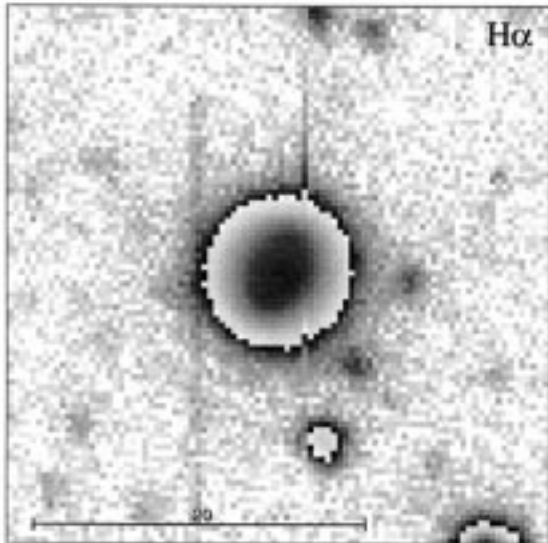
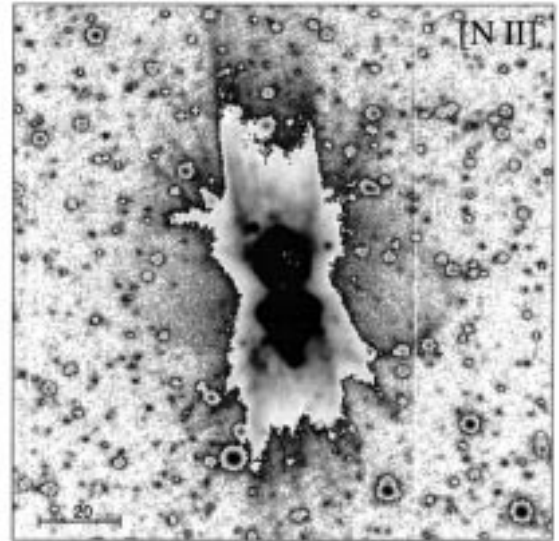
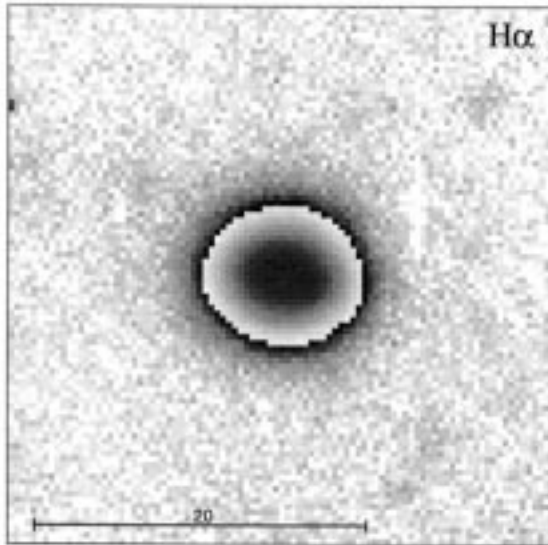


Fig. 29. M 3-32 (top), M 3-33 (middle), and M 3-39 (bottom)

Fig. 30. Mz 3 (top & middle), and NGC 246 (bottom)

