Table S34: List of the compartments in the 4-disease model

j	X_j	$\mathtt{C}$			
		$\mathtt{C}_h$	$\mathtt{C}_s$	$\mathtt{C}_c$	$\mathtt{C}_g$
1	X_1	S	S	S	S
2	X_2	I	S	S	S
3	X_3	C	S	S	S
4	X_4	P	S	S	S
5	X_5	$\mathrm{I_P}$	S	S	S
6	X_6	$\mathrm{C_P}$	S	S	S
7	X_7	T	S	S	S
8	X_8	S	E	S	S
9	X_9	I	E	S	S
10	X_{10}	C	E	S	S
11	X_{11}	P	E	S	S
12	X_{12}	$\mathrm{I_P}$	E	S	S
13	X_{13}	$\mathrm{C_P}$	E	S	S
14	X_{14}	T	E	S	S
15	X_{15}	S	$\mathrm{I_1}$	S	S
16	X_{16}	I	$\mathrm{I_1}$	S	S
17	X_{17}	C	$\mathrm{I_1}$	S	S
18	X_{18}	P	$\mathrm{I_1}$	S	S
19	X_{19}	$\mathrm{I_P}$	$\mathrm{I_1}$	S	S
20	X_{20}	$\mathrm{C_P}$	$\mathrm{I_1}$	S	S
21	X_{21}	T	$\mathrm{I_1}$	S	S
22	X_{22}	S	$\mathrm{I_2}$	S	S
23	X_{23}	I	$\mathrm{I_2}$	S	S
24	X_{24}	C	$\mathrm{I_2}$	S	S
25	X_{25}	P	$\mathrm{I_2}$	S	S
26	X_{26}	$\mathrm{I_P}$	$\mathrm{I_2}$	S	S
27	X_{27}	$\mathrm{C_P}$	$\mathrm{I_2}$	S	S
28	X_{28}	T	$\mathrm{I_2}$	S	S
29	X_{29}	S	$\mathrm{I_3}$	S	S
30	X_{30}	I	$\mathrm{I_3}$	S	S
31	X_{31}	C	$\mathrm{I_3}$	S	S
32	X_{32}	P	$\mathrm{I_3}$	S	S
33	X_{33}	$\mathrm{I_P}$	$\mathrm{I_3}$	S	S
34	X_{34}	$\mathrm{C_P}$	$\mathrm{I_3}$	S	S
35	X_{35}	T	$\mathrm{I_3}$	S	S
36	X_{36}	S	S	E	S
37	X_{37}	I	S	E	S
38	X_{38}	C	S	E	S
39	X_{39}	P	S	E	S
40	X_{40}	$\mathrm{I_P}$	S	E	S
41	X_{41}	$\mathrm{C_P}$	S	E	S
42	X_{42}	T	S	E	S
43	X_{43}	S	E	E	S
44	X_{44}	I	E	E	S
45	X_{45}	C	E	E	S
46	X_{46}	P	E	E	S
47	X_{47}	$\mathrm{I_P}$	E	E	S
48	X_{48}	$\mathrm{C_P}$	E	E	S

49	X_{49}	T	E	E	S
50	X_{50}	S	I_1	E	S
51	X_{51}	I	I_1	E	S
52	X_{52}	C	I_1	E	S
53	X_{53}	P	I_1	E	S
54	X_{54}	I_P	I_1	E	S
55	X_{55}	C_P	I_1	E	S
56	X_{56}	T	I_1	E	S
57	X_{57}	S	I_2	E	S
58	X_{58}	I	I_2	E	S
59	X_{59}	C	I_2	E	S
60	X_{60}	P	I_2	E	S
61	X_{61}	I_P	I_2	E	S
62	X_{62}	C_P	I_2	E	S
63	X_{63}	T	I_2	E	S
64	X_{64}	S	I_3	E	S
65	X_{65}	I	I_3	E	S
66	X_{66}	C	I_3	E	S
67	X_{67}	P	I_3	E	S
68	X_{68}	I_P	I_3	E	S
69	X_{69}	C_P	I_3	E	S
70	X_{70}	T	I_3	E	S
71	X_{71}	S	S	I_A	S
72	X_{72}	I	S	I_A	S
73	X_{73}	C	S	I_A	S
74	X_{74}	P	S	I_A	S
75	X_{75}	I_P	S	I_A	S
76	X_{76}	C_P	S	I_A	S
77	X_{77}	T	S	I_A	S
78	X_{78}	S	E	I_A	S
79	X_{79}	I	E	I_A	S
80	X_{80}	C	E	I_A	S
81	X_{81}	P	E	I_A	S
82	X_{82}	I_P	E	I_A	S
83	X_{83}	C_P	E	I_A	S
84	X_{84}	T	E	I_A	S
85	X_{85}	S	I_1	I_A	S
86	X_{86}	I	I_1	I_A	S
87	X_{87}	C	I_1	I_A	S
88	X_{88}	P	I_1	I_A	S
89	X_{89}	I_P	I_1	I_A	S
90	X_{90}	C_P	I_1	I_A	S
91	X_{91}	T	I_1	I_A	S
92	X_{92}	S	I_2	I_A	S
93	X_{93}	I	I_2	I_A	S
94	X_{94}	C	I_2	I_A	S
95	X_{95}	P	I_2	I_A	S
96	X_{96}	I_P	I_2	I_A	S
97	X_{97}	C_P	I_2	I_A	S
98	X_{98}	T	I_2	I_A	S
99	X_{99}	S	I_3	I_A	S
100	X_{100}	I	I_3	I_A	S

101	X_{101}	C	I_3	I_A	S
102	X_{102}	P	I_3	I_A	S
103	X_{103}	I_P	I_3	I_A	S
104	X_{104}	C_P	I_3	I_A	S
105	X_{105}	T	I_3	I_A	S
106	X_{106}	S	S	I_S	S
107	X_{107}	I	S	I_S	S
108	X_{108}	C	S	I_S	S
109	X_{109}	P	S	I_S	S
110	X_{110}	I_P	S	I_S	S
111	X_{111}	C_P	S	I_S	S
112	X_{112}	T	S	I_S	S
113	X_{113}	S	E	I_S	S
114	X_{114}	I	E	I_S	S
115	X_{115}	C	E	I_S	S
116	X_{116}	P	E	I_S	S
117	X_{117}	I_P	E	I_S	S
118	X_{118}	C_P	E	I_S	S
119	X_{119}	T	E	I_S	S
120	X_{120}	S	I_1	I_S	S
121	X_{121}	I	I_1	I_S	S
122	X_{122}	C	I_1	I_S	S
123	X_{123}	P	I_1	I_S	S
124	X_{124}	I_P	I_1	I_S	S
125	X_{125}	C_P	I_1	I_S	S
126	X_{126}	T	I_1	I_S	S
127	X_{127}	S	I_2	I_S	S
128	X_{128}	I	I_2	I_S	S
129	X_{129}	C	I_2	I_S	S
130	X_{130}	P	I_2	I_S	S
131	X_{131}	I_P	I_2	I_S	S
132	X_{132}	C_P	I_2	I_S	S
133	X_{133}	T	I_2	I_S	S
134	X_{134}	S	I_3	I_S	S
135	X_{135}	I	I_3	I_S	S
136	X_{136}	C	I_3	I_S	S
137	X_{137}	P	I_3	I_S	S
138	X_{138}	I_P	I_3	I_S	S
139	X_{139}	C_P	I_3	I_S	S
140	X_{140}	T	I_3	I_S	S
141	X_{141}	S	S	S	E
142	X_{142}	I	S	S	E
143	X_{143}	C	S	S	E
144	X_{144}	P	S	S	E
145	X_{145}	I_P	S	S	E
146	X_{146}	C_P	S	S	E
147	X_{147}	T	S	S	E
148	X_{148}	S	E	S	E
149	X_{149}	I	E	S	E
150	X_{150}	C	E	S	E
151	X_{151}	P	E	S	E
152	X_{152}	I_P	E	S	E

153	X_{153}	C_P	E	S	E
154	X_{154}	T	E	S	E
155	X_{155}	S	I_1	S	E
156	X_{156}	I	I_1	S	E
157	X_{157}	C	I_1	S	E
158	X_{158}	P	I_1	S	E
159	X_{159}	I_P	I_1	S	E
160	X_{160}	C_P	I_1	S	E
161	X_{161}	T	I_1	S	E
162	X_{162}	S	I_2	S	E
163	X_{163}	I	I_2	S	E
164	X_{164}	C	I_2	S	E
165	X_{165}	P	I_2	S	E
166	X_{166}	I_P	I_2	S	E
167	X_{167}	C_P	I_2	S	E
168	X_{168}	T	I_2	S	E
169	X_{169}	S	I_3	S	E
170	X_{170}	I	I_3	S	E
171	X_{171}	C	I_3	S	E
172	X_{172}	P	I_3	S	E
173	X_{173}	I_P	I_3	S	E
174	X_{174}	C_P	I_3	S	E
175	X_{175}	T	I_3	S	E
176	X_{176}	S	S	E	E
177	X_{177}	I	S	E	E
178	X_{178}	C	S	E	E
179	X_{179}	P	S	E	E
180	X_{180}	I_P	S	E	E
181	X_{181}	C_P	S	E	E
182	X_{182}	T	S	E	E
183	X_{183}	S	E	E	E
184	X_{184}	I	E	E	E
185	X_{185}	C	E	E	E
186	X_{186}	P	E	E	E
187	X_{187}	I_P	E	E	E
188	X_{188}	C_P	E	E	E
189	X_{189}	T	E	E	E
190	X_{190}	S	I_1	E	E
191	X_{191}	I	I_1	E	E
192	X_{192}	C	I_1	E	E
193	X_{193}	P	I_1	E	E
194	X_{194}	I_P	I_1	E	E
195	X_{195}	C_P	I_1	E	E
196	X_{196}	T	I_1	E	E
197	X_{197}	S	I_2	E	E
198	X_{198}	I	I_2	E	E
199	X_{199}	C	I_2	E	E
200	X_{200}	P	I_2	E	E
201	X_{201}	I_P	I_2	E	E
202	X_{202}	C_P	I_2	E	E
203	X_{203}	T	I_2	E	E
204	X_{204}	S	I_3	E	E

205	X_{205}	I	I_3	E	E
206	X_{206}	C	I_3	E	E
207	X_{207}	P	I_3	E	E
208	X_{208}	I_P	I_3	E	E
209	X_{209}	C_P	I_3	E	E
210	X_{210}	T	I_3	E	E
211	X_{211}	S	S	I_A	E
212	X_{212}	I	S	I_A	E
213	X_{213}	C	S	I_A	E
214	X_{214}	P	S	I_A	E
215	X_{215}	I_P	S	I_A	E
216	X_{216}	C_P	S	I_A	E
217	X_{217}	T	S	I_A	E
218	X_{218}	S	E	I_A	E
219	X_{219}	I	E	I_A	E
220	X_{220}	C	E	I_A	E
221	X_{221}	P	E	I_A	E
222	X_{222}	I_P	E	I_A	E
223	X_{223}	C_P	E	I_A	E
224	X_{224}	T	E	I_A	E
225	X_{225}	S	I_1	I_A	E
226	X_{226}	I	I_1	I_A	E
227	X_{227}	C	I_1	I_A	E
228	X_{228}	P	I_1	I_A	E
229	X_{229}	I_P	I_1	I_A	E
230	X_{230}	C_P	I_1	I_A	E
231	X_{231}	T	I_1	I_A	E
232	X_{232}	S	I_2	I_A	E
233	X_{233}	I	I_2	I_A	E
234	X_{234}	C	I_2	I_A	E
235	X_{235}	P	I_2	I_A	E
236	X_{236}	I_P	I_2	I_A	E
237	X_{237}	C_P	I_2	I_A	E
238	X_{238}	T	I_2	I_A	E
239	X_{239}	S	I_3	I_A	E
240	X_{240}	I	I_3	I_A	E
241	X_{241}	C	I_3	I_A	E
242	X_{242}	P	I_3	I_A	E
243	X_{243}	I_P	I_3	I_A	E
244	X_{244}	C_P	I_3	I_A	E
245	X_{245}	T	I_3	I_A	E
246	X_{246}	S	S	I_S	E
247	X_{247}	I	S	I_S	E
248	X_{248}	C	S	I_S	E
249	X_{249}	P	S	I_S	E
250	X_{250}	I_P	S	I_S	E
251	X_{251}	C_P	S	I_S	E
252	X_{252}	T	S	I_S	E
253	X_{253}	S	E	I_S	E
254	X_{254}	I	E	I_S	E
255	X_{255}	C	E	I_S	E
256	X_{256}	P	E	I_S	E

257	X_{257}	I_P	E	I_S	E
258	X_{258}	C_P	E	I_S	E
259	X_{259}	T	E	I_S	E
260	X_{260}	S	I_1	I_S	E
261	X_{261}	I	I_1	I_S	E
262	X_{262}	C	I_1	I_S	E
263	X_{263}	P	I_1	I_S	E
264	X_{264}	I_P	I_1	I_S	E
265	X_{265}	C_P	I_1	I_S	E
266	X_{266}	T	I_1	I_S	E
267	X_{267}	S	I_2	I_S	E
268	X_{268}	I	I_2	I_S	E
269	X_{269}	C	I_2	I_S	E
270	X_{270}	P	I_2	I_S	E
271	X_{271}	I_P	I_2	I_S	E
272	X_{272}	C_P	I_2	I_S	E
273	X_{273}	T	I_2	I_S	E
274	X_{274}	S	I_3	I_S	E
275	X_{275}	I	I_3	I_S	E
276	X_{276}	C	I_3	I_S	E
277	X_{277}	P	I_3	I_S	E
278	X_{278}	I_P	I_3	I_S	E
279	X_{279}	C_P	I_3	I_S	E
280	X_{280}	T	I_3	I_S	E
281	X_{281}	S	S	S	I_A
282	X_{282}	I	S	S	I_A
283	X_{283}	C	S	S	I_A
284	X_{284}	P	S	S	I_A
285	X_{285}	I_P	S	S	I_A
286	X_{286}	C_P	S	S	I_A
287	X_{287}	T	S	S	I_A
288	X_{288}	S	E	S	I_A
289	X_{289}	I	E	S	I_A
290	X_{290}	C	E	S	I_A
291	X_{291}	P	E	S	I_A
292	X_{292}	I_P	E	S	I_A
293	X_{293}	C_P	E	S	I_A
294	X_{294}	T	E	S	I_A
295	X_{295}	S	I_1	S	I_A
296	X_{296}	I	I_1	S	I_A
297	X_{297}	C	I_1	S	I_A
298	X_{298}	P	I_1	S	I_A
299	X_{299}	I_P	I_1	S	I_A
300	X_{300}	C_P	I_1	S	I_A
301	X_{301}	T	I_1	S	I_A
302	X_{302}	S	I_2	S	I_A
303	X_{303}	I	I_2	S	I_A
304	X_{304}	C	I_2	S	I_A
305	X_{305}	P	I_2	S	I_A
306	X_{306}	I_P	I_2	S	I_A
307	X_{307}	C_P	I_2	S	I_A
308	X_{308}	T	I_2	S	I_A

309	X_{309}	S	I_3	S	I_A
310	X_{310}	I	I_3	S	I_A
311	X_{311}	C	I_3	S	I_A
312	X_{312}		I_3	S	I_A
313	X_{313}	I_P	I_3	S	I_A
314	X_{314}	C_P	I_3	S	I_A
315	X_{315}	T	I_3	S	I_A
316	X_{316}	S	S	E	I_A
317	X_{317}	I	S	E	I_A
318	X_{318}	C	S	E	I_A
319	X_{319}	P	S	E	I_A
320	X_{320}	I_P	S	E	I_A
321	X_{321}	C_P	S	E	I_A
322	X_{322}	T	S	E	I_A
323	X_{323}	S	E	E	I_A
324	X_{324}	I	E	E	I_A
325	X_{325}	C	E	E	I_A
326	X_{326}	P	E	E	I_A
327	X_{327}	I_P	E	E	I_A
328	X_{328}	C_P	E	E	I_A
329	X_{329}	T	E	E	I_A
330	X_{330}	S	I_1	E	I_A
331	X_{331}	I	I_1	E	I_A
332	X_{332}	C	I_1	E	I_A
333	X_{333}	P	I_1	E	I_A
334	X_{334}	I_P	I_1	E	I_A
335	X_{335}	C_P	I_1	E	I_A
336	X_{336}	T	I_1	E	I_A
337	X_{337}	S	I_2	E	I_A
338	X_{338}	I	I_2	E	I_A
339	X_{339}	C	I_2	E	I_A
340	X_{340}	P	I_2	E	I_A
341	X_{341}	I_P	I_2	E	I_A
342	X_{342}	C_P	I_2	E	I_A
343	X_{343}	T	I_2	E	I_A
344	X_{344}	S	I_3	E	I_A
345	X_{345}	I	I_3	E	I_A
346	X_{346}	C	I_3	E	I_A
347	X_{347}	P	I_3	E	I_A
348	X_{348}	I_P	I_3	E	I_A
349	X_{349}	C_P	I_3	E	I_A
350	X_{350}	T	I_3	E	I_A
351	X_{351}	S	S	I_A	I_A
352	X_{352}	I	S	I_A	I_A
353	X_{353}	C	S	I_A	I_A
354	X_{354}	P	S	I_A	I_A
355	X_{355}	I_P	S	I_A	I_A
356	X_{356}	C_P	S	I_A	I_A
357	X_{357}	T	S	I_A	I_A
358	X_{358}	S	E	I_A	I_A
359	X_{359}	I	E	I_A	I_A
360	X_{360}	C	E	I_A	I_A

361	X_{361}	P	E	I_A	I_A
362	X_{362}	I_P	E	I_A	I_A
363	X_{363}	C_P	E	I_A	I_A
364	X_{364}	T	E	I_A	I_A
365	X_{365}	S	I_1	I_A	I_A
366	X_{366}	I	I_1	I_A	I_A
367	X_{367}	C	I_1	I_A	I_A
368	X_{368}	P	I_1	I_A	I_A
369	X_{369}	I_P	I_1	I_A	I_A
370	X_{370}	C_P	I_1	I_A	I_A
371	X_{371}	T	I_1	I_A	I_A
372	X_{372}	S	I_2	I_A	I_A
373	X_{373}	I	I_2	I_A	I_A
374	X_{374}	C	I_2	I_A	I_A
375	X_{375}	P	I_2	I_A	I_A
376	X_{376}	I_P	I_2	I_A	I_A
377	X_{377}	C_P	I_2	I_A	I_A
378	X_{378}	T	I_2	I_A	I_A
379	X_{379}	S	I_3	I_A	I_A
380	X_{380}	I	I_3	I_A	I_A
381	X_{381}	C	I_3	I_A	I_A
382	X_{382}	P	I_3	I_A	I_A
383	X_{383}	I_P	I_3	I_A	I_A
384	X_{384}	C_P	I_3	I_A	I_A
385	X_{385}	T	I_3	I_A	I_A
386	X_{386}	S	S	I_S	I_A
387	X_{387}	I	S	I_S	I_A
388	X_{388}	C	S	I_S	I_A
389	X_{389}	P	S	I_S	I_A
390	X_{390}	I_P	S	I_S	I_A
391	X_{391}	C_P	S	I_S	I_A
392	X_{392}	T	S	I_S	I_A
393	X_{393}	S	E	I_S	I_A
394	X_{394}	I	E	I_S	I_A
395	X_{395}	C	E	I_S	I_A
396	X_{396}	P	E	I_S	I_A
397	X_{397}	I_P	E	I_S	I_A
398	X_{398}	C_P	E	I_S	I_A
399	X_{399}	T	E	I_S	I_A
400	X_{400}	S	I_1	I_S	I_A
401	X_{401}	I	I_1	I_S	I_A
402	X_{402}	C	I_1	I_S	I_A
403	X_{403}	P	I_1	I_S	I_A
404	X_{404}	I_P	I_1	I_S	I_A
405	X_{405}	C_P	I_1	I_S	I_A
406	X_{406}	T	I_1	I_S	I_A
407	X_{497}	S	I_2	I_S	I_A
408	X_{408}	I	I_2	I_S	I_A
409	X_{409}	C	I_2	I_S	I_A
410	X_{410}	P	I_2	I_S	I_A
411	X_{411}	I_P	I_2	I_S	I_A
412	X_{412}	C_P	I_2	I_S	I_A

413	X_{413}	T	I_2	I_S	I_A
414	X_{414}	S	I_3	I_S	I_A
415	X_{415}	I	I_3	I_S	I_A
416	X_{416}	C	I_3	I_S	I_A
417	X_{417}	P	I_3	I_S	I_A
418	X_{418}	I_P	I_3	I_S	I_A
419	X_{419}	C_P	I_3	I_S	I_A
420	X_{420}	T	I_3	I_S	I_A
421	X_{421}	S	S	S	I_S
422	X_{422}	I	S	S	I_S
423	X_{423}	C	S	S	I_S
424	X_{424}	P	S	S	I_S
425	X_{425}	I_P	S	S	I_S
426	X_{426}	C_P	S	S	I_S
427	X_{427}	T	S	S	I_S
428	X_{428}	S	E	S	I_S
429	X_{429}	I	E	S	I_S
430	X_{430}	C	E	S	I_S
431	X_{431}	P	E	S	I_S
432	X_{432}	I_P	E	S	I_S
433	X_{433}	C_P	E	S	I_S
434	X_{434}	T	E	S	I_S
435	X_{435}	S	I_1	S	I_S
436	X_{436}	I	I_1	S	I_S
437	X_{437}	C	I_1	S	I_S
438	X_{438}	P	I_1	S	I_S
439	X_{439}	I_P	I_1	S	I_S
440	X_{440}	C_P	I_1	S	I_S
441	X_{441}	T	I_1	S	I_S
442	X_{442}	S	I_2	S	I_S
443	X_{443}	I	I_2	S	I_S
444	X_{444}	C	I_2	S	I_S
445	X_{445}	P	I_2	S	I_S
446	X_{456}	I_P	I_2	S	I_S
447	X_{447}	C_P	I_2	S	I_S
448	X_{448}	T	I_2	S	I_S
449	X_{449}	S	I_3	S	I_S
450	X_{450}	I	I_3	S	I_S
451	X_{451}	C	I_3	S	I_S
452	X_{452}	P	I_3	S	I_S
453	X_{453}	I_P	I_3	S	I_S
454	X_{454}	C_P	I_3	S	I_S
455	X_{455}	T	I_3	S	I_S
456	X_{456}	S	S	E	I_S
457	X_{457}	I	S	E	I_S
458	X_{458}	C	S	E	I_S
459	X_{459}	P	S	E	I_S
460	X_{460}	I_P	S	E	I_S
461	X_{461}	C_P	S	E	I_S
462	X_{462}	T	S	E	I_S
463	X_{463}	S	E	E	I_S
464	X_{464}	I	E	E	I_S

