

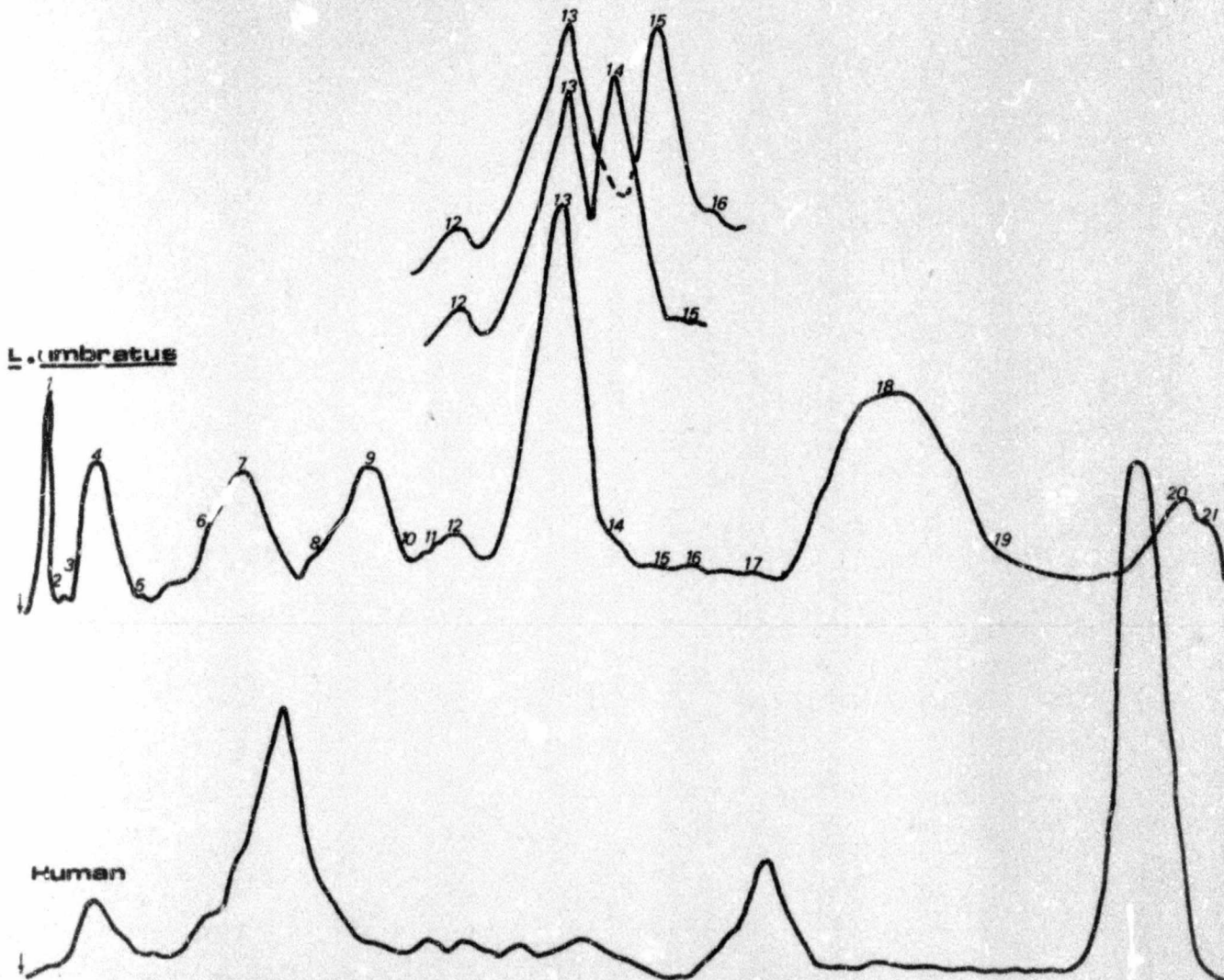


Fig. 4. Typical polyacrylamide gel electrophoresis of L. umbratus plasma compared to that of the human. Origin on left. Variations in the pattern are observed in fractions 13 - 15.

TABLE 5

Lebeo umbratusGel electrophoresis

Fractions (slowest to fastest)

Protein %

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	2.8	1.4	1.4	1.3	2.1	2.8	4.9	1.4	4.9	1.4	2.1	2.1	12.6	2.8	2.8	4.9	7.0	19.6	7.7	5.6	4.9
2	2.7	1.6	2.1	4.9	1.1	3.3	5.5	1.6	3.8	1.1	1.6	3.8	7.7	8.2	3.3	4.9	4.3	17.5	6.6	5.3	6.0
3	4.2	1.1	1.6	5.2	1.0	2.1	6.3	2.1	2.6	2.6	2.7	2.2	10.9	8.9	3.1	4.2	4.7	21.9	5.2	5.5	4.2
4	1.1	1.1	3.2	1.1	0.5	2.2	4.8	4.3	9.7	3.2	2.7	2.2	15.1	2.7	2.7	3.2	5.4	17.3	5.9	5.9	5.9
5	4.1	2.5	1.6	4.9	1.6	3.3	5.7	2.5	2.5	1.6	1.6	1.6	9.8	8.2	4.1	3.3	3.3	23.8	5.7	4.9	4.1
6	3.5	1.9	4.4	3.5	1.4	2.8	4.9	2.8	9.1	2.1	2.1	2.1	7.0	1.4	8.4	2.1	3.5	21.0	5.6	4.9	4.9
7	3.8	1.9	4.7	1.9	1.9	3.4	4.7	3.8	4.7	1.9	3.8	1.9	7.6	9.5	4.7	7.7	5.7	24.5	4.7	5.7	5.7
8	3.4	0.9	2.6	1.7	0.9	3.4	5.1	4.3	5.1	1.7	1.7	2.6	12.6	2.6	2.6	7.7	6.0	22.3	4.3	4.3	4.3
9	3.5	1.4	3.5	2.8	0.7	3.5	4.1	2.1	4.1	2.1	2.1	2.1	14.5	2.1	2.8	6.2	4.8	23.5	5.5	4.1	4.8
10	2.2	1.5	1.5	3.7	1.5	3.7	4.4	2.2	4.4	1.5	1.5	1.5	5.6	2.9	8.1	2.9	5.1	28.5	6.6	5.1	5.1
11	1.5	1.5	1.5	3.7	1.5	2.2	3.7	3.7	3.7	2.2	2.2	2.2	15.3	2.9	2.9	5.1	6.6	25.6	4.4	4.4	5.1
12	1.6	1.6	1.6	2.9	1.6	3.9	4.7	3.1	5.5	6	3.1	1.6	7.8	2.5	9.4	3.9	6.3	23.4	3.1	4.7	5.5
13	3.4	1.4	2.0	2.0	0.7	2.0	4.7	3.4	2.7	0.8	2.0	1.4	13.5	2.0	4.1	6.1	2.7	27.1	6.8	6.1	4.7
14	2.3	1.6	1.6	2.3	0.8	2.3	3.9	3.1	6.7	0.8	3.1	2.3	14.8	2.3	3.9	3.1	3.1	25.8	4.7	6.3	5.5
15	4.0	1.0	1.0	3.0	1.0	2.0	4.0	3.0	5.0	1.0	4.0	1.0	8.0	2.0	8.0	4.0	4.0	30.0	5.0	5.0	3.0
16	2.1	2.1	1.1	3.2	1.1	1.6	7.0	2.7	5.4	1.6	2.1	2.7	13.4	2.1	6.4	3.2	6.4	22.5	4.3	5.4	3.7
Mean	2.9	1.6	2.0	3.3	1.2	2.8	4.9	2.9	4.9	1.7	2.4	2.1	11.1	3.2	4.8	4.3	5.0	23.4	5.4	5.3	4.8

Distance from point of application (mm)

	0.5	2.0	3.0	3.5	4.5	6.5	8.0	11.0	13.0	15.5	17.0	19.0	21.0	22.0	26.0	27.5	32.0	36.0	41.0	52	55
1	0.86	0.67	0.67	1.21	0.50	0.61	1.41	0.40	1.41	0.40	0.60	0.60	3.62	0.81	0.81	1.41	2.02	5.65	2.22	1.62	1.41

Relative mobility %

	1	4	5	6	8	12	15	20	24	28	31	33	38	40	48	50	58	65	75	94	100
1	0.81	0.40	0.40	0.40	0.50	0.60	0.61	1.41	0.40	0.40	0.60	0.60	3.62	0.81	0.81	1.41	2.02	5.65	2.22	1.62	1.41

Fractions (slowest to fastest)