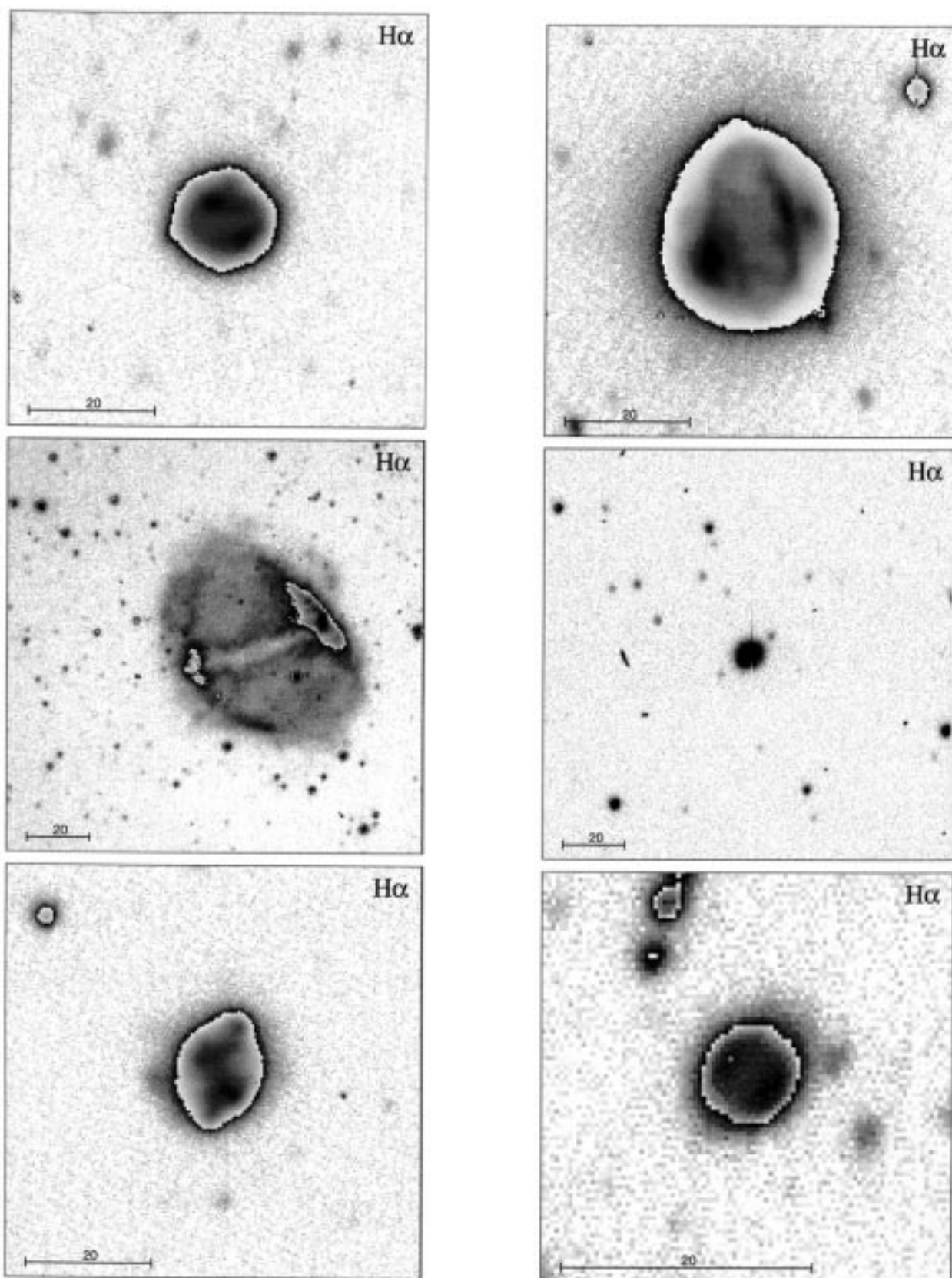


Fig. 31. NGC 3211 (top), NGC 4071 (middle), and NGC 5307 (bottom)

Fig. 32. NGC 6153 (top), PB 1 (middle), and Pe 1-3 (bottom)

