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APPENDICES

Appendix A

Calibration Curve

The concentration versus absorbance data of doxorubicin (DOX) in phosphate buffer pH 7.4 at 480 nm are presented in Table 1A. They show a linear relationship with the correlation coefficient = 0.997

Table 1A Absorbance of DOX in phosphate buffer solution pH 7.4 determined at 480 nm

Concentration of DOX in phosphate buffer solution pH 7.4 ($\mu\text{g/ml}$)	Absorbance
0	0.000
1	0.015
5	0.031
10	0.057
25	0.107
50	0.182
75	0.270
100	0.341

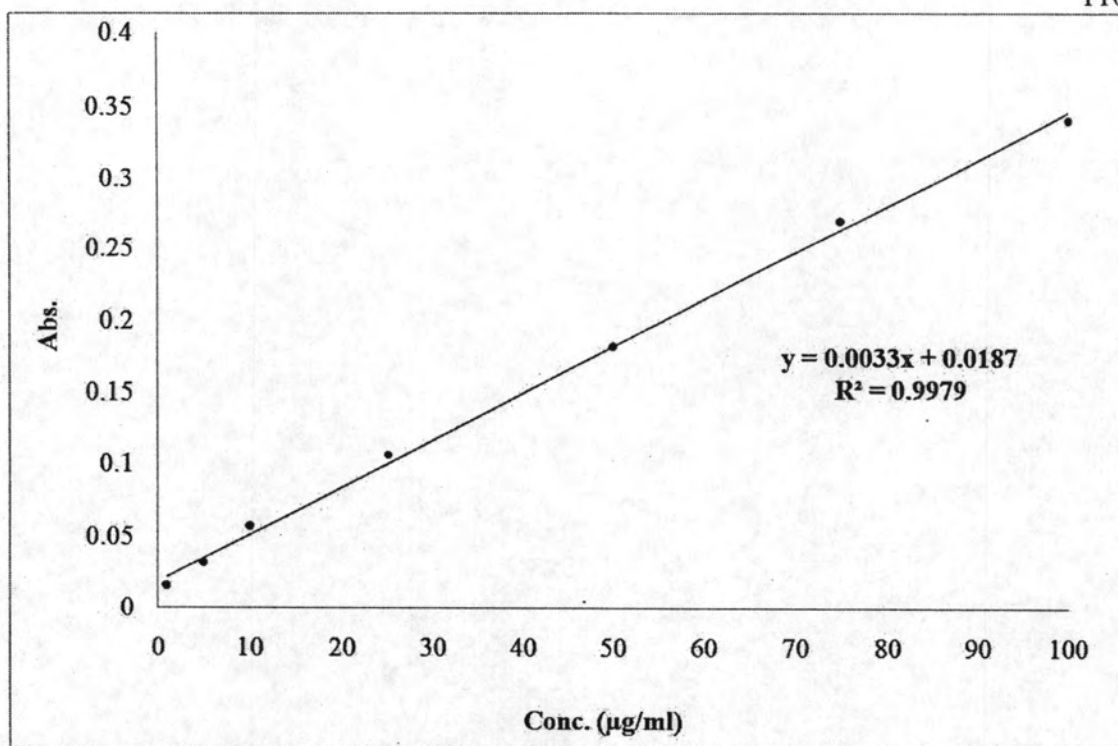


Figure 1A Standard calibration curve of absorbance of DOX in phosphate buffer solution pH 7.4

Appendix B

Cumulative Drug Release

Table 1B Cumulative 0.25% DOX release from CS nanoparticles

Time (h)	% Cumulative DOX release				
	1	2	3	Mean	SD
0.5	0.0000	0.0000	0.0815	0.0272	0.0471
1	0.8152	0.8152	1.6308	1.0871	0.4709
2	1.6345	1.6345	3.2694	2.1795	0.9439
3	3.2731	4.9035	5.7314	4.6360	1.2508
4	4.9198	5.7432	5.7599	5.4743	0.4803
5	13.9117	15.5543	15.5711	15.0124	0.9533
6	17.2418	19.7079	21.3550	19.4349	2.0701
7	18.9579	22.2514	23.0914	21.4336	2.1848
8	26.3886	27.2527	28.0969	27.2461	0.8542
24	34.6712	36.3546	38.0181	36.3480	1.6734
48	45.4402	46.3166	47.1730	46.3099	0.8664
72	57.0774	59.5883	57.1879	57.9512	1.4188
96	65.5109	68.0340	71.3279	68.2909	2.9170
120	75.6155	77.3356	80.6458	77.8656	2.5567
144	84.1386	85.8668	89.1933	86.3996	2.5691
168	92.7024	96.0693	99.4121	96.0613	3.3548
192	98.0462	99.7989	102.3424	100.0000	2.1602