Protein mg/ml

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0.81	0.40	0.40	0.40	0.50	0.60	0.61	1.41	0.40	0.40	0.60	0.60	3.62	0.81	0.81	1.41	2.02	5.65	2.22	1.62	1.41
2	0.86	0.67	0.67	1.21	0.50	0.61	1.41	0.40	1.41	0.40	0.60	0.60	3.62	0.81	0.81	1.41	2.02	5.65	2.22	1.62	1.41
3	1.69	0.64	0.64	2.08	0.40	0.84	2.52	0.84	1.04	0.84	0.84	0.84	4.36	3.56	1.06	1.06	1.57	5.59	2.11	1.70	1.92
4	0.43	0.43	0.43	1.25	0.20	0.86	1.87	0.86	1.68	1.06	1.06	1.06	5.99	1.06	1.06	1.25	1.88	8.65	2.08	2.60	1.68
5	1.29	0.79	0.79	1.55	0.50	1.04	1.80	0.79	0.79	0.79	0.79	0.79	3.09	2.59	1.06	1.06	1.57	5.59	2.11	1.70	1.92
6	1.07	0.43	0.43	1.07	0.31	0.85	1.89	0.85	2.77	0.85	0.85	0.85	3.09	2.59	1.06	1.06	1.57	5.59	2.11	1.70	1.92
7	1.09	0.55	0.55	1.36	0.55	1.09	1.36	0.55	1.36	0.55	0.55	0.55	2.13	2.74	1.36	1.36	1.64	7.07	1.36	1.64	1.64
8	0.93	0.25	0.25	0.45	0.25	0.93	1.39	1.17	1.39	0.46	0.46	0.46	2.13	2.74	1.36	1.36	1.64	7.07	1.36	1.64	1.64
9	1.07	0.43	0.43	1.07	0.31	0.85	1.89	0.85	2.77	0.85	0.85	0.85	3.09	2.59	1.06	1.06	1.57	5.59	2.11	1.70	1.92
10	0.70	0.48	0.48	1.05	0.31	0.61	1.41	0.48	1.41	0.48	0.48	0.48	4.41	0.64	0.85	1.89	1.46	7.15	1.68	1.25	1.46
11	0.43	0.43	0.43	1.05	0.31	0.61	1.41	0.48	1.41	0.48	0.48	0.48	4.41	0.64	0.85	1.89	1.46	7.15	1.68	1.25	1.46
12	0.46	0.46	0.46	1.11	0.46	1.11	1.34	0.89	1.57	0.89	0.89	0.89	4.41	0.64	0.85	1.89	1.46	7.15	1.68	1.25	1.46
13	0.57	0.40	0.40	0.57	0.20	0.57	1.34	0.97	0.77	0.40	0.57	0.40	3.84	0.57	1.17	1.74	0.77	7.72	1.94	1.34	1.34
14	0.49	0.34	0.34	0.49	0.17	0.49	0.83	0.66	1.00	0.17	0.66	0.49	3.14	0.49	0.83	0.66	0.66	5.45	1.00	1.34	1.17
15	1.24	0.31	0.31	0.93	0.31	0.62	1.24	0.93	1.55	0.31	1.24	0.31	2.47	0.62	2.47	1.24	1.24	9.28	1.55	1.55	0.93
16	0.58	0.58	0.30	0.88	0.30	0.44	1.92	0.74	1.48	0.44	0.58	0.74	3.67	0.58	1.76	0.83	1.76	6.17	1.48	1.48	1.02
Mean	0.88	0.47	0.62	1.00	0.37	0.85	1.50	0.87	1.50	0.54	0.71	0.62	3.34	1.24	1.45	1.31	1.51	7.03	1.65	1.60	1.47

Fish 14 - Fraction 10a, relative mobility 29%; % protein 1.6; protein 0.34 mg/ml.

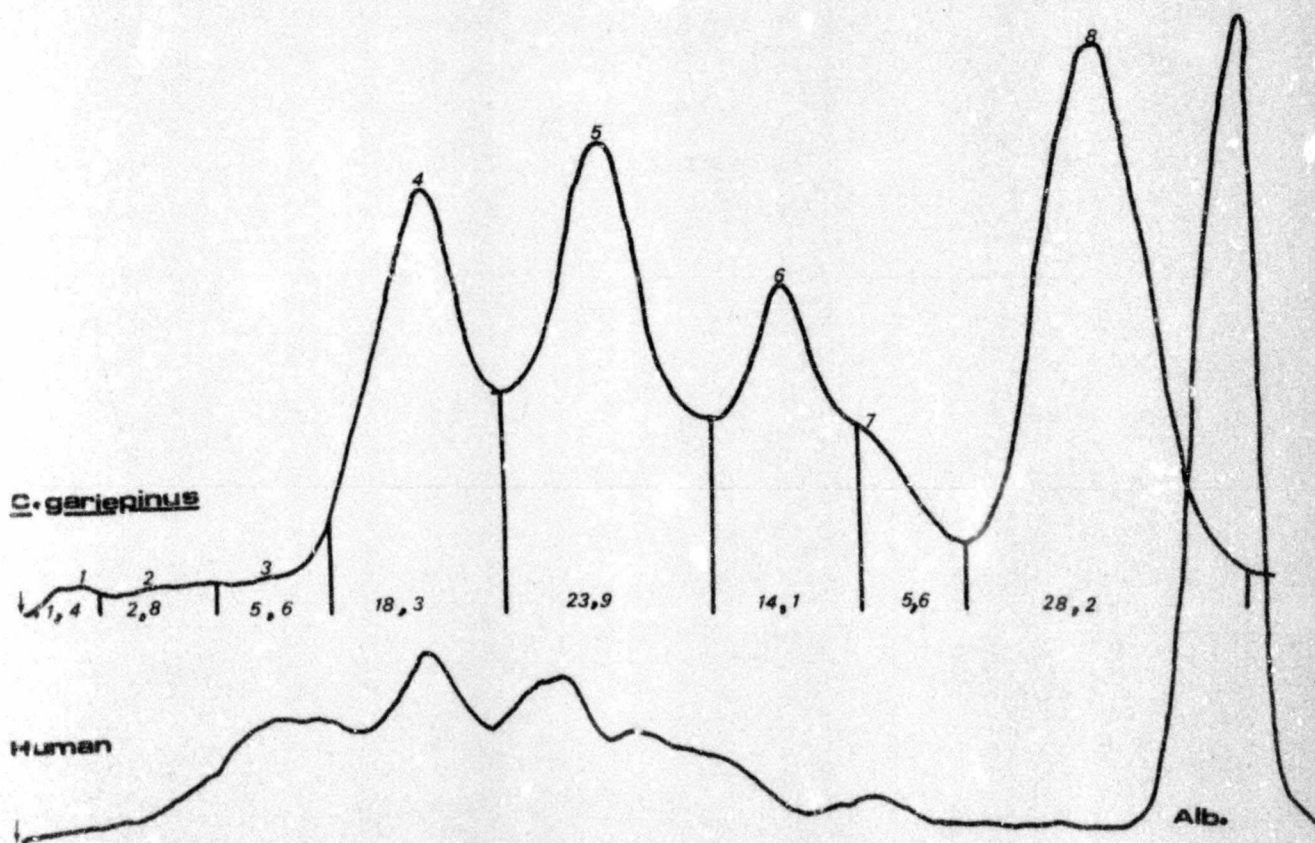


Fig. 5. Typical paper electrophorevogram of C. gariepinus and human plasma proteins. Origin on left. Percentage protein indicated under curve.