465	X_{465}	C	E	E	I_S
466	X_{466}	P	E	E	I_S
467	X_{467}	I_P	E	E	I_S
468	X_{468}	C_P	E	E	I_S
469	X_{469}	T	E	E	I_S
470	X_{470}	S	I_1	E	I_S
471	X_{471}	I	I_1	E	I_S
472	X_{472}	C	I_1	E	I_S
473	X_{473}	P	I_1	E	I_S
474	X_{474}	I_P	I_1	E	I_S
475	X_{475}	C_P	I_1	E	I_S
476	X_{476}	T	I_1	E	I_S
477	X_{477}	S	I_2	E	I_S
478	X_{478}	I	I_2	E	I_S
479	X_{479}	C	I_2	E	I_S
480	X_{480}	P	I_2	E	I_S
481	X_{481}	I_P	I_2	E	I_S
482	X_{482}	C_P	I_2	E	I_S
483	X_{483}	T	I_2	E	I_S
484	X_{484}	S	I_3	E	I_S
485	X_{485}	I	I_3	E	I_S
486	X_{486}	C	I_3	E	I_S
487	X_{487}	P	I_3	E	I_S
488	X_{488}	I_P	I_3	E	I_S
489	X_{489}	C_P	I_3	E	I_S
490	X_{490}	T	I_3	E	I_S
491	X_{491}	S	S	I_A	I_S
492	X_{492}	I	S	I_A	I_S
493	X_{493}	C	S	I_A	I_S
494	X_{494}	P	S	I_A	I_S
495	X_{495}	I_P	S	I_A	I_S
496	X_{496}	C_P	S	I_A	I_S
497	X_{497}	T	S	I_A	I_S
498	X_{498}	S	E	I_A	I_S
499	X_{499}	I	E	I_A	I_S
500	X_{500}	C	E	I_A	I_S
501	X_{501}	P	E	I_A	I_S
502	X_{502}	I_P	E	I_A	I_S
503	X_{503}	C_P	E	I_A	I_S
504	X_{504}	T	E	I_A	I_S
505	X_{505}	S	I_1	I_A	I_S
506	X_{506}	I	I_1	I_A	I_S
507	X_{507}	C	I_1	I_A	I_S
508	X_{508}	P	I_1	I_A	I_S
509	X_{509}	I_P	I_1	I_A	I_S
510	X_{510}	C_P	I_1	I_A	I_S
511	X_{511}	T	I_1	I_A	I_S
512	X_{512}	S	I_2	I_A	I_S
513	X_{513}	I	I_2	I_A	I_S
514	X_{514}	C	I_2	I_A	I_S
515	X_{515}	P	I_2	I_A	I_S
516	X_{516}	I_P	I_2	I_A	I_S

517	X_{517}	C_P	I_2	I_A	I_S
518	X_{518}	T	I_2	I_A	I_S
519	X_{519}	S	I_3	I_A	I_S
520	X_{520}	I	I_3	I_A	I_S
521	X_{521}	C	I_3	I_A	I_S
522	X_{522}	P	I_3	I_A	I_S
523	X_{523}	I_P	I_3	I_A	I_S
524	X_{524}	C_P	I_3	I_A	I_S
525	X_{525}	T	I_3	I_A	I_S
526	X_{526}	S	S	I_S	I_S
527	X_{527}	I	S	I_S	I_S
528	X_{528}	C	S	I_S	I_S
529	X_{529}	P	S	I_S	I_S
530	X_{530}	I_P	S	I_S	I_S
531	X_{531}	C_P	S	I_S	I_S
532	X_{532}	T	S	I_S	I_S
533	X_{533}	S	E	I_S	I_S
534	X_{534}	I	E	I_S	I_S
535	X_{535}	C	E	I_S	I_S
536	X_{536}	P	E	I_S	I_S
537	X_{537}	I_P	E	I_S	I_S
538	X_{538}	C_P	E	I_S	I_S
539	X_{539}	T	E	I_S	I_S
540	X_{540}	S	I_1	I_S	I_S
541	X_{541}	I	I_1	I_S	I_S
542	X_{542}	C	I_1	I_S	I_S
543	X_{543}	P	I_1	I_S	I_S
544	X_{544}	I_P	I_1	I_S	I_S
545	X_{545}	C_P	I_1	I_S	I_S
546	X_{546}	T	I_1	I_S	I_S
547	X_{547}	S	I_2	I_S	I_S
548	X_{548}	I	I_2	I_S	I_S
549	X_{549}	C	I_2	I_S	I_S
550	X_{550}	P	I_2	I_S	I_S
551	X_{551}	I_P	I_2	I_S	I_S
552	X_{552}	C_P	I_2	I_S	I_S
553	X_{553}	T	I_2	I_S	I_S
554	X_{554}	S	I_3	I_S	I_S
555	X_{555}	I	I_3	I_S	I_S
556	X_{556}	C	I_3	I_S	I_S
557	X_{557}	P	I_3	I_S	I_S
558	X_{558}	I_P	I_3	I_S	I_S
559	X_{559}	C_P	I_3	I_S	I_S
560	X_{560}	T	I_3	I_S	I_S

$$
\begin{aligned}
\frac{\partial X_1}{\partial t} &= (1-p)\pi + X_{29}(\gamma_s(0)+\rho_s+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{71}(\nu_c+\rho_c+\rho_{cg}+\rho_{hc}+\rho_{sc}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_{281}(\nu_g+\rho_g+\rho_{cg}+\rho_{hg}+\rho_{sg}+\rho_{hcg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{36}(\rho_c+\rho_{cg}+\rho_{hc}+\rho_{sc}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_8(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{15}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) + X_{22}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{141}(\rho_g+\rho_{cg}+\rho_{hg}+\rho_{sg}+\rho_{hcg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) - X_1(\Lambda_h+\Lambda_s+\Lambda_g+\Lambda_c+\mu) + X_{43}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) \\
&+ X_{50}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_{57}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_{64}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) \\
&+ X_{78}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_{85}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_{92}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) \\
&+ X_{99}(\rho_{sc}+\rho_{scg}+\rho_{hsc}+\rho_{hscg}) + X_{176}(\rho_{cg}+\rho_{hcg}+\rho_{scg}+\rho_{hscg}) + X_{148}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{155}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) + X_{162}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) + X_{169}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{211}(\rho_{cg}+\rho_{hcg}+\rho_{scg}+\rho_{hscg}) + X_{316}(\rho_{cg}+\rho_{hcg}+\rho_{scg}+\rho_{hscg}) + X_{288}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{295}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) + X_{302}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) + X_{309}(\rho_{sg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg}) \\
&+ X_{351}(\rho_{cg}+\rho_{hcg}+\rho_{scg}+\rho_{hscg}) + X_{106}(\gamma_c(0)+\nu_c) + X_{421}(\gamma_g(0)+\nu_g) + X_{183}(\rho_{scg}+\rho_{hscg}) \\
&+ X_{190}(\rho_{scg}+\rho_{hscg}) + X_{197}(\rho_{scg}+\rho_{hscg}) + X_{204}(\rho_{scg}+\rho_{hscg}) + X_{218}(\rho_{scg}+\rho_{hscg}) + X_{225}(\rho_{scg}+\rho_{hscg}) \\
&+ X_{232}(\rho_{scg}+\rho_{hscg}) + X_{239}(\rho_{scg}+\rho_{hscg}) + X_{323}(\rho_{scg}+\rho_{hscg}) + X_{330}(\rho_{scg}+\rho_{hscg}) + X_{337}(\rho_{scg}+\rho_{hscg}) \\
&+ X_{344}(\rho_{scg}+\rho_{hscg}) + X_{358}(\rho_{scg}+\rho_{hscg}) + X_{365}(\rho_{scg}+\rho_{hscg}) + X_{372}(\rho_{scg}+\rho_{hscg}) + X_{379}(\rho_{scg}+\rho_{hscg}) \\
\frac{\partial X_2}{\partial t} &= \Lambda_h X_1 + X_{184}\rho_{scg} + X_{191}\rho_{scg} + X_{198}\rho_{scg} + X_{205}\rho_{scg} + X_{219}\rho_{scg} + X_{226}\rho_{scg} + X_{233}\rho_{scg} + X_{240}\rho_{scg} \\
&+ X_{324}\rho_{scg} + X_{331}\rho_{scg} + X_{338}\rho_{scg} + X_{345}\rho_{scg} + X_{359}\rho_{scg} + X_{366}\rho_{scg} + X_{373}\rho_{scg} + X_{380}\rho_{scg} \\
&+ X_{30}(\gamma_s(0)+\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{72}(\nu_c+\rho_c+\rho_{cg}+\rho_{sc}+\rho_{scg}) + X_{282}(\nu_g+\rho_g+\rho_{cg}+\rho_{sg}+\rho_{scg}) \\
&- X_2(\Lambda_s+\Lambda_g+\Lambda_c+\mu+\rho_h+\rho_{hc}+\rho_{hg}+\rho_{hs}+\rho_{hcg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_h) + X_{37}(\rho_c+\rho_{cg}+\rho_{sc}+\rho_{scg}) \\
&+ X_9(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{16}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{23}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{142}(\rho_g+\rho_{cg}+\rho_{sg}+\rho_{scg}) \\
&+ X_{107}(\gamma_c(0)+\nu_c) + X_{422}(\gamma_g(0)+\nu_g) + X_{44}(\rho_{sc}+\rho_{scg}) + X_{51}(\rho_{sc}+\rho_{scg}) + X_{58}(\rho_{sc}+\rho_{scg}) + X_{65}(\rho_{sc}+\rho_{scg}) \\
&+ X_{79}(\rho_{sc}+\rho_{scg}) + X_{86}(\rho_{sc}+\rho_{scg}) + X_{93}(\rho_{sc}+\rho_{scg}) + X_{100}(\rho_{sc}+\rho_{scg}) + X_{149}(\rho_{sg}+\rho_{scg}) + X_{156}(\rho_{sg}+\rho_{scg}) \\
&+ X_{177}(\rho_{cg}+\rho_{scg}) + X_{163}(\rho_{sg}+\rho_{scg}) + X_{170}(\rho_{sg}+\rho_{scg}) + X_{212}(\rho_{cg}+\rho_{scg}) + X_{289}(\rho_{sg}+\rho_{scg}) \\
&+ X_{296}(\rho_{sg}+\rho_{scg}) + X_{317}(\rho_{cg}+\rho_{scg}) + X_{303}(\rho_{sg}+\rho_{scg}) + X_{310}(\rho_{sg}+\rho_{scg}) + X_{352}(\rho_{cg}+\rho_{scg}) \\
\frac{\partial X_3}{\partial t} &= X_{185}\rho_{scg} + X_{192}\rho_{scg} + X_{199}\rho_{scg} + X_{206}\rho_{scg} + X_{220}\rho_{scg} + X_{227}\rho_{scg} + X_{234}\rho_{scg} + X_{241}\rho_{scg} \\
&+ X_{325}\rho_{scg} + X_{332}\rho_{scg} + X_{339}\rho_{scg} + X_{346}\rho_{scg} + X_{360}\rho_{scg} + X_{367}\rho_{scg} + X_{374}\rho_{scg} + X_{381}\rho_{scg} + X_2\sigma_h \\
&+ X_{31}(\gamma_s(0)+\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{73}(\nu_c+\rho_c+\rho_{cg}+\rho_{sc}+\rho_{scg}) + X_{283}(\nu_g+\rho_g+\rho_{cg}+\rho_{sg}+\rho_{scg}) \\
&- X_3(\Lambda_s+\Lambda_g+\Lambda_c+\mu+\rho_h+\rho_{hc}+\rho_{hg}+\rho_{hs}+\rho_{hcg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\theta_h) + X_{38}(\rho_c+\rho_{cg}+\rho_{sc}+\rho_{scg}) \\
&+ X_{10}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{17}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{24}(\rho_s+\rho_{sc}+\rho_{sg}+\rho_{scg}) + X_{143}(\rho_g+\rho_{cg}+\rho_{sg}+\rho_{scg}) \\
&+ X_{108}(\gamma_c(0)+\nu_c) + X_{423}(\gamma_g(0)+\nu_g) + X_{45}(\rho_{sc}+\rho_{scg}) + X_{52}(\rho_{sc}+\rho_{scg}) + X_{59}(\rho_{sc}+\rho_{scg}) + X_{66}(\rho_{sc}+\rho_{scg}) \\
&+ X_{80}(\rho_{sc}+\rho_{scg}) + X_{87}(\rho_{sc}+\rho_{scg}) + X_{94}(\rho_{sc}+\rho_{scg}) + X_{101}(\rho_{sc}+\rho_{scg}) + X_{150}(\rho_{sg}+\rho_{scg}) + X_{157}(\rho_{sg}+\rho_{scg}) \\
&+ X_{178}(\rho_{cg}+\rho_{scg}) + X_{164}(\rho_{sg}+\rho_{scg}) + X_{171}(\rho_{sg}+\rho_{scg}) + X_{213}(\rho_{cg}+\rho_{scg}) + X_{290}(\rho_{sg}+\rho_{scg}) \\
&+ X_{297}(\rho_{sg}+\rho_{scg}) + X_{318}(\rho_{cg}+\rho_{scg}) + X_{304}(\rho_{sg}+\rho_{scg}) + X_{311}(\rho_{sg}+\rho_{scg}) + X_{353}(\rho_{cg}+\rho_{scg}) \\
\frac{\partial X_4}{\partial t} &= p\pi + X_{11}\eta_s^p + X_{18}\eta_s^p + X_{39}\eta_c^p + X_{25}\eta_s^p + X_{144}\eta_g^p + X_{109}(\eta_c^p+\gamma_c(0)+\nu_c) + X_{424}(\eta_g^p+\gamma_g(0)+\nu_g) \\
&+ X_{32}(\eta_s^p+\gamma_s(0)) + X_{74}(\eta_c^p+\nu_c) + X_{284}(\eta_g^p+\nu_g) - X_4(\Lambda_s+\Lambda_g+\Lambda_c+\mu-\Lambda_h(\zeta_h-1)) \\
\frac{\partial X_5}{\partial t} &= X_{12}\eta_s^p + X_{19}\eta_s^p + X_{40}\eta_c^p + X_{26}\eta_s^p + X_{145}\eta_g^p - X_5(\Lambda_s+\Lambda_g+\Lambda_c+\eta_h^p+\mu+\sigma_h) + X_{110}(\eta_c^p+\gamma_c(0)+\nu_c) \\
&+ X_{425}(\eta_g^p+\gamma_g(0)+\nu_g) + X_{33}(\eta_s^p+\gamma_s(0)) + X_{75}(\eta_c^p+\nu_c) + X_{285}(\eta_g^p+\nu_g) - \Lambda_h X_4(\zeta_h-1) \\
\frac{\partial X_6}{\partial t} &= X_{13}\eta_s^p + X_{20}\eta_s^p + X_{41}\eta_c^p + X_{27}\eta_s^p + X_{146}\eta_g^p + X_5\sigma_h - X_6(\Lambda_s+\Lambda_g+\Lambda_c+\eta_h^p+\mu+\theta_h) \\
&+ X_{111}(\eta_c^p+\gamma_c(0)+\nu_c) + X_{426}(\eta_g^p+\gamma_g(0)+\nu_g) + X_{34}(\eta_s^p+\gamma_s(0)) + X_{76}(\eta_c^p+\nu_c) + X_{286}(\eta_g^p+\nu_g)
\end{aligned}
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\begin{aligned}
\frac{\partial X_7}{\partial t} &= X_5\eta_h^p + X_3(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h) + X_{184}\rho_{hscg} + X_{185}\rho_{hscg} + X_{191}\rho_{hscg} \\
&+ X_{192}\rho_{hscg} + X_{198}\rho_{hscg} + X_{199}\rho_{hscg} + X_{205}\rho_{hscg} + X_{206}\rho_{hscg} + X_{219}\rho_{hscg} + X_{220}\rho_{hscg} + X_{226}\rho_{hscg} \\
&+ X_{227}\rho_{hscg} + X_{233}\rho_{hscg} + X_{234}\rho_{hscg} + X_{240}\rho_{hscg} + X_{241}\rho_{hscg} + X_{324}\rho_{hscg} + X_{325}\rho_{hscg} + X_{331}\rho_{hscg} + X_{332}\rho_{hscg} \\
&+ X_{338}\rho_{hscg} + X_{339}\rho_{hscg} + X_{345}\rho_{hscg} + X_{346}\rho_{hscg} + X_{359}\rho_{hscg} + X_{360}\rho_{hscg} + X_{366}\rho_{hscg} + X_{367}\rho_{hscg} + X_{373}\rho_{hscg} \\
&+ X_{374}\rho_{hscg} + X_{380}\rho_{hscg} + X_{381}\rho_{hscg} + X_{49}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) + X_{56}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) \\
&+ X_{63}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) + X_{70}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) + X_{84}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) \\
&+ X_{91}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) + X_{98}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) + X_{105}(\rho_{sc} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) \\
&+ X_{182}(\rho_{cg} + \rho_{scg} + \rho_{hcg} + \rho_{hscg}) + X_{154}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) + X_{161}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{168}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) + X_{175}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) + X_{217}(\rho_{cg} + \rho_{scg} + \rho_{hcg} + \rho_{hscg}) \\
&+ X_{322}(\rho_{cg} + \rho_{scg} + \rho_{hcg} + \rho_{hscg}) + X_{294}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) + X_{301}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{308}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) + X_{315}(\rho_{sg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg}) + X_{357}(\rho_{cg} + \rho_{scg} + \rho_{hcg} + \rho_{hscg}) \\
&+ X_{35}(\gamma_s(0) + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{112}(\gamma_c(0) + \nu_c) + X_{427}(\gamma_g(0) + \nu_g) \\
&+ X_{77}(\nu_c + \rho_c + \rho_{cg} + \rho_{sc} + \rho_{scg} + \rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) + X_{287}(\nu_g + \rho_g + \rho_{cg} + \rho_{sg} + \rho_{scg} + \rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) \\
&- X_7(\Lambda_s + \Lambda_g + \Lambda_c + \mu) + X_2(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{189}(\rho_{scg} + \rho_{hscg}) \\
&+ X_{196}(\rho_{scg} + \rho_{hscg}) + X_{203}(\rho_{scg} + \rho_{hscg}) + X_{210}(\rho_{scg} + \rho_{hscg}) + X_{224}(\rho_{scg} + \rho_{hscg}) + X_{231}(\rho_{scg} + \rho_{hscg}) \\
&+ X_{238}(\rho_{scg} + \rho_{hscg}) + X_{245}(\rho_{scg} + \rho_{hscg}) + X_{329}(\rho_{scg} + \rho_{hscg}) + X_{336}(\rho_{scg} + \rho_{hscg}) + X_{343}(\rho_{scg} + \rho_{hscg}) \\
&+ X_{350}(\rho_{scg} + \rho_{hscg}) + X_{364}(\rho_{scg} + \rho_{hscg}) + X_{371}(\rho_{scg} + \rho_{hscg}) + X_{378}(\rho_{scg} + \rho_{hscg}) + X_{385}(\rho_{scg} + \rho_{hscg}) \\
&+ X_{37}(\rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) + X_{38}(\rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) + X_9(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{10}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{16}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{17}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{23}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{24}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{30}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{31}(\rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{72}(\rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) + X_{73}(\rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) \\
&+ X_{142}(\rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) + X_{143}(\rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) + X_{282}(\rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{283}(\rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) + X_{42}(\rho_c + \rho_{cg} + \rho_{sc} + \rho_{scg} + \rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) \\
&+ X_{14}(\rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{21}(\rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{28}(\rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{147}(\rho_g + \rho_{cg} + \rho_{sg} + \rho_{scg} + \rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_6(\eta_h^p + \theta_h) + X_{44}(\rho_{hsc} + \rho_{hscg}) + X_{45}(\rho_{hsc} + \rho_{hscg}) + X_{51}(\rho_{hsc} + \rho_{hscg}) + X_{52}(\rho_{hsc} + \rho_{hscg}) + X_{58}(\rho_{hsc} + \rho_{hscg}) \\
&+ X_{59}(\rho_{hsc} + \rho_{hscg}) + X_{65}(\rho_{hsc} + \rho_{hscg}) + X_{66}(\rho_{hsc} + \rho_{hscg}) + X_{79}(\rho_{hsc} + \rho_{hscg}) + X_{80}(\rho_{hsc} + \rho_{hscg}) \\
&+ X_{86}(\rho_{hsc} + \rho_{hscg}) + X_{87}(\rho_{hsc} + \rho_{hscg}) + X_{93}(\rho_{hsc} + \rho_{hscg}) + X_{94}(\rho_{hsc} + \rho_{hscg}) + X_{100}(\rho_{hsc} + \rho_{hscg}) \\
&+ X_{101}(\rho_{hsc} + \rho_{hscg}) + X_{149}(\rho_{hsg} + \rho_{hscg}) + X_{150}(\rho_{hsg} + \rho_{hscg}) + X_{156}(\rho_{hsg} + \rho_{hscg}) + X_{157}(\rho_{hsg} + \rho_{hscg}) \\
&+ X_{177}(\rho_{hcg} + \rho_{hscg}) + X_{178}(\rho_{hcg} + \rho_{hscg}) + X_{163}(\rho_{hsg} + \rho_{hscg}) + X_{164}(\rho_{hsg} + \rho_{hscg}) + X_{170}(\rho_{hsg} + \rho_{hscg}) \\
&+ X_{171}(\rho_{hsg} + \rho_{hscg}) + X_{212}(\rho_{hcg} + \rho_{hscg}) + X_{213}(\rho_{hcg} + \rho_{hscg}) + X_{289}(\rho_{hsg} + \rho_{hscg}) + X_{290}(\rho_{hsg} + \rho_{hscg}) \\
&+ X_{296}(\rho_{hsg} + \rho_{hscg}) + X_{297}(\rho_{hsg} + \rho_{hscg}) + X_{317}(\rho_{hcg} + \rho_{hscg}) + X_{318}(\rho_{hcg} + \rho_{hscg}) + X_{303}(\rho_{hsg} + \rho_{hscg}) \\
&+ X_{304}(\rho_{hsg} + \rho_{hscg}) + X_{310}(\rho_{hsg} + \rho_{hscg}) + X_{311}(\rho_{hsg} + \rho_{hscg}) + X_{352}(\rho_{hcg} + \rho_{hscg}) + X_{353}(\rho_{hcg} + \rho_{hscg})
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_8}{\partial t} &= \Lambda_s X_1 + X_{78}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{288}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) \\
&- X_8(\Lambda_h + \Lambda_g + \Lambda_c + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s) \\
&+ X_{43}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{148}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{113}(\gamma_c(0) + \nu_c) \\
&+ X_{428}(\gamma_g(0) + \nu_g) + X_{183}(\rho_{cg} + \rho_{hcg}) + X_{218}(\rho_{cg} + \rho_{hcg}) + X_{323}(\rho_{cg} + \rho_{hcg}) + X_{358}(\rho_{cg} + \rho_{hcg})
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_9}{\partial t} &= \Lambda_h X_8 + \Lambda_s X_2 + X_{184}\rho_{cg} + X_{219}\rho_{cg} + X_{324}\rho_{cg} + X_{359}\rho_{cg} \\
&- X_9(\Lambda_g + \Lambda_c + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s) \\
&+ X_{79}(\nu_c + \rho_c + \rho_{cg}) + X_{289}(\nu_g + \rho_g + \rho_{cg}) + X_{114}(\gamma_c(0) + \nu_c) + X_{429}(\gamma_g(0) + \nu_g) + X_{44}(\rho_c + \rho_{cg}) + X_{149}(\rho_g + \rho_{cg})
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{10}}{\partial t} &= \Lambda_s X_3 + X_{185}\rho_{cg} + X_{220}\rho_{cg} + X_{325}\rho_{cg} + X_{360}\rho_{cg} + X_9\sigma_h \\
&- X_{10}(\Lambda_g + \Lambda_c + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \theta_h) \\
&+ X_{80}(\nu_c + \rho_c + \rho_{cg}) + X_{290}(\nu_g + \rho_g + \rho_{cg}) + X_{115}(\gamma_c(0) + \nu_c) + X_{430}(\gamma_g(0) + \nu_g) + X_{45}(\rho_c + \rho_{cg}) + X_{150}(\rho_g + \rho_{cg})
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{11}}{\partial t} &= \Lambda_s X_4 + X_{46}\eta_c^p + X_{151}\eta_g^p + X_{116}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{431}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{11}(\Lambda_g + \Lambda_c + \eta_s^p + \mu + \sigma_s - \Lambda_h(\zeta_h - 1)) + X_{81}(\eta_c^p + \nu_c) + X_{291}(\eta_g^p + \nu_g)
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{12}}{\partial t} &= \Lambda_s X_5 + X_{47}\eta_c^p + X_{152}\eta_g^p + X_{117}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{432}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{12}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_s) + X_{82}(\eta_c^p + \nu_c) + X_{292}(\eta_g^p + \nu_g) - \Lambda_h X_{11}(\zeta_h - 1)
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{13}}{\partial t} &= \Lambda_s X_6 + X_{48}\eta_c^p + X_{153}\eta_g^p + X_{12}\sigma_h + X_{118}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{433}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{13}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \mu + \sigma_s + \theta_h) + X_{83}(\eta_c^p + \nu_c) + X_{293}(\eta_g^p + \nu_g)
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{14}}{\partial t} &= \Lambda_s X_7 + X_{12}\eta_h^p + X_{84}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{294}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{184}\rho_{hcg} + X_{185}\rho_{hcg} \\
&+ X_{219}\rho_{hcg} + X_{220}\rho_{hcg} + X_{324}\rho_{hcg} + X_{325}\rho_{hcg} + X_{359}\rho_{hcg} + X_{360}\rho_{hcg} + X_{119}(\gamma_c(0) + \nu_c) + X_{434}(\gamma_g(0) + \nu_g) \\
&+ X_{10}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \theta_h) - X_{14}(\Lambda_g + \Lambda_c + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{189}(\rho_{cg} + \rho_{hcg}) + X_{224}(\rho_{cg} + \rho_{hcg}) + X_{329}(\rho_{cg} + \rho_{hcg}) + X_{364}(\rho_{cg} + \rho_{hcg}) + X_{49}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) \\
&+ X_{154}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_9(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg}) + X_{13}(\eta_h^p + \theta_h) + X_{44}(\rho_{hc} + \rho_{hcg}) + X_{45}(\rho_{hc} + \rho_{hcg}) \\
&+ X_{79}(\rho_{hc} + \rho_{hcg}) + X_{80}(\rho_{hc} + \rho_{hcg}) + X_{149}(\rho_{hg} + \rho_{hcg}) + X_{150}(\rho_{hg} + \rho_{hcg}) + X_{289}(\rho_{hg} + \rho_{hcg}) + X_{290}(\rho_{hg} + \rho_{hcg}) \\
\frac{\partial X_{15}}{\partial t} &= X_8\sigma_s + X_{85}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{295}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) \\
&- X_{15}(\Lambda_h + \Lambda_g + \Lambda_c + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s) \\
&+ X_{50}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{155}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{120}(\gamma_c(0) + \nu_c) \\
&+ X_{435}(\gamma_g(0) + \nu_g) + X_{190}(\rho_{cg} + \rho_{hcg}) + X_{225}(\rho_{cg} + \rho_{hcg}) + X_{330}(\rho_{cg} + \rho_{hcg}) + X_{365}(\rho_{cg} + \rho_{hcg}) \\
\frac{\partial X_{16}}{\partial t} &= \Lambda_h X_{15} + X_{191}\rho_{cg} + X_{226}\rho_{cg} + X_{331}\rho_{cg} + X_{366}\rho_{cg} + X_9\sigma_s \\
&- X_{16}(\Lambda_g + \Lambda_c + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \tau_s) \\
&+ X_{86}(\nu_c + \rho_c + \rho_{cg}) + X_{296}(\nu_g + \rho_g + \rho_{cg}) + X_{121}(\gamma_c(0) + \nu_c) + X_{436}(\gamma_g(0) + \nu_g) + X_{51}(\rho_c + \rho_{cg}) + X_{156}(\rho_g + \rho_{cg}) \\
\frac{\partial X_{17}}{\partial t} &= X_{192}\rho_{cg} + X_{227}\rho_{cg} + X_{332}\rho_{cg} + X_{367}\rho_{cg} + X_{16}\sigma_h + X_{10}\sigma_s \\
&- X_{17}(\Lambda_g + \Lambda_c + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s + \theta_h) \\
&+ X_{87}(\nu_c + \rho_c + \rho_{cg}) + X_{297}(\nu_g + \rho_g + \rho_{cg}) + X_{122}(\gamma_c(0) + \nu_c) + X_{437}(\gamma_g(0) + \nu_g) + X_{52}(\rho_c + \rho_{cg}) + X_{157}(\rho_g + \rho_{cg}) \\
\frac{\partial X_{18}}{\partial t} &= X_{53}\eta_c^p + X_{158}\eta_g^p + X_{11}\sigma_s + X_{123}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{438}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{18}(\Lambda_g + \Lambda_c + \eta_s^p + \mu + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{88}(\eta_c^p + \nu_c) + X_{298}(\eta_g^p + \nu_g) \\
\frac{\partial X_{19}}{\partial t} &= X_{54}\eta_c^p + X_{159}\eta_g^p + X_{12}\sigma_s + X_{124}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{439}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{19}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \mu + \sigma_h + \tau_s) + X_{89}(\eta_c^p + \nu_c) + X_{299}(\eta_g^p + \nu_g) - \Lambda_h X_{18}(\zeta_h - 1) \\
\frac{\partial X_{20}}{\partial t} &= X_{55}\eta_c^p + X_{160}\eta_g^p + X_{19}\sigma_h + X_{13}\sigma_s + X_{125}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{440}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{20}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \mu + \tau_s + \theta_h) + X_{90}(\eta_c^p + \nu_c) + X_{300}(\eta_g^p + \nu_g) \\
\frac{\partial X_{21}}{\partial t} &= X_{19}\eta_h^p + X_{91}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{301}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{191}\rho_{hcg} + X_{192}\rho_{hcg} + X_{226}\rho_{hcg} \\
&+ X_{227}\rho_{hcg} + X_{331}\rho_{hcg} + X_{332}\rho_{hcg} + X_{366}\rho_{hcg} + X_{367}\rho_{hcg} + X_{14}\sigma_s + X_{126}(\gamma_c(0) + \nu_c) + X_{441}(\gamma_g(0) + \nu_g) \\
&+ X_{17}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \theta_h) - X_{21}(\Lambda_g + \Lambda_c + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \tau_s + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&+ X_{196}(\rho_{cg} + \rho_{hcg}) + X_{231}(\rho_{cg} + \rho_{hcg}) + X_{336}(\rho_{cg} + \rho_{hcg}) + X_{371}(\rho_{cg} + \rho_{hcg}) + X_{56}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) \\
&+ X_{161}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{16}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg}) + X_{20}(\eta_h^p + \theta_h) + X_{51}(\rho_{hc} + \rho_{hcg}) + X_{52}(\rho_{hc} + \rho_{hcg}) \\
&+ X_{86}(\rho_{hc} + \rho_{hcg}) + X_{87}(\rho_{hc} + \rho_{hcg}) + X_{156}(\rho_{hg} + \rho_{hcg}) + X_{157}(\rho_{hg} + \rho_{hcg}) + X_{296}(\rho_{hg} + \rho_{hcg}) + X_{297}(\rho_{hg} + \rho_{hcg}) \\
\frac{\partial X_{22}}{\partial t} &= X_{15}\tau_s + X_{92}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{302}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) \\
&- X_{22}(\Lambda_h + \Lambda_g + \Lambda_c + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_s) \\
&+ X_{57}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{162}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{127}(\gamma_c(0) + \nu_c) \\
&+ X_{442}(\gamma_g(0) + \nu_g) + X_{197}(\rho_{cg} + \rho_{hcg}) + X_{232}(\rho_{cg} + \rho_{hcg}) + X_{337}(\rho_{cg} + \rho_{hcg}) + X_{372}(\rho_{cg} + \rho_{hcg}) \\
\frac{\partial X_{23}}{\partial t} &= \Lambda_h X_{22} + X_{198}\rho_{cg} + X_{233}\rho_{cg} + X_{338}\rho_{cg} + X_{373}\rho_{cg} + X_{16}\tau_s \\
&- X_{23}(\Lambda_g + \Lambda_c + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \theta_s) \\
&+ X_{93}(\nu_c + \rho_c + \rho_{cg}) + X_{303}(\nu_g + \rho_g + \rho_{cg}) + X_{128}(\gamma_c(0) + \nu_c) + X_{443}(\gamma_g(0) + \nu_g) + X_{58}(\rho_c + \rho_{cg}) + X_{163}(\rho_g + \rho_{cg}) \\
\frac{\partial X_{24}}{\partial t} &= X_{199}\rho_{cg} + X_{234}\rho_{cg} + X_{339}\rho_{cg} + X_{374}\rho_{cg} + X_{23}\sigma_h + X_{17}\tau_s \\
&- X_{24}(\Lambda_g + \Lambda_c + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h + \theta_s) \\
&+ X_{94}(\nu_c + \rho_c + \rho_{cg}) + X_{304}(\nu_g + \rho_g + \rho_{cg}) + X_{129}(\gamma_c(0) + \nu_c) + X_{444}(\gamma_g(0) + \nu_g) + X_{59}(\rho_c + \rho_{cg}) + X_{164}(\rho_g + \rho_{cg}) \\
\frac{\partial X_{25}}{\partial t} &= X_{60}\eta_c^p + X_{165}\eta_g^p + X_{18}\tau_s + X_{130}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{445}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{25}(\Lambda_g + \Lambda_c + \eta_s^p + \mu + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{95}(\eta_c^p + \nu_c) + X_{305}(\eta_g^p + \nu_g) \\
\frac{\partial X_{26}}{\partial t} &= X_{61}\eta_c^p + X_{166}\eta_g^p + X_{19}\tau_s + X_{131}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{446}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{26}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \mu + \sigma_h + \theta_s) + X_{96}(\eta_c^p + \nu_c) + X_{306}(\eta_g^p + \nu_g) - \Lambda_h X_{25}(\zeta_h - 1) \\
\frac{\partial X_{27}}{\partial t} &= X_{62}\eta_c^p + X_{167}\eta_g^p + X_{26}\sigma_h + X_{20}\tau_s + X_{132}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{447}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&- X_{27}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \mu + \theta_h + \theta_s) + X_{97}(\eta_c^p + \nu_c) + X_{307}(\eta_g^p + \nu_g)
\end{aligned}
$$