Table 2B Cumulative 0.5% DOX release from CS nanoparticles

Time (h)	% Cumulative DOX release				
	1	2	3	Mean	SD
0.5	2.4691	2.4691	3.2922	2.7435	0.4752
1	3.7160	3.3045	4.5432	3.8546	0.6309
2	6.6152	6.6132	7.8580	7.0288	0.7181
3	8.7058	10.7613	12.4239	10.6303	1.8625
4	16.5679	19.0453	20.3045	18.6392	1.9011
5	25.7037	29.4280	28.2243	27.7853	1.9005
6	28.7119	36.1584	34.9486	33.2730	3.9960
7	35.0267	38.8066	38.8251	37.5528	2.1877
8	38.4918	40.6440	40.2510	39.7956	1.1461
24	44.0309	45.3704	44.5638	44.6550	0.6744
48	51.6543	53.0000	51.3663	52.0069	0.8721
72	64.2531	66.0165	62.7284	64.3326	1.6455
96	73.6214	74.5700	73.3230	73.8381	0.6511
120	83.8580	86.4568	86.4383	85.5844	1.4951
144	96.6132	92.6399	92.6214	93.9582	2.2993
168	101.1872	97.1934	101.2860	100.0000	2.3349

Table 3B Cumulative 1.0% DOX release from CS nanoparticles

Time (h)	% Cumulative DOX release				
	1	2	3	Mean	SD
0.5	4.6154	5.0641	5.1923	4.9573	0.2473
1	5.8564	6.0510	5.7311	5.8795	0.1316
2	19.7958	20.5683	19.6058	19.9900	0.4162
3	39.2535	38.6196	39.8958	39.2563	0.5210
4	42.6542	42.8503	42.7869	42.7638	0.0817
5	45.0452	45.1782	45.1785	45.1340	0.0628
6	46.9984	47.3244	47.4529	47.2585	0.1913
7	53.5756	51.6596	50.3785	51.8713	1.3138
8	55.7615	55.7590	60.8817	57.4674	2.4143
24	61.8032	61.1596	64.3849	62.4493	1.3937
48	66.5917	70.4321	70.4683	69.1640	1.8190
72	72.0436	75.2622	75.9394	74.4151	1.6995
96	81.3673	82.0378	82.0772	81.8275	0.3258
120	89.4538	90.1276	90.1670	89.9161	0.3273
144	95.6558	95.6917	96.3721	95.9065	0.3296
168	99.3224	98.7173	100.0420	99.3606	0.5415
192	99.7769	99.8074	100.4968	100.0270	0.3324

Table 4B Cumulative DOX release from m-CS nanoparticles

Time (h)	% Cumulative DOX release				
	1	2	3	Mean	SD
0.5	1.7308	1.6667	1.9872	1.7949	0.1385
1	4.3997	4.1750	4.0484	4.2077	0.1453
2	7.3383	7.1446	7.5942	7.3590	0.1842
3	10.2595	10.1288	11.7346	10.7076	0.7281
4	14.7976	14.5381	14.9981	14.7779	0.1883
5	17.1146	16.8538	17.6365	17.2017	0.3254
6	19.9556	19.3731	20.4160	19.9149	0.4268
7	25.1822	24.3404	24.8756	24.7994	0.3479
8	30.4345	30.0372	30.7032	30.3916	0.2736
24	40.5841	40.0567	42.4567	41.0325	1.0298
48	49.5659	48.7795	49.4606	49.2686	0.3485
72	54.9377	51.0705	55.6010	53.8697	1.9978
96	57.1300	56.4487	58.4375	57.3387	0.8252
120	65.7421	63.7756	67.6971	65.7383	1.6009
144	73.1139	71.1378	73.1554	72.4691	0.9415
168	81.1620	78.5353	80.5625	80.0866	1.1239
192	87.9579	85.9596	87.9949	87.3041	0.9508
216	95.4135	93.4067	95.4522	94.7575	0.9553
240	99.6846	99.5923	101.0042	100.0937	0.6449

