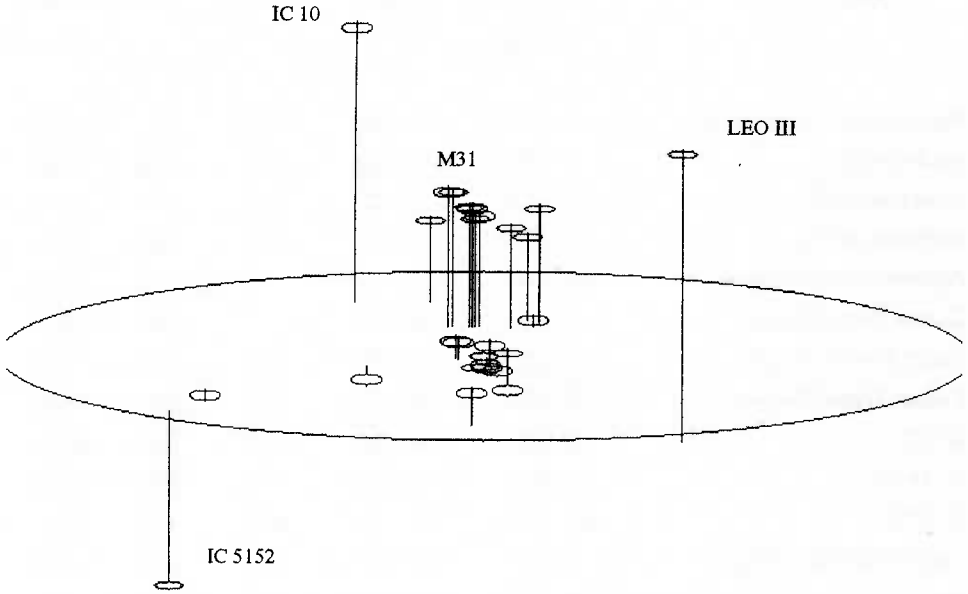


Three-dimensional plot of the Local Group of galaxies

The diagram shows the Local Group with the Milky Way galaxy arbitrarily placed at the centre. All 27 of the galaxies mentioned in Mark Humphrys's description, as listed in Table 1, are included. A few are identified, such as M31, the Andromeda Galaxy (at over 2 million light years, the farthest object visible with the naked eye). Others, such as the Large and Small Magellanic Clouds, are clustered close to the Milky Way, and cannot be separately identified in the plot.

The diameter of the circle (which is provided to enhance the three-dimensional effect), is 6,500,000 light-years. It is the Celestial Equator, so galaxies above the circle have positive declination, and galaxies below the circle have negative declination. The First Point of Aries (zero hours Right Ascension) lies on the far side of the diagram.

The diagram was created by a computer program developed by David Le Conte. ¤

The Local Group of Galaxies

by Mark Humphrys

In the last newsletter I wrote about the galaxy clusters in Leo. This month I thought I would concentrate on galaxies closer to home - those that make up the Local Group of galaxies, of which our own Milky Way is the second largest member, next to the great spiral galaxy in Andromeda, M31.

Fortunately, the distribution of the members of the Group is such that the majority are visible to observers in the Northern Hemisphere, and it is these that I am going to concentrate on. Table 1 shows the members of the Local Group.

Furthest north lies the Ursa Minor Dwarf Galaxy (Fig. 1). At magnitude 12 it will be difficult to spot; however, using the telescope's setting circles should make the job easier. The galaxy lies some 4.5° south of gamma Ursae Minoris, very close to two 5th magnitude stars to the north east. Another dwarf elliptical galaxy lies in the constellation Draco, the Dragon (Fig. 2). At magnitude 11, it is somewhat brighter than many of the 14th and 15th magnitude galaxies that lie in the vicinity. It is over ½° in diameter, but just how much of it can be seen with the 14-inch SCT?

The next 13 galaxies can be found in an area extending from Cassiopeia in the north to Cetus in the south. Figure 3 shows the area, with all the Local Group members indicated. IC 10, an irregular galaxy (Fig. 4), is just over one degree east from Beta Cassiopeiae, but further south lie two galaxies: NGC 147 and NGC 185 (Fig. 5). Both are of similar magnitude, 9.2/9.3, and size, 12.9'/11.5', respectively. Star-hop northwards from 5th magnitude Pi Cassiopeiae to O Cassiopeiae, one degree westwards to NGC 185, a further degree to NGC 147.