$$\frac{\partial X_{28}}{\partial t} = X_{26}\eta_h^p + X_{98}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{308}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{198}\rho_{hcg} + X_{199}\rho_{hcg} + X_{233}\rho_{hcg}$$
$$+ X_{234}\rho_{hcg} + X_{338}\rho_{hcg} + X_{339}\rho_{hcg} + X_{373}\rho_{hcg} + X_{374}\rho_{hcg} + X_{21}\tau_s + X_{133}(\gamma_c(0) + \nu_c) + X_{448}(\gamma_g(0) + \nu_g)$$
$$+ X_{24}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \theta_h) - X_{28}(\Lambda_g + \Lambda_c + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \theta_s + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg})$$
$$+ X_{203}(\rho_{cg} + \rho_{hcg}) + X_{238}(\rho_{cg} + \rho_{hcg}) + X_{343}(\rho_{cg} + \rho_{hcg}) + X_{378}(\rho_{cg} + \rho_{hcg}) + X_{63}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg})$$
$$+ X_{168}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{23}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg}) + X_{27}(\eta_h^p + \theta_h) + X_{58}(\rho_{hc} + \rho_{hcg}) + X_{59}(\rho_{hc} + \rho_{hcg})$$
$$+ X_{93}(\rho_{hc} + \rho_{hcg}) + X_{94}(\rho_{hc} + \rho_{hcg}) + X_{163}(\rho_{hg} + \rho_{hcg}) + X_{164}(\rho_{hg} + \rho_{hcg}) + X_{303}(\rho_{hg} + \rho_{hcg}) + X_{304}(\rho_{hg} + \rho_{hcg})$$

$$\frac{\partial X_{29}}{\partial t} = X_{22}\theta_s + X_{99}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{309}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg})$$
$$- X_{29}(\Lambda_h + \Lambda_g + \Lambda_c + \gamma_s(0) + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg})$$
$$+ X_{64}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{169}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{134}(\gamma_c(0) + \nu_c)$$
$$+ X_{449}(\gamma_g(0) + \nu_g) + X_{204}(\rho_{cg} + \rho_{hcg}) + X_{239}(\rho_{cg} + \rho_{hcg}) + X_{344}(\rho_{cg} + \rho_{hcg}) + X_{379}(\rho_{cg} + \rho_{hcg})$$

$$\frac{\partial X_{30}}{\partial t} = \Lambda_h X_{29} + X_{205}\rho_{cg} + X_{240}\rho_{cg} + X_{345}\rho_{cg} + X_{380}\rho_{cg} + X_{23}\theta_s$$
$$- X_{30}(\Lambda_g + \Lambda_c + \gamma_s(0) + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h)$$
$$+ X_{100}(\nu_c + \rho_c + \rho_{cg}) + X_{310}(\nu_g + \rho_g + \rho_{cg}) + X_{135}(\gamma_c(0) + \nu_c) + X_{450}(\gamma_g(0) + \nu_g) + X_{65}(\rho_c + \rho_{cg}) + X_{170}(\rho_g + \rho_{cg})$$

$$\frac{\partial X_{31}}{\partial t} = X_{206}\rho_{cg} + X_{241}\rho_{cg} + X_{346}\rho_{cg} + X_{381}\rho_{cg} + X_{30}\sigma_h + X_{24}\theta_s$$
$$- X_{31}(\Lambda_g + \Lambda_c + \gamma_s(0) + \mu + \rho_h + \rho_s + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h)$$
$$+ X_{101}(\nu_c + \rho_c + \rho_{cg}) + X_{311}(\nu_g + \rho_g + \rho_{cg}) + X_{136}(\gamma_c(0) + \nu_c) + X_{451}(\gamma_g(0) + \nu_g) + X_{66}(\rho_c + \rho_{cg}) + X_{171}(\rho_g + \rho_{cg})$$

$$\frac{\partial X_{32}}{\partial t} = X_{67}\eta_c^p + X_{172}\eta_g^p + X_{25}\theta_s + X_{137}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{452}(\eta_g^p + \gamma_g(0) + \nu_g)$$
$$- X_{32}(\Lambda_g + \Lambda_c + \eta_s^p + \gamma_s(0) + \mu - \Lambda_h(\zeta_h - 1)) + X_{102}(\eta_c^p + \nu_c) + X_{312}(\eta_g^p + \nu_g)$$

$$\frac{\partial X_{33}}{\partial t} = X_{68}\eta_c^p + X_{173}\eta_g^p + X_{26}\theta_s + X_{138}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{453}(\eta_g^p + \gamma_g(0) + \nu_g)$$
$$- X_{33}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_h) + X_{103}(\eta_c^p + \nu_c) + X_{313}(\eta_g^p + \nu_g) - \Lambda_h X_{32}(\zeta_h - 1)$$

$$\frac{\partial X_{34}}{\partial t} = X_{69}\eta_c^p + X_{174}\eta_g^p + X_{33}\sigma_h + X_{27}\theta_s + X_{139}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{454}(\eta_g^p + \gamma_g(0) + \nu_g)$$
$$- X_{34}(\Lambda_g + \Lambda_c + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \theta_h) + X_{104}(\eta_c^p + \nu_c) + X_{314}(\eta_g^p + \nu_g)$$

$$\frac{\partial X_{35}}{\partial t} = X_{33}\eta_h^p + X_{105}(\nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg}) + X_{315}(\nu_g + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{205}\rho_{hcg} + X_{206}\rho_{hcg} + X_{240}\rho_{hcg}$$
$$+ X_{241}\rho_{hcg} + X_{345}\rho_{hcg} + X_{346}\rho_{hcg} + X_{380}\rho_{hcg} + X_{381}\rho_{hcg} + X_{28}\theta_s + X_{140}(\gamma_c(0) + \nu_c) + X_{455}(\gamma_g(0) + \nu_g)$$
$$- X_{35}(\Lambda_g + \Lambda_c + \gamma_s(0) + \mu + \rho_s + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hs} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{31}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \theta_h)$$
$$+ X_{210}(\rho_{cg} + \rho_{hcg}) + X_{245}(\rho_{cg} + \rho_{hcg}) + X_{350}(\rho_{cg} + \rho_{hcg}) + X_{385}(\rho_{cg} + \rho_{hcg}) + X_{70}(\rho_c + \rho_{cg} + \rho_{hc} + \rho_{hcg})$$
$$+ X_{175}(\rho_g + \rho_{cg} + \rho_{hg} + \rho_{hcg}) + X_{30}(\rho_h + \rho_{hc} + \rho_{hg} + \rho_{hcg}) + X_{34}(\eta_h^p + \theta_h) + X_{65}(\rho_{hc} + \rho_{hcg}) + X_{66}(\rho_{hc} + \rho_{hcg})$$
$$+ X_{100}(\rho_{hc} + \rho_{hcg}) + X_{101}(\rho_{hc} + \rho_{hcg}) + X_{170}(\rho_{hg} + \rho_{hcg}) + X_{171}(\rho_{hg} + \rho_{hcg}) + X_{310}(\rho_{hg} + \rho_{hcg}) + X_{311}(\rho_{hg} + \rho_{hcg})$$

$$\frac{\partial X_{36}}{\partial t} = \Lambda_c X_1 + X_{64}(\gamma_s(0) + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{316}(\nu_g + \rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg})$$
$$- X_{36}(\Lambda_h + \Lambda_s + \Lambda_g + \mu + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hscg} + \sigma_c)$$
$$+ X_{43}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{50}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{57}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg})$$
$$+ X_{176}(\rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg}) + X_{456}(\gamma_g(0) + \nu_g) + X_{183}(\rho_{sg} + \rho_{hsg}) + X_{190}(\rho_{sg} + \rho_{hsg}) + X_{197}(\rho_{sg} + \rho_{hsg})$$
$$+ X_{204}(\rho_{sg} + \rho_{hsg}) + X_{323}(\rho_{sg} + \rho_{hsg}) + X_{330}(\rho_{sg} + \rho_{hsg}) + X_{337}(\rho_{sg} + \rho_{hsg}) + X_{344}(\rho_{sg} + \rho_{hsg})$$

$$\frac{\partial X_{37}}{\partial t} = \Lambda_h X_{36} + \Lambda_c X_2 + X_{184}\rho_{sg} + X_{191}\rho_{sg} + X_{198}\rho_{sg} + X_{205}\rho_{sg} + X_{324}\rho_{sg} + X_{331}\rho_{sg} + X_{338}\rho_{sg} + X_{345}\rho_{sg} - X_{37}(\Lambda_s + \Lambda_g$$
$$+ \mu + \rho_c + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c) + X_{65}(\gamma_s(0) + \rho_s + \rho_{sg})$$
$$+ X_{317}(\nu_g + \rho_g + \rho_{sg}) + X_{457}(\gamma_g(0) + \nu_g) + X_{44}(\rho_s + \rho_{sg}) + X_{51}(\rho_s + \rho_{sg}) + X_{58}(\rho_s + \rho_{sg}) + X_{177}(\rho_g + \rho_{sg})$$

$$\frac{\partial X_{38}}{\partial t} = \Lambda_c X_3 + X_{185}\rho_{sg} + X_{192}\rho_{sg} + X_{199}\rho_{sg} + X_{206}\rho_{sg} + X_{325}\rho_{sg} + X_{332}\rho_{sg} + X_{339}\rho_{sg} + X_{346}\rho_{sg} + X_{37}\sigma_h - X_{38}(\Lambda_s + \Lambda_g$$
$$+ \mu + \rho_c + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_h) + X_{66}(\gamma_s(0) + \rho_s + \rho_{sg})$$
$$+ X_{318}(\nu_g + \rho_g + \rho_{sg}) + X_{458}(\gamma_g(0) + \nu_g) + X_{45}(\rho_s + \rho_{sg}) + X_{52}(\rho_s + \rho_{sg}) + X_{59}(\rho_s + \rho_{sg}) + X_{178}(\rho_g + \rho_{sg})$$

$$\frac{\partial X_{39}}{\partial t} = \Lambda_c X_4 + X_{46}\eta_s^p + X_{53}\eta_s^p + X_{60}\eta_s^p + X_{179}\eta_g^p + X_{459}(\eta_g^p + \gamma_g(0) + \nu_g)$$
$$- X_{39}(\Lambda_s + \Lambda_g + \eta_c^p + \mu + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{67}(\eta_s^p + \gamma_s(0)) + X_{319}(\eta_g^p + \nu_g)$$

$$\frac{\partial X_{40}}{\partial t} = \Lambda_c X_5 + X_{47}\eta_s^p + X_{54}\eta_s^p + X_{61}\eta_s^p + X_{180}\eta_g^p + X_{460}(\eta_g^p + \gamma_g(0) + \nu_g)$$
$$- X_{40}(\Lambda_s + \Lambda_g + \eta_c^p + \eta_h^p + \mu + \sigma_h + \sigma_c) + X_{68}(\eta_s^p + \gamma_s(0)) + X_{320}(\eta_g^p + \nu_g) - \Lambda_h X_{39}(\zeta_h - 1)$$