Table 5B Cumulative 1% DOX release from m-CS/CS (1:1 w/w) nanoparticles

Time (h)	% Cumulative DOX release				
	1	2	3	Mean	SD
0.5	0.4118	0.3922	0.7843	0.5294	0.1804
1	1.3942	1.3745	1.8667	1.5451	0.2275
2	3.9110	3.8716	4.1505	3.9777	0.1233
3	7.7344	7.7732	8.3084	7.9387	0.2619
4	10.3416	10.2629	10.9773	10.5273	0.3198
5	12.9027	12.7649	13.3063	12.9913	0.2297
6	18.0255	17.2399	20.1957	18.4870	1.2500
7	22.4284	18.3056	24.4133	21.7158	2.5439
8	25.2843	23.8860	29.0437	26.0713	2.1779
24	34.2324	31.2585	35.0692	33.5200	1.6352
48	40.4794	38.2752	41.3202	40.0249	1.2840
72	47.1490	43.5615	50.1506	46.9537	2.6935
96	52.2824	49.2654	54.5143	52.0207	2.1508
120	56.4598	54.0164	57.5261	56.0008	1.4691
144	63.5980	61.1428	66.8261	63.8557	2.3273
168	70.5745	68.8919	73.0339	70.8334	1.7009
192	77.5823	75.8919	79.6594	77.7112	1.5408
216	85.4027	82.7242	86.7030	84.9433	1.6565
240	94.0323	88.7922	96.5137	93.1127	3.2187
264	99.9388	97.0260	102.8214	99.9287	2.3660

Table 6B Cumulative 1% DOX release from m-CS/Alg (1:1 w/w) nanoparticles

Time (h)	% Cumulative DOX release				
	1	2	3	Mean	SD
0.5	0.2814	0.4762	0.2165	0.3247	0.1104
1	1.5382	1.7773	1.4513	1.5889	0.1378
2	1.9788	2.1758	1.7399	1.9648	0.1782
3	3.1791	3.2450	2.7443	3.0561	0.2222
4	3.7577	3.9776	3.7103	3.8152	0.1165
5	4.4256	4.6466	4.1616	4.4113	0.1983
6	6.6120	6.8124	6.1735	6.5326	0.2668
7	8.3547	8.7292	9.8837	8.9892	0.6507
8	12.7465	12.9714	12.5733	12.7637	0.1630
24	17.3117	19.2693	16.7047	17.7619	1.0943
48	27.1374	28.2390	23.8867	26.4210	1.8476
72	32.0335	33.1405	28.7666	31.3135	1.8568
96	38.6851	39.1480	35.1854	37.6728	1.7690
120	44.9361	47.3493	42.2850	44.8568	2.0683
144	49.9188	51.4781	46.3889	49.2619	2.1290
168	55.3582	58.6567	52.2438	55.4196	2.6184
192	61.6880	65.2182	60.0739	62.3267	2.1481
216	69.5569	70.9387	67.2864	69.2607	1.5057
240	75.2971	77.3338	74.3156	75.6488	1.2570
264	82.3570	83.9702	81.8063	82.7112	0.9182
288	89.4477	89.7687	87.3799	88.8654	1.0586
312	95.0536	95.5910	92.5444	94.3963	1.3278
336	98.0772	99.4816	96.2076	97.9221	1.3411
360	100.0229	100.1333	99.8686	100.0083	0.1086