The next three galaxies need no introduction. M31, the 3rd magnitude spiral in Andromeda, over 2° in size, is visible with the naked eye. Its two fainter companions are M32 and M110. They are sufficiently familiar to most Section members, so I won't say any more about them, but will move on to three other, much fainter dwarf galaxies, Andromeda I, II and III, all at 13th magnitude. Andromeda I and III are shown in Figure 6, in the vicinity of the 3.8 magnitude star Mu Andromedae and 4.3 magnitude Pi Andromedae. Andromeda II lies between two galaxy clusters on the border between Andromeda and Pisces (Fig. 7). Fortunately, it is two magnitudes brighter than the majority of the surrounding galaxies. To find the galaxy, star-hop south-east from the 2nd magnitude star Beta Andromedae.

Another bright binocular object is M33 in Triangulum, a double-armed spiral, 1° in diameter. Photographs of the galaxy show irregular clumps of nebulosity and dark areas of gas and dust. How much detail can be seen with the 14-inch? »»

Travelling south into Pisces we come to the next member, LGS3 (does anybody know what the LGS stands for?) lying in a straight line between 77 Andromedae and Psi Piscium (Fig. 8). This galaxy is one of the faintest of the Local Group, at 15th magnitude. Nearby is the equally faint galaxy NGC 354. From Pisces to Pegasus is the Pegasus Dwarf Galaxy, a 12th magnitude irregular galaxy lying inbetween several fainter galaxies (Fig. 9). To locate it find 66 and 74 Pegasi; the galaxy is about halfway between the two, 2° north of 70 Pegasi.

The last member shown in Figure 3 is IC 1613 in Cetus, a faint 9.3 magnitude irregular dwarf galaxy. Figure 10 shows the star field in detail. It is best to locate 26 and 29 Ceti, and from there locate the 6th magnitude star to the north-west, below which lies the galaxy.

Moving now to the constellation of Leo for the last three galaxies that I am going to mention, Leos I, II and III. Figure 11 shows most of Leo, and indicates the general position of the three Local Group members. Start with Leo I, (Fig. 12) which should be the easiest to find, being about 20' from Regulus, the brightest star in Leo. However, this proximity to the star causes a problem, as the light drowns out the 9.8 magnitude galaxy. Try using a magnification that ensures that Regulus sits outside of the field of view when centred on Leo I. Leo II lies about 1.5° north of Delta Leonis; at 11.5 magnitude it will be no more than a faint splodge of light (Fig. 13). The faintest of the three is Leo III, which lies on the border between Leo and Leo Minor (Fig. 14). It is two degrees to the south of 20 Leonis Minoris. At 12.6 magnitude, it again will be difficult to spot.

Many of these galaxies represent quite an observing challenge. Some may not be readily visible through the 14-inch SCT, but until you try you never know for certain. Make drawings of your observations, or describe what you see, and don't forget to to mention the eyepiece that you are using, the seeing conditions, and any other information that may help future observers. All of the Local Group members mentioned in the article are within range photographically, and so if you can't see them, line up the setting circles and take long exposure photographs, perhaps starting with a two-minute unguided shot, building up to longer guided shots. Again, make notes of everything that you do.

Southern Hemisphere members of the Local Group I will leave for another time, though there are several which are visible from here, the brightest of which is NGC 6822, Barnard's Galaxy, lying in the north-east of Sagittarius. At magnitude 9 it should be readily visible in the 14-inch. Two others, the Aquarius Dwarf Galaxy at -12°, and the Sagittarius Dwarf Galaxy at -17°, are extremely faint at around 15th magnitude, so may not be seen. ¤