$$
\begin{aligned}
\frac{\partial X_{41}}{\partial t} &= \Lambda_c X_6 + X_{48}\eta_s^p + X_{55}\eta_s^p + X_{62}\eta_s^p + X_{181}\eta_g^p + X_{40}\sigma_h + X_{461}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{41}(\Lambda_s + \Lambda_g + \eta_c^p + \eta_h^p + \mu + \sigma_c + \theta_h) + X_{69}(\eta_s^p + \gamma_s(0)) + X_{321}(\eta_g^p + \nu_g) \\
\frac{\partial X_{42}}{\partial t} &= \Lambda_c X_7 + X_{70}(\gamma_s(0) + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{40}\eta_h^p + X_{322}(\nu_g + \rho_g + \rho_{sg} + \rho_{hg} + \rho_{hsg}) + X_{184}\rho_{hsg} + X_{185}\rho_{hsg} \\
&\quad + X_{191}\rho_{hsg} + X_{192}\rho_{hsg} + X_{198}\rho_{hsg} + X_{199}\rho_{hsg} + X_{205}\rho_{hsg} + X_{206}\rho_{hsg} + X_{324}\rho_{hsg} + X_{325}\rho_{hsg} + X_{331}\rho_{hsg} \\
&\quad + X_{332}\rho_{hsg} + X_{338}\rho_{hsg} + X_{339}\rho_{hsg} + X_{345}\rho_{hsg} + X_{346}\rho_{hsg} + X_{462}(\gamma_g(0) + \nu_g) + X_{38}(\rho_h + \rho_{hg} + \rho_{hs} + \rho_{hsg} + \theta_h) \\
&\quad - X_{42}(\Lambda_s + \Lambda_g + \mu + \rho_c + \rho_{cg} + \rho_{sc} + \rho_{scg} + \sigma_c + \rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) + X_{189}(\rho_{sg} + \rho_{hsg}) \\
&\quad + X_{196}(\rho_{sg} + \rho_{hsg}) + X_{203}(\rho_{sg} + \rho_{hsg}) + X_{210}(\rho_{sg} + \rho_{hsg}) + X_{329}(\rho_{sg} + \rho_{hsg}) + X_{336}(\rho_{sg} + \rho_{hsg}) \\
&\quad + X_{343}(\rho_{sg} + \rho_{hsg}) + X_{350}(\rho_{sg} + \rho_{hsg}) + X_{49}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{56}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) \\
&\quad + X_{63}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{182}(\rho_g + \rho_{sg} + \rho_{hg} + \rho_{hsg}) + X_{37}(\rho_h + \rho_{hg} + \rho_{hs} + \rho_{hsg}) + X_{41}(\eta_h^p + \theta_h) \\
&\quad + X_{44}(\rho_{hs} + \rho_{hsg}) + X_{45}(\rho_{hs} + \rho_{hsg}) + X_{51}(\rho_{hs} + \rho_{hsg}) + X_{52}(\rho_{hs} + \rho_{hsg}) + X_{58}(\rho_{hs} + \rho_{hsg}) + X_{59}(\rho_{hs} + \rho_{hsg}) \\
&\quad + X_{65}(\rho_{hs} + \rho_{hsg}) + X_{66}(\rho_{hs} + \rho_{hsg}) + X_{177}(\rho_{hg} + \rho_{hsg}) + X_{178}(\rho_{hg} + \rho_{hsg}) + X_{317}(\rho_{hg} + \rho_{hsg}) + X_{318}(\rho_{hg} + \rho_{hsg}) \\
\frac{\partial X_{43}}{\partial t} &= \Lambda_s X_{36} + \Lambda_c X_8 - X_{43}(\Lambda_h + \Lambda_g + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_c) \\
&\quad + X_{323}(\nu_g + \rho_g + \rho_{hg}) + X_{463}(\gamma_g(0) + \nu_g) + X_{183}(\rho_g + \rho_{hg}) \\
\frac{\partial X_{44}}{\partial t} &= \Lambda_h X_{43} + \Lambda_s X_{37} + \Lambda_c X_9 + X_{184}\rho_g \\
&\quad - X_{44}(\Lambda_g + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s + \sigma_c) \\
&\quad + X_{464}(\gamma_g(0) + \nu_g) + X_{324}(\nu_g + \rho_g) \\
\frac{\partial X_{45}}{\partial t} &= \Lambda_s X_{38} + \Lambda_c X_{10} + X_{185}\rho_g + X_{44}\sigma_h \\
&\quad - X_{45}(\Lambda_g + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_c + \theta_h) \\
&\quad + X_{465}(\gamma_g(0) + \nu_g) + X_{325}(\nu_g + \rho_g) \\
\frac{\partial X_{46}}{\partial t} &= \Lambda_s X_{39} + \Lambda_c X_{11} - X_{46}(\Lambda_g + \eta_c^p + \eta_s^p + \mu + \sigma_s + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{186}\eta_g^p + X_{466}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{326}(\eta_g^p + \nu_g) \\
\frac{\partial X_{47}}{\partial t} &= \Lambda_s X_{40} + \Lambda_c X_{12} + X_{187}\eta_g^p + X_{467}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{47}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_s + \sigma_c) + X_{327}(\eta_g^p + \nu_g) - \Lambda_h X_{46}(\zeta_h - 1) \\
\frac{\partial X_{48}}{\partial t} &= \Lambda_s X_{41} + \Lambda_c X_{13} + X_{188}\eta_g^p + X_{47}\sigma_h + X_{468}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{48}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \sigma_s + \sigma_c + \theta_h) + X_{328}(\eta_g^p + \nu_g) \\
\frac{\partial X_{49}}{\partial t} &= \Lambda_s X_{42} + \Lambda_c X_{14} + X_{189}(\rho_g + \rho_{hg}) + X_{47}\eta_h^p \\
&\quad - X_{49}(\Lambda_g + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \sigma_c + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{184}\rho_{hg} + X_{185}\rho_{hg} \\
&\quad + X_{324}\rho_{hg} + X_{325}\rho_{hg} + X_{469}(\gamma_g(0) + \nu_g) + X_{45}(\rho_h + \rho_{hg} + \theta_h) + X_{329}(\nu_g + \rho_g + \rho_{hg}) + X_{48}(\eta_h^p + \theta_h) + X_{44}(\rho_h + \rho_{hg}) \\
\frac{\partial X_{50}}{\partial t} &= \Lambda_c X_{15} + X_{43}\sigma_s - X_{50}(\Lambda_h + \Lambda_g + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \tau_s) \\
&\quad + X_{330}(\nu_g + \rho_g + \rho_{hg}) + X_{470}(\gamma_g(0) + \nu_g) + X_{190}(\rho_g + \rho_{hg}) \\
\frac{\partial X_{51}}{\partial t} &= \Lambda_h X_{50} + \Lambda_c X_{16} + X_{191}\rho_g + X_{44}\sigma_s \\
&\quad - X_{51}(\Lambda_g + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c + \tau_s) \\
&\quad + X_{471}(\gamma_g(0) + \nu_g) + X_{331}(\nu_g + \rho_g) \\
\frac{\partial X_{52}}{\partial t} &= \Lambda_c X_{17} + X_{192}\rho_g + X_{51}\sigma_h + X_{45}\sigma_s \\
&\quad - X_{52}(\Lambda_g + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \tau_s + \theta_h) \\
&\quad + X_{472}(\gamma_g(0) + \nu_g) + X_{332}(\nu_g + \rho_g) \\
\frac{\partial X_{53}}{\partial t} &= \Lambda_c X_{18} - X_{53}(\Lambda_g + \eta_c^p + \eta_s^p + \mu + \sigma_c + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{193}\eta_g^p + X_{46}\sigma_s + X_{473}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{333}(\eta_g^p + \nu_g) \\
\frac{\partial X_{54}}{\partial t} &= \Lambda_c X_{19} + X_{194}\eta_g^p + X_{47}\sigma_s + X_{474}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{54}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_c + \tau_s) + X_{334}(\eta_g^p + \nu_g) - \Lambda_h X_{53}(\zeta_h - 1) \\
\frac{\partial X_{55}}{\partial t} &= \Lambda_c X_{20} + X_{195}\eta_g^p + X_{54}\sigma_h + X_{48}\sigma_s + X_{475}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{55}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \sigma_c + \tau_s + \theta_h) + X_{335}(\eta_g^p + \nu_g) \\
\frac{\partial X_{56}}{\partial t} &= \Lambda_c X_{21} + X_{196}(\rho_g + \rho_{hg}) + X_{54}\eta_h^p \\
&\quad - X_{56}(\Lambda_g + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \tau_s + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{191}\rho_{hg} + X_{192}\rho_{hg} + X_{331}\rho_{hg} + X_{332}\rho_{hg} + X_{49}\sigma_s + X_{476}(\gamma_g(0) + \nu_g) \\
&\quad + X_{52}(\rho_h + \rho_{hg} + \theta_h) + X_{336}(\nu_g + \rho_g + \rho_{hg}) + X_{55}(\eta_h^p + \theta_h) + X_{51}(\rho_h + \rho_{hg})
\end{aligned}
$$

$$\frac{\partial X_{57}}{\partial t} = \Lambda_c X_{22} + X_{50}\tau_s - X_{57}(\Lambda_h + \Lambda_g + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_s) + X_{337}(\nu_g + \rho_g + \rho_{hg}) + X_{477}(\gamma_g(0) + \nu_g) + X_{197}(\rho_g + \rho_{hg})$$

$$\frac{\partial X_{58}}{\partial t} = \Lambda_h X_{57} + \Lambda_c X_{23} + X_{198}\rho_g + X_{51}\tau_s - X_{58}(\Lambda_g + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c + \theta_s) + X_{478}(\gamma_g(0) + \nu_g) + X_{338}(\nu_g + \rho_g)$$

$$\frac{\partial X_{59}}{\partial t} = \Lambda_c X_{24} + X_{199}\rho_g + X_{58}\sigma_h + X_{52}\tau_s - X_{59}(\Lambda_g + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_h + \theta_s) + X_{479}(\gamma_g(0) + \nu_g) + X_{339}(\nu_g + \rho_g)$$

$$\frac{\partial X_{60}}{\partial t} = \Lambda_c X_{25} - X_{60}(\Lambda_g + \eta_c^p + \eta_s^p + \mu + \sigma_c + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{200}\eta_g^p + X_{53}\tau_s + X_{480}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{340}(\eta_g^p + \nu_g)$$

$$\frac{\partial X_{61}}{\partial t} = \Lambda_c X_{26} + X_{201}\eta_g^p + X_{54}\tau_s + X_{481}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{61}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_c + \theta_s) + X_{341}(\eta_g^p + \nu_g) - \Lambda_h X_{60}(\zeta_h - 1)$$

$$\frac{\partial X_{62}}{\partial t} = \Lambda_c X_{27} + X_{202}\eta_g^p + X_{61}\sigma_h + X_{55}\tau_s + X_{482}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{62}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \sigma_c + \theta_h + \theta_s) + X_{342}(\eta_g^p + \nu_g)$$

$$\frac{\partial X_{63}}{\partial t} = \Lambda_c X_{28} + X_{203}(\rho_g + \rho_{hg}) + X_{61}\eta_h^p - X_{63}(\Lambda_g + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \theta_s + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{198}\rho_{hg} + X_{199}\rho_{hg} + X_{338}\rho_{hg} + X_{339}\rho_{hg} + X_{56}\tau_s + X_{483}(\gamma_g(0) + \nu_g) + X_{59}(\rho_h + \rho_{hg} + \theta_h) + X_{343}(\nu_g + \rho_g + \rho_{hg}) + X_{62}(\eta_h^p + \theta_h) + X_{58}(\rho_h + \rho_{hg})$$

$$\frac{\partial X_{64}}{\partial t} = \Lambda_c X_{29} + X_{57}\theta_s - X_{64}(\Lambda_h + \Lambda_g + \gamma_s(0) + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c) + X_{344}(\nu_g + \rho_g + \rho_{hg}) + X_{484}(\gamma_g(0) + \nu_g) + X_{204}(\rho_g + \rho_{hg})$$

$$\frac{\partial X_{65}}{\partial t} = \Lambda_h X_{64} + \Lambda_c X_{30} + X_{205}\rho_g + X_{58}\theta_s - X_{65}(\Lambda_g + \gamma_s(0) + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c) + X_{485}(\gamma_g(0) + \nu_g) + X_{345}(\nu_g + \rho_g)$$

$$\frac{\partial X_{66}}{\partial t} = \Lambda_c X_{31} + X_{206}\rho_g + X_{65}\sigma_h + X_{59}\theta_s - X_{66}(\Lambda_g + \gamma_s(0) + \mu + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_h) + X_{486}(\gamma_g(0) + \nu_g) + X_{346}(\nu_g + \rho_g)$$

$$\frac{\partial X_{67}}{\partial t} = \Lambda_c X_{32} + X_{207}\eta_g^p + X_{60}\theta_s + X_{487}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{347}(\eta_g^p + \nu_g) - X_{67}(\Lambda_g + \eta_c^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_c - \Lambda_h(\zeta_h - 1))$$

$$\frac{\partial X_{68}}{\partial t} = \Lambda_c X_{33} + X_{208}\eta_g^p + X_{61}\theta_s - X_{68}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_h + \sigma_c) + X_{488}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{348}(\eta_g^p + \nu_g) - \Lambda_h X_{67}(\zeta_h - 1)$$

$$\frac{\partial X_{69}}{\partial t} = \Lambda_c X_{34} + X_{209}\eta_g^p + X_{68}\sigma_h + X_{62}\theta_s - X_{69}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_c + \theta_h) + X_{489}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{349}(\eta_g^p + \nu_g)$$

$$\frac{\partial X_{70}}{\partial t} = \Lambda_c X_{35} - X_{70}(\Lambda_g + \gamma_s(0) + \mu + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{210}(\rho_g + \rho_{hg}) + X_{68}\eta_h^p + X_{205}\rho_{hg} + X_{206}\rho_{hg} + X_{345}\rho_{hg} + X_{346}\rho_{hg} + X_{63}\theta_s + X_{490}(\gamma_g(0) + \nu_g) + X_{66}(\rho_h + \rho_{hg} + \theta_h) + X_{350}(\nu_g + \rho_g + \rho_{hg}) + X_{69}(\eta_h^p + \theta_h) + X_{65}(\rho_h + \rho_{hg})$$

$$\frac{\partial X_{71}}{\partial t} = X_{99}(\gamma_s(0) + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{351}(\nu_g + \rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg}) - X_{71}(\Lambda_h + \Lambda_s + \Lambda_g + \mu + \nu_c + \rho_c + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hscg}) + X_{78}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{85}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{92}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{211}(\rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg}) + X_{491}(\gamma_g(0) + \nu_g) + X_{218}(\rho_{sg} + \rho_{hsg}) + X_{225}(\rho_{sg} + \rho_{hsg}) + X_{232}(\rho_{sg} + \rho_{hsg}) + X_{239}(\rho_{sg} + \rho_{hsg}) + X_{358}(\rho_{sg} + \rho_{hsg}) + X_{365}(\rho_{sg} + \rho_{hsg}) + X_{372}(\rho_{sg} + \rho_{hsg}) + X_{379}(\rho_{sg} + \rho_{hsg}) - X_{36}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{72}}{\partial t} = \Lambda_h X_{71} + X_{219}\rho_{sg} + X_{226}\rho_{sg} + X_{233}\rho_{sg} + X_{240}\rho_{sg} + X_{359}\rho_{sg} + X_{366}\rho_{sg} + X_{373}\rho_{sg} + X_{380}\rho_{sg} - X_{72}(\Lambda_s + \Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h) + X_{100}(\gamma_s(0) + \rho_s + \rho_{sg}) + X_{352}(\nu_g + \rho_g + \rho_{sg}) + X_{492}(\gamma_g(0) + \nu_g) + X_{79}(\rho_s + \rho_{sg}) + X_{86}(\rho_s + \rho_{sg}) + X_{93}(\rho_s + \rho_{sg}) + X_{212}(\rho_g + \rho_{sg}) - X_{37}\sigma_c(\epsilon_c - 1)$$

$$
\begin{aligned}
\frac{\partial X_{73}}{\partial t} &= X_{220}\rho_{sg} + X_{227}\rho_{sg} + X_{234}\rho_{sg} + X_{241}\rho_{sg} + X_{360}\rho_{sg} + X_{367}\rho_{sg} + X_{374}\rho_{sg} + X_{381}\rho_{sg} + X_{72}\sigma_h \\
&\quad - X_{73}(\Lambda_s + \Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h) \\
&\quad + X_{101}(\gamma_s(0) + \rho_s + \rho_{sg}) + X_{353}(\nu_g + \rho_g + \rho_{sg}) + X_{493}(\gamma_g(0) + \nu_g) \\
&\quad + X_{80}(\rho_s + \rho_{sg}) + X_{87}(\rho_s + \rho_{sg}) + X_{94}(\rho_s + \rho_{sg}) + X_{213}(\rho_g + \rho_{sg}) - X_{38}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{74}}{\partial t} &= X_{81}\eta_s^p + X_{88}\eta_s^p + X_{95}\eta_s^p + X_{214}\eta_g^p + X_{494}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{74}(\Lambda_s + \Lambda_g + \eta_c^p + \mu + \nu_c - \Lambda_h(\zeta_h - 1)) + X_{102}(\eta_s^p + \gamma_s(0)) + X_{354}(\eta_g^p + \nu_g) - X_{39}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{75}}{\partial t} &= X_{82}\eta_s^p + X_{89}\eta_s^p + X_{96}\eta_s^p + X_{215}\eta_g^p + X_{495}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{75}(\Lambda_s + \Lambda_g + \eta_c^p + \eta_h^p + \mu + \nu_c + \sigma_h) \\
&\quad + X_{103}(\eta_s^p + \gamma_s(0)) + X_{355}(\eta_g^p + \nu_g) - \Lambda_h X_{74}(\zeta_h - 1) - X_{40}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{76}}{\partial t} &= X_{83}\eta_s^p + X_{90}\eta_s^p + X_{97}\eta_s^p + X_{216}\eta_g^p + X_{75}\sigma_h + X_{496}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{76}(\Lambda_s + \Lambda_g + \eta_c^p + \eta_h^p + \mu + \nu_c + \theta_h) + X_{104}(\eta_s^p + \gamma_s(0)) + X_{356}(\eta_g^p + \nu_g) - X_{41}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{77}}{\partial t} &= X_{105}(\gamma_s(0) + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{75}\eta_h^p + X_{357}(\nu_g + \rho_g + \rho_{sg} + \rho_{hg} + \rho_{hsg}) + X_{219}\rho_{hsg} + X_{220}\rho_{hsg} \\
&\quad + X_{226}\rho_{hsg} + X_{227}\rho_{hsg} + X_{233}\rho_{hsg} + X_{234}\rho_{hsg} + X_{240}\rho_{hsg} + X_{241}\rho_{hsg} + X_{359}\rho_{hsg} + X_{360}\rho_{hsg} + X_{366}\rho_{hsg} \\
&\quad + X_{367}\rho_{hsg} + X_{373}\rho_{hsg} + X_{374}\rho_{hsg} + X_{380}\rho_{hsg} + X_{381}\rho_{hsg} + X_{497}(\gamma_g(0) + \nu_g) + X_{73}(\rho_h + \rho_{hg} + \rho_{hs} + \rho_{hsg} + \theta_h) \\
&\quad - X_{77}(\Lambda_s + \Lambda_g + \mu + \nu_c + \rho_c + \rho_{cg} + \rho_{sc} + \rho_{scg} + \rho_{hc} + \rho_{hcg} + \rho_{hsc} + \rho_{hscg}) + X_{224}(\rho_{sg} + \rho_{hsg}) + X_{231}(\rho_{sg} + \rho_{hsg}) \\
&\quad + X_{238}(\rho_{sg} + \rho_{hsg}) + X_{245}(\rho_{sg} + \rho_{hsg}) + X_{364}(\rho_{sg} + \rho_{hsg}) + X_{371}(\rho_{sg} + \rho_{hsg}) + X_{378}(\rho_{sg} + \rho_{hsg}) \\
&\quad + X_{385}(\rho_{sg} + \rho_{hsg}) + X_{84}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{91}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{98}(\rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) \\
&\quad + X_{217}(\rho_g + \rho_{sg} + \rho_{hg} + \rho_{hsg}) + X_{72}(\rho_h + \rho_{hg} + \rho_{hs} + \rho_{hsg}) + X_{76}(\eta_h^p + \theta_h) + X_{79}(\rho_{hs} + \rho_{hsg}) + X_{80}(\rho_{hs} + \rho_{hsg}) \\
&\quad + X_{86}(\rho_{hs} + \rho_{hsg}) + X_{87}(\rho_{hs} + \rho_{hsg}) + X_{93}(\rho_{hs} + \rho_{hsg}) + X_{94}(\rho_{hs} + \rho_{hsg}) + X_{100}(\rho_{hs} + \rho_{hsg}) + X_{101}(\rho_{hs} + \rho_{hsg}) \\
&\quad + X_{212}(\rho_{hg} + \rho_{hsg}) + X_{213}(\rho_{hg} + \rho_{hsg}) + X_{352}(\rho_{hg} + \rho_{hsg}) + X_{353}(\rho_{hg} + \rho_{hsg}) - X_{42}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{78}}{\partial t} &= \Lambda_s X_{71} - X_{78}(\Lambda_h + \Lambda_g + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s) \\
&\quad + X_{358}(\nu_g + \rho_g + \rho_{hg}) + X_{498}(\gamma_g(0) + \nu_g) + X_{218}(\rho_g + \rho_{hg}) - X_{43}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{79}}{\partial t} &= \Lambda_h X_{78} + \Lambda_s X_{72} + X_{219}\rho_g \\
&\quad - X_{79}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s) \\
&\quad + X_{499}(\gamma_g(0) + \nu_g) + X_{359}(\nu_g + \rho_g) - X_{44}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{80}}{\partial t} &= \Lambda_s X_{73} + X_{220}\rho_g + X_{79}\sigma_h \\
&\quad - X_{80}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \theta_h) \\
&\quad + X_{500}(\gamma_g(0) + \nu_g) + X_{360}(\nu_g + \rho_g) - X_{45}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{81}}{\partial t} &= \Lambda_s X_{74} - X_{81}(\Lambda_g + \eta_c^p + \eta_s^p + \mu + \nu_c + \sigma_s - \Lambda_h(\zeta_h - 1)) + X_{221}\eta_g^p + X_{501}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{361}(\eta_g^p + \nu_g) - X_{46}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{82}}{\partial t} &= \Lambda_s X_{75} + X_{222}\eta_g^p + X_{502}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{82}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_h + \sigma_s) \\
&\quad + X_{362}(\eta_g^p + \nu_g) - \Lambda_h X_{81}(\zeta_h - 1) - X_{47}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{83}}{\partial t} &= \Lambda_s X_{76} + X_{223}\eta_g^p + X_{82}\sigma_h + X_{503}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{83}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_s + \theta_h) + X_{363}(\eta_g^p + \nu_g) - X_{48}\sigma_c(\epsilon_c \\
&\quad - 1) \\
\frac{\partial X_{84}}{\partial t} &= \Lambda_s X_{77} + X_{224}(\rho_g + \rho_{hg}) + X_{82}\eta_h^p \\
&\quad - X_{84}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{219}\rho_{hg} + X_{220}\rho_{hg} + X_{359}\rho_{hg} + X_{360}\rho_{hg} + X_{504}(\gamma_g(0) + \nu_g) + X_{80}(\rho_h + \rho_{hg} + \theta_h) \\
&\quad + X_{364}(\nu_g + \rho_g + \rho_{hg}) + X_{83}(\eta_h^p + \theta_h) + X_{79}(\rho_h + \rho_{hg}) - X_{49}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{85}}{\partial t} &= X_{78}\sigma_s - X_{85}(\Lambda_h + \Lambda_g + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s) \\
&\quad + X_{365}(\nu_g + \rho_g + \rho_{hg}) + X_{505}(\gamma_g(0) + \nu_g) + X_{225}(\rho_g + \rho_{hg}) - X_{50}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{86}}{\partial t} &= \Lambda_h X_{85} + X_{226}\rho_g + X_{79}\sigma_s \\
&\quad - X_{86}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \tau_s) \\
&\quad + X_{506}(\gamma_g(0) + \nu_g) + X_{366}(\nu_g + \rho_g) - X_{51}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{87}}{\partial t} &= X_{227}\rho_g + X_{86}\sigma_h + X_{80}\sigma_s \\
&\quad - X_{87}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s + \theta_h) \\
&\quad + X_{507}(\gamma_g(0) + \nu_g) + X_{367}(\nu_g + \rho_g) - X_{52}\sigma_c(\epsilon_c - 1)
\end{aligned}
$$