TABLE 6
Clarias gariepinus
Paper electrophoresis

Fish	Length cm	Weight gm	Sex	Hemo- tocrit %	Plasma- Protein mg/ml	Locality Early Spring	Protein % Fractions (slowest to fastest)								Protein mg/ml Fractions (slowest to fastest)								
							Protein % Fractions (slowest to fastest)								Protein mg/ml Fractions (slowest to fastest)								
							1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
1	48,3	1561	f	28,8	32,0	Marble Hall	3,4	3,4	6,8	22,0	10,2	10,2	3,4	40,6	1,09	1,09	2,18	7,04	3,26	3,26	3,26	1,09	13,00
2	30,5	218	m	32,0	52,0	Marble Hall	4,4	4,4	8,8	30,9	11,6	7,0	1,8	30,9	2,29	2,29	4,58	16,01	6,14	3,64	0,94	0,94	16,01
3	34,2	290	m	17,0	36,0	Marble Hall	2,1	4,1	8,3	18,8	6,2	8,3	6,2	37,4	0,76	1,48	2,99	6,75	2,23	2,99	2,23	13,50	
4	38,5	403	m	40,6	27,2	Marble Hall	1,3	2,5	8,9	26,6	13,9	10,0	5,0	30,4	0,35	0,68	2,42	7,23	3,78	2,72	1,36	8,26	
5	38,5	154	m	27,6	25,6	Marble Hall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	30,0	192	f	29,2	31,6	Marble Hall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	53,0	1155	f	30,3	34,0	Marble Hall	1,4	2,7	4,1	16,4	26,0	16,4	4,1	28,8	0,48	0,92	1,39	5,58	8,83	5,58	1,39	9,73	
8	46,5	674	f	23,7	34,0	Marble Hall	1,2	2,5	5,8	16,0	21,0	9,6	10,9	32,1	0,41	0,85	1,98	5,43	7,14	3,34	3,71	10,99	
9	54,0	1019	f	28,2	26,4	Marble Hall	1,4	2,8	5,5	13,9	26,3	15,6	5,5	27,2	0,37	0,74	1,45	3,67	6,95	4,11	1,45	7,32	
10	50,5	968	f	24,3	28,0	Marble Hall	1,3	2,5	6,4	15,4	26,2	15,4	5,1	25,6	0,36	0,70	1,79	4,31	7,96	4,31	1,43	7,48	
11	69,0	2449	f	34,0	30,8	Marble Hall	1,4	1,4	5,7	20,0	21,4	15,7	5,7	28,5	0,43	0,43	1,75	6,16	6,59	4,82	1,76	8,49	
12	54,5	1167	f	28,2	22,4	Marble Hall	2,0	4,0	12,0	10,0	24,0	16,0	2,0	30,0	0,45	0,89	2,69	2,24	5,38	3,58	0,45	6,72	
13	67,5	2046	f	30,0	29,6	Marble Hall	1,5	1,5	6,1	16,7	30,0	19,7	4,5	34,8	0,45	0,45	1,81	4,95	9,00	5,83	1,33	10,34	
14	46,0	713	f	26,1	32,0	Marble Hall	1,4	2,8	5,6	18,3	23,9	14,1	5,6	28,2	0,45	0,89	1,79	5,83	7,65	4,51	1,79	9,03	
15	50,5	830	f	28,6	64,0	Marble Hall	1,8	9,3	12,9	25,0	9,3	6,5	3,7	31,5	1,21	5,95	8,25	16,00	5,95	4,15	2,37	20,48	
16	56,8	1428	f	30,0	35,2	Marble Hall	1,3	5,3	15,8	22,3	12,0	6,5	2,6	32,9	0,45	1,87	5,55	7,85	4,22	2,29	0,91	11,58	
17	52,0	1110	f	27,4	13,6	Marble Hall	1,1	3,2	15,1	26,9	10,8	5,4	3,2	34,4	0,15	0,44	2,05	3,65	1,47	7,35	0,44	6,68	
18	60,0	1407	f	26,1	32,8	Marble Hall	2,2	2,2	22,2	20,0	11,1	8,9	6,7	28,9	0,72	0,72	7,28	6,96	3,84	2,82	2,20	9,49	
19	48,0	884	f	23,8	28,6	Marble Hall	1,8	3,6	17,8	21,4	12,5	7,1	5,4	30,3	0,52	1,04	5,12	6,16	3,5	2,05	1,96	8,74	
20	50,5	810	f	26,7	27,2	Marble Hall	2,0	4,0	20,0	20,0	10,0	8,0	4,0	28,0	0,54	1,09	5,43	5,43	2,72	2,17	1,09	7,62	
21	54,0	1341	f	30,5	35,2	Marble Hall	1,5	3,1	18,5	23,1	10,8	7,7	3,1	32,2	0,53	1,09	6,51	8,12	3,61	2,71	1,09	11,35	
Mean				28,7±4,1	132,3±10,1		1,8	3,4	10,9	20,2	16,8	11,0	4,7	31,2	0,63	1,24	3,52	6,79	5,28	3,80	1,50	10,22	

Distances from point of application (mm)							
0,5	3,5	5,5	9,9	12,0	13,0	14,0	19,5
Relative mobility							
2,5	48	33	49	62	67	72	100

Fish 3 - fractions 5a; relative mobility 63%; % protein 8,3; protein 7,99 mg/ml

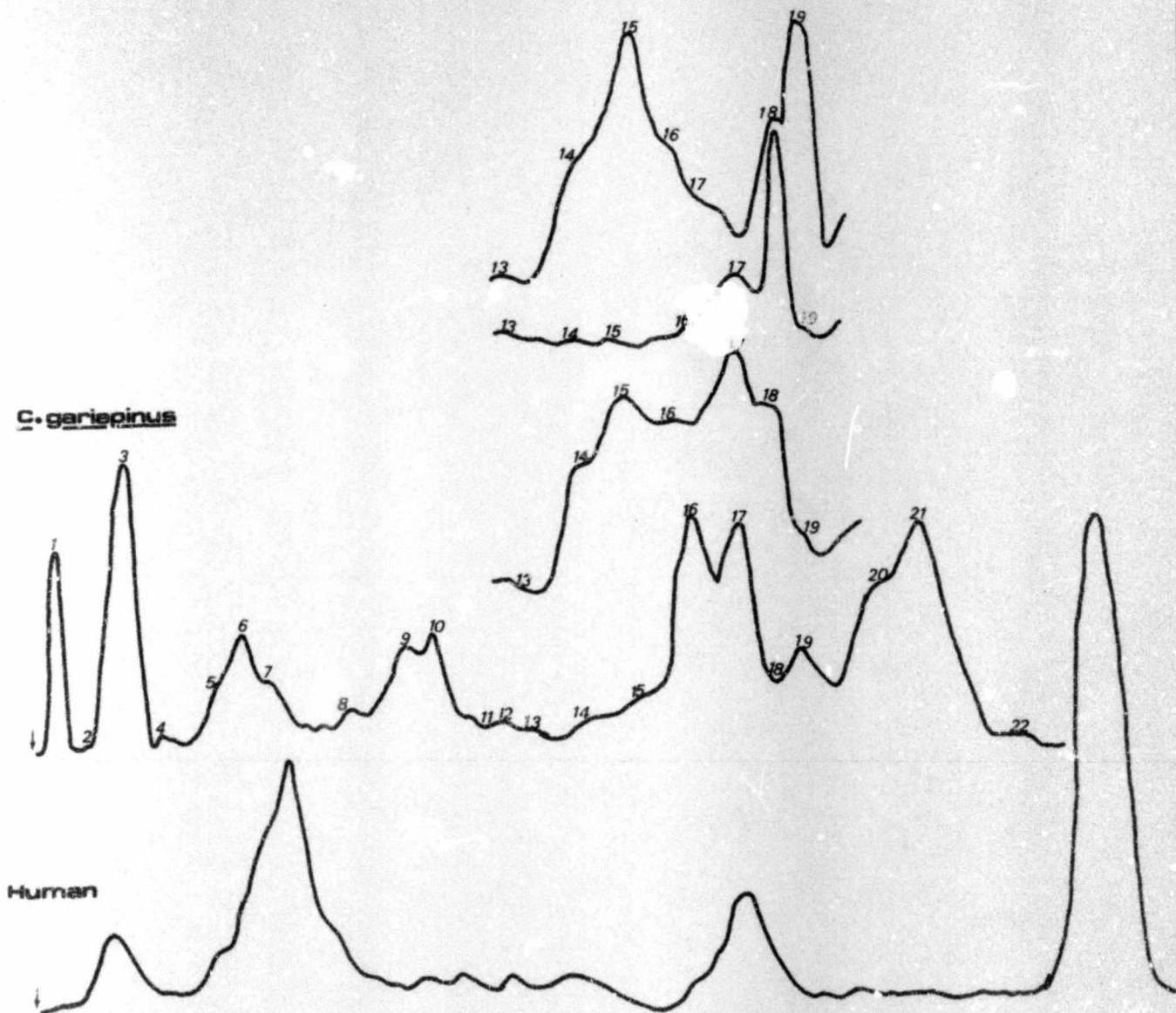


Fig. 6. Typical polyacrylamide gel electrophoresis of C. gariepinus plasma compared to that of the human. Origin on left. Variations in the pattern are observed in fractions 14 - 19.

TABLE 7

C. carlepinus
Gel electrophoresis

Fractions (slowest to fastest)																						
Protein %																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	1.5	3.0	3.7	2.3	7.5	3.0	3.0	2.3	2.3	3.7	2.3	2.3	3.0	6.1	5.3	7.5	9.0	3.7	3.7	19.6	17.3	1.5
2	1.8	1.8	2.4	1.2	1.6	1.2	1.8	1.8	1.8	4.8	2.4	2.4	2.4	3.0	4.8	1.3	4.8	4.2	14.3	7.8	17.3	3.0
3	1.2	3.7	4.4	1.2	1.2	2.5	1.2	1.9	3.7	3.7	3.1	1.9	2.5	3.1	4.4	8.7	5.6	3.7	9.3	9.3	19.9	2.5
4	1.8	3.5	4.1	0.6	1.4	2.1	1.4	2.1	4.8	4.1	2.7	2.4	2.1	2.7	3.5	8.9	5.9	7.1	7.1	3.5	17.8	2.4
5	1.4	4.1	2.1	1.4	1.4	2.1	1.4	2.1	4.8	4.1	2.7	2.4	2.1	2.7	3.5	8.9	5.9	7.1	7.1	3.5	17.8	2.4
6	0.9	3.5	1.7	0.9	0.9	2.2	0.9	1.3	3.1	3.5	1.3	1.7	2.2	3.0	5.1	5.6	3.5	3.0	8.7	24.3	1.7	
7	2.4	6.1	3.1	1.8	1.2	1.8	3.1	4.3	3.1	4.3	1.2	1.2	1.6	3.1	4.4	4.4	6.7	3.5	3.0	8.7	24.3	1.7
8	3.1	5.4	1.5	2.3	1.5	3.1	2.3	3.8	3.1	2.3	2.3	2.0	2.5	3.1	3.5	3.6	6.9	6.9	11.0	22.0	1.8	
9	2.6	4.6	11.8	2.0	2.6	2.6	3.2	3.1	3.3	3.3	1.9	2.0	2.5	3.1	3.9	3.9	7.2	7.2	11.0	22.0	1.5	
10	4.1	6.3	2.5	1.3	1.5	1.7	2.9	3.7	3.3	3.3	1.9	1.7	2.9	5.1	1.8	3.2	6.3	7.0	11.4	46.3	3.9	
11	3.0	6.6	1.8	1.2	1.8	1.7	2.9	3.7	3.0	3.6	2.2	2.4	2.7	2.9	5.0	3.4	5.8	5.4	8.5	14.5	22.8	2.9
12	2.2	11.4	2.2	1.6	2.2	2.7	1.6	4.4	4.4	2.7	2.2	2.2	2.6	3.8	3.8	5.4	8.4	5.4	4.9	22.3	3.3	
13	2.0	9.0	2.5	1.5	1.5	2.0	2.5	4.0	2.5	4.0	2.2	1.5	2.0	3.8	3.8	5.4	8.4	5.4	4.9	22.3	3.3	
14	1.9	4.6	4.6	0.9	1.9	2.8	2.8	4.6	4.6	1.9	1.9	1.9	1.9	3.8	3.8	5.4	8.4	5.4	4.9	22.3	3.3	
15	1.3	7.5	3.6	0.6	1.3	2.9	3.6	3.6	3.6	1.3	1.3	1.3	1.3	3.8	3.8	5.4	8.4	5.4	4.9	22.3	3.3	
16	1.6	9.6	3.6	0.8	1.6	3.6	3.6	3.6	3.6	1.6	1.6	1.6	1.6	3.8	3.8	5.4	8.4	5.4	4.9	22.3	3.3	
17	2.7	6.2	2.7	1.4	0.7	2.2	2.2	2.4	2.4	2.4	1.4	1.4	1.4	3.1	3.1	7.1	7.1	7.1	13.4	22.9	2.4	
18	2.7	6.2	2.7	1.4	0.7	2.2	2.2	2.4	2.4	2.4	1.4	1.4	1.4	3.1	3.1	7.1	7.1	7.1	13.4	22.9	2.4	
19	1.9	1.9	5.8	4.4	1.7	2.2	2.2	3.5	4.4	2.8	1.7	1.7	1.7	5.5	3.9	7.2	6.1	8.3	12.7	16.9	2.2	
20	1.9	1.9	5.8	4.4	1.7	2.2	2.2	3.5	4.4	2.8	1.7	1.7	1.7	5.5	3.9	7.2	6.1	8.3	12.7	16.9	2.2	
21	1.8	6.0	6.0	1.2	1.2	1.8	1.8	1.8	3.0	3.0	1.8	1.8	1.8	3.0	3.0	7.2	7.2	13.9	9.1	19.3	1.2	
Mean	2.1	6.1	3.6	1.3	1.8	2.3	2.0	2.9	3.4	3.4	2.0	1.8	2.2	3.0	4.9	4.4	7.0	5.5	7.1	11.5	19.8	2.4