Table 1: LOCAL GROUP OF GALAXIES

Adapted from Norton's 2000, p.160

GALAXY	R.A. h m	DEC. ° '	MAG.	TYPE	DIST. '000s LY
Andromeda Galaxy M31	0 42.7	+41 16	3.4	Sb	2380
Andromeda I	0 45.7	+38 00	13.2	dE0	2380
Andromeda II	1 16.4	+33 27	13.0	dE0	2380
Andromeda III	0 35.4	+36 31	13.0	dE2	2380
Aquarius Dwarf Galaxy	20 46.9	- 12 51	-	IRR	4890
Carina Dwarf Galaxy	6 41.6	- 50 58	-	dE	554
Draco Dwarf Galaxy	17 20.2	+57 55	11.0	dE3	261
Fornax Dwarf Galaxy	2 39.9	- 34 32	8.0	dE3	424
IC 10	0 20.4	+59 18	10.3	IRR	4238
IC 1613	1 04.8	+ 2 07	9.3	IRR	2412
IC 5152	22 02.9	- 51 17	11.0	IRR	4890
Large Magellanic Cloud	5 23.6	- 69 45	0.1	IRR	163
Leo I	10 08.4	+12 18	9.8	dE3	750
Leo II	11 13.5	+22 10	11.5	dE0	750
Leo III	9 59.4	+30 45	12.6	IRR	7498
LGS 3	1 03.8	+21 53	15.0	IRR	2934
Milky Way				Sb/Sc	
NGC 147	0 33.2	+48 30	9.3	dE4	2380
NGC 185	0 39.0	+48 20	9.2	dE0	2380
NGC 205 (M110)	0 40.4	+41 41	8.0	E6	2380
NGC 221 (M32)	0 42.7	+40 52	8.2	E2	2380
NGC 6822	19 44.9	- 14 48	9.0	IRR	1695
Pegasus Dwarf Galaxy	23 28.6	+14 45	12.0	IRR	4238
Sagittarius Dwarf Galaxy	19 30.0	- 17 41	15.0	IRR	3586
Sculptor Dwarf Galaxy	0 59.9	- 33 42	10.0	dE3	277
Small Magellanic Cloud	0 52.7	- 72 50	2.3	IRR	196
Triangulum Galaxy (M33)	1 33.9	+30 39	5.7	Sc	2934
Ursa Minor Dwarf Galaxy	15 08.8	+67 12	12.0	dE6	245
WLM System	0 02.0	- 15 28	10.9	IRR	5216