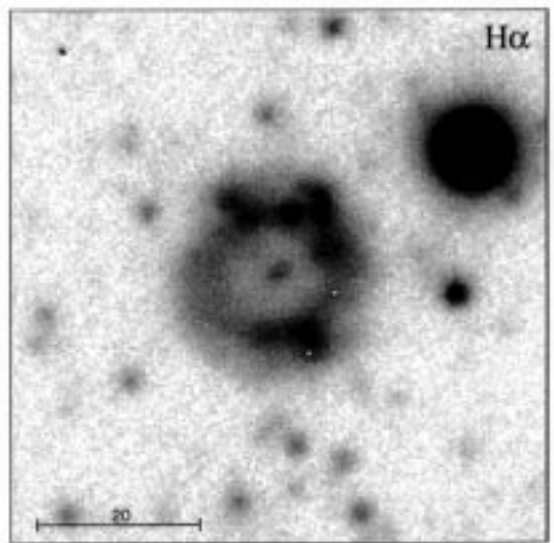
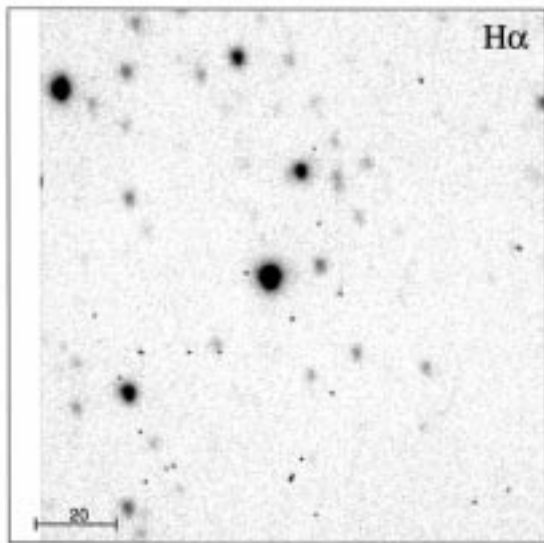
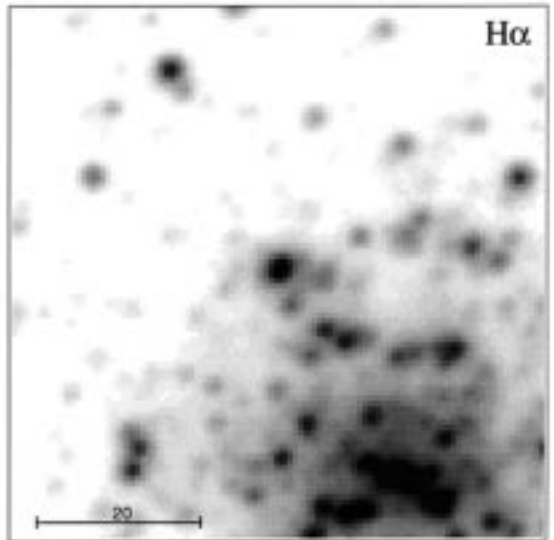
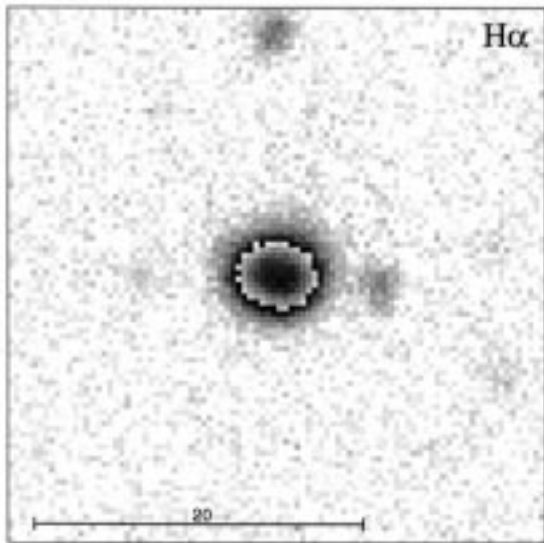
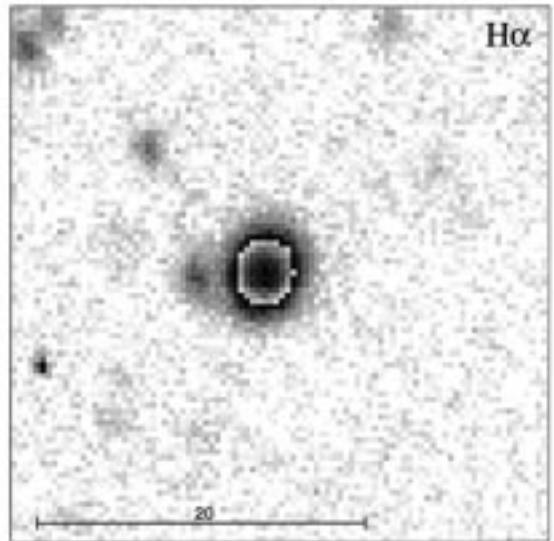
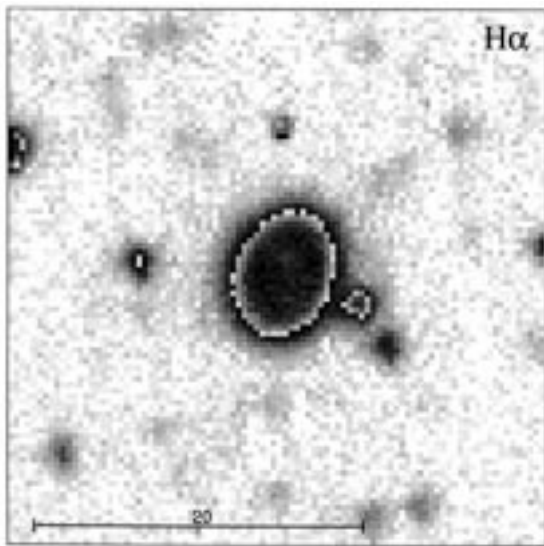