Table 7B Cumulative 1% DOX release from CS/PLA (1:1 w/w) nanoparticles

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
0	0.0000	0.0000	0.0000	0.0000	0.0000
0.01042	14.8026	13.1579	15.4605	14.4737	1.1860
0.02083	17.3289	18.1447	18.9763	18.1500	0.8237
0.03125	19.8059	20.3026	20.7993	20.3026	0.4967
0.04167	19.8158	21.7914	21.4645	21.0239	1.0590
0.08333	22.4474	23.7711	24.7566	23.6583	1.1587
0.125	24.7605	25.4237	26.4145	25.5329	0.8324
0.16667	27.0724	28.0618	28.3947	27.8430	0.6878
0.20833	29.7132	30.8684	29.3895	29.9904	0.7775
0.25	31.3684	32.0309	30.7092	31.3695	0.6609
0.29167	33.0197	33.8447	31.3724	32.7456	1.2588
0.33333	34.6711	35.6612	33.3487	34.5603	1.1602
1	37.9671	38.9579	36.8105	37.9118	1.0748
2	41.2697	41.9316	39.6204	40.9406	1.1902
3	47.8618	47.8645	45.5526	47.0930	1.3340
4	56.1118	56.1118	51.1684	54.4640	2.8541
5	62.7237	63.0526	59.4145	61.7303	2.0123
6	79.1974	80.1855	74.0855	77.8228	3.2741
7	87.4868	88.6421	85.1638	87.0976	1.7715
8	92.4539	95.7480	92.4447	93.5489	1.9045
9	97.4079	99.2303	95.7632	97.4671	1.7343
10	99.0724	99.0796	97.5855	98.5792	0.8605
11	99.9013	99.9013	98.5796	99.4607	0.7631
12	99.9046	100.2336	99.0770	99.7384	0.5959
13	99.9046	100.3993	99.0789	99.7943	0.6671
14	99.9046	100.2355	99.9013	100.0138	0.1920

Table 8B Cumulative 1% DOX release from m-CS/PLA (1:1 w/w) nanoparticles

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
0	0.0000	0.0000	0.0000	0.0000	0.0000
0.01042	6.2112	4.6584	6.2112	5.6936	0.8965
0.02083	9.3416	7.3168	7.4783	8.0455	1.1253
0.03125	9.3540	8.4143	8.7255	8.8313	0.4787
0.04167	10.9068	9.5056	10.1280	10.1801	0.7021
0.08333	10.9130	10.9075	10.9099	10.9101	0.0028
0.125	15.5714	12.7764	13.2422	13.8634	1.4975
0.16667	17.1429	14.0261	14.1832	15.1174	1.7559
0.20833	17.1491	15.4286	16.0503	16.2093	0.8712
0.25	18.7019	16.6764	18.0764	17.8182	1.0371
0.29167	23.3665	18.7000	20.2584	20.7749	2.3757
0.33333	24.9379	21.8137	22.9068	23.2195	1.5854
1	31.1553	27.2609	26.4888	28.3017	2.5013
2	34.2857	31.3199	31.1615	32.2557	1.7598
3	35.8509	34.9075	32.7329	34.4971	1.5990
4	40.5155	37.0957	35.8447	37.8186	2.4179
5	46.7453	42.3839	42.0683	43.7325	2.6140
6	51.4286	46.7528	48.3043	48.8286	2.3816
7	56.1056	51.4286	52.9876	53.5072	2.3814
8	59.2298	54.5528	56.1118	56.6315	2.3814
9	62.3478	61.0870	60.7826	61.4058	0.8299
10	71.6770	68.5665	65.4596	68.5677	3.1087
11	77.9255	73.2547	70.1366	73.7723	3.9201
12	82.6087	77.9317	74.8137	78.4513	3.9234
13	87.2857	82.6087	79.4907	83.1284	3.9234
14	90.4099	87.2857	82.6149	86.7702	3.9230

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
15	98.1863	95.0683	91.9441	95.0663	3.1211
16	99.7702	98.2050	96.6398	98.2050	1.5652