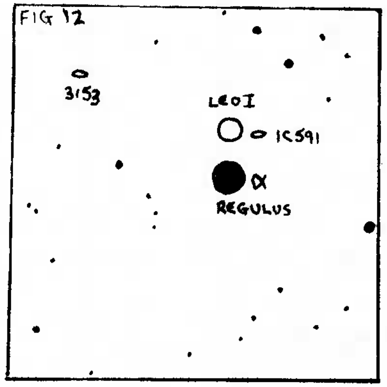


FIG 12
3153
LEO I
IC591
α
REGULUS

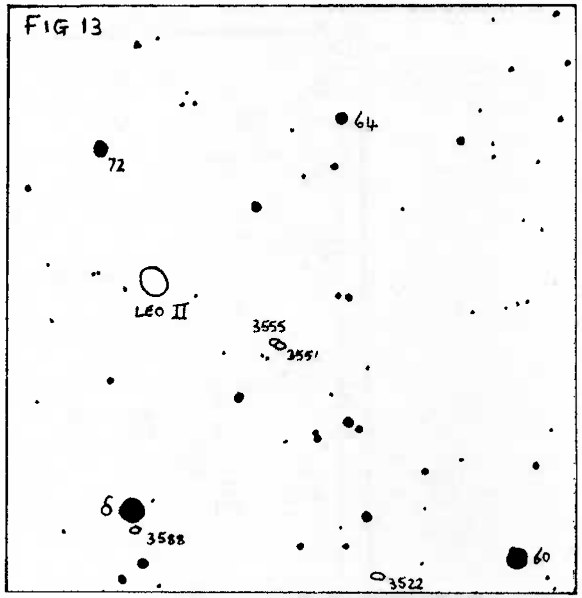


FIG 13
64
72
LEO II
3555
3551
δ
3588
60
3522

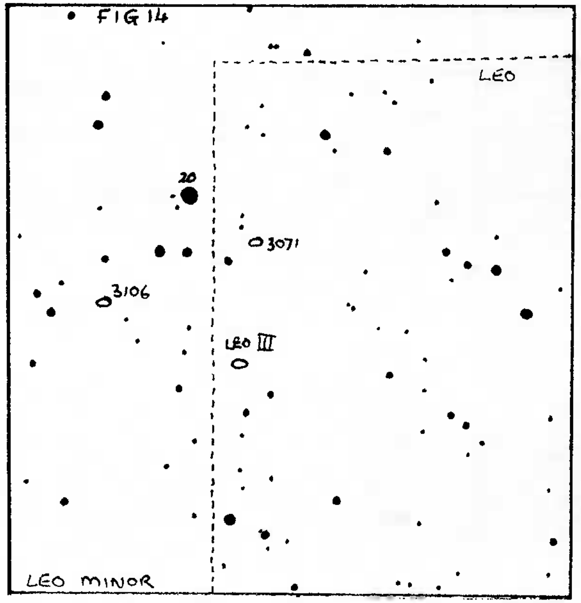