Distance from point of application (mm)																					
1,5	2,5	3,0	3,5	4,5	5,0	6,5	9,0	11,0	12,0	13,5	15,5	17,0	20,0	21,5	23,0	25,5	28,5	30,5	36,5	39,0	43,0

Relative mobility %																					
3	6	7	8	10	12	15	21	25	28	31	36	40	46	50	54	59	66	71	85	91	100

Fractions (slowest to fastest)																						
Protein mg/ml																						
1	0.45	0.96	1.19	0.73	0.45	0.96	0.96	0.73	0.73	1.19	0.73	0.73	0.96	1.96	1.70	2.40	2.38	1.19	1.19	6.25	5.55	0.45
2	0.94	0.94	1.25	0.62	0.94	0.62	0.94	0.94	0.94	2.49	1.25	1.25	1.56	2.49	5.88	2.49	2.49	2.19	7.44	4.06	9.00	1.56
3	0.43	1.33	1.59	0.43	0.43	0.91	0.43	0.91	0.43	0.68	1.33	1.33	1.33	1.12	0.68	1.33	1.33	1.33	7.44	3.35	7.16	0.91
4	0.36	0.95	1.11	0.16	0.36	0.54	0.36	0.54	0.95	1.47	0.82	0.65	1.28	0.95	2.42	1.61	1.93	1.93	0.95	2.42	4.64	0.65
5	0.36	1.05	0.54	0.36	0.54	0.36	0.54	1.23	1.05	0.69	0.54	0.54	0.54	0.69	1.23	1.41	3.86	1.05	0.87	2.28	5.47	0.69
6	0.28	1.11	0.54	0.28	0.28	0.54	0.28	0.54	1.64	1.11	0.41	0.54	0.54	0.95	1.93	1.77	5.90	1.05	1.11	2.75	7.68	0.41
7	0.82	2.07	1.05	0.61	0.41	0.61	1.05	1.46	1.05	1.46	0.78	0.51	0.51	0.78	1.05	1.87	1.46	1.46	2.29	2.08	3.93	0.61
8	1.05	1.84	1.05	0.78	0.51	0.51	1.05	1.46	1.05	1.46	0.78	0.51	0.51	0.78	1.05	1.87	1.46	1.46	2.29	2.08	3.93	0.61
9	0.59	1.22	3.12	0.33	0.69	0.69	0.69	0.87	0.87	0.34	0.53	0.53	0.53	0.69	0.87	1.03	1.03	1.91	1.54	3.74	6.80	0.51
10	1.23	1.77	0.70	0.36	0.70	0.99	0.89	0.89	1.23	0.39	0.53	0.53	0.53	0.69	0.87	1.03	1.03	1.91	1.54	3.74	6.80	0.51
11	0.26	2.55	0.77	0.37	0.52	0.52	0.89	1.4	1.02	1.02	0.37	0.52	0.52	0.69	0.87	1.03	1.03	1.91	1.54	3.74	6.80	0.51
12	0.57	1.48	0.40	0.27	0.40	0.61	0.40	0.54	0.67	0.61	0.54	0.54	0.54	0.61	0.81	1.08	1.08	1.21	1.99	4.68	7.03	0.67
13	0.55	3.37	0.60	0.47	0.65	0.80	0.47	1.31	1.31	0.89	0.65	0.65	0.67	0.80	1.13	1.15	1.60	1.78	1.60	1.45	6.60	0.96
14	0.64	2.63	0.60	0.46	0.63	0.82	0.46	0.64	0.80	1.28	0.64	0.64	0.64	0.82	1.08	1.12	2.56	1.28	2.08	1.46	6.60	0.96
15	1.23	2.94	2.94	0.57	1.23	1.23	1.23	1.23	1.28	1.28	1.22	1.22	1.22	1.22	1.81	1.80	2.94	2.37	7.28	10.8	12.5	1.22
16	0.64	2.68	1.13	0.21	0.46	0.59	0.46	0.59	1.34	0.86	0.67	0.46	0.67	0.67	1.34	1.34	3.34	3.71	4.69	6.89	6.23	0.68
17	0.22	2.89	0.53	0.19	0.19	0.22	0.22	0.32	0.57	0.32	0.22	0.19	0.19	0.32	0.42	0.42	1.97	1.77	0.57	1.82	7.10	0.32
18	0.89	2.04	0.89	0.46	0.23	0.46	0.23	0.46	0.69	1.12	0.46	0.46	0.46	0.46	1.35	1.12	2.88	4.07	1.35	3.65	7.45	0.63
19	0.12	2.54	1.27	0.49	0.49	0.63	0.63	0.95	1.27	0.81	0.49	0.49	0.49	0.49	1.59	1.2	2.08	1.76	2.39	3.65	7.45	0.63
20	0.52	2.12	1.06	0.16	0.52	0.35	0.35	0.71	1.06	1.1	0.52	0.35	0.35	0.35	0.87	1.06	1.23	1.61	1.77	2.1	7.60	0.71
21	0.53	2.12	2.12	0.42	0.42	0.63	0.63	0.63	1.06	1.06	0.63	0.63	0.63	0.63	1.06	1.06	2.54	2.54	4.89	3.2	7.60	0.42
Mean	0.68	1.87	1.15	0.43	0.51	0.65	0.56	0.95	1.04	1.04	0.65	0.59	0.72	0.94	1.57	1.40	2.19	1.73	2.40	3.32	5.83	0.75