$$\frac{\partial X_{88}}{\partial t} = X_{228}\eta_g^p - X_{88}(\Lambda_g + \eta_c^p + \eta_s^p + \mu + \nu_c + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{81}\sigma_s + X_{508}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{368}(\eta_g^p + \nu_g) - X_{53}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{89}}{\partial t} = X_{229}\eta_g^p + X_{82}\sigma_s + X_{509}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{89}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_h + \tau_s)$$
$$+ X_{369}(\eta_g^p + \nu_g) - \Lambda_h X_{88}(\zeta_h - 1) - X_{54}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{90}}{\partial t} = X_{230}\eta_g^p + X_{89}\sigma_h + X_{83}\sigma_s + X_{510}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{90}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \tau_s + \theta_h) + X_{370}(\eta_g^p + \nu_g) - X_{55}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{91}}{\partial t} = X_{231}(\rho_g + \rho_{hg}) + X_{89}\eta_h^p - X_{91}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \tau_s + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg})$$
$$+ X_{226}\rho_{hg} + X_{227}\rho_{hg} + X_{366}\rho_{hg} + X_{367}\rho_{hg} + X_{84}\sigma_s + X_{511}(\gamma_g(0) + \nu_g)$$
$$+ X_{87}(\rho_h + \rho_{hg} + \theta_h) + X_{371}(\nu_g + \rho_g + \rho_{hg}) + X_{90}(\eta_h^p + \theta_h) + X_{86}(\rho_h + \rho_{hg}) - X_{56}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{92}}{\partial t} = X_{85}\tau_s - X_{92}(\Lambda_h + \Lambda_g + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_s)$$
$$+ X_{372}(\nu_g + \rho_g + \rho_{hg}) + X_{512}(\gamma_g(0) + \nu_g) + X_{232}(\rho_g + \rho_{hg}) - X_{57}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{93}}{\partial t} = \Lambda_h X_{92} + X_{233}\rho_g + X_{86}\tau_s$$
$$- X_{93}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \theta_s)$$
$$+ X_{513}(\gamma_g(0) + \nu_g) + X_{373}(\nu_g + \rho_g) - X_{58}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{94}}{\partial t} = X_{234}\rho_g + X_{93}\sigma_h + X_{87}\tau_s$$
$$- X_{94}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h + \theta_s)$$
$$+ X_{514}(\gamma_g(0) + \nu_g) + X_{374}(\nu_g + \rho_g) - X_{59}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{95}}{\partial t} = X_{235}\eta_g^p - X_{95}(\Lambda_g + \eta_c^p + \eta_s^p + \mu + \nu_c + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{88}\tau_s + X_{515}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{375}(\eta_g^p + \nu_g) - X_{60}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{96}}{\partial t} = X_{236}\eta_g^p + X_{89}\tau_s + X_{516}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{96}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_h + \theta_s)$$
$$+ X_{376}(\eta_g^p + \nu_g) - \Lambda_h X_{95}(\zeta_h - 1) - X_{61}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{97}}{\partial t} = X_{237}\eta_g^p + X_{96}\sigma_h + X_{90}\tau_s + X_{517}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{97}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \theta_h + \theta_s) + X_{377}(\eta_g^p + \nu_g) - X_{62}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{98}}{\partial t} = X_{238}(\rho_g + \rho_{hg}) + X_{96}\eta_h^p - X_{98}(\Lambda_g + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \theta_s + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg})$$
$$+ X_{233}\rho_{hg} + X_{234}\rho_{hg} + X_{373}\rho_{hg} + X_{374}\rho_{hg} + X_{91}\tau_s + X_{518}(\gamma_g(0) + \nu_g) + X_{94}(\rho_h + \rho_{hg} + \theta_h)$$
$$+ X_{378}(\nu_g + \rho_g + \rho_{hg}) + X_{97}(\eta_h^p + \theta_h) + X_{93}(\rho_h + \rho_{hg}) - X_{63}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{99}}{\partial t} = X_{92}\theta_s - X_{99}(\Lambda_h + \Lambda_g + \gamma_s(0) + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg})$$
$$+ X_{379}(\nu_g + \rho_g + \rho_{hg}) + X_{519}(\gamma_g(0) + \nu_g) + X_{239}(\rho_g + \rho_{hg}) - X_{64}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{100}}{\partial t} = \Lambda_h X_{99} + X_{240}\rho_g + X_{93}\theta_s$$
$$- X_{100}(\Lambda_g + \gamma_s(0) + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h)$$
$$+ X_{520}(\gamma_g(0) + \nu_g) + X_{380}(\nu_g + \rho_g) - X_{65}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{101}}{\partial t} = X_{241}\rho_g + X_{100}\sigma_h + X_{94}\theta_s$$
$$- X_{101}(\Lambda_g + \gamma_s(0) + \mu + \nu_c + \rho_c + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h)$$
$$+ X_{521}(\gamma_g(0) + \nu_g) + X_{381}(\nu_g + \rho_g) - X_{66}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{102}}{\partial t} = X_{242}\eta_g^p + X_{95}\theta_s + X_{522}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{382}(\eta_g^p + \nu_g) - X_{102}(\Lambda_g + \eta_c^p + \eta_s^p + \gamma_s(0) + \mu + \nu_c - \Lambda_h(\zeta_h - 1)) - X_{67}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{103}}{\partial t} = X_{243}\eta_g^p + X_{96}\theta_s - X_{103}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_c + \sigma_h)$$
$$+ X_{523}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{383}(\eta_g^p + \nu_g) - \Lambda_h X_{102}(\zeta_h - 1) - X_{68}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{104}}{\partial t} = X_{244}\eta_g^p + X_{103}\sigma_h + X_{97}\theta_s - X_{104}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_c + \theta_h)$$
$$+ X_{524}(\eta_g^p + \gamma_g(0) + \nu_g) + X_{384}(\eta_g^p + \nu_g) - X_{69}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{105}}{\partial t} = X_{245}(\rho_g + \rho_{hg}) - X_{105}(\Lambda_g + \gamma_s(0) + \mu + \nu_c + \rho_c + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hc} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg})$$
$$+ X_{103}\eta_h^p + X_{240}\rho_{hg} + X_{241}\rho_{hg} + X_{380}\rho_{hg} + X_{381}\rho_{hg} + X_{98}\theta_s + X_{525}(\gamma_g(0) + \nu_g)$$
$$+ X_{101}(\rho_h + \rho_{hg} + \theta_h) + X_{385}(\nu_g + \rho_g + \rho_{hg}) + X_{104}(\eta_h^p + \theta_h) + X_{100}(\rho_h + \rho_{hg}) - X_{70}\sigma_c(\epsilon_c - 1)$$

$$
\begin{aligned}
\frac{\partial X_{106}}{\partial t} &= X_{134}(\gamma_s(0)+\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) - X_{106}(\Lambda_h+\Lambda_s+\Lambda_g+\gamma_c(0)+\mu+\nu_c) + X_{386}(\nu_g+\rho_g+\rho_{hg}+\rho_{sg}+\rho_{hsg}) \\
&+ X_{113}(\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) + X_{120}(\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) + X_{127}(\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) \\
&+ X_{246}(\rho_g+\rho_{hg}+\rho_{sg}+\rho_{hsg}) + X_{526}(\gamma_g(0)+\nu_g) + X_{253}(\rho_{sg}+\rho_{hsg}) + X_{260}(\rho_{sg}+\rho_{hsg}) + X_{267}(\rho_{sg}+\rho_{hsg}) \\
&+ X_{274}(\rho_{sg}+\rho_{hsg}) + X_{393}(\rho_{sg}+\rho_{hsg}) + X_{400}(\rho_{sg}+\rho_{hsg}) + X_{407}(\rho_{sg}+\rho_{hsg}) + X_{414}(\rho_{sg}+\rho_{hsg}) + X_{36}\epsilon_c\sigma_c \\
\frac{\partial X_{107}}{\partial t} &= \Lambda_h X_{106} + X_{254}\rho_{sg} + X_{261}\rho_{sg} + X_{268}\rho_{sg} + X_{275}\rho_{sg} + X_{394}\rho_{sg} + X_{401}\rho_{sg} + X_{408}\rho_{sg} + X_{415}\rho_{sg} \\
&- X_{107}(\Lambda_s+\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_h+\rho_{hg}+\rho_{hs}+\rho_{hsg}+\sigma_h) + X_{135}(\gamma_s(0)+\rho_s+\rho_{sg}) + X_{387}(\nu_g+\rho_g+\rho_{sg}) \\
&+ X_{527}(\gamma_g(0)+\nu_g) + X_{114}(\rho_s+\rho_{sg}) + X_{121}(\rho_s+\rho_{sg}) + X_{128}(\rho_s+\rho_{sg}) + X_{247}(\rho_g+\rho_{sg}) + X_{37}\epsilon_c\sigma_c \\
\frac{\partial X_{108}}{\partial t} &= X_{255}\rho_{sg} + X_{262}\rho_{sg} + X_{269}\rho_{sg} + X_{276}\rho_{sg} + X_{395}\rho_{sg} + X_{402}\rho_{sg} + X_{409}\rho_{sg} + X_{416}\rho_{sg} + X_{107}\sigma_h \\
&- X_{108}(\Lambda_s+\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_h+\rho_{hg}+\rho_{hs}+\rho_{hsg}+\theta_h) + X_{136}(\gamma_s(0)+\rho_s+\rho_{sg}) + X_{388}(\nu_g+\rho_g+\rho_{sg}) \\
&+ X_{528}(\gamma_g(0)+\nu_g) + X_{115}(\rho_s+\rho_{sg}) + X_{122}(\rho_s+\rho_{sg}) + X_{129}(\rho_s+\rho_{sg}) + X_{248}(\rho_g+\rho_{sg}) + X_{38}\epsilon_c\sigma_c \\
\frac{\partial X_{109}}{\partial t} &= X_{116}\eta_s^p + X_{123}\eta_s^p + X_{130}\eta_s^p + X_{249}\eta_g^p + X_{529}(\eta_g^p+\gamma_g(0)+\nu_g) \\
&- X_{109}(\Lambda_s+\Lambda_g+\eta_c^p+\gamma_c(0)+\mu+\nu_c-\Lambda_h(\zeta_h-1)) + X_{137}(\eta_s^p+\gamma_s(0)) + X_{389}(\eta_g^p+\nu_g) + X_{39}\epsilon_c\sigma_c \\
\frac{\partial X_{110}}{\partial t} &= X_{117}\eta_s^p + X_{124}\eta_s^p + X_{131}\eta_s^p + X_{250}\eta_g^p - X_{110}(\Lambda_s+\Lambda_g+\eta_c^p+\eta_h^p+\gamma_c(0)+\mu+\nu_c+\sigma_h) \\
&+ X_{530}(\eta_g^p+\gamma_g(0)+\nu_g) + X_{138}(\eta_s^p+\gamma_s(0)) + X_{390}(\eta_g^p+\nu_g) + X_{40}\epsilon_c\sigma_c - \Lambda_h X_{109}(\zeta_h-1) \\
\frac{\partial X_{111}}{\partial t} &= X_{118}\eta_s^p + X_{125}\eta_s^p + X_{132}\eta_s^p + X_{251}\eta_g^p + X_{110}\sigma_h - X_{111}(\Lambda_s+\Lambda_g+\eta_c^p+\eta_h^p+\gamma_c(0)+\mu+\nu_c+\theta_h) \\
&+ X_{531}(\eta_g^p+\gamma_g(0)+\nu_g) + X_{139}(\eta_s^p+\gamma_s(0)) + X_{391}(\eta_g^p+\nu_g) + X_{41}\epsilon_c\sigma_c \\
\frac{\partial X_{112}}{\partial t} &= X_{110}\eta_h^p + X_{254}\rho_{hsg} + X_{255}\rho_{hsg} + X_{261}\rho_{hsg} + X_{262}\rho_{hsg} + X_{268}\rho_{hsg} + X_{269}\rho_{hsg} + X_{275}\rho_{hsg} + X_{276}\rho_{hsg} + X_{394}\rho_{hsg} \\
&+ X_{395}\rho_{hsg} + X_{401}\rho_{hsg} + X_{402}\rho_{hsg} + X_{408}\rho_{hsg} + X_{409}\rho_{hsg} + X_{415}\rho_{hsg} + X_{416}\rho_{hsg} + X_{119}(\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) \\
&+ X_{126}(\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) + X_{133}(\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) + X_{252}(\rho_g+\rho_{hg}+\rho_{sg}+\rho_{hsg}) + X_{532}(\gamma_g(0)+\nu_g) \\
&+ X_{108}(\rho_h+\rho_{hg}+\rho_{hs}+\rho_{hsg}+\theta_h) - X_{112}(\Lambda_s+\Lambda_g+\gamma_c(0)+\mu+\nu_c) + X_{140}(\gamma_s(0)+\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}) \\
&+ X_{392}(\nu_g+\rho_g+\rho_{hg}+\rho_{sg}+\rho_{hsg}) + X_{107}(\rho_h+\rho_{hg}+\rho_{hs}+\rho_{hsg}) + X_{111}(\eta_h^p+\theta_h) + X_{114}(\rho_{hs}+\rho_{hsg}) \\
&+ X_{115}(\rho_{hs}+\rho_{hsg}) + X_{121}(\rho_{hs}+\rho_{hsg}) + X_{122}(\rho_{hs}+\rho_{hsg}) + X_{128}(\rho_{hs}+\rho_{hsg}) + X_{129}(\rho_{hs}+\rho_{hsg}) \\
&+ X_{135}(\rho_{hs}+\rho_{hsg}) + X_{136}(\rho_{hs}+\rho_{hsg}) + X_{247}(\rho_{hg}+\rho_{hsg}) + X_{248}(\rho_{hg}+\rho_{hsg}) + X_{259}(\rho_{sg}+\rho_{hsg}) \\
&+ X_{266}(\rho_{sg}+\rho_{hsg}) + X_{273}(\rho_{sg}+\rho_{hsg}) + X_{280}(\rho_{sg}+\rho_{hsg}) + X_{387}(\rho_{hg}+\rho_{hsg}) + X_{388}(\rho_{hg}+\rho_{hsg}) \\
&+ X_{399}(\rho_{sg}+\rho_{hsg}) + X_{406}(\rho_{sg}+\rho_{hsg}) + X_{413}(\rho_{sg}+\rho_{hsg}) + X_{420}(\rho_{sg}+\rho_{hsg}) + X_{42}\epsilon_c\sigma_c \\
\frac{\partial X_{113}}{\partial t} &= \Lambda_s X_{106} - X_{113}(\Lambda_h+\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}+\sigma_s) \\
&+ X_{393}(\nu_g+\rho_g+\rho_{hg}) + X_{533}(\gamma_g(0)+\nu_g) + X_{253}(\rho_g+\rho_{hg}) + X_{43}\epsilon_c\sigma_c \\
\frac{\partial X_{114}}{\partial t} &= \Lambda_h X_{113} + \Lambda_s X_{107} + X_{254}\rho_g - X_{114}(\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_h+\rho_s+\rho_{hg}+\rho_{sg}+\rho_{hs}+\rho_{hsg}+\sigma_h+\sigma_s) \\
&+ X_{534}(\gamma_g(0)+\nu_g) + X_{394}(\nu_g+\rho_g) + X_{44}\epsilon_c\sigma_c \\
\frac{\partial X_{115}}{\partial t} &= \Lambda_s X_{108} + X_{255}\rho_g + X_{114}\sigma_h - X_{115}(\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_h+\rho_s+\rho_{hg}+\rho_{sg}+\rho_{hs}+\rho_{hsg}+\sigma_s+\theta_h) \\
&+ X_{535}(\gamma_g(0)+\nu_g) + X_{395}(\nu_g+\rho_g) + X_{45}\epsilon_c\sigma_c \\
\frac{\partial X_{116}}{\partial t} &= \Lambda_s X_{109} + X_{256}\eta_g^p + X_{536}(\eta_g^p+\gamma_g(0)+\nu_g) - X_{116}(\Lambda_g+\eta_c^p+\eta_s^p+\gamma_c(0)+\mu+\nu_c+\sigma_s-\Lambda_h(\zeta_h-1)) + X_{396}(\eta_g^p+\nu_g) + X_{46}\epsilon_c\sigma_c \\
\frac{\partial X_{117}}{\partial t} &= \Lambda_s X_{110} + X_{257}\eta_g^p + X_{537}(\eta_g^p+\gamma_g(0)+\nu_g) - X_{117}(\Lambda_g+\eta_c^p+\eta_h^p+\eta_s^p+\gamma_c(0)+\mu+\nu_c+\sigma_h+\sigma_s) \\
&+ X_{397}(\eta_g^p+\nu_g) + X_{47}\epsilon_c\sigma_c - \Lambda_h X_{116}(\zeta_h-1) \\
\frac{\partial X_{118}}{\partial t} &= \Lambda_s X_{111} + X_{258}\eta_g^p + X_{117}\sigma_h + X_{538}(\eta_g^p+\gamma_g(0)+\nu_g) \\
&- X_{118}(\Lambda_g+\eta_c^p+\eta_h^p+\eta_s^p+\gamma_c(0)+\mu+\nu_c+\sigma_s+\theta_h) + X_{398}(\eta_g^p+\nu_g) + X_{48}\epsilon_c\sigma_c \\
\frac{\partial X_{119}}{\partial t} &= \Lambda_s X_{112} + X_{117}\eta_h^p + X_{254}\rho_{hg} + X_{255}\rho_{hg} + X_{394}\rho_{hg} + X_{395}\rho_{hg} + X_{539}(\gamma_g(0)+\nu_g) + X_{259}(\rho_g+\rho_{hg}) + X_{115}(\rho_h+\rho_{hg}+\theta_h) \\
&- X_{119}(\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}+\sigma_s) + X_{399}(\nu_g+\rho_g+\rho_{hg}) + X_{118}(\eta_h^p+\theta_h) + X_{114}(\rho_h+\rho_{hg}) + X_{49}\epsilon_c\sigma_c \\
\frac{\partial X_{120}}{\partial t} &= X_{113}\sigma_s - X_{120}(\Lambda_h+\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_s+\rho_{sg}+\rho_{hs}+\rho_{hsg}+\tau_s) \\
&+ X_{400}(\nu_g+\rho_g+\rho_{hg}) + X_{540}(\gamma_g(0)+\nu_g) + X_{260}(\rho_g+\rho_{hg}) + X_{50}\epsilon_c\sigma_c \\
\frac{\partial X_{121}}{\partial t} &= \Lambda_h X_{120} + X_{261}\rho_g + X_{114}\sigma_s - X_{121}(\Lambda_g+\gamma_c(0)+\mu+\nu_c+\rho_h+\rho_s+\rho_{hg}+\rho_{sg}+\rho_{hs}+\rho_{hsg}+\sigma_h+\tau_s) \\
&+ X_{541}(\gamma_g(0)+\nu_g) + X_{401}(\nu_g+\rho_g) + X_{51}\epsilon_c\sigma_c
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{122}}{\partial t} &= X_{262}\rho_g + X_{121}\sigma_h + X_{115}\sigma_s - X_{122}(\Lambda_g + \gamma_c(0) + \mu + \nu_c + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \tau_s + \theta_h) \\
&\quad + X_{542}(\gamma_g(0) + \nu_g) + X_{402}(\nu_g + \rho_g) + X_{52}\epsilon_c\sigma_c \\
\frac{\partial X_{123}}{\partial t} &= X_{263}\eta_g^p + X_{116}\sigma_s + X_{543}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{123}(\Lambda_g + \eta_c^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{403}(\eta_g^p + \nu_g) + X_{53}\epsilon_c\sigma_c \\
\frac{\partial X_{124}}{\partial t} &= X_{264}\eta_g^p + X_{117}\sigma_s + X_{544}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{124}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_h + \tau_s) \\
&\quad + X_{404}(\eta_g^p + \nu_g) + X_{54}\epsilon_c\sigma_c - \Lambda_h X_{123}(\zeta_h - 1) \\
\frac{\partial X_{125}}{\partial t} &= X_{265}\eta_g^p + X_{124}\sigma_h + X_{118}\sigma_s + X_{545}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{125}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \tau_s + \theta_h) + X_{405}(\eta_g^p + \nu_g) + X_{55}\epsilon_c\sigma_c \\
\frac{\partial X_{126}}{\partial t} &= X_{124}\eta_h^p + X_{261}\rho_{hg} + X_{262}\rho_{hg} + X_{401}\rho_{hg} + X_{402}\rho_{hg} + X_{119}\sigma_s + X_{546}(\gamma_g(0) + \nu_g) + X_{266}(\rho_g + \rho_{hg}) + X_{122}(\rho_h + \rho_{hg} + \theta_h) \\
&\quad - X_{126}(\Lambda_g + \gamma_c(0) + \mu + \nu_c + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \tau_s) + X_{406}(\nu_g + \rho_g + \rho_{hg}) + X_{125}(\eta_h^p + \theta_h) + X_{121}(\rho_h + \rho_{hg}) + X_{56}\epsilon_c\sigma_c \\
\frac{\partial X_{127}}{\partial t} &= X_{120}\tau_s - X_{127}(\Lambda_h + \Lambda_g + \gamma_c(0) + \mu + \nu_c + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_s) \\
&\quad + X_{407}(\nu_g + \rho_g + \rho_{hg}) + X_{547}(\gamma_g(0) + \nu_g) + X_{267}(\rho_g + \rho_{hg}) + X_{57}\epsilon_c\sigma_c \\
\frac{\partial X_{128}}{\partial t} &= \Lambda_h X_{127} + X_{268}\rho_g + X_{121}\tau_s - X_{128}(\Lambda_g + \gamma_c(0) + \mu + \nu_c + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \theta_s) \\
&\quad + X_{548}(\gamma_g(0) + \nu_g) + X_{408}(\nu_g + \rho_g) + X_{58}\epsilon_c\sigma_c \\
\frac{\partial X_{129}}{\partial t} &= X_{269}\rho_g + X_{128}\sigma_h + X_{122}\tau_s - X_{129}(\Lambda_g + \gamma_c(0) + \mu + \nu_c + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_h + \theta_s) \\
&\quad + X_{549}(\gamma_g(0) + \nu_g) + X_{409}(\nu_g + \rho_g) + X_{59}\epsilon_c\sigma_c \\
\frac{\partial X_{130}}{\partial t} &= X_{270}\eta_g^p + X_{123}\tau_s + X_{550}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{130}(\Lambda_g + \eta_c^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{410}(\eta_g^p + \nu_g) + X_{60}\epsilon_c\sigma_c \\
\frac{\partial X_{131}}{\partial t} &= X_{271}\eta_g^p + X_{124}\tau_s + X_{551}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{131}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_h + \theta_s) \\
&\quad + X_{411}(\eta_g^p + \nu_g) + X_{61}\epsilon_c\sigma_c - \Lambda_h X_{130}(\zeta_h - 1) \\
\frac{\partial X_{132}}{\partial t} &= X_{272}\eta_g^p + X_{131}\sigma_h + X_{125}\tau_s + X_{552}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{132}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \theta_h + \theta_s) + X_{412}(\eta_g^p + \nu_g) + X_{62}\epsilon_c\sigma_c \\
\frac{\partial X_{133}}{\partial t} &= X_{131}\eta_h^p + X_{268}\rho_{hg} + X_{269}\rho_{hg} + X_{408}\rho_{hg} + X_{409}\rho_{hg} + X_{126}\tau_s + X_{553}(\gamma_g(0) + \nu_g) + X_{273}(\rho_g + \rho_{hg}) + X_{129}(\rho_h + \rho_{hg} + \theta_h) \\
&\quad - X_{133}(\Lambda_g + \gamma_c(0) + \mu + \nu_c + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_s) + X_{413}(\nu_g + \rho_g + \rho_{hg}) + X_{132}(\eta_h^p + \theta_h) + X_{128}(\rho_h + \rho_{hg}) + X_{63}\epsilon_c\sigma_c \\
\frac{\partial X_{134}}{\partial t} &= X_{127}\theta_s - X_{134}(\Lambda_h + \Lambda_g + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) \\
&\quad + X_{414}(\nu_g + \rho_g + \rho_{hg}) + X_{554}(\gamma_g(0) + \nu_g) + X_{274}(\rho_g + \rho_{hg}) + X_{64}\epsilon_c\sigma_c \\
\frac{\partial X_{135}}{\partial t} &= \Lambda_h X_{134} + X_{275}\rho_g + X_{128}\theta_s - X_{135}(\Lambda_g + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h) \\
&\quad + X_{555}(\gamma_g(0) + \nu_g) + X_{415}(\nu_g + \rho_g) + X_{65}\epsilon_c\sigma_c \\
\frac{\partial X_{136}}{\partial t} &= X_{276}\rho_g + X_{135}\sigma_h + X_{129}\theta_s - X_{136}(\Lambda_g + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_h) \\
&\quad + X_{556}(\gamma_g(0) + \nu_g) + X_{416}(\nu_g + \rho_g) + X_{66}\epsilon_c\sigma_c \\
\frac{\partial X_{137}}{\partial t} &= X_{277}\eta_g^p + X_{130}\theta_s + X_{557}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{137}(\Lambda_g + \eta_c^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c - \Lambda_h(\zeta_h - 1)) + X_{417}(\eta_g^p + \nu_g) + X_{67}\epsilon_c\sigma_c \\
\frac{\partial X_{138}}{\partial t} &= X_{278}\eta_g^p + X_{131}\theta_s + X_{558}(\eta_g^p + \gamma_g(0) + \nu_g) - X_{138}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \sigma_h) \\
&\quad + X_{418}(\eta_g^p + \nu_g) + X_{68}\epsilon_c\sigma_c - \Lambda_h X_{137}(\zeta_h - 1) \\
\frac{\partial X_{139}}{\partial t} &= X_{279}\eta_g^p + X_{138}\sigma_h + X_{132}\theta_s + X_{559}(\eta_g^p + \gamma_g(0) + \nu_g) \\
&\quad - X_{139}(\Lambda_g + \eta_c^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \theta_h) + X_{419}(\eta_g^p + \nu_g) + X_{69}\epsilon_c\sigma_c \\
\frac{\partial X_{140}}{\partial t} &= X_{138}\eta_h^p + X_{275}\rho_{hg} + X_{276}\rho_{hg} + X_{415}\rho_{hg} + X_{416}\rho_{hg} + X_{133}\theta_s + X_{560}(\gamma_g(0) + \nu_g) + X_{280}(\rho_g + \rho_{hg}) \\
&\quad + X_{136}(\rho_h + \rho_{hg} + \theta_h) - X_{140}(\Lambda_g + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_s + \rho_{sg} + \rho_{hs} + \rho_{hsg}) \\
&\quad + X_{420}(\nu_g + \rho_g + \rho_{hg}) + X_{139}(\eta_h^p + \theta_h) + X_{135}(\rho_h + \rho_{hg}) + X_{70}\epsilon_c\sigma_c
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{141}}{\partial t} &= \Lambda_g X_1 + X_{169}(\gamma_s(0) + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{211}(\nu_c + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) \\
&\quad - X_{141}(\Lambda_h + \Lambda_s + \Lambda_c + \mu + \rho_g + \rho_{cg} + \rho_{hg} + \rho_{sg} + \rho_{hcg} + \rho_{scg} + \rho_{hsg} + \rho_{hscg} + \sigma_g) \\
&\quad + X_{176}(\rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) + X_{148}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{155}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) \\
&\quad + X_{162}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{246}(\gamma_c(0) + \nu_c) + X_{183}(\rho_{sc} + \rho_{hsc}) + X_{190}(\rho_{sc} + \rho_{hsc}) + X_{197}(\rho_{sc} + \rho_{hsc}) \\
&\quad + X_{204}(\rho_{sc} + \rho_{hsc}) + X_{218}(\rho_{sc} + \rho_{hsc}) + X_{225}(\rho_{sc} + \rho_{hsc}) + X_{232}(\rho_{sc} + \rho_{hsc}) + X_{239}(\rho_{sc} + \rho_{hsc}) \\
\frac{\partial X_{142}}{\partial t} &= \Lambda_g X_2 + \Lambda_h X_{141} + X_{184}\rho_{sc} + X_{191}\rho_{sc} + X_{198}\rho_{sc} + X_{205}\rho_{sc} + X_{219}\rho_{sc} + X_{226}\rho_{sc} + X_{233}\rho_{sc} + X_{240}\rho_{sc} \\
&\quad - X_{142}(\Lambda_s + \Lambda_c + \mu + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g) \\
&\quad + X_{170}(\gamma_s(0) + \rho_s + \rho_{sc}) + X_{212}(\nu_c + \rho_c + \rho_{sc}) + X_{247}(\gamma_c(0) + \nu_c) \\
&\quad + X_{149}(\rho_s + \rho_{sc}) + X_{156}(\rho_s + \rho_{sc}) + X_{177}(\rho_c + \rho_{sc}) + X_{163}(\rho_s + \rho_{sc}) \\
\frac{\partial X_{143}}{\partial t} &= \Lambda_g X_3 + X_{185}\rho_{sc} + X_{192}\rho_{sc} + X_{199}\rho_{sc} + X_{206}\rho_{sc} + X_{220}\rho_{sc} + X_{227}\rho_{sc} + X_{234}\rho_{sc} + X_{241}\rho_{sc} + X_{142}\sigma_h \\
&\quad - X_{143}(\Lambda_s + \Lambda_c + \mu + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_h) \\
&\quad + X_{171}(\gamma_s(0) + \rho_s + \rho_{sc}) + X_{213}(\nu_c + \rho_c + \rho_{sc}) + X_{248}(\gamma_c(0) + \nu_c) \\
&\quad + X_{150}(\rho_s + \rho_{sc}) + X_{157}(\rho_s + \rho_{sc}) + X_{178}(\rho_c + \rho_{sc}) + X_{164}(\rho_s + \rho_{sc}) \\
\frac{\partial X_{144}}{\partial t} &= \Lambda_g X_4 + X_{151}\eta_s^p + X_{158}\eta_s^p + X_{179}\eta_c^p + X_{165}\eta_s^p + X_{249}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{144}(\Lambda_s + \Lambda_c + \eta_g^p + \mu + \sigma_g - \Lambda_h(\zeta_h - 1)) + X_{172}(\eta_s^p + \gamma_s(0)) + X_{214}(\eta_c^p + \nu_c) \\
\frac{\partial X_{145}}{\partial t} &= \Lambda_g X_5 + X_{152}\eta_s^p + X_{159}\eta_s^p + X_{180}\eta_c^p + X_{166}\eta_s^p + X_{250}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{145}(\Lambda_s + \Lambda_c + \eta_g^p + \eta_h^p + \mu + \sigma_h + \sigma_g) + X_{173}(\eta_s^p + \gamma_s(0)) + X_{215}(\eta_c^p + \nu_c) - \Lambda_h X_{144}(\zeta_h - 1) \\
\frac{\partial X_{146}}{\partial t} &= \Lambda_g X_6 + X_{153}\eta_s^p + X_{160}\eta_s^p + X_{181}\eta_c^p + X_{167}\eta_s^p + X_{145}\sigma_h + X_{251}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{146}(\Lambda_s + \Lambda_c + \eta_g^p + \eta_h^p + \mu + \sigma_g + \theta_h) + X_{174}(\eta_s^p + \gamma_s(0)) + X_{216}(\eta_c^p + \nu_c) \\
\frac{\partial X_{147}}{\partial t} &= \Lambda_g X_7 + X_{175}(\gamma_s(0) + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{145}\eta_h^p + X_{217}(\nu_c + \rho_c + \rho_{sc} + \rho_{hc} + \rho_{hsc}) + X_{184}\rho_{hsc} + X_{185}\rho_{hsc} \\
&\quad + X_{191}\rho_{hsc} + X_{192}\rho_{hsc} + X_{198}\rho_{hsc} + X_{199}\rho_{hsc} + X_{205}\rho_{hsc} + X_{206}\rho_{hsc} + X_{219}\rho_{hsc} + X_{220}\rho_{hsc} + X_{226}\rho_{hsc} \\
&\quad + X_{227}\rho_{hsc} + X_{233}\rho_{hsc} + X_{234}\rho_{hsc} + X_{240}\rho_{hsc} + X_{241}\rho_{hsc} + X_{252}(\gamma_c(0) + \nu_c) + X_{143}(\rho_h + \rho_{hc} + \rho_{hs} + \rho_{hsc} + \theta_h) \\
&\quad - X_{147}(\Lambda_s + \Lambda_c + \mu + \rho_g + \rho_{cg} + \rho_{sg} + \rho_{scg} + \sigma_g + \rho_{hg} + \rho_{hcg} + \rho_{hsg} + \rho_{hscg}) + X_{189}(\rho_{sc} + \rho_{hsc}) \\
&\quad + X_{196}(\rho_{sc} + \rho_{hsc}) + X_{203}(\rho_{sc} + \rho_{hsc}) + X_{210}(\rho_{sc} + \rho_{hsc}) + X_{224}(\rho_{sc} + \rho_{hsc}) + X_{231}(\rho_{sc} + \rho_{hsc}) + X_{238}(\rho_{sc} + \rho_{hsc}) \\
&\quad + X_{245}(\rho_{sc} + \rho_{hsc}) + X_{182}(\rho_c + \rho_{sc} + \rho_{hc} + \rho_{hsc}) + X_{154}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{161}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) \\
&\quad + X_{168}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{142}(\rho_h + \rho_{hc} + \rho_{hs} + \rho_{hsc}) + X_{146}(\eta_h^p + \theta_h) + X_{149}(\rho_{hs} + \rho_{hsc}) + X_{150}(\rho_{hs} + \rho_{hsc}) \\
&\quad + X_{156}(\rho_{hs} + \rho_{hsc}) + X_{157}(\rho_{hs} + \rho_{hsc}) + X_{177}(\rho_{hc} + \rho_{hsc}) + X_{178}(\rho_{hc} + \rho_{hsc}) + X_{163}(\rho_{hs} + \rho_{hsc}) \\
&\quad + X_{164}(\rho_{hs} + \rho_{hsc}) + X_{170}(\rho_{hs} + \rho_{hsc}) + X_{171}(\rho_{hs} + \rho_{hsc}) + X_{212}(\rho_{hc} + \rho_{hsc}) + X_{213}(\rho_{hc} + \rho_{hsc}) \\
\frac{\partial X_{148}}{\partial t} &= \Lambda_g X_8 + \Lambda_s X_{141} - X_{148}(\Lambda_h + \Lambda_c + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_g) \\
&\quad + X_{218}(\nu_c + \rho_c + \rho_{hc}) + X_{253}(\gamma_c(0) + \nu_c) + X_{183}(\rho_c + \rho_{hc}) \\
\frac{\partial X_{149}}{\partial t} &= \Lambda_g X_9 + \Lambda_h X_{148} + \Lambda_s X_{142} + X_{184}\rho_c \\
&\quad - X_{149}(\Lambda_c + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s + \sigma_g) \\
&\quad + X_{254}(\gamma_c(0) + \nu_c) + X_{219}(\nu_c + \rho_c) \\
\frac{\partial X_{150}}{\partial t} &= \Lambda_g X_{10} + \Lambda_s X_{143} + X_{185}\rho_c + X_{149}\sigma_h \\
&\quad - X_{150}(\Lambda_c + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_g + \theta_h) \\
&\quad + X_{255}(\gamma_c(0) + \nu_c) + X_{220}(\nu_c + \rho_c) \\
\frac{\partial X_{151}}{\partial t} &= \Lambda_g X_{11} + \Lambda_s X_{144} - X_{151}(\Lambda_c + \eta_g^p + \eta_s^p + \mu + \sigma_s + \sigma_g - \Lambda_h(\zeta_h - 1)) + X_{186}\eta_c^p + X_{256}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{221}(\eta_c^p + \nu_c) \\
\frac{\partial X_{152}}{\partial t} &= \Lambda_g X_{12} + \Lambda_s X_{145} + X_{187}\eta_c^p + X_{257}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{152}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_s + \sigma_g) + X_{222}(\eta_c^p + \nu_c) - \Lambda_h X_{151}(\zeta_h - 1) \\
\frac{\partial X_{153}}{\partial t} &= \Lambda_g X_{13} + \Lambda_s X_{146} + X_{188}\eta_c^p + X_{152}\sigma_h + X_{258}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{153}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_s + \sigma_g + \theta_h) + X_{223}(\eta_c^p + \nu_c) \\
\frac{\partial X_{154}}{\partial t} &= \Lambda_g X_{14} + \Lambda_s X_{147} + X_{189}(\rho_c + \rho_{hc}) + X_{152}\eta_h^p \\
&\quad - X_{154}(\Lambda_c + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \sigma_g + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{184}\rho_{hc} + X_{185}\rho_{hc} \\
&\quad + X_{219}\rho_{hc} + X_{220}\rho_{hc} + X_{259}(\gamma_c(0) + \nu_c) + X_{150}(\rho_h + \rho_{hc} + \theta_h) + X_{224}(\nu_c + \rho_c + \rho_{hc}) + X_{153}(\eta_h^p + \theta_h) + X_{149}(\rho_h + \rho_{hc})
\end{aligned}
$$