FIG 14
LEO
20
3071
3106
LEO III
LEO MINOR

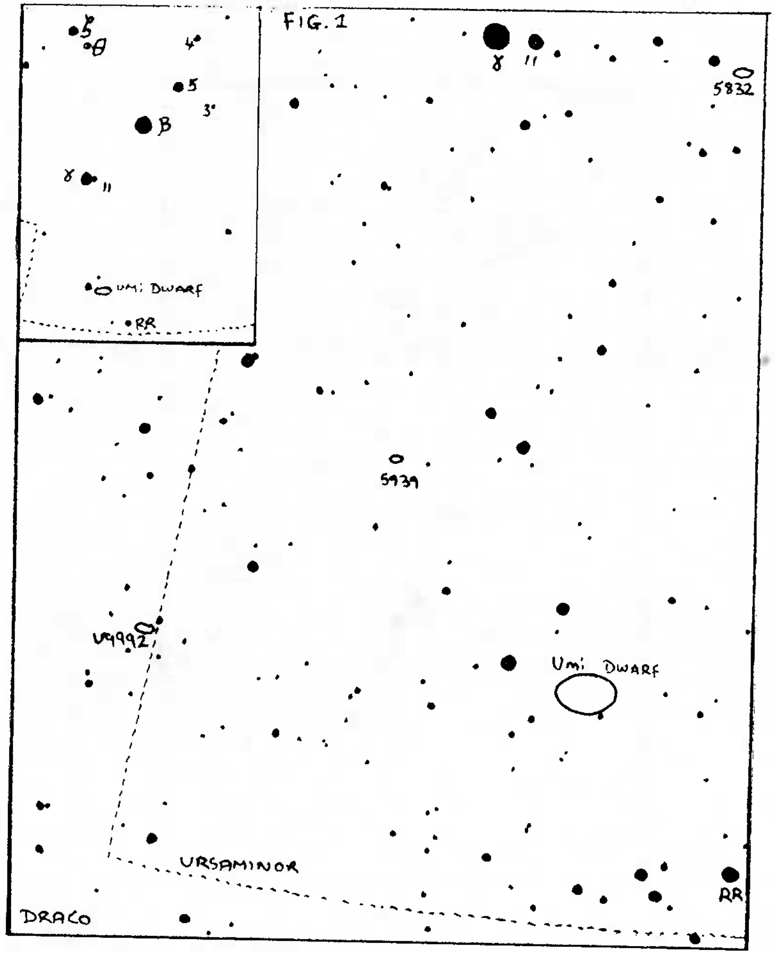


FIG. 1
ζ
θ
4
5
3
β
γ
11
UMi DWARF
RR
5832
5939
U9992
UMi DWARF
URSA MINOR
DRACO
RR

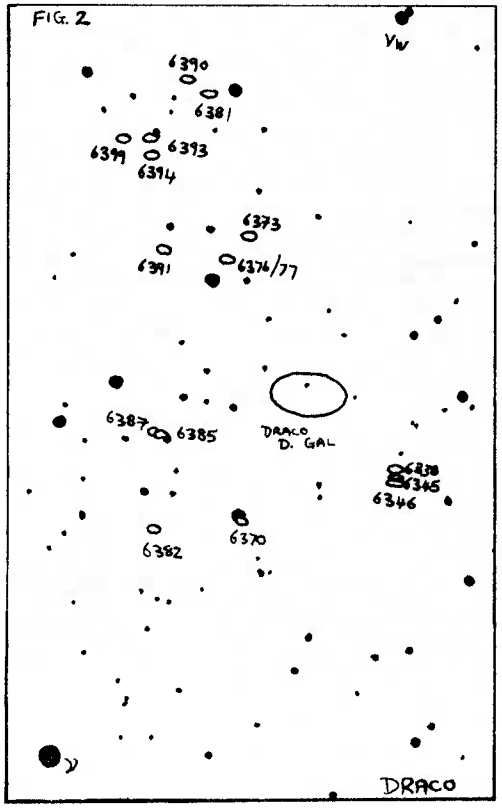