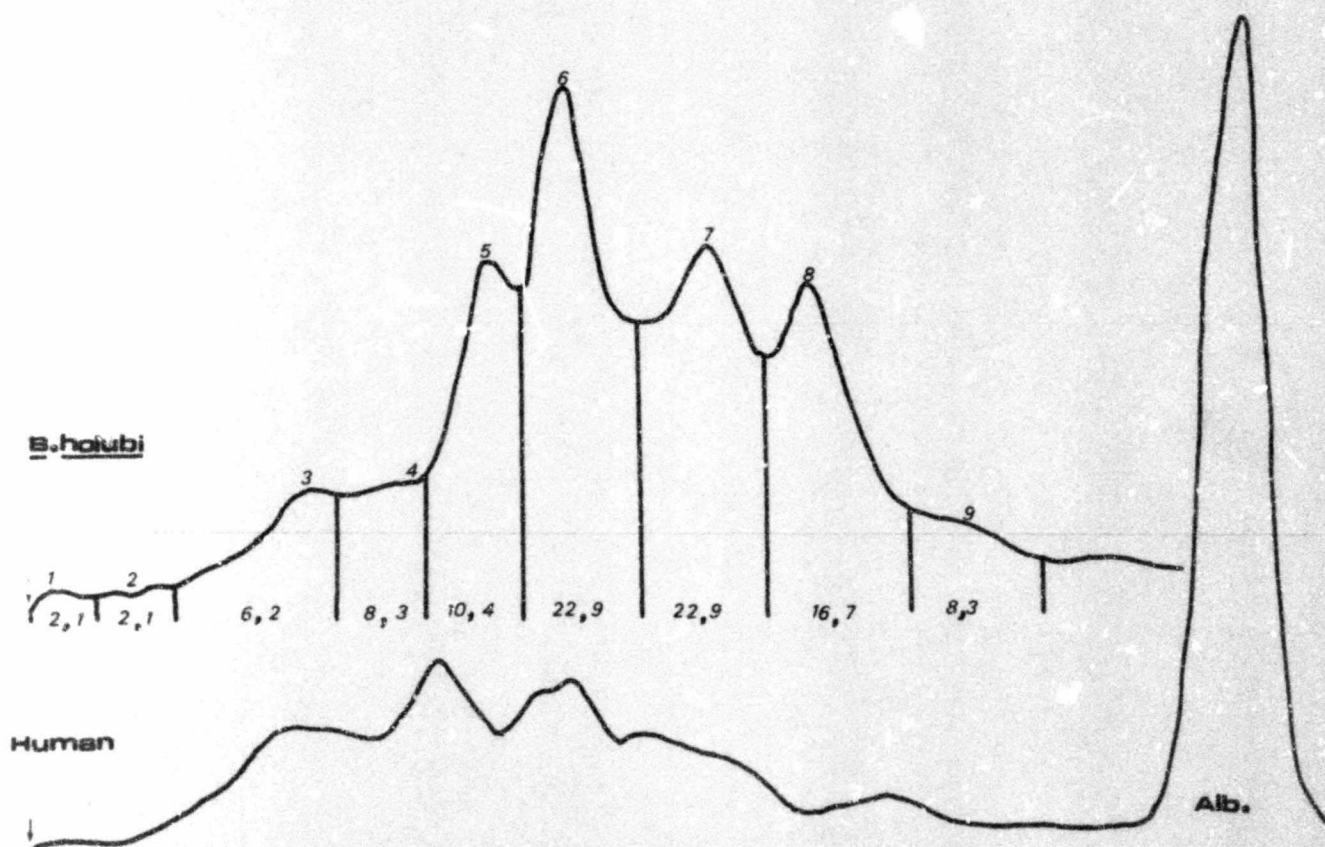


Fig. 7. Typical paper electrophoretogram of B. holubi and human plasma proteins. Origin on the left. Percentage protein indicated under curve.

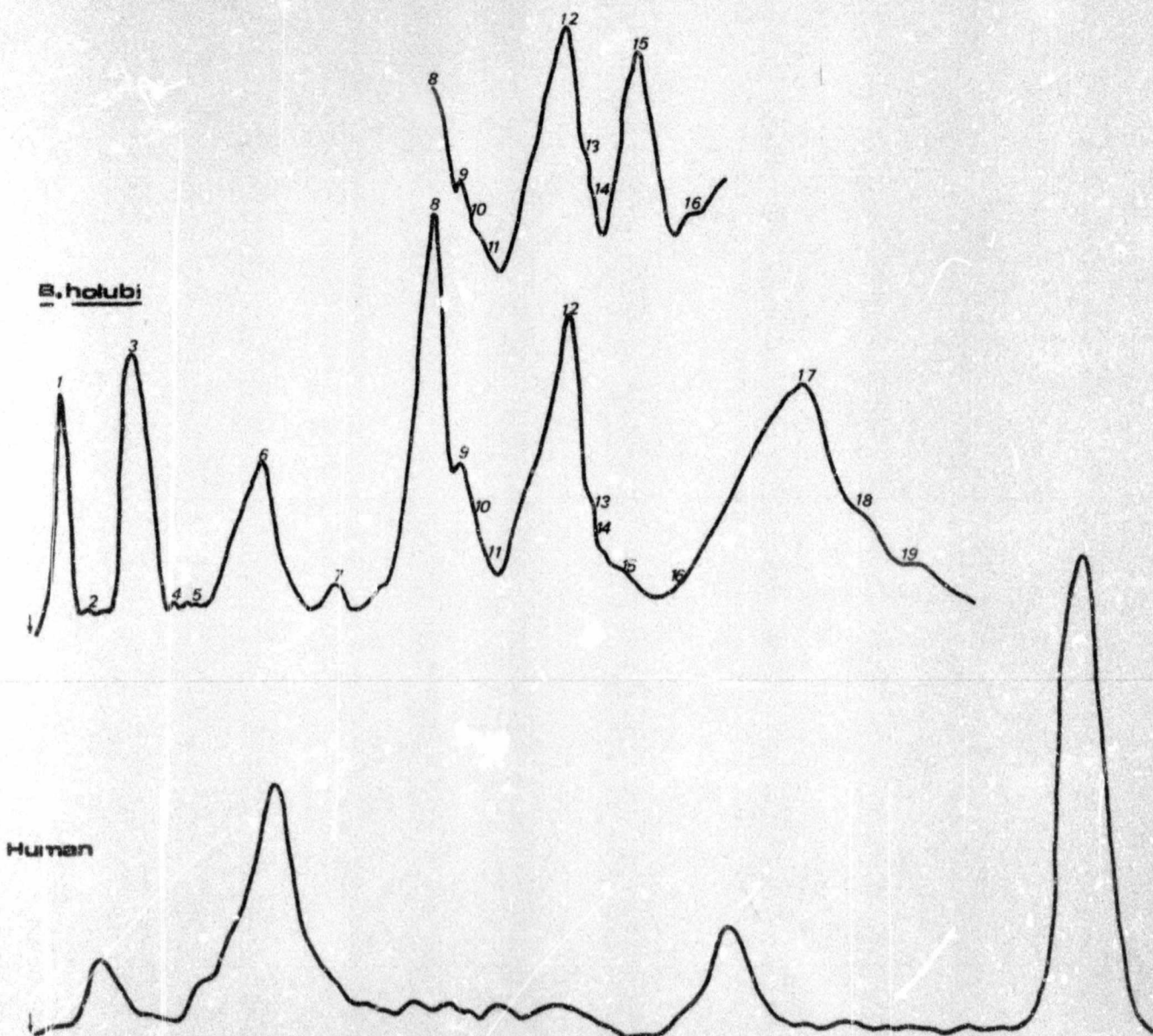


Fig. 8. Typical polyacrylamide gel electrophoresis of B. holubi plasma compared to that of the human. Origin on left. Variations are observed in fraction 15.

TABLE 9

Barbus holubiGel electrophoresis

Fractions (slowest to fastest)																			
Protein %																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1	4.4	2.7	2.2	2.2	4.4	2.2	5.5	3.3	2.2	2.2	15.4	3.3	2.2	2.2	7.7	31.9	2.2	2.2	
2	4.0	2.7	1.3	2.2	4.0	4.0	5.5	6.7	5.3	4.0	6.7	3.3	4.0	2.7	8.0	25.3	2.7	2.7	
3	3.0	1.5	3.0	2.2	5.2	2.2	5.2	3.7	1.5	1.5	8.2	5.9	3.7	3.0	10.4	28.2	8.2	3.0	
4	8.3	0.9	2.8	2.8	5.5	3.7	9.2	1.8	1.8	1.8	8.3	1.8	3.7	2.8	11.9	24.8	3.7	1.8	
5	5.2	1.2	4.6	2.1	6.4	3.5	7.5	1.7	1.7	1.7	6.4	1.7	1.7	9.8	5.2	31.8	6.9	1.2	
6	5.5	2.1	3.5	2.1	6.2	2.8	4.2	2.5	2.5	1.4	5.5	3.5	3.5	9.7	9.0	11.1	2.8		
7	4.8	1.4	5.8	1.4	5.5	1.4	7.1	2.1	1.4	1.4	11.1	4.7	2.1	2.6	10.3	30.2	7.5	1.4	
8	2.1	1.6	4.8	1.1	4.2	3.7	7.9	3.1	1.1	1.1	5.4	2.7	2.1	2.6	4.7	33.6	6.8	1.1	
9	3.5	1.2	2.9	1.2	8.1	2.9	5.8	2.9	1.7	1.7	2.6	4.2	2.9	8.9	5.2	31.3	10.4	0.6	
10	2.1	1.1	2.6	1.1	1.6	3.2	6.9	2.6	1.6	2.6	4.9	3.1	2.6	8.9	3.2	36.4	6.9	1.1	
11	6.2	1.8	5.5	1.2	5.2	2.5	5.2	3.1	1.2	1.8	4.9	3.1	5.5	2.5	11.7	28.6	5.5	1.2	
12	4.9	1.6	2.5	1.6	6.6	3.3	13.1	4.1	1.6	1.6	7.4	1.6	2.5	10.6	9.8	13.9	9.0	1.6	
Mean	4.5	1.6	3.5	1.5	2.4	5.7	7.0	7.0	1.9	1.9	7.4	3.5	3.0	5.8	7.5	27.8	6.7	2.0	
Distance from point of application (mm)																			
0.5	1.0	2.5	3.0	4.0	5.5	7.0	10.0	11.5	12.0	14.0	15.5	16.5	18.0	21.5	23.5	31.0	38.0	42.0	
Relative mobility %																			
1	2	6	7	10	13	17	24	27	29	33	37	39	43	51	56	74	90	100	
1	0.58	0.29	0.28	0.29	0.58	0.29	0.73	0.43	0.29	0.29	2.03	0.43	0.29	0.29	1.02	4.20	0.29	0.29	
2	0.48	0.32	0.16	0.16	0.32	0.48	0.64	0.81	0.64	0.48	0.81	0.81	0.48	0.32	0.96	3.03	0.32	0.32	
3	0.67	0.34	0.67	0.16	0.49	0.49	1.17	0.83	0.34	0.34	1.84	1.32	0.83	0.67	2.33	6.31	1.84	0.67	
4	1.09	0.12	0.37	0.37	0.73	0.49	1.22	0.24	0.24	0.24	1.09	0.24	0.49	0.37	1.57	3.27	0.49	0.24	
5	1.42	0.33	1.25	0.33	1.74	0.95	2.01	0.46	0.46	0.46	1.74	0.46	0.46	2.67	1.42	8.65	1.88	0.33	
6	0.75	0.29	0.48	0.29	0.84	0.38	0.57	0.38	0.29	0.19	0.75	0.48	0.48	1.32	1.22	2.91	1.51	0.38	
7	1.04	0.30	1.04	0.30	1.19	0.30	1.53	0.45	0.30	0.30	1.34	0.56	0.56	1.62	2.23	6.53	1.62	0.30	
8	0.51	0.39	1.41	0.27	0.39	1.02	1.92	0.75	0.27	0.27	2.69	1.14	0.51	0.63	1.14	8.18	1.63	0.27	
9	1.21	0.41	1.00	0.41	0.79	1.00	2.00	1.00	0.58	0.58	2.21	0.79	1.00	2.38	1.79	10.88	3.58	0.41	
10	0.58	0.20	0.72	0.30	0.44	0.68	1.91	0.72	0.44	0.72	0.72	1.16	0.72	2.46	0.88	10.01	1.91	0.30	
11	1.71	0.50	1.52	0.33	0.50	1.71	3.71	0.85	0.33	0.50	1.35	0.85	1.52	2.69	3.21	6.77	1.52	0.33	
12	1.41	0.46	0.72	0.46	1.90	1.18	3.77	1.18	0.46	0.46	2.13	0.46	0.72	3.05	2.62	4.00	2.59	0.46	
Mean	0.95	0.34	0.80	0.31	0.54	1.32	1.60	0.68	0.39	0.40	1.56	0.73	0.66	1.37	1.72	6.23	1.60	0.34	