$$\frac{\partial X_{155}}{\partial t} = \Lambda_g X_{15} + X_{148}\sigma_s - X_{155}(\Lambda_h + \Lambda_c + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \tau_s) + X_{225}(\nu_c + \rho_c + \rho_{hc}) + X_{260}(\gamma_c(0) + \nu_c) + X_{190}(\rho_c + \rho_{hc})$$

$$\frac{\partial X_{156}}{\partial t} = \Lambda_g X_{16} + \Lambda_h X_{155} + X_{191}\rho_c + X_{149}\sigma_s - X_{156}(\Lambda_c + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \tau_s) + X_{261}(\gamma_c(0) + \nu_c) + X_{226}(\nu_c + \rho_c)$$

$$\frac{\partial X_{157}}{\partial t} = \Lambda_g X_{17} + X_{192}\rho_c + X_{156}\sigma_h + X_{150}\sigma_s - X_{157}(\Lambda_c + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \tau_s + \theta_h) + X_{262}(\gamma_c(0) + \nu_c) + X_{227}(\nu_c + \rho_c)$$

$$\frac{\partial X_{158}}{\partial t} = \Lambda_g X_{18} - X_{158}(\Lambda_c + \eta_g^p + \eta_s^p + \mu + \sigma_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{193}\eta_c^p + X_{151}\sigma_s + X_{263}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{228}(\eta_c^p + \nu_c)$$

$$\frac{\partial X_{159}}{\partial t} = \Lambda_g X_{19} + X_{194}\eta_c^p + X_{152}\sigma_s + X_{264}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{159}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_g + \tau_s) + X_{229}(\eta_c^p + \nu_c) - \Lambda_h X_{158}(\zeta_h - 1)$$

$$\frac{\partial X_{160}}{\partial t} = \Lambda_g X_{20} + X_{195}\eta_c^p + X_{159}\sigma_h + X_{153}\sigma_s + X_{265}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{160}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_g + \tau_s + \theta_h) + X_{230}(\eta_c^p + \nu_c)$$

$$\frac{\partial X_{161}}{\partial t} = \Lambda_g X_{21} + X_{196}(\rho_c + \rho_{hc}) + X_{159}\eta_h^p - X_{161}(\Lambda_c + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \tau_s + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{191}\rho_{hc} + X_{192}\rho_{hc} + X_{226}\rho_{hc} + X_{227}\rho_{hc} + X_{154}\sigma_s + X_{266}(\gamma_c(0) + \nu_c) + X_{157}(\rho_h + \rho_{hc} + \theta_h) + X_{231}(\nu_c + \rho_c + \rho_{hc}) + X_{160}(\eta_h^p + \theta_h) + X_{156}(\rho_h + \rho_{hc})$$

$$\frac{\partial X_{162}}{\partial t} = \Lambda_g X_{22} + X_{155}\tau_s - X_{162}(\Lambda_h + \Lambda_c + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_s) + X_{232}(\nu_c + \rho_c + \rho_{hc}) + X_{267}(\gamma_c(0) + \nu_c) + X_{197}(\rho_c + \rho_{hc})$$

$$\frac{\partial X_{163}}{\partial t} = \Lambda_g X_{23} + \Lambda_h X_{162} + X_{198}\rho_c + X_{156}\tau_s - X_{163}(\Lambda_c + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \theta_s) + X_{268}(\gamma_c(0) + \nu_c) + X_{233}(\nu_c + \rho_c)$$

$$\frac{\partial X_{164}}{\partial t} = \Lambda_g X_{24} + X_{199}\rho_c + X_{163}\sigma_h + X_{157}\tau_s - X_{164}(\Lambda_c + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_h + \theta_s) + X_{269}(\gamma_c(0) + \nu_c) + X_{234}(\nu_c + \rho_c)$$

$$\frac{\partial X_{165}}{\partial t} = \Lambda_g X_{25} - X_{165}(\Lambda_c + \eta_g^p + \eta_s^p + \mu + \sigma_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{200}\eta_c^p + X_{158}\tau_s + X_{270}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{235}(\eta_c^p + \nu_c)$$

$$\frac{\partial X_{166}}{\partial t} = \Lambda_g X_{26} + X_{201}\eta_c^p + X_{159}\tau_s + X_{271}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{166}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_g + \theta_s) + X_{236}(\eta_c^p + \nu_c) - \Lambda_h X_{165}(\zeta_h - 1)$$

$$\frac{\partial X_{167}}{\partial t} = \Lambda_g X_{27} + X_{202}\eta_c^p + X_{166}\sigma_h + X_{160}\tau_s + X_{272}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{167}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_g + \theta_h + \theta_s) + X_{237}(\eta_c^p + \nu_c)$$

$$\frac{\partial X_{168}}{\partial t} = \Lambda_g X_{28} + X_{203}(\rho_c + \rho_{hc}) + X_{166}\eta_h^p - X_{168}(\Lambda_c + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \theta_s + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{198}\rho_{hc} + X_{199}\rho_{hc} + X_{233}\rho_{hc} + X_{234}\rho_{hc} + X_{161}\tau_s + X_{273}(\gamma_c(0) + \nu_c) + X_{164}(\rho_h + \rho_{hc} + \theta_h) + X_{238}(\nu_c + \rho_c + \rho_{hc}) + X_{167}(\eta_h^p + \theta_h) + X_{163}(\rho_h + \rho_{hc})$$

$$\frac{\partial X_{169}}{\partial t} = \Lambda_g X_{29} + X_{162}\theta_s - X_{169}(\Lambda_h + \Lambda_c + \gamma_s(0) + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g) + X_{239}(\nu_c + \rho_c + \rho_{hc}) + X_{274}(\gamma_c(0) + \nu_c) + X_{204}(\rho_c + \rho_{hc})$$

$$\frac{\partial X_{170}}{\partial t} = \Lambda_g X_{30} + \Lambda_h X_{169} + X_{205}\rho_c + X_{163}\theta_s - X_{170}(\Lambda_c + \gamma_s(0) + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g) + X_{275}(\gamma_c(0) + \nu_c) + X_{240}(\nu_c + \rho_c)$$

$$\frac{\partial X_{171}}{\partial t} = \Lambda_g X_{31} + X_{206}\rho_c + X_{170}\sigma_h + X_{164}\theta_s - X_{171}(\Lambda_c + \gamma_s(0) + \mu + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_h) + X_{276}(\gamma_c(0) + \nu_c) + X_{241}(\nu_c + \rho_c)$$

$$\frac{\partial X_{172}}{\partial t} = \Lambda_g X_{32} + X_{207}\eta_c^p + X_{165}\theta_s + X_{277}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{242}(\eta_c^p + \nu_c) - X_{172}(\Lambda_c + \eta_g^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_g - \Lambda_h(\zeta_h - 1))$$