Table 9B Cumulative 1% DOX release from m-CS/PLA (2:1 w/w) nanoparticles

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
0	0.0000	0.0000	0.0000	0.0000	0.0000
0.010417	0.0000	0.0000	0.2933	0.0978	0.1693
0.020833	0.2933	0.7331	1.4674	0.8313	0.5932
0.03125	1.0276	1.4692	1.4721	1.3230	0.2558
0.041667	1.7636	2.2053	2.9384	2.3024	0.5934
0.083333	2.9396	3.9677	4.4106	3.7726	0.7546
0.125	4.1173	5.5877	5.8827	5.1959	0.9457
0.166667	5.0018	6.7672	7.3548	6.3746	1.2247
0.208333	6.9114	7.3584	8.8270	7.6989	1.0022
0.25	8.6786	10.2933	10.2991	9.7570	0.9339
0.291667	10.2985	10.3050	11.6246	10.7427	0.7638
0.333333	10.5982	11.3314	16.1754	12.7017	3.0306
1	14.7050	14.4147	22.0587	17.0594	4.3319
2	19.1202	15.4534	23.5484	19.3740	4.0535
3	22.0704	21.6158	25.0205	22.9022	1.8485
4	25.0147	25.0129	26.4927	25.5067	0.8538
5	27.9589	28.2522	30.0176	28.7429	1.1136
6	29.4370	29.2915	30.9114	29.8800	0.8962
7	33.8416	32.9613	34.2874	33.6968	0.6748
8	38.2581	36.9349	41.1924	38.7951	2.1790
9	45.6070	43.6956	47.0850	45.4626	1.6993
10	50.0352	46.5085	50.3343	48.9593	2.1277
11	57.3842	55.3173	57.6786	56.7934	1.2867
12	63.2786	60.7777	64.1595	62.7386	1.7544
13	70.6334	67.3977	71.3701	69.8004	2.1132
14	79.4604	75.7818	77.9971	77.7464	1.8521

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
15	83.8944	82.4135	82.4223	82.9101	0.8525
16	86.8446	85.3724	86.1056	86.1075	0.7361
17	91.2551	88.7566	88.3196	89.4438	1.5838
18	98.6041	96.1015	97.1261	97.2772	1.2581
19	99.2199	97.1572	99.2141	98.5304	1.1892
20	99.5155	98.4809	99.5155	99.1707	0.5973
21	100.1032	99.6592	100.2499	100.0000	0.3075
22	100.1056	99.6639	100.2528	100.0000	0.3065

Table 10B Cumulative 1% DOX release from m-CS/PLA (1:2 w/w) nanoparticles

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
0	0.0000	0.0000	0.0000	0.0000	0.0000
0.010417	0.0000	0.0000	0.0000	0.0000	0.0000
0.020833	0.1166	0.2331	0.0000	0.1166	0.1166
0.03125	0.3501	0.3506	0.0000	0.2336	0.2023
0.041667	0.4676	0.5841	0.2331	0.4283	0.1788
0.083333	0.8177	1.1678	0.5837	0.8564	0.2940
0.125	1.9846	1.8695	1.2844	1.7128	0.3755
0.166667	2.8051	3.1543	2.3361	2.7652	0.4106
0.208333	4.3235	3.6256	3.3893	3.7795	0.4858
0.25	6.3110	7.0075	6.0741	6.4642	0.4852
0.291667	8.8830	9.3520	8.1828	8.8059	0.5884
0.333333	9.2429	9.5944	8.6573	9.1649	0.4734
1	10.0601	10.5277	9.8247	10.1375	0.3578
2	11.2289	11.6970	10.6452	11.1904	0.5269
3	13.0984	13.3333	12.1636	12.8651	0.6188
4	14.8541	14.3888	15.2000	14.8143	0.4071
5	16.1431	15.9082	16.9604	16.3372	0.5523
6	19.1786	19.8769	19.1818	19.4124	0.4023
7	20.2396	21.7576	20.2396	20.7456	0.8764
8	23.1576	25.3781	23.1576	23.8977	1.2820
9	25.8499	27.1408	25.8499	26.2802	0.7453
10	27.4923	28.6629	27.1427	27.7660	0.7962
11	28.8974	29.7179	28.6629	29.0928	0.5540
12	30.4182	30.5380	32.0490	31.0017	0.9089
13	34.1538	34.2709	34.2769	34.2339	0.0694
14	39.7632	37.7823	37.4326	38.3260	1.2568