FIG. 2
ν_W
6390
6381
6393
6399
6394
6373
6391
6374/77
6387
6385
DRACO
D. GAL
6338
6345
6346
6382
6370
ν
DRACO

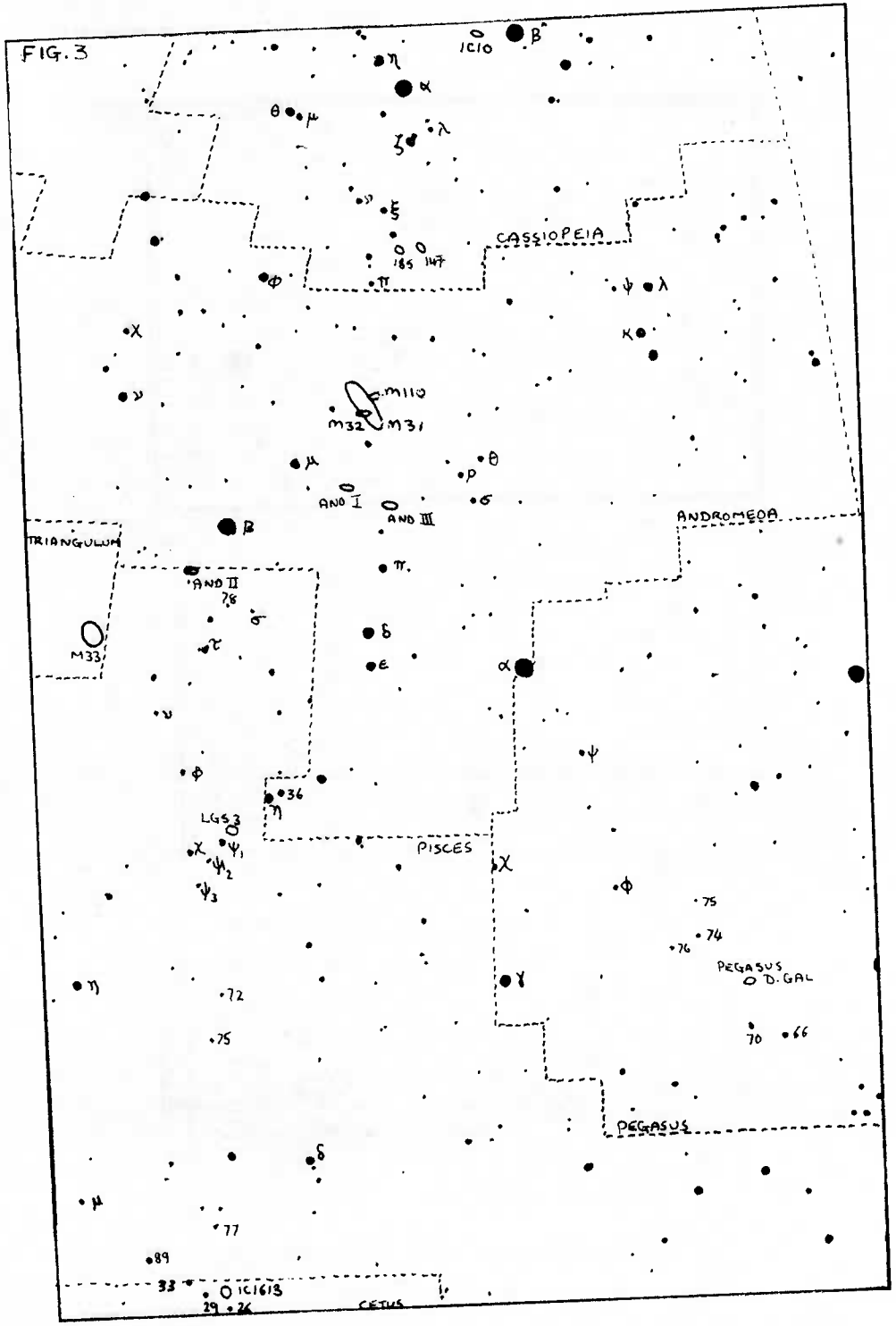
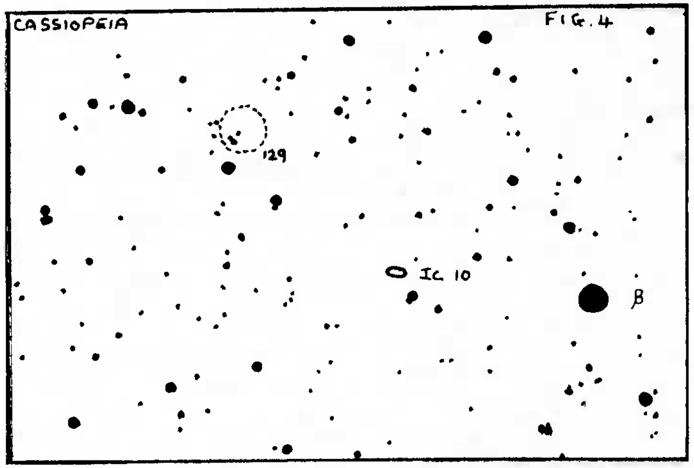