$$
\begin{aligned}
\frac{\partial X_{173}}{\partial t} &= \Lambda_g X_{33} + X_{208}\eta_c^p + X_{166}\theta_s - X_{173}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_h + \sigma_g) \\
&\quad + X_{278}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{243}(\eta_c^p + \nu_c) - \Lambda_h X_{172}(\zeta_h - 1) \\
\frac{\partial X_{174}}{\partial t} &= \Lambda_g X_{34} + X_{209}\eta_c^p + X_{173}\sigma_h + X_{167}\theta_s - X_{174}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_g + \theta_h) + X_{279}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{244}(\eta_c^p + \nu_c) \\
\frac{\partial X_{175}}{\partial t} &= \Lambda_g X_{35} - X_{175}(\Lambda_c + \gamma_s(0) + \mu + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{210}(\rho_c + \rho_{hc}) + X_{173}\eta_h^p + X_{205}\rho_{hc} + X_{206}\rho_{hc} + X_{240}\rho_{hc} + X_{241}\rho_{hc} + X_{168}\theta_s \\
&\quad + X_{280}(\gamma_c(0) + \nu_c) + X_{171}(\rho_h + \rho_{hc} + \theta_h) + X_{245}(\nu_c + \rho_c + \rho_{hc}) + X_{174}(\eta_h^p + \theta_h) + X_{170}(\rho_h + \rho_{hc}) \\
\frac{\partial X_{176}}{\partial t} &= \Lambda_g X_{36} + \Lambda_c X_{141} - X_{176}(\Lambda_h + \Lambda_s + \mu + \rho_c + \rho_g + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c) \\
&\quad + X_{204}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{183}(\rho_s + \rho_{hs}) + X_{190}(\rho_s + \rho_{hs}) + X_{197}(\rho_s + \rho_{hs}) \\
\frac{\partial X_{177}}{\partial t} &= \Lambda_g X_{37} + \Lambda_h X_{176} + \Lambda_c X_{142} + X_{184}\rho_s + X_{191}\rho_s + X_{198}\rho_s \\
&\quad - X_{177}(\Lambda_s + \mu + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \sigma_c) \\
&\quad + X_{205}(\gamma_s(0) + \rho_s) \\
\frac{\partial X_{178}}{\partial t} &= \Lambda_g X_{38} + \Lambda_c X_{143} + X_{185}\rho_s + X_{192}\rho_s + X_{199}\rho_s + X_{177}\sigma_h \\
&\quad - X_{178}(\Lambda_s + \mu + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c + \theta_h) \\
&\quad + X_{206}(\gamma_s(0) + \rho_s) \\
\frac{\partial X_{179}}{\partial t} &= \Lambda_g X_{39} + \Lambda_c X_{144} - X_{179}(\Lambda_s + \eta_c^p + \eta_g^p + \mu + \sigma_g + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{186}\eta_s^p + X_{193}\eta_s^p + X_{200}\eta_s^p + X_{207}(\eta_s^p + \gamma_s(0)) \\
\frac{\partial X_{180}}{\partial t} &= \Lambda_g X_{40} + \Lambda_c X_{145} + X_{187}\eta_s^p + X_{194}\eta_s^p + X_{201}\eta_s^p \\
&\quad - X_{180}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \sigma_h + \sigma_g + \sigma_c) + X_{208}(\eta_s^p + \gamma_s(0)) - \Lambda_h X_{179}(\zeta_h - 1) \\
\frac{\partial X_{181}}{\partial t} &= \Lambda_g X_{41} + \Lambda_c X_{146} + X_{188}\eta_s^p + X_{195}\eta_s^p + X_{202}\eta_s^p + X_{180}\sigma_h - X_{181}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \sigma_g + \sigma_c + \theta_h) + X_{209}(\eta_s^p + \gamma_s(0)) \\
\frac{\partial X_{182}}{\partial t} &= \Lambda_g X_{42} + \Lambda_c X_{147} + X_{189}(\rho_s + \rho_{hs}) + X_{196}(\rho_s + \rho_{hs}) + X_{203}(\rho_s + \rho_{hs}) + X_{180}\eta_h^p \\
&\quad - X_{182}(\Lambda_s + \mu + \rho_c + \rho_g + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \sigma_c + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{184}\rho_{hs} + X_{185}\rho_{hs} + X_{191}\rho_{hs} + X_{192}\rho_{hs} + X_{198}\rho_{hs} + X_{199}\rho_{hs} + X_{205}\rho_{hs} + X_{206}\rho_{hs} \\
&\quad + X_{178}(\rho_h + \rho_{hs} + \theta_h) + X_{210}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{181}(\eta_h^p + \theta_h) + X_{177}(\rho_h + \rho_{hs}) \\
\frac{\partial X_{183}}{\partial t} &= \Lambda_g X_{43} + \Lambda_s X_{176} + \Lambda_c X_{148} \\
&\quad - X_{183}(\Lambda_h + \mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_g + \sigma_c) \\
\frac{\partial X_{184}}{\partial t} &= \Lambda_g X_{44} + \Lambda_h X_{183} + \Lambda_s X_{177} + \Lambda_c X_{149} \\
&\quad - X_{184}(\mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s + \sigma_g + \sigma_c) \\
\frac{\partial X_{185}}{\partial t} &= \Lambda_g X_{45} + \Lambda_s X_{178} + \Lambda_c X_{150} \\
&\quad - X_{185}(\mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_g + \sigma_c + \theta_h) \\
&\quad + X_{184}\sigma_h \\
\frac{\partial X_{186}}{\partial t} &= \Lambda_g X_{46} + \Lambda_s X_{179} + \Lambda_c X_{151} - X_{186}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \sigma_s + \sigma_g + \sigma_c - \Lambda_h(\zeta_h - 1)) \\
\frac{\partial X_{187}}{\partial t} &= \Lambda_g X_{47} + \Lambda_s X_{180} + \Lambda_c X_{152} - X_{187}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_s + \sigma_g + \sigma_c) - \Lambda_h X_{186}(\zeta_h - 1) \\
\frac{\partial X_{188}}{\partial t} &= \Lambda_g X_{48} + \Lambda_s X_{181} + \Lambda_c X_{153} + X_{187}\sigma_h - X_{188}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_s + \sigma_g + \sigma_c + \theta_h) \\
\frac{\partial X_{189}}{\partial t} &= \Lambda_g X_{49} + \Lambda_s X_{182} + \Lambda_c X_{154} + X_{187}\eta_h^p + X_{184}\rho_h \\
&\quad - X_{189}(\mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \sigma_g + \sigma_c + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{188}(\eta_h^p + \theta_h) + X_{185}(\rho_h + \theta_h) \\
\frac{\partial X_{190}}{\partial t} &= \Lambda_g X_{50} + \Lambda_c X_{155} + X_{183}\sigma_s \\
&\quad - X_{190}(\Lambda_h + \mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c + \tau_s) \\
\frac{\partial X_{191}}{\partial t} &= \Lambda_g X_{51} + \Lambda_h X_{190} + \Lambda_c X_{156} \\
&\quad - X_{191}(\mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \sigma_c + \tau_s) \\
&\quad + X_{184}\sigma_s
\end{aligned}
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\begin{aligned}
\frac{\partial X_{192}}{\partial t} &= \Lambda_g X_{52} + \Lambda_c X_{157} \\
&\quad - X_{192}(\mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c + \tau_s + \theta_h) \\
&\quad + X_{191}\sigma_h + X_{185}\sigma_s \\
\frac{\partial X_{193}}{\partial t} &= \Lambda_g X_{53} + \Lambda_c X_{158} + X_{186}\sigma_s - X_{193}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \sigma_g + \sigma_c + \tau_s - \Lambda_h(\zeta_h - 1)) \\
\frac{\partial X_{194}}{\partial t} &= \Lambda_g X_{54} + \Lambda_c X_{159} + X_{187}\sigma_s - X_{194}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_g + \sigma_c + \tau_s) - \Lambda_h X_{193}(\zeta_h - 1) \\
\frac{\partial X_{195}}{\partial t} &= \Lambda_g X_{55} + \Lambda_c X_{160} + X_{194}\sigma_h + X_{188}\sigma_s - X_{195}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_g + \sigma_c + \tau_s + \theta_h) \\
\frac{\partial X_{196}}{\partial t} &= \Lambda_g X_{56} + \Lambda_c X_{161} + X_{194}\eta_h^p + X_{191}\rho_h + X_{189}\sigma_s \\
&\quad - X_{196}(\mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \sigma_c + \tau_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{195}(\eta_h^p + \theta_h) + X_{192}(\rho_h + \theta_h) \\
\frac{\partial X_{197}}{\partial t} &= \Lambda_g X_{57} + \Lambda_c X_{162} + X_{190}\tau_s \\
&\quad - X_{197}(\Lambda_h + \mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c + \theta_s) \\
\frac{\partial X_{198}}{\partial t} &= \Lambda_g X_{58} + \Lambda_h X_{197} + \Lambda_c X_{163} \\
&\quad - X_{198}(\mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \sigma_c + \theta_s) \\
&\quad + X_{191}\tau_s \\
\frac{\partial X_{199}}{\partial t} &= \Lambda_g X_{59} + \Lambda_c X_{164} \\
&\quad - X_{199}(\mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c + \theta_h + \theta_s) \\
&\quad + X_{198}\sigma_h + X_{192}\tau_s \\
\frac{\partial X_{200}}{\partial t} &= \Lambda_g X_{60} + \Lambda_c X_{165} + X_{193}\tau_s - X_{200}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \sigma_g + \sigma_c + \theta_s - \Lambda_h(\zeta_h - 1)) \\
\frac{\partial X_{201}}{\partial t} &= \Lambda_g X_{61} + \Lambda_c X_{166} + X_{194}\tau_s - X_{201}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_h + \sigma_g + \sigma_c + \theta_s) - \Lambda_h X_{200}(\zeta_h - 1) \\
\frac{\partial X_{202}}{\partial t} &= \Lambda_g X_{62} + \Lambda_c X_{167} + X_{201}\sigma_h + X_{195}\tau_s - X_{202}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \sigma_g + \sigma_c + \theta_h + \theta_s) \\
\frac{\partial X_{203}}{\partial t} &= \Lambda_g X_{63} + \Lambda_c X_{168} + X_{201}\eta_h^p + X_{198}\rho_h + X_{196}\tau_s \\
&\quad - X_{203}(\mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \sigma_c + \theta_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{202}(\eta_h^p + \theta_h) + X_{199}(\rho_h + \theta_h) \\
\frac{\partial X_{204}}{\partial t} &= \Lambda_g X_{64} + \Lambda_c X_{169} + X_{197}\theta_s \\
&\quad - X_{204}(\Lambda_h + \gamma_s(0) + \mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c) \\
\frac{\partial X_{205}}{\partial t} &= \Lambda_g X_{65} + \Lambda_h X_{204} + \Lambda_c X_{170} + X_{198}\theta_s \\
&\quad - X_{205}(\gamma_s(0) + \mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \sigma_c) \\
\frac{\partial X_{206}}{\partial t} &= \Lambda_g X_{66} + \Lambda_c X_{171} + X_{205}\sigma_h + X_{199}\theta_s \\
&\quad - X_{206}(\gamma_s(0) + \mu + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \sigma_c + \theta_h) \\
\frac{\partial X_{207}}{\partial t} &= \Lambda_g X_{67} + \Lambda_c X_{172} + X_{200}\theta_s - X_{207}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_g + \sigma_c - \Lambda_h(\zeta_h - 1)) \\
\frac{\partial X_{208}}{\partial t} &= \Lambda_g X_{68} + \Lambda_c X_{173} + X_{201}\theta_s - X_{208}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_h + \sigma_g + \sigma_c) - \Lambda_h X_{207}(\zeta_h - 1) \\
\frac{\partial X_{209}}{\partial t} &= \Lambda_g X_{69} + \Lambda_c X_{174} + X_{208}\sigma_h + X_{202}\theta_s - X_{209}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \sigma_g + \sigma_c + \theta_h) \\
\frac{\partial X_{210}}{\partial t} &= \Lambda_g X_{70} + \Lambda_c X_{175} + X_{208}\eta_h^p + X_{205}\rho_h + X_{203}\theta_s \\
&\quad - X_{210}(\gamma_s(0) + \mu + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \sigma_c + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{209}(\eta_h^p + \theta_h) + X_{206}(\rho_h + \theta_h) \\
\frac{\partial X_{211}}{\partial t} &= \Lambda_g X_{71} - X_{211}(\Lambda_h + \Lambda_s + \mu + \nu_c + \rho_c + \rho_g + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g) \\
&\quad + X_{239}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{218}(\rho_s + \rho_{hs}) + X_{225}(\rho_s + \rho_{hs}) + X_{232}(\rho_s + \rho_{hs}) - X_{176}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{212}}{\partial t} &= \Lambda_g X_{72} + \Lambda_h X_{211} + X_{219}\rho_s + X_{226}\rho_s + X_{233}\rho_s \\
&\quad - X_{212}(\Lambda_s + \mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g) \\
&\quad + X_{240}(\gamma_s(0) + \rho_s) - X_{177}\sigma_c(\epsilon_c - 1)
\end{aligned}
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\begin{aligned}
\frac{\partial X_{213}}{\partial t} &= \Lambda_g X_{73} + X_{220}\rho_s + X_{227}\rho_s + X_{234}\rho_s + X_{212}\sigma_h \\
&\quad - X_{213}(\Lambda_s + \mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_h) \\
&\quad + X_{241}(\gamma_s(0) + \rho_s) - X_{178}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{214}}{\partial t} &= \Lambda_g X_{74} - X_{214}(\Lambda_s + \eta_c^p + \eta_g^p + \mu + \nu_c + \sigma_g - \Lambda_h(\zeta_h - 1)) + X_{221}\eta_s^p + X_{228}\eta_s^p + X_{235}\eta_s^p + X_{242}(\eta_s^p + \gamma_s(0)) - X_{179}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{215}}{\partial t} &= \Lambda_g X_{75} + X_{222}\eta_s^p + X_{229}\eta_s^p + X_{236}\eta_s^p - X_{215}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \nu_c + \sigma_h + \sigma_g) \\
&\quad + X_{243}(\eta_s^p + \gamma_s(0)) - \Lambda_h X_{214}(\zeta_h - 1) - X_{180}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{216}}{\partial t} &= \Lambda_g X_{76} + X_{223}\eta_s^p + X_{230}\eta_s^p + X_{237}\eta_s^p + X_{215}\sigma_h \\
&\quad - X_{216}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \nu_c + \sigma_g + \theta_h) + X_{244}(\eta_s^p + \gamma_s(0)) - X_{181}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{217}}{\partial t} &= \Lambda_g X_{77} + X_{224}(\rho_s + \rho_{hs}) + X_{231}(\rho_s + \rho_{hs}) + X_{238}(\rho_s + \rho_{hs}) + X_{215}\eta_h^p \\
&\quad - X_{217}(\Lambda_s + \mu + \nu_c + \rho_c + \rho_g + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{219}\rho_{hs} + X_{220}\rho_{hs} + X_{226}\rho_{hs} + X_{227}\rho_{hs} + X_{233}\rho_{hs} + X_{234}\rho_{hs} + X_{240}\rho_{hs} + X_{241}\rho_{hs} \\
&\quad + X_{213}(\rho_h + \rho_{hs} + \theta_h) + X_{245}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{216}(\eta_h^p + \theta_h) + X_{212}(\rho_h + \rho_{hs}) - X_{182}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{218}}{\partial t} &= \Lambda_g X_{78} + \Lambda_s X_{211} \\
&\quad - X_{218}(\Lambda_h + \mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_g) \\
&\quad - X_{183}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{219}}{\partial t} &= \Lambda_g X_{79} - X_{219}(\mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s + \sigma_g) \\
&\quad + \Lambda_h X_{218} + \Lambda_s X_{212} - X_{184}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{220}}{\partial t} &= \Lambda_g X_{80} - X_{220}(\mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_g + \theta_h) \\
&\quad + \Lambda_s X_{213} + X_{219}\sigma_h - X_{185}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{221}}{\partial t} &= \Lambda_g X_{81} + \Lambda_s X_{214} - X_{221}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_c + \sigma_s + \sigma_g - \Lambda_h(\zeta_h - 1)) - X_{186}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{222}}{\partial t} &= \Lambda_g X_{82} + \Lambda_s X_{215} - X_{222}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_h + \sigma_s + \sigma_g) - \Lambda_h X_{221}(\zeta_h - 1) - X_{187}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{223}}{\partial t} &= \Lambda_g X_{83} + \Lambda_s X_{216} + X_{222}\sigma_h - X_{223}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_s + \sigma_g + \theta_h) - X_{188}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{224}}{\partial t} &= \Lambda_g X_{84} + \Lambda_s X_{217} + X_{222}\eta_h^p + X_{219}\rho_h \\
&\quad - X_{224}(\mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \sigma_g + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{223}(\eta_h^p + \theta_h) + X_{220}(\rho_h + \theta_h) - X_{189}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{225}}{\partial t} &= \Lambda_g X_{85} + X_{218}\sigma_s \\
&\quad - X_{225}(\Lambda_h + \mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \tau_s) \\
&\quad - X_{190}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{226}}{\partial t} &= \Lambda_g X_{86} - X_{226}(\mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g + \tau_s) \\
&\quad + \Lambda_h X_{225} + X_{219}\sigma_s - X_{191}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{227}}{\partial t} &= \Lambda_g X_{87} - X_{227}(\mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \tau_s + \theta_h) \\
&\quad + X_{226}\sigma_h + X_{220}\sigma_s - X_{192}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{228}}{\partial t} &= \Lambda_g X_{88} + X_{221}\sigma_s - X_{228}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_c + \sigma_g + \tau_s - \Lambda_h(\zeta_h - 1)) - X_{193}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{229}}{\partial t} &= \Lambda_g X_{89} + X_{222}\sigma_s - X_{229}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_h + \sigma_g + \tau_s) - \Lambda_h X_{228}(\zeta_h - 1) - X_{194}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{230}}{\partial t} &= \Lambda_g X_{90} + X_{229}\sigma_h + X_{223}\sigma_s - X_{230}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_g + \tau_s + \theta_h) - X_{195}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{231}}{\partial t} &= \Lambda_g X_{91} + X_{229}\eta_h^p + X_{226}\rho_h + X_{224}\sigma_s \\
&\quad - X_{231}(\mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \tau_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{230}(\eta_h^p + \theta_h) + X_{227}(\rho_h + \theta_h) - X_{196}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{232}}{\partial t} &= \Lambda_g X_{92} + X_{225}\tau_s \\
&\quad - X_{232}(\Lambda_h + \mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_s) \\
&\quad - X_{197}\sigma_c(\epsilon_c - 1)
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{233}}{\partial t} &= \Lambda_g X_{93} - X_{233}(\mu+\nu_c+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_h+\sigma_g+\theta_s) \\
&\quad + \Lambda_h X_{232} + X_{226}\tau_s - X_{198}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{234}}{\partial t} &= \Lambda_g X_{94} - X_{234}(\mu+\nu_c+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_g+\theta_h+\theta_s) \\
&\quad + X_{233}\sigma_h + X_{227}\tau_s - X_{199}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{235}}{\partial t} &= \Lambda_g X_{95} + X_{228}\tau_s - X_{235}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_c + \sigma_g + \theta_s - \Lambda_h(\zeta_h - 1)) - X_{200}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{236}}{\partial t} &= \Lambda_g X_{96} + X_{229}\tau_s - X_{236}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_h + \sigma_g + \theta_s) - \Lambda_h X_{235}(\zeta_h - 1) - X_{201}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{237}}{\partial t} &= \Lambda_g X_{97} + X_{236}\sigma_h + X_{230}\tau_s - X_{237}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \sigma_g + \theta_h + \theta_s) - X_{202}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{238}}{\partial t} &= \Lambda_g X_{98} + X_{236}\eta_h^p + X_{233}\rho_h + X_{231}\tau_s \\
&\quad - X_{238}(\mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \theta_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{237}(\eta_h^p + \theta_h) + X_{234}(\rho_h + \theta_h) - X_{203}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{239}}{\partial t} &= \Lambda_g X_{99} + X_{232}\theta_s \\
&\quad - X_{239}(\Lambda_h + \gamma_s(0) + \mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g) \\
&\quad - X_{204}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{240}}{\partial t} &= \Lambda_g X_{100} + \Lambda_h X_{239} + X_{233}\theta_s \\
&\quad - X_{240}(\gamma_s(0) + \mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_g) \\
&\quad - X_{205}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{241}}{\partial t} &= \Lambda_g X_{101} + X_{240}\sigma_h + X_{234}\theta_s \\
&\quad - X_{241}(\gamma_s(0) + \mu + \nu_c + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_g + \theta_h) \\
&\quad - X_{206}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{242}}{\partial t} &= \Lambda_g X_{102} + X_{235}\theta_s - X_{242}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \mu + \nu_c + \sigma_g - \Lambda_h(\zeta_h - 1)) - X_{207}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{243}}{\partial t} &= \Lambda_g X_{103} + X_{236}\theta_s - X_{243}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_c + \sigma_h + \sigma_g) - \Lambda_h X_{242}(\zeta_h - 1) - X_{208}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{244}}{\partial t} &= \Lambda_g X_{104} + X_{243}\sigma_h + X_{237}\theta_s - X_{244}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_c + \sigma_g + \theta_h) - X_{209}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{245}}{\partial t} &= \Lambda_g X_{105} + X_{243}\eta_h^p + X_{240}\rho_h + X_{238}\theta_s \\
&\quad - X_{245}(\gamma_s(0) + \mu + \nu_c + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_g + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{244}(\eta_h^p + \theta_h) + X_{241}(\rho_h + \theta_h) - X_{210}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{246}}{\partial t} &= \Lambda_g X_{106} - X_{246}(\Lambda_h + \Lambda_s + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg} + \sigma_g) \\
&\quad + X_{274}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{253}(\rho_s + \rho_{hs}) + X_{260}(\rho_s + \rho_{hs}) + X_{267}(\rho_s + \rho_{hs}) + X_{176}\epsilon_c\sigma_c \\
\frac{\partial X_{247}}{\partial t} &= \Lambda_g X_{107} + \Lambda_h X_{246} + X_{254}\rho_s + X_{261}\rho_s + X_{268}\rho_s \\
&\quad - X_{247}(\Lambda_s + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \sigma_g) + X_{275}(\gamma_s(0) + \rho_s) + X_{177}\epsilon_c\sigma_c \\
\frac{\partial X_{248}}{\partial t} &= \Lambda_g X_{108} + X_{255}\rho_s + X_{262}\rho_s + X_{269}\rho_s + X_{247}\sigma_h \\
&\quad - X_{248}(\Lambda_s + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \theta_h) + X_{276}(\gamma_s(0) + \rho_s) + X_{178}\epsilon_c\sigma_c \\
\frac{\partial X_{249}}{\partial t} &= \Lambda_g X_{109} + X_{256}\eta_s^p + X_{263}\eta_s^p + X_{270}\eta_s^p - X_{249}(\Lambda_s + \eta_c^p + \eta_g^p + \gamma_c(0) + \mu + \nu_c + \sigma_g - \Lambda_h(\zeta_h - 1)) + X_{277}(\eta_s^p + \gamma_s(0)) + X_{179}\epsilon_c\sigma_c \\
\frac{\partial X_{250}}{\partial t} &= \Lambda_g X_{110} + X_{257}\eta_s^p + X_{264}\eta_s^p + X_{271}\eta_s^p - X_{250}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_c(0) + \mu + \nu_c + \sigma_h + \sigma_g) \\
&\quad + X_{278}(\eta_s^p + \gamma_s(0)) + X_{180}\epsilon_c\sigma_c - \Lambda_h X_{249}(\zeta_h - 1) \\
\frac{\partial X_{251}}{\partial t} &= \Lambda_g X_{111} + X_{258}\eta_s^p + X_{265}\eta_s^p + X_{272}\eta_s^p + X_{250}\sigma_h \\
&\quad - X_{251}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_c(0) + \mu + \nu_c + \sigma_g + \theta_h) + X_{279}(\eta_s^p + \gamma_s(0)) + X_{181}\epsilon_c\sigma_c \\
\frac{\partial X_{252}}{\partial t} &= \Lambda_g X_{112} + X_{250}\eta_h^p + X_{254}\rho_{hs} + X_{255}\rho_{hs} + X_{261}\rho_{hs} + X_{262}\rho_{hs} + X_{268}\rho_{hs} + X_{269}\rho_{hs} + X_{275}\rho_{hs} + X_{276}\rho_{hs} + X_{259}(\rho_s + \rho_{hs}) \\
&\quad + X_{266}(\rho_s + \rho_{hs}) + X_{273}(\rho_s + \rho_{hs}) + X_{248}(\rho_h + \rho_{hs} + \theta_h) - X_{252}(\Lambda_s + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg} + \sigma_g) \\
&\quad + X_{280}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{251}(\eta_h^p + \theta_h) + X_{247}(\rho_h + \rho_{hs}) + X_{182}\epsilon_c\sigma_c \\
\frac{\partial X_{253}}{\partial t} &= \Lambda_g X_{113} + \Lambda_s X_{246} - X_{253}(\Lambda_h + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_s + \sigma_g) + X_{183}\epsilon_c\sigma_c
\end{aligned}
$$

$$\frac{\partial X_{254}}{\partial t} = \Lambda_g X_{114} + \Lambda_h X_{253} + \Lambda_s X_{247} - X_{254}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \sigma_s + \sigma_g) + X_{184}\epsilon_c\sigma_c$$

$$\frac{\partial X_{255}}{\partial t} = \Lambda_g X_{115} + \Lambda_s X_{248} + X_{254}\sigma_h - X_{255}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_s + \sigma_g + \theta_h) + X_{185}\epsilon_c\sigma_c$$

$$\frac{\partial X_{256}}{\partial t} = \Lambda_g X_{116} + \Lambda_s X_{249} - X_{256}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_s + \sigma_g - \Lambda_h(\zeta_h - 1)) + X_{186}\epsilon_c\sigma_c$$

$$\frac{\partial X_{257}}{\partial t} = \Lambda_g X_{117} + \Lambda_s X_{250} - X_{257}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_h + \sigma_s + \sigma_g) + X_{187}\epsilon_c\sigma_c - \Lambda_h X_{256}(\zeta_h - 1)$$

$$\frac{\partial X_{258}}{\partial t} = \Lambda_g X_{118} + \Lambda_s X_{251} + X_{257}\sigma_h - X_{258}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_s + \sigma_g + \theta_h) + X_{188}\epsilon_c\sigma_c$$

$$\begin{aligned}\frac{\partial X_{259}}{\partial t} &= \Lambda_g X_{119} + \Lambda_s X_{252} + X_{257}\eta_h^p - X_{259}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_s + \sigma_g) \\ &\quad + X_{254}\rho_h + X_{258}(\eta_h^p + \theta_h) + X_{255}(\rho_h + \theta_h) + X_{189}\epsilon_c\sigma_c\end{aligned}$$

$$\frac{\partial X_{260}}{\partial t} = \Lambda_g X_{120} + X_{253}\sigma_s - X_{260}(\Lambda_h + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \tau_s) + X_{190}\epsilon_c\sigma_c$$

$$\frac{\partial X_{261}}{\partial t} = \Lambda_g X_{121} + \Lambda_h X_{260} + X_{254}\sigma_s - X_{261}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \sigma_g + \tau_s) + X_{191}\epsilon_c\sigma_c$$

$$\frac{\partial X_{262}}{\partial t} = \Lambda_g X_{122} + X_{261}\sigma_h + X_{255}\sigma_s - X_{262}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \tau_s + \theta_h) + X_{192}\epsilon_c\sigma_c$$

$$\frac{\partial X_{263}}{\partial t} = \Lambda_g X_{123} + X_{256}\sigma_s - X_{263}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{193}\epsilon_c\sigma_c$$

$$\frac{\partial X_{264}}{\partial t} = \Lambda_g X_{124} + X_{257}\sigma_s - X_{264}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_h + \sigma_g + \tau_s) + X_{194}\epsilon_c\sigma_c - \Lambda_h X_{263}(\zeta_h - 1)$$

$$\frac{\partial X_{265}}{\partial t} = \Lambda_g X_{125} + X_{264}\sigma_h + X_{258}\sigma_s - X_{265}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_g + \tau_s + \theta_h) + X_{195}\epsilon_c\sigma_c$$

$$\begin{aligned}\frac{\partial X_{266}}{\partial t} &= \Lambda_g X_{126} + X_{264}\eta_h^p - X_{266}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \tau_s) \\ &\quad + X_{261}\rho_h + X_{259}\sigma_s + X_{265}(\eta_h^p + \theta_h) + X_{262}(\rho_h + \theta_h) + X_{196}\epsilon_c\sigma_c\end{aligned}$$

$$\frac{\partial X_{267}}{\partial t} = \Lambda_g X_{127} + X_{260}\tau_s - X_{267}(\Lambda_h + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \theta_s) + X_{197}\epsilon_c\sigma_c$$

$$\frac{\partial X_{268}}{\partial t} = \Lambda_g X_{128} + \Lambda_h X_{267} + X_{261}\tau_s - X_{268}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \sigma_g + \theta_s) + X_{198}\epsilon_c\sigma_c$$

$$\frac{\partial X_{269}}{\partial t} = \Lambda_g X_{129} + X_{268}\sigma_h + X_{262}\tau_s - X_{269}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \theta_h + \theta_s) + X_{199}\epsilon_c\sigma_c$$