Fish 11 - fraction 7a; % protein - 7.7;
1.02 protein mg/ml; relative mobility 19%

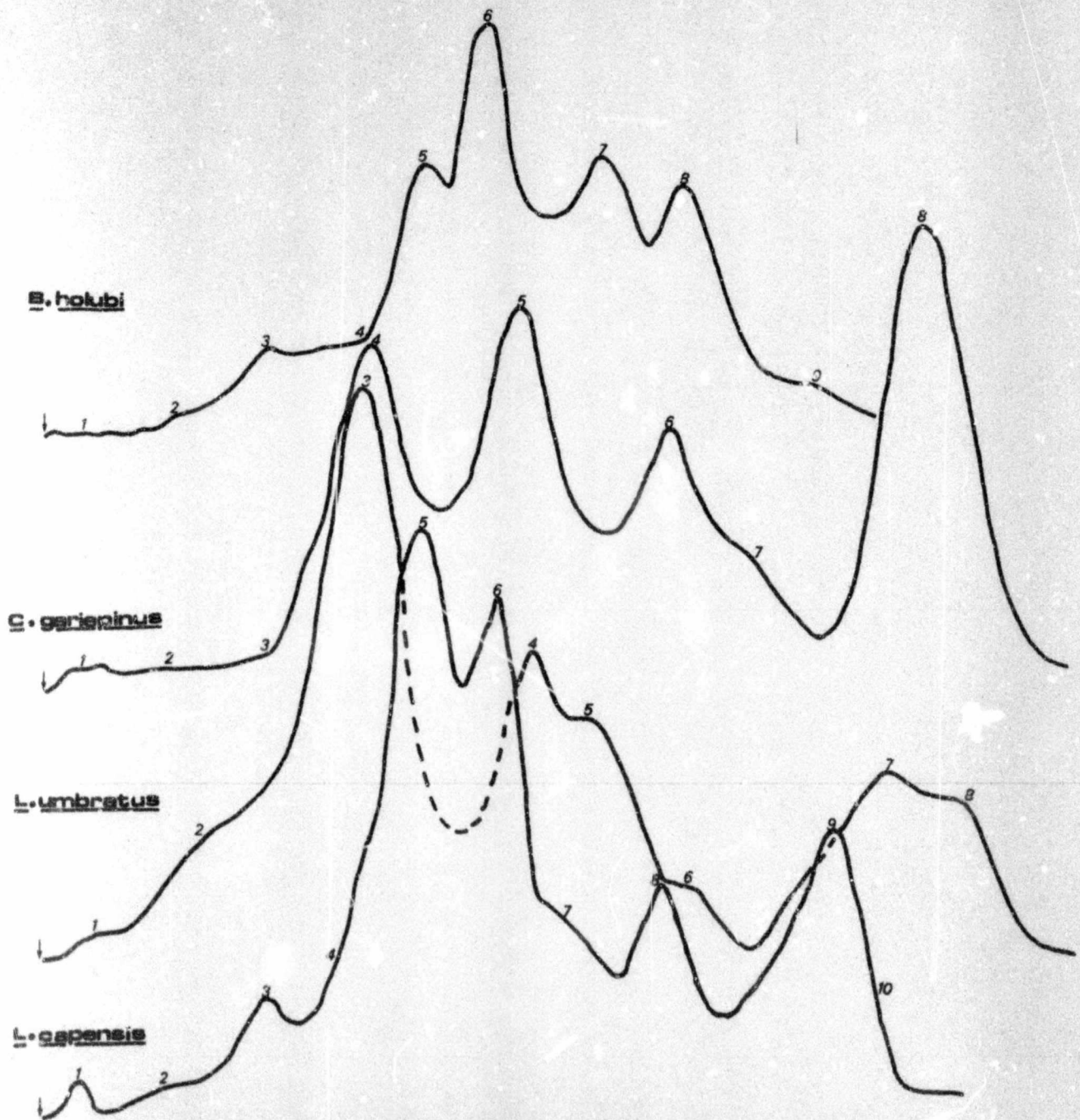


Fig. 9. Comparative summary of paper electrophoretic patterns of the species investigated. Origin on left.

TABLE 10

Summary Table

Paper: electrophoresis

Distance from point of application (mm)	Fractions (slowest to fastest)											Hematocrit %	Plasma Protein mg/ml	Species			
											Sex ratio						
	No. fish investigated	1	2	3	4	5	6	7	8	9					10		
Relative mobility	0,5	2,0	4,0	5,5	7,5	10,0	11,5	15,0	17,5	19,0	22	13 m	9 f	30,6 ± 6,9	35,9 ± 7,4	L. capensis	
	0,5	2,0	4,0	6,0	9,0	10,0	12,5	15,0	18,5	20,5	16	6 m	10 f	28,4 ± 3,8	30,3 ± 4,4	L. umbratus	
	0,5	3,5	6,5	9,5	12,0	13,0	14,0	19,0	-	-	21	4 m	17 f	28,7 ± 4,1	32,3 ± 10,1	C. gariepinus	
	0,5	2,5	5,5	7,0	8,5	10,0	12,0	14,5	16,0	-	12	6 m	6 f	28,9 ± 5,6	22,2 ± 7,5	B. holubi	
Protein concentration mg/ml	2,6	10,5	21,1	34,3	39,5	52,7	60,5	79,0	92,5	100				m: 31,94 f: 28,31	m: 37,10 f: 34,31	L. capensis	
	2	10	20	29	44	49	51	73	90	100				m: 27,73 f: 28,76	m: 27,67 f: 31,67	L. ur	
	2,5	18,0	33,0	49	62	67	72	100	-	-				m: 34,3 f: 27,41	m: 35,20 f: 31,62	C. gariepinus	
	3	16	34	44	53	63	75	90	100	-				m: 31,20 f: 22,93	m: 22,17 f: 22,13	B. holubi	
Protein concentration mg/ml	2,2	2,7	7,7	8,3	20,9	19,1	9,7	11,9	12,6								L. capensis
	2,6	8,6	10,8	28,7	12,7	13,9	10,0	6,9	13,5								L. umbratus
	1,8	3,4	10,9	20,2	16,8	11,0	4,7	31,2	-	-							C. gariepinus
	2,7	4,5	7,4	7,7	15,1	19,5	15,8	16,7	9,6	-							B. holubi
Protein concentration mg/ml	0,76	0,96	2,77	2,95	7,94	6,94	3,32	4,33	4,59	1,27							L. capensis
	0,79	2,60	3,26	8,60	3,85	4,22	3,16	2,06	4,08	2,58							L. umbratus
	0,63	1,24	3,53	6,79	5,26	3,80	1,50	10,22	-	-							C. gariepinus
	0,44	0,77	1,28	1,39	2,82	3,72	2,97	3,25	1,62	-							B. holubi

Remarks

*1) L. umbratus usually only has 8 fractions. In 30% of fish

fractions 3 and 5 (fractions 2a and 3a in table 5) are found and are therefore included.

2) Human plasma albumin migrated 23,5 mm under the same conditions.