FIG. 3
IC10
β
η
α
θ
μ
λ
ζ
ν
ξ
CASSIOPEIA
185
147
ϕ
π
ψ
λ
χ
K
ν
M110
M32
M31
μ
θ
ρ
AND I
AND III
σ
ANDROMEDA
β
TRIANGULUM
AND II
π
76
σ
M33
τ
δ
ϵ
α
υ
ψ
ϕ
36
η
LGS 3
χ
ψ_1
ψ_2
ψ_3
PISCES
χ
ϕ
75
74
76
PEGASUS
D. GAL
η
γ
72
75
70
66
PEGASUS
δ
μ
77
89
33
IC1613
29
26
CETUS


CASSIOPEIA
FIG. 4
129
IC 10
β

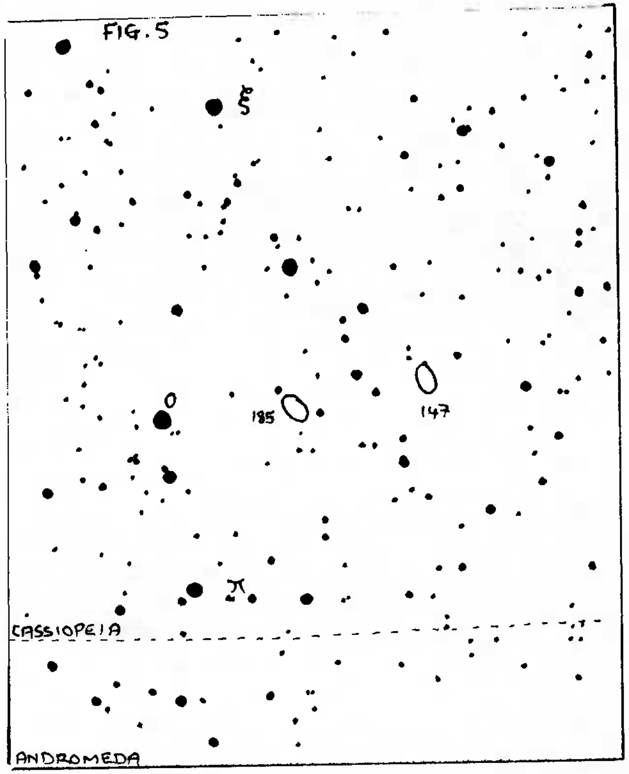


FIG. 5
ξ
185
147
π
CASSIOPEIA
ANDROMEDA

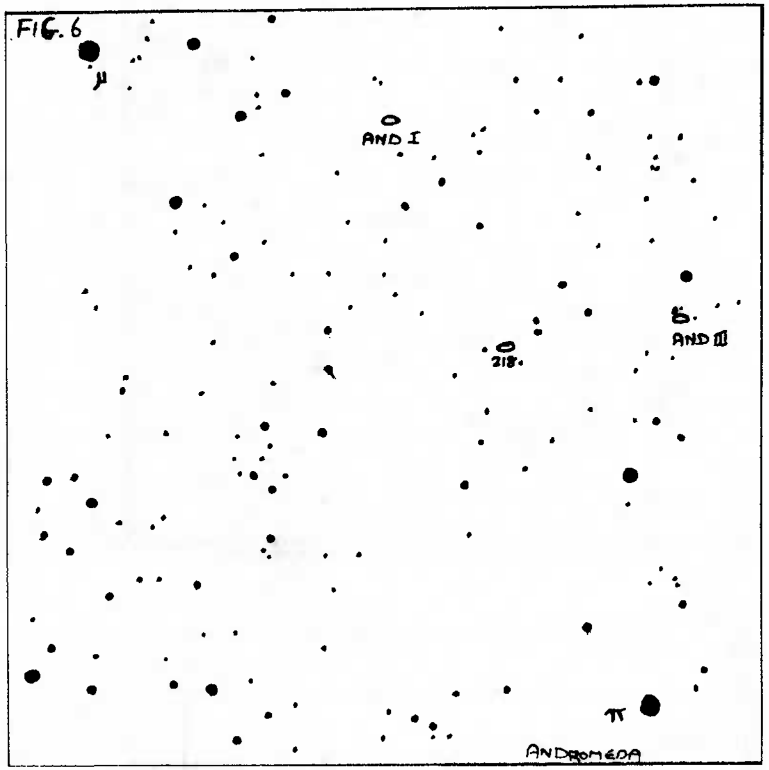


FIG. 6
μ
AND I
218
AND III
π
ANDROMEDA

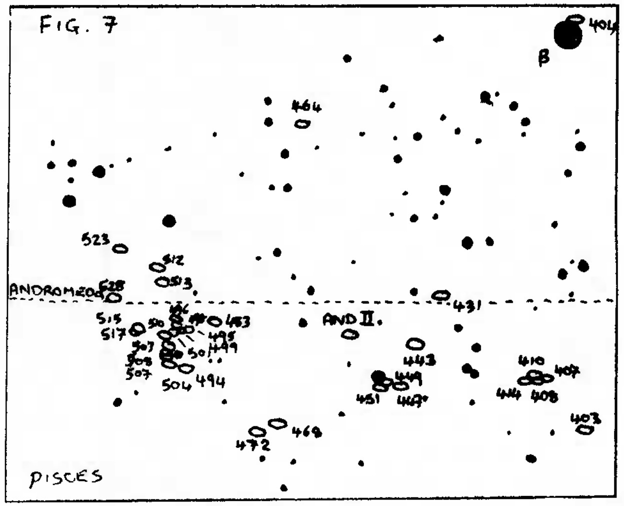


FIG. 7