Fig. 33. Pe 1-6 (top), Pe 2-7 (middle), and Pe 2-8 (bottom)

Fig. 34. Pe 2-14 (top), Ps 1 (middle), and TH 2-A (bottom)

Table 2. continued

No.	R.A. (2000.0) Dec.		PNG Name	Fig.	image H α		image H β		image [O III]		image [N II]	
	size	exp.			size	exp.	size	exp.	size	exp.	size	exp.
73	16 24 21.1	-54 36 03	330.6-03.6 He 2-159	23	17 × 13	15	1.5					
74	16 24 37.2	-53 22 34	331.5-02.7 He 2-161	7	24 × 15	15	1.5	17 × 12	15	1.3		
75	16 29 30.4	-59 09 22	327.8-07.2 He 2-163	24	26 × 20	5	1.7					
76	16 29 53.2	-53 23 04	332.0-03.3 He 2-164	8	18	15	1.5	18	15	1.4		
77	16 29 59.6	-54 09 37	331.5-03.9 He 2-165	8	71 × 64	15	1.4	53 × 41	15	1.6		
78	16 31 30.9	-40 15 22	341.8+05.4 NGC 6153	32	42 × 41	15	1.9					
79	16 34 14.9	-49 21 20	335.4-01.1 He 2-169	8	37 × 29	15	1.6				77 × 44	15 1.7 ^c
80	17 06 23.0	-44 13 12	342.9-02.0 Pe 1- 8	12	25 × 23	4	1.0 ^b	25 × 24	4	1.1 ^b		
81	17 19 32.0	-45 53 12	342.9-04.9 He 2-207	24	42 × 27	4	1.4 ^b					
82	17 21 11.6	-27 11 28	358.5+05.4 M 3-39	29	30 × 21	10	1.6					
83	17 47 38.3	-22 06 20	006.0+03.1 M 1-28	1	82 × 47	15	1.5	23 × 21	15	1.8	103 × 53	10 1.5 ^c
84	17 51 12.3	-34 55 26	355.4-04.0 Hf 2-1	9	20 × 20	10	1.6				22 × 22	10 1.5 ^c
85	17 53 46.0	-29 43 48	000.2-01.9 M 2-19	28	18 × 12	10	1.8					
86	17 58 15.0	-33 47 36	357.1-04.7 H 1-43	13	stellar	10	1.9					
87	18 04 30.0	-34 58 00	356.7-06.4 H 1-51	3	20 × 17	20	1.8	16 × 13	20	1.7		
88	18 04 56.0	-32 54 06	358.6-05.5 M 3-51	10	21 × 15	10	1.7				22 × 18	10 1.7 ^c
89	18 29 11.0	-21 46 54	011.0-05.1 M 1-47	27	9	10	1.6					
90	18 30 00.0	-19 40 36	013.0-04.3 Pe 2-14	34	7 × 6	10	1.5					
91	18 33 29.0	-11 07 24	020.9-01.1 M 1-51	9	30 × 16	20	1.7	12 × 8	20	2.2		
92	18 39 25.8	-30 40 36	004.0-11.1 M 3-29	28							20 × 18	10 1.7 ^c
93	18 44 43.0	-25 21 36	009.4-09.8 M 3-32	29	14	15	2.3					
94	18 48 12.0	-25 28 48	009.6-10.6 M 3-33	29	13	15	1.7					
95	18 50 26.0	-22 34 24	012.5-09.8 M 1-62	27	12	15	1.7					
96	18 55 38.7	-32 15 55	003.9-14.9 Hb 7	13	13 × 12	5	1.7					
97 ²	19 22 00	-04 12	PK 32-8° 1 Anon. 19h19m	12	7 × 5	4	1.6 ^b					
98	19 32 07.3	-34 12 33	004.8-22.7 He 2-436	24	8	10	1.7					
99	19 40 30.0	-20 27 00	019.4-19.6 K 2- 7	25	stellar	20	2.2					
100	21 29 59.4	+12 10 26	065.0-27.3 Ps 1	34	9 × 7	3	2.1 ^c					
101	21 59 30.0	-39 23 00	002.7-52.4 IC 5148-50	9	155 × 133	20	2.3	135 × 129	20	2.3		