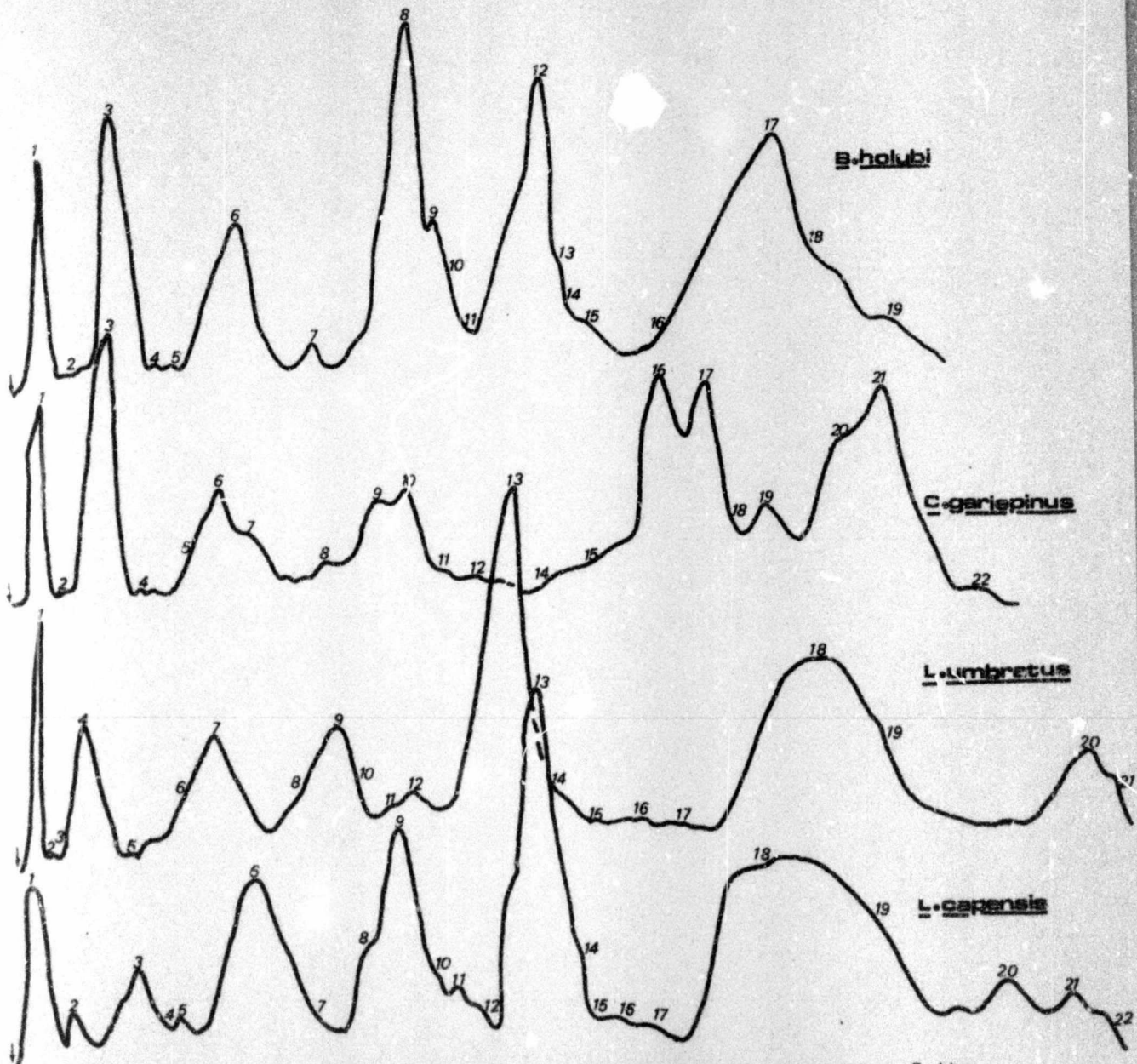


Fig. 10. Comparative summary of gel electrophoretic patterns of the species investigated. Origin on left.

TABLE 11

Summary table

Gel electrophoresis

Distance from point of application mm.	Fractions (slowest to fastest)																						Species
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
	0,5	1,5	2,5	3,0	5,5	7,0	7,5	11,5	14,0	16,0	17,5	18,5	20,0	22,5	24,5	28,0	32,5	37,5	46,0	52,0	54,0	56,0	
	0,5	2,0	3,0	3,5	4,5	6,5	8,0	11,0	13,0	15,5	17,0	18,0	21,0	22,0	26,0	27,5	32,0	36,0	41,0	52	55	-	
	1,5	2,5	3,0	3,5	4,5	5,0	6,5	9,0	11,0	12,0	13,5	15,5	17,0	20,0	21,5	23,0	25,5	28,5	30,5	36,5	39,0	43,0	
	0,5	1,0	2,5	3,0	4,0	5,5	7,0	10,0	11,5	12,0	14,0	15,5	16,5	18,0	21,5	23,5	31,0	38,0	42,0	-	-	-	
Relative mobility	1	3	4	5	10	12	13	20	25	29	31	33	36	40	44	50	58	67	82	93	96	100	
	1	4	5	6	8	12	15	20	24	28	31	33	38	40	48	50	58	65	75	94	100	-	
	3	6	7	8	10	12	15	21	25	28	31	36	40	46	50	54	59	66	71	85	91	100	
	1	2	6	7	10	13	17	24	27	29	33	37	39	43	51	56	74	90	100	-	-	-	
Protein concentration mg/ml	3,8	1,4	3,5	1,7	2,6	4,8	2,5	3,2	7,2	1,9	1,9	2,2	8,0	5,9	3,7	3,8	2,7	21,7	4,4	4,9	2,7	2,6	
	2,9	1,6	2,0	3,3	1,2	2,8	4,9	2,9	4,9	1,7	2,4	2,1	11,1	3,9	4,8	4,3	5,0	23,4	5,4	5,3	4,8	-	
	2,1	6,1	3,6	1,3	1,6	2,3	2,0	2,9	3,4	3,4	2,0	1,8	2,2	3,0	4,9	4,4	7,0	5,5	7,1	11,5	19,8	2,4	
	4,5	1,6	3,5	1,5	2,4	5,7	3,0	7,0	7,0	1,9	1,9	7,4	3,5	3,0	5,8	7,5	27,8	6,7	2,0	-	-	-	
	1,30	0,50	1,29	0,64	0,89	1,71	0,90	1,15	2,60	0,68	0,68	0,78	2,90	2,09	1,25	1,38	0,97	7,99	1,60	1,78	0,93	0,89	
	0,88	0,47	0,62	1,00	0,37	0,85	1,50	0,87	1,50	0,54	0,71	0,62	3,34	1,24	1,45	1,31	1,51	7,03	1,65	1,60	1,47	-	
	0,68	1,87	1,15	0,43	0,51	0,65	0,58	0,95	1,04	1,08	0,65	0,59	0,72	0,99	1,57	1,40	2,19	1,73	2,40	3,32	5,83	0,75	
	0,95	0,34	0,80	0,31	0,54	1,32	0,65	1,60	0,68	0,39	0,40	1,56	0,73	0,66	1,37	1,72	6,23	1,60	0,34	-	-	-	

Remarks 1) Human plasma albumin migrated 50,0 mm under the same conditions.

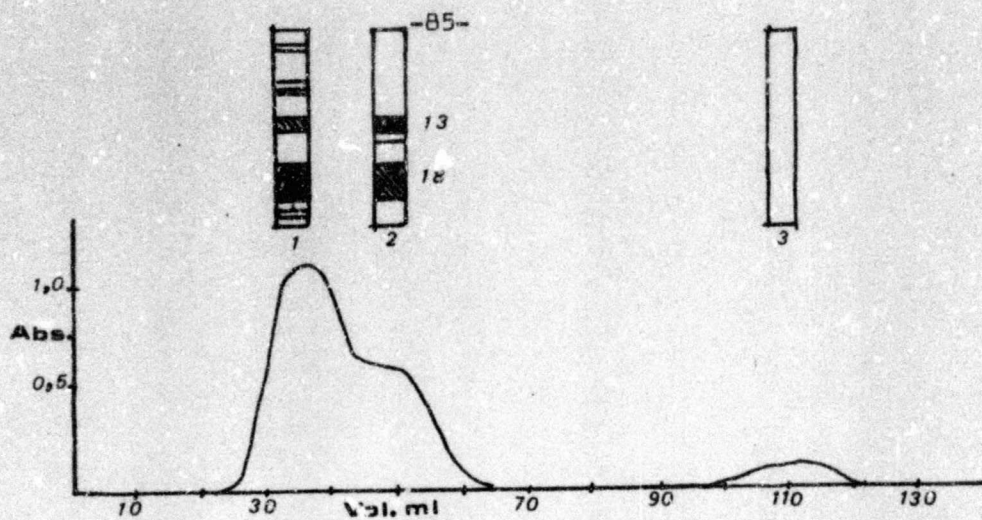


Fig. 12. Elution pattern of L. umbratus protein on SEphadex G-100.
Tris-HCl buffer, pH 7,5.