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
15	43.2821	40.8266	39.7762	41.2949	1.7992
16	46.7925	44.4517	43.2821	44.8421	1.7875
17	52.6340	53.7902	51.4545	52.6263	1.1679
18	56.1538	57.3240	57.3147	56.9308	0.6729
19	65.7249	67.3613	60.8345	64.6402	3.3959
20	70.1921	71.3641	65.5105	69.0222	3.0972
21	77.3193	78.4895	76.3683	77.3924	1.0625
22	81.3105	83.0634	80.0247	81.4662	1.5253
23	87.0373	85.4126	82.3702	84.9400	2.3692
24	89.9739	90.3170	87.2746	89.1885	1.6663
25	99.5427	99.1944	98.0168	98.9179	0.7996
26	100.0471	100.6284	99.4583	100.0446	0.5851
27	100.0490	100.6340	99.4639	100.0490	0.5851
28	100.0490	100.6340	99.4639	100.0490	0.5851

Table 11B Cumulative 2% DOX release from m-CS/PLA (1:2 w/w) nanoparticles

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
0	0.0000	0.0000	0.0000	0.0000	0.0000
0.010417	0.4921	0.0000	0.0000	0.1640	0.2841
0.020833	1.9705	0.9843	0.9843	1.3130	0.5694
0.03125	2.4685	0.9882	1.9724	1.8097	0.7535
0.041667	2.4705	1.9724	2.9606	2.4678	0.4941
0.083333	4.4390	2.9606	3.9488	3.7828	0.7530
0.125	4.6437	3.9488	4.9370	4.5098	0.5075
0.166667	5.4319	3.9528	4.9409	4.7752	0.7534
0.208333	6.4193	5.4291	6.4173	6.0886	0.5711
0.25	7.4075	6.4193	7.2106	7.0125	0.5230
0.291667	7.9035	7.3583	9.5760	8.2793	1.1556
0.333333	8.8898	8.0510	11.0618	9.3342	1.5538
1	9.3858	9.0380	14.7587	11.0608	3.2071
2	12.3406	11.7486	17.1356	13.7416	2.9542
3	15.3051	12.8913	18.2770	15.4911	2.6976
4	18.2697	15.8978	20.2500	18.1392	2.1790
5	19.2657	18.2720	21.2421	19.5933	1.5119
6	25.6673	25.6634	23.2146	24.8484	1.4150
7	27.6614	26.6772	31.0965	28.4783	2.3201
8	32.5906	32.5866	34.0807	33.0860	0.8615
9	35.5630	36.0551	37.5374	36.3852	1.0278
10	39.5118	40.9902	41.4882	40.6634	1.0279
11	41.9882	39.5335	43.4724	41.6647	1.9893
12	44.9508	43.4646	49.3858	45.9337	3.0806
13	50.8681	49.3858	52.3622	50.8720	1.4882
14	54.8287	52.3622	54.8346	54.0085	1.4258

Time (days)	% Cumulative DOX release				
	1	2	3	Mean	SD
15	58.7815	57.2953	59.2736	58.4501	1.0300
16	62.7343	61.2520	62.2441	62.0768	0.7552
17	66.1949	63.7283	65.7008	65.2080	1.3050
18	70.6378	68.1673	72.1122	70.3058	1.9933
19	76.0689	73.1063	76.5669	75.2474	1.8709
20	79.0433	77.0630	80.5217	78.8760	1.7354
21	82.0079	81.0157	83.9823	82.3353	1.5101
22	85.9567	83.9843	86.4567	85.4659	1.3073
23	91.3858	89.4094	90.8957	90.5636	1.0292
24	95.8366	96.3209	96.3268	96.1614	0.2813
25	101.0217	99.0551	99.7933	99.9567	0.9934
26	101.2884	99.0659	99.8071	100.0538	1.1316

Appendix C

Topoisomerase II inhibition

%Topoisomerase II inhibition of Etoposide

Topoisomerase II cause relaxation 48%, we assumed that it leads to relaxation 100%

Therefore, Etoposide cause relaxation 15%, we assumed that it leads to relaxation

$$(100\% \times 15\%) / 48\% = 13.24\%$$

%Topoisomerase II inhibition = 100 - %relaxation

Consequently Etoposide results in topoisomerase II inhibition $(100 - 13.24) = 68.76\%$

- Calculation for 6-deoxyclitriacetal derivatives as followed like this.

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