404
β
464
523
ANDROMEDA
431
AND II
443
PISCES

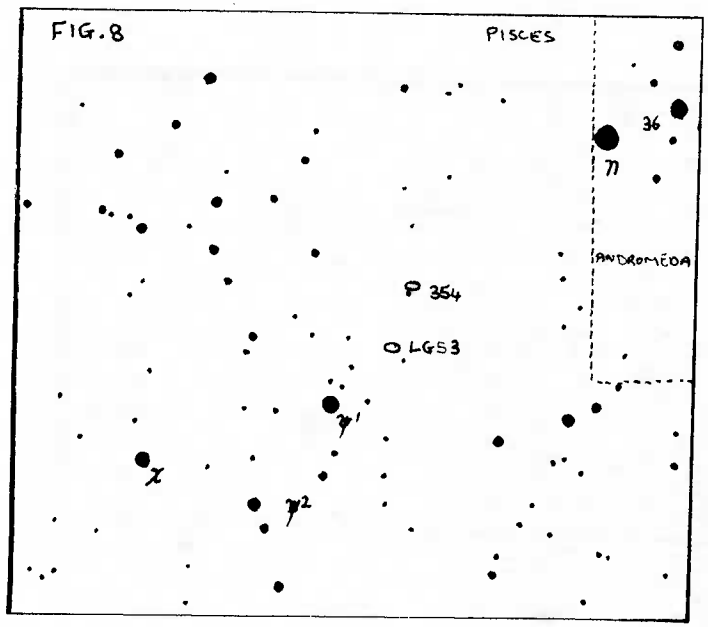


FIG. 8
PISCES
36
η
ANDROMEDA
P 354
LGS3
γ1
χ
γ2

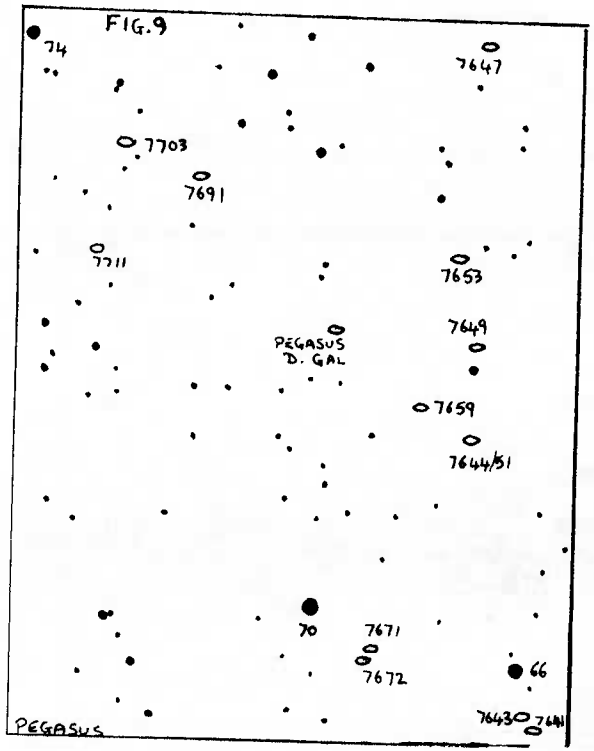


FIG. 9
74
7647
7703
7691
7711
7653
7649
PEGASUS
D. GAL
7659
7644/51
70
7671
7672
66
7643
7641
PEGASUS

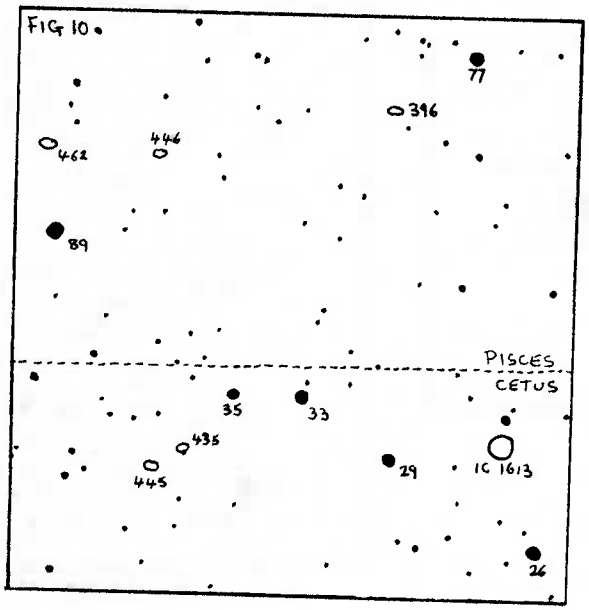


FIG 10
77
396
462
446
89
PISCES
CETUS
35
33
435
445
29
IC 1613
26

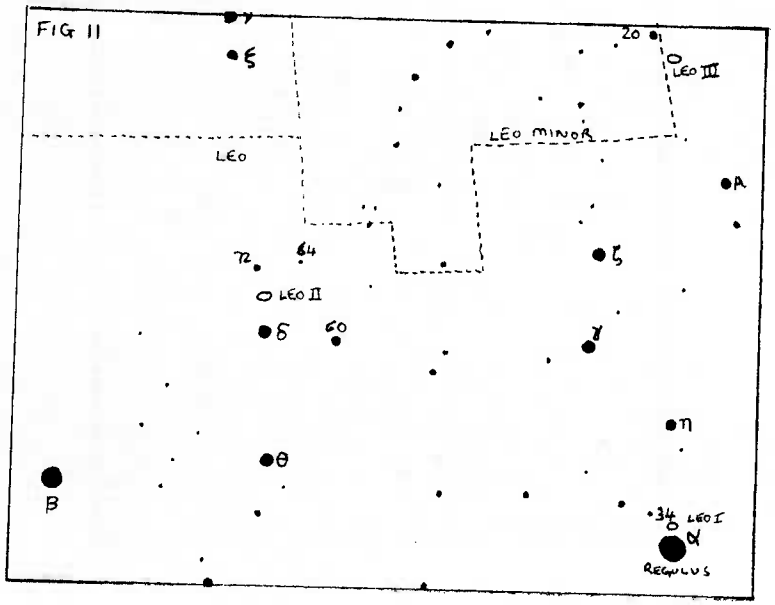


FIG 11
ξ
20
LEO III
LEO MINOR
LEO
A
72
64
ζ
LEO II
δ
60
γ
η
θ
B
34
LEO I
α
REGULUS