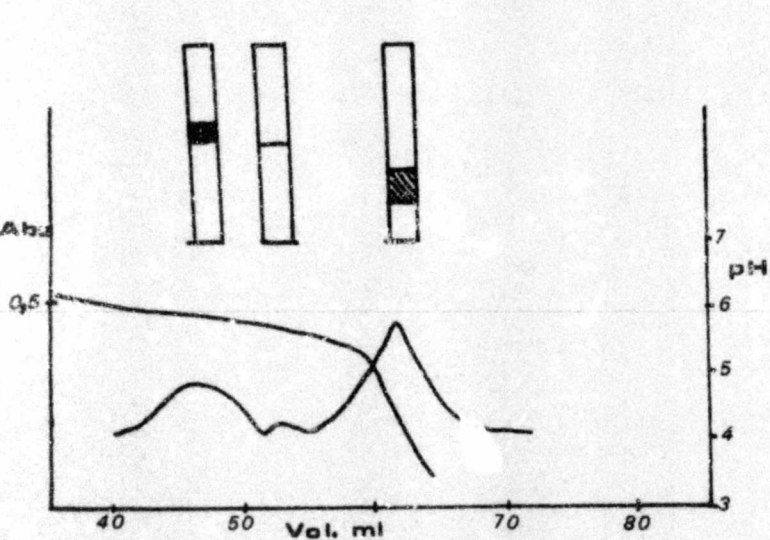


Fig. 13. Isoelectric focusing of
sample 2 in fig. 12.

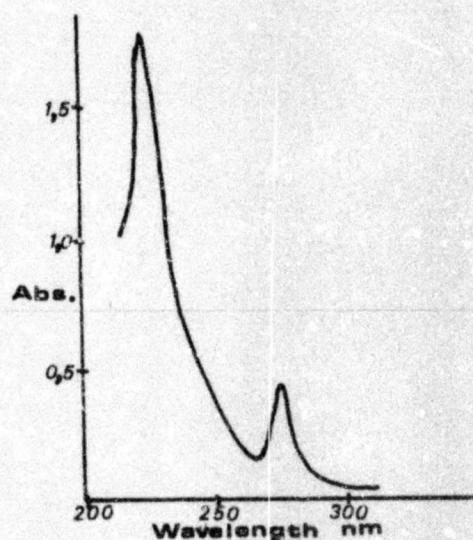


Fig. 14. Absorption spectrum of
fraction 13.

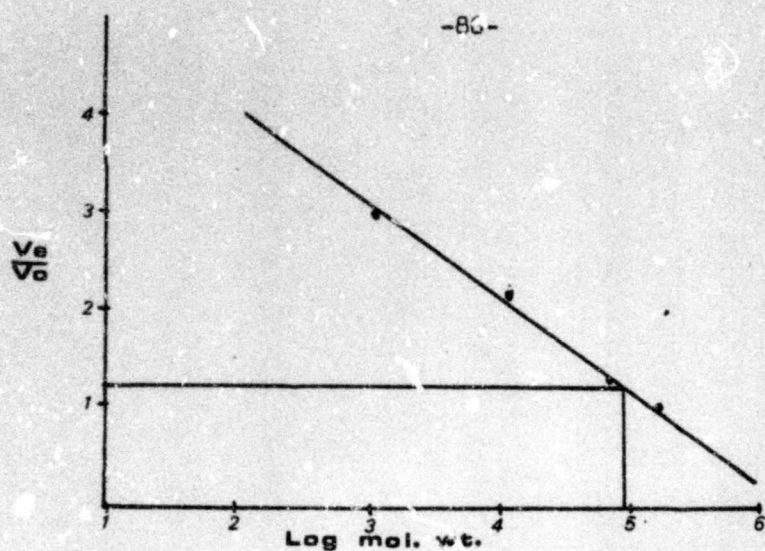


Fig. 15. Molecular weight determination of fraction 13 according to the method of Andrews.

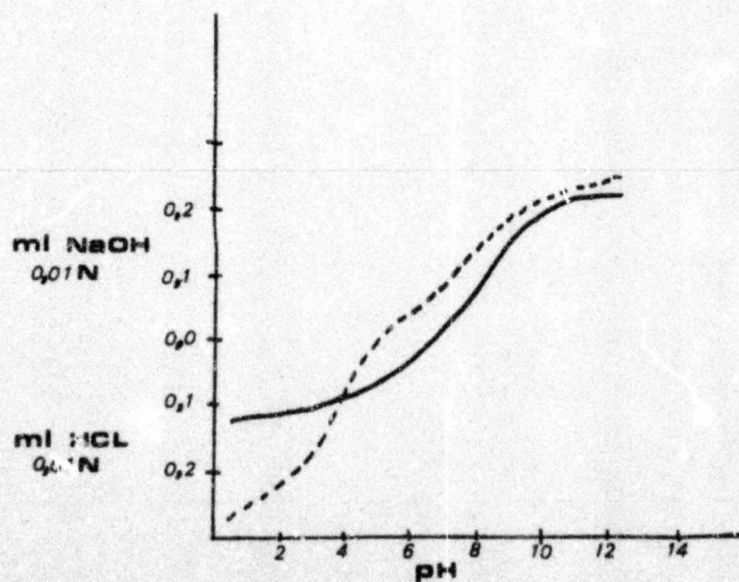


Fig. 16. Titration curves of fraction 13 (dashed line) and bovine albumin.

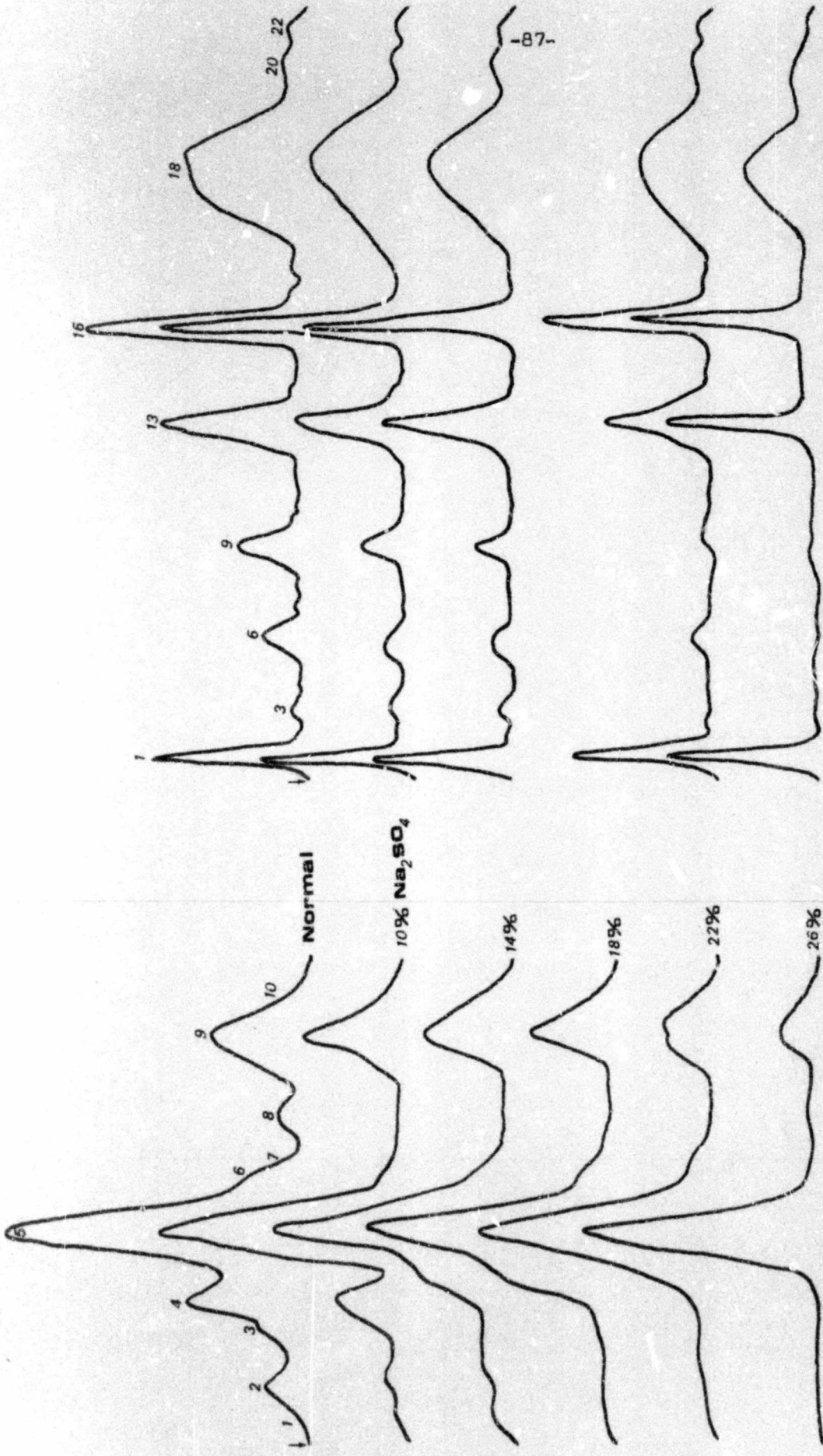


Fig. 17. Precipitation of L. capensis proteins with Na₂SO₄. Paper electrophoresis on the left and gel electrophoresis on the right.

Author Hattingh Johann

Name of thesis A comparative study of the plasma proteins of some Transvaal freshwater fish. 1973

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