$$\frac{\partial X_{270}}{\partial t} = \Lambda_g X_{130} + X_{263}\tau_s - X_{270}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{200}\epsilon_c\sigma_c$$

$$\frac{\partial X_{271}}{\partial t} = \Lambda_g X_{131} + X_{264}\tau_s - X_{271}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_h + \sigma_g + \theta_s) + X_{201}\epsilon_c\sigma_c - \Lambda_h X_{270}(\zeta_h - 1)$$

$$\frac{\partial X_{272}}{\partial t} = \Lambda_g X_{132} + X_{271}\sigma_h + X_{265}\tau_s - X_{272}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \sigma_g + \theta_h + \theta_s) + X_{202}\epsilon_c\sigma_c$$

$$\begin{aligned}\frac{\partial X_{273}}{\partial t} &= \Lambda_g X_{133} + X_{271}\eta_h^p - X_{273}(\gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \theta_s) \\ &\quad + X_{268}\rho_h + X_{266}\tau_s + X_{272}(\eta_h^p + \theta_h) + X_{269}(\rho_h + \theta_h) + X_{203}\epsilon_c\sigma_c\end{aligned}$$

$$\frac{\partial X_{274}}{\partial t} = \Lambda_g X_{134} + X_{267}\theta_s - X_{274}(\Lambda_h + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g) + X_{204}\epsilon_c\sigma_c$$

$$\frac{\partial X_{275}}{\partial t} = \Lambda_g X_{135} + \Lambda_h X_{274} + X_{268}\theta_s - X_{275}(\gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \sigma_g) + X_{205}\epsilon_c\sigma_c$$

$$\frac{\partial X_{276}}{\partial t} = \Lambda_g X_{136} + X_{275}\sigma_h + X_{269}\theta_s - X_{276}(\gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g + \theta_h) + X_{206}\epsilon_c\sigma_c$$

$$\frac{\partial X_{277}}{\partial t} = \Lambda_g X_{137} + X_{270}\theta_s - X_{277}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \sigma_g - \Lambda_h(\zeta_h - 1)) + X_{207}\epsilon_c\sigma_c$$

$$\frac{\partial X_{278}}{\partial t} = \Lambda_g X_{138} + X_{271}\theta_s - X_{278}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \sigma_h + \sigma_g) + X_{208}\epsilon_c\sigma_c - \Lambda_h X_{277}(\zeta_h - 1)$$

$$\frac{\partial X_{279}}{\partial t} = \Lambda_g X_{139} + X_{278}\sigma_h + X_{272}\theta_s - X_{279}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \sigma_g + \theta_h) + X_{209}\epsilon_c\sigma_c$$

$$\begin{aligned}\frac{\partial X_{280}}{\partial t} &= \Lambda_g X_{140} - X_{280}(\gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_g) \\ &\quad + X_{278}\eta_h^p + X_{275}\rho_h + X_{273}\theta_s + X_{279}(\eta_h^p + \theta_h) + X_{276}(\rho_h + \theta_h) + X_{210}\epsilon_c\sigma_c\end{aligned}$$

$$
\begin{aligned}
\frac{\partial X_{281}}{\partial t} &= X_{309}(\gamma_s(0)+\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})+X_{351}(\nu_c+\rho_c+\rho_{hc}+\rho_{sc}+\rho_{hsc})\\
&\quad -X_{281}(\Lambda_h+\Lambda_s+\Lambda_c+\mu+\nu_g+\rho_g+\rho_{cg}+\rho_{hg}+\rho_{sg}+\rho_{hcg}+\rho_{scg}+\rho_{hsg}+\rho_{hscg})\\
&\quad +X_{316}(\rho_c+\rho_{hc}+\rho_{sc}+\rho_{hsc})+X_{288}(\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})+X_{295}(\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})\\
&\quad +X_{302}(\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})+X_{386}(\gamma_c(0)+\nu_c)+X_{323}(\rho_{sc}+\rho_{hsc})+X_{330}(\rho_{sc}+\rho_{hsc})+X_{337}(\rho_{sc}+\rho_{hsc})\\
&\quad +X_{344}(\rho_{sc}+\rho_{hsc})+X_{358}(\rho_{sc}+\rho_{hsc})+X_{365}(\rho_{sc}+\rho_{hsc})+X_{372}(\rho_{sc}+\rho_{hsc})+X_{379}(\rho_{sc}+\rho_{hsc})-X_{141}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{282}}{\partial t} &= \Lambda_h X_{281}+X_{324}\rho_{sc}+X_{331}\rho_{sc}+X_{338}\rho_{sc}+X_{345}\rho_{sc}+X_{359}\rho_{sc}+X_{366}\rho_{sc}+X_{373}\rho_{sc}+X_{380}\rho_{sc}\\
&\quad -X_{282}(\Lambda_s+\Lambda_c+\mu+\nu_g+\rho_g+\rho_h+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_h)\\
&\quad +X_{310}(\gamma_s(0)+\rho_s+\rho_{sc})+X_{352}(\nu_c+\rho_c+\rho_{sc})+X_{387}(\gamma_c(0)+\nu_c)+X_{289}(\rho_s+\rho_{sc})\\
&\quad +X_{296}(\rho_s+\rho_{sc})+X_{317}(\rho_c+\rho_{sc})+X_{303}(\rho_s+\rho_{sc})-X_{142}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{283}}{\partial t} &= X_{325}\rho_{sc}+X_{332}\rho_{sc}+X_{339}\rho_{sc}+X_{346}\rho_{sc}+X_{360}\rho_{sc}+X_{367}\rho_{sc}+X_{374}\rho_{sc}+X_{381}\rho_{sc}+X_{282}\sigma_h\\
&\quad -X_{283}(\Lambda_s+\Lambda_c+\mu+\nu_g+\rho_g+\rho_h+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\theta_h)\\
&\quad +X_{311}(\gamma_s(0)+\rho_s+\rho_{sc})+X_{353}(\nu_c+\rho_c+\rho_{sc})+X_{388}(\gamma_c(0)+\nu_c)+X_{290}(\rho_s+\rho_{sc})\\
&\quad +X_{297}(\rho_s+\rho_{sc})+X_{318}(\rho_c+\rho_{sc})+X_{304}(\rho_s+\rho_{sc})-X_{143}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{284}}{\partial t} &= X_{291}\eta_s^p+X_{298}\eta_s^p+X_{319}\eta_c^p+X_{305}\eta_s^p+X_{389}(\eta_c^p+\gamma_c(0)+\nu_c)\\
&\quad -X_{284}(\Lambda_s+\Lambda_c+\eta_g^p+\mu+\nu_g-\Lambda_h(\zeta_h-1))+X_{312}(\eta_s^p+\gamma_s(0))+X_{354}(\eta_c^p+\nu_c)-X_{144}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{285}}{\partial t} &= X_{292}\eta_s^p+X_{299}\eta_s^p+X_{320}\eta_c^p+X_{306}\eta_s^p+X_{390}(\eta_c^p+\gamma_c(0)+\nu_c)-X_{285}(\Lambda_s+\Lambda_c+\eta_g^p+\eta_h^p+\mu+\nu_g+\sigma_h)\\
&\quad +X_{313}(\eta_s^p+\gamma_s(0))+X_{355}(\eta_c^p+\nu_c)-\Lambda_h X_{284}(\zeta_h-1)-X_{145}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{286}}{\partial t} &= X_{293}\eta_s^p+X_{300}\eta_s^p+X_{321}\eta_c^p+X_{307}\eta_s^p+X_{285}\sigma_h+X_{391}(\eta_c^p+\gamma_c(0)+\nu_c)\\
&\quad -X_{286}(\Lambda_s+\Lambda_c+\eta_g^p+\eta_h^p+\mu+\nu_g+\theta_h)+X_{314}(\eta_s^p+\gamma_s(0))+X_{356}(\eta_c^p+\nu_c)-X_{146}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{287}}{\partial t} &= X_{315}(\gamma_s(0)+\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})+X_{285}\eta_h^p+X_{357}(\nu_c+\rho_c+\rho_{sc}+\rho_{hc}+\rho_{hsc})+X_{324}\rho_{hsc}+X_{325}\rho_{hsc}\\
&\quad +X_{331}\rho_{hsc}+X_{332}\rho_{hsc}+X_{338}\rho_{hsc}+X_{339}\rho_{hsc}+X_{345}\rho_{hsc}+X_{346}\rho_{hsc}+X_{359}\rho_{hsc}+X_{360}\rho_{hsc}+X_{366}\rho_{hsc}\\
&\quad +X_{367}\rho_{hsc}+X_{373}\rho_{hsc}+X_{374}\rho_{hsc}+X_{380}\rho_{hsc}+X_{381}\rho_{hsc}+X_{392}(\gamma_c(0)+\nu_c)+X_{283}(\rho_h+\rho_{hc}+\rho_{hs}+\rho_{hsc}+\theta_h)\\
&\quad -X_{287}(\Lambda_s+\Lambda_c+\mu+\nu_g+\rho_g+\rho_{cg}+\rho_{sg}+\rho_{scg}+\rho_{hg}+\rho_{hcg}+\rho_{hsg}+\rho_{hscg})+X_{329}(\rho_{sc}+\rho_{hsc})\\
&\quad +X_{336}(\rho_{sc}+\rho_{hsc})+X_{343}(\rho_{sc}+\rho_{hsc})+X_{350}(\rho_{sc}+\rho_{hsc})+X_{364}(\rho_{sc}+\rho_{hsc})+X_{371}(\rho_{sc}+\rho_{hsc})+X_{378}(\rho_{sc}+\rho_{hsc})\\
&\quad +X_{385}(\rho_{sc}+\rho_{hsc})+X_{322}(\rho_c+\rho_{sc}+\rho_{hc}+\rho_{hsc})+X_{294}(\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})+X_{301}(\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})\\
&\quad +X_{308}(\rho_s+\rho_{sc}+\rho_{hs}+\rho_{hsc})+X_{282}(\rho_h+\rho_{hc}+\rho_{hs}+\rho_{hsc})+X_{286}(\eta_h^p+\theta_h)+X_{289}(\rho_{hs}+\rho_{hsc})+X_{290}(\rho_{hs}+\rho_{hsc})\\
&\quad +X_{296}(\rho_{hs}+\rho_{hsc})+X_{297}(\rho_{hs}+\rho_{hsc})+X_{317}(\rho_{hc}+\rho_{hsc})+X_{318}(\rho_{hc}+\rho_{hsc})+X_{303}(\rho_{hs}+\rho_{hsc})\\
&\quad +X_{304}(\rho_{hs}+\rho_{hsc})+X_{310}(\rho_{hs}+\rho_{hsc})+X_{311}(\rho_{hs}+\rho_{hsc})+X_{352}(\rho_{hc}+\rho_{hsc})+X_{353}(\rho_{hc}+\rho_{hsc})-X_{147}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{288}}{\partial t} &= \Lambda_s X_{281}-X_{288}(\Lambda_h+\Lambda_c+\mu+\nu_g+\rho_g+\rho_s+\rho_{cg}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_s)\\
&\quad +X_{358}(\nu_c+\rho_c+\rho_{hc})+X_{393}(\gamma_c(0)+\nu_c)+X_{323}(\rho_c+\rho_{hc})-X_{148}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{289}}{\partial t} &= \Lambda_h X_{288}+\Lambda_s X_{282}+X_{324}\rho_c\\
&\quad -X_{289}(\Lambda_c+\mu+\nu_g+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_h+\sigma_s)\\
&\quad +X_{394}(\gamma_c(0)+\nu_c)+X_{359}(\nu_c+\rho_c)-X_{149}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{290}}{\partial t} &= \Lambda_s X_{283}+X_{325}\rho_c+X_{289}\sigma_h\\
&\quad -X_{290}(\Lambda_c+\mu+\nu_g+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_s+\theta_h)\\
&\quad +X_{395}(\gamma_c(0)+\nu_c)+X_{360}(\nu_c+\rho_c)-X_{150}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{291}}{\partial t} &= \Lambda_s X_{284}-X_{291}(\Lambda_c+\eta_g^p+\eta_s^p+\mu+\nu_g+\sigma_s-\Lambda_h(\zeta_h-1))+X_{326}\eta_c^p+X_{396}(\eta_c^p+\gamma_c(0)+\nu_c)+X_{361}(\eta_c^p+\nu_c)-X_{151}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{292}}{\partial t} &= \Lambda_s X_{285}+X_{327}\eta_c^p+X_{397}(\eta_c^p+\gamma_c(0)+\nu_c)-X_{292}(\Lambda_c+\eta_g^p+\eta_h^p+\eta_s^p+\mu+\nu_g+\sigma_h+\sigma_s)\\
&\quad +X_{362}(\eta_c^p+\nu_c)-\Lambda_h X_{291}(\zeta_h-1)-X_{152}\sigma_g(\epsilon_g-1)\\
\frac{\partial X_{293}}{\partial t} &= \Lambda_s X_{286}+X_{328}\eta_c^p+X_{292}\sigma_h+X_{398}(\eta_c^p+\gamma_c(0)+\nu_c)\\
&\quad -X_{293}(\Lambda_c+\eta_g^p+\eta_h^p+\eta_s^p+\mu+\nu_g+\sigma_s+\theta_h)+X_{363}(\eta_c^p+\nu_c)-X_{153}\sigma_g(\epsilon_g-1)
\end{aligned}
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\begin{aligned}
\frac{\partial X_{294}}{\partial t} &= \Lambda_s X_{287} + X_{329}(\rho_c + \rho_{hc}) + X_{292}\eta_h^p \\
&\quad - X_{294}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{324}\rho_{hc} + X_{325}\rho_{hc} + X_{359}\rho_{hc} + X_{360}\rho_{hc} + X_{399}(\gamma_c(0) + \nu_c) + X_{290}(\rho_h + \rho_{hc} + \theta_h) \\
&\quad + X_{364}(\nu_c + \rho_c + \rho_{hc}) + X_{293}(\eta_h^p + \theta_h) + X_{289}(\rho_h + \rho_{hc}) - X_{154}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{295}}{\partial t} &= X_{288}\sigma_s - X_{295}(\Lambda_h + \Lambda_c + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s) \\
&\quad + X_{365}(\nu_c + \rho_c + \rho_{hc}) + X_{400}(\gamma_c(0) + \nu_c) + X_{330}(\rho_c + \rho_{hc}) - X_{155}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{296}}{\partial t} &= \Lambda_h X_{295} + X_{331}\rho_c + X_{289}\sigma_s \\
&\quad - X_{296}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \tau_s) \\
&\quad + X_{401}(\gamma_c(0) + \nu_c) + X_{366}(\nu_c + \rho_c) - X_{156}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{297}}{\partial t} &= X_{332}\rho_c + X_{296}\sigma_h + X_{290}\sigma_s \\
&\quad - X_{297}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s + \theta_h) \\
&\quad + X_{402}(\gamma_c(0) + \nu_c) + X_{367}(\nu_c + \rho_c) - X_{157}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{298}}{\partial t} &= X_{333}\eta_c^p - X_{298}(\Lambda_c + \eta_g^p + \eta_s^p + \mu + \nu_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{291}\sigma_s + X_{403}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{368}(\eta_c^p + \nu_c) - X_{158}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{299}}{\partial t} &= X_{334}\eta_c^p + X_{292}\sigma_s + X_{404}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{299}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_h + \tau_s) \\
&\quad + X_{369}(\eta_c^p + \nu_c) - \Lambda_h X_{298}(\zeta_h - 1) - X_{159}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{300}}{\partial t} &= X_{335}\eta_c^p + X_{299}\sigma_h + X_{293}\sigma_s + X_{405}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{300}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \tau_s + \theta_h) + X_{370}(\eta_c^p + \nu_c) - X_{160}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{301}}{\partial t} &= X_{336}(\rho_c + \rho_{hc}) + X_{299}\eta_h^p - X_{301}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \tau_s + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{331}\rho_{hc} + X_{332}\rho_{hc} + X_{366}\rho_{hc} + X_{367}\rho_{hc} + X_{294}\sigma_s + X_{406}(\gamma_c(0) + \nu_c) + X_{297}(\rho_h + \rho_{hc} + \theta_h) \\
&\quad + X_{371}(\nu_c + \rho_c + \rho_{hc}) + X_{300}(\eta_h^p + \theta_h) + X_{296}(\rho_h + \rho_{hc}) - X_{161}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{302}}{\partial t} &= X_{295}\tau_s - X_{302}(\Lambda_h + \Lambda_c + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_s) \\
&\quad + X_{372}(\nu_c + \rho_c + \rho_{hc}) + X_{407}(\gamma_c(0) + \nu_c) + X_{337}(\rho_c + \rho_{hc}) - X_{162}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{303}}{\partial t} &= \Lambda_h X_{302} + X_{338}\rho_c + X_{296}\tau_s \\
&\quad - X_{303}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \theta_s) \\
&\quad + X_{408}(\gamma_c(0) + \nu_c) + X_{373}(\nu_c + \rho_c) - X_{163}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{304}}{\partial t} &= X_{339}\rho_c + X_{303}\sigma_h + X_{297}\tau_s \\
&\quad - X_{304}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h + \theta_s) \\
&\quad + X_{409}(\gamma_c(0) + \nu_c) + X_{374}(\nu_c + \rho_c) - X_{164}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{305}}{\partial t} &= X_{340}\eta_c^p - X_{305}(\Lambda_c + \eta_g^p + \eta_s^p + \mu + \nu_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{298}\tau_s + X_{410}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{375}(\eta_c^p + \nu_c) - X_{165}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{306}}{\partial t} &= X_{341}\eta_c^p + X_{299}\tau_s + X_{411}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{306}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_h + \theta_s) \\
&\quad + X_{376}(\eta_c^p + \nu_c) - \Lambda_h X_{305}(\zeta_h - 1) - X_{166}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{307}}{\partial t} &= X_{342}\eta_c^p + X_{306}\sigma_h + X_{300}\tau_s + X_{412}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{307}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \theta_h + \theta_s) + X_{377}(\eta_c^p + \nu_c) - X_{167}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{308}}{\partial t} &= X_{343}(\rho_c + \rho_{hc}) + X_{306}\eta_h^p - X_{308}(\Lambda_c + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \theta_s + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{338}\rho_{hc} + X_{339}\rho_{hc} + X_{373}\rho_{hc} + X_{374}\rho_{hc} + X_{301}\tau_s + X_{413}(\gamma_c(0) + \nu_c) + X_{304}(\rho_h + \rho_{hc} + \theta_h) \\
&\quad + X_{378}(\nu_c + \rho_c + \rho_{hc}) + X_{307}(\eta_h^p + \theta_h) + X_{303}(\rho_h + \rho_{hc}) - X_{168}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{309}}{\partial t} &= X_{302}\theta_s - X_{309}(\Lambda_h + \Lambda_c + \gamma_s(0) + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{379}(\nu_c + \rho_c + \rho_{hc}) + X_{414}(\gamma_c(0) + \nu_c) + X_{344}(\rho_c + \rho_{hc}) - X_{169}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{310}}{\partial t} &= \Lambda_h X_{309} + X_{345}\rho_c + X_{303}\theta_s \\
&\quad - X_{310}(\Lambda_c + \gamma_s(0) + \mu + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h) \\
&\quad + X_{415}(\gamma_c(0) + \nu_c) + X_{380}(\nu_c + \rho_c) - X_{170}\sigma_g(\epsilon_g - 1)
\end{aligned}
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\begin{aligned}
\frac{\partial X_{311}}{\partial t} &= X_{346}\rho_c + X_{310}\sigma_h + X_{304}\theta_s \\
&\quad - X_{311}(\Lambda_c + \gamma_s(0) + \mu + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h) \\
&\quad + X_{416}(\gamma_c(0) + \nu_c) + X_{381}(\nu_c + \rho_c) - X_{171}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{312}}{\partial t} &= X_{347}\eta_c^p + X_{305}\theta_s + X_{417}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{382}(\eta_c^p + \nu_c) \\
&\quad - X_{312}(\Lambda_c + \eta_g^p + \eta_s^p + \gamma_s(0) + \mu + \nu_g - \Lambda_h(\zeta_h - 1)) - X_{172}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{313}}{\partial t} &= X_{348}\eta_c^p + X_{306}\theta_s - X_{313}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_g + \sigma_h) \\
&\quad + X_{418}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{383}(\eta_c^p + \nu_c) - \Lambda_h X_{312}(\zeta_h - 1) - X_{173}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{314}}{\partial t} &= X_{349}\eta_c^p + X_{313}\sigma_h + X_{307}\theta_s - X_{314}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_g + \theta_h) \\
&\quad + X_{419}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{384}(\eta_c^p + \nu_c) - X_{174}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{315}}{\partial t} &= X_{350}(\rho_c + \rho_{hc}) - X_{315}(\Lambda_c + \gamma_s(0) + \mu + \nu_g + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{313}\eta_h^p + X_{345}\rho_{hc} + X_{346}\rho_{hc} + X_{380}\rho_{hc} + X_{381}\rho_{hc} + X_{308}\theta_s + X_{420}(\gamma_c(0) + \nu_c) \\
&\quad + X_{311}(\rho_h + \rho_{hc} + \theta_h) + X_{385}(\nu_c + \rho_c + \rho_{hc}) + X_{314}(\eta_h^p + \theta_h) + X_{310}(\rho_h + \rho_{hc}) - X_{175}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{316}}{\partial t} &= \Lambda_c X_{281} - X_{316}(\Lambda_h + \Lambda_s + \mu + \nu_g + \rho_c + \rho_g + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c) \\
&\quad + X_{344}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{323}(\rho_s + \rho_{hs}) + X_{330}(\rho_s + \rho_{hs}) + X_{337}(\rho_s + \rho_{hs}) - X_{176}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{317}}{\partial t} &= \Lambda_h X_{316} + \Lambda_c X_{282} + X_{324}\rho_s + X_{331}\rho_s + X_{338}\rho_s \\
&\quad - X_{317}(\Lambda_s + \mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c) \\
&\quad + X_{345}(\gamma_s(0) + \rho_s) - X_{177}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{318}}{\partial t} &= \Lambda_c X_{283} + X_{325}\rho_s + X_{332}\rho_s + X_{339}\rho_s + X_{317}\sigma_h \\
&\quad - X_{318}(\Lambda_s + \mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_h) \\
&\quad + X_{346}(\gamma_s(0) + \rho_s) - X_{178}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{319}}{\partial t} &= \Lambda_c X_{284} - X_{319}(\Lambda_s + \eta_c^p + \eta_g^p + \mu + \nu_g + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{326}\eta_s^p + X_{333}\eta_s^p + X_{340}\eta_s^p + X_{347}(\eta_s^p + \gamma_s(0)) - X_{179}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{320}}{\partial t} &= \Lambda_c X_{285} + X_{327}\eta_s^p + X_{334}\eta_s^p + X_{341}\eta_s^p - X_{320}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \nu_g + \sigma_h + \sigma_c) \\
&\quad + X_{348}(\eta_s^p + \gamma_s(0)) - \Lambda_h X_{319}(\zeta_h - 1) - X_{180}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{321}}{\partial t} &= \Lambda_c X_{286} + X_{328}\eta_s^p + X_{335}\eta_s^p + X_{342}\eta_s^p + X_{320}\sigma_h \\
&\quad - X_{321}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \nu_g + \sigma_c + \theta_h) + X_{349}(\eta_s^p + \gamma_s(0)) - X_{181}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{322}}{\partial t} &= \Lambda_c X_{287} + X_{329}(\rho_s + \rho_{hs}) + X_{336}(\rho_s + \rho_{hs}) + X_{343}(\rho_s + \rho_{hs}) + X_{320}\eta_h^p \\
&\quad - X_{322}(\Lambda_s + \mu + \nu_g + \rho_c + \rho_g + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{324}\rho_{hs} + X_{325}\rho_{hs} + X_{331