Table 3. Alphabetical list of objects

Name	No.	Fig.	Name	No.	Fig.	Name	No.	Fig.	Name	No.	Fig.
A 26	9	12	He 2-85	37	18	He 2-161	74	7	M 3-39	82	29
A 7	2	12	He 2-86	38	18	He 2-163	75	24	M 3-51	88	10
Anon. 19h19m	97	12	He 2-88	39	19	He 2-164	76	8	Mz 2	67	10
Cn 1-1	57	12	He 2-96	42	19	He 2-165	77	8	Mz 3	69	30
H 1-43	86	13	He 2-102	44	19	He 2-169	79	8	NGC 246	1	30
H 1-51	87	3	He 2-103	45	20	He 2-207	81	24	NGC 2818	12	10
Hb 7	96	13	He 2-109	46	20	He 2-436	98	24	NGC 2899	15	11
He 2-11	10	13	He 2-111	47	20	Hf 2-1	84	9	NGC 3195	19	2
He 2-18	11	14	He 2-112	48	21	IC 5148-50	101	9	NGC 3211	20	31
He 2-28	13	14	He 2-114	49	4	K 2-7	99	25	NGC 3699	25	11
He 2-29	14	14	He 2-115	50	21	Lo 12	61	25	NGC 4071	29	31
He 2-35	16	15	He 2-116	51	5	Lo 13	63	25	NGC 5189	41	11
He 2-37	17	15	He 2-119	52	5	Lo 14	65	26	NGC 5307	43	31
He 2-39	18	15	He 2-120	53	5	M 1-13	6	26	NGC 6153	78	32
He 2-47	21	16	He 2-129	55	21	M 1-14	7	26	PB 1	3	32
He 2-63	24	16	He 2-132	56	22	M 1-17	8	27	Pe 1-3	23	32
He 2-67	26	2	He 2-138	58	22	M 1-28	83	1	Pe 1-6	72	33
He 2-68	27	16	He 2-140	59	22	M 1-47	89	27	Pe 1-8	80	12
He 2-70	28	3	He 2-143	60	23	M 1-51	91	9	Pe 2-7	22	33
He 2-76	30	3	He 2-145	62	6	M 1-62	95	27	Pe 2-8	54	33
He 2-77	31	17	He 2-146	64	6	M 2-19	85	28	Pe 2-14	90	34
He 2-78	32	17	He 2-147	66	23	M 3- 1	4	28	Ps 1	100	34
He 2-81	33	17	He 2-152	68	6	M 3- 2	5	1	Th 2-A	40	34
He 2-82	34	4	He 2-153	70	7	M 3-29	92	28			
He 2-83	35	18	He 2-155	71	7	M 3-32	93	29			
He 2-84	36	4	He 2-159	73	23	M 3-33	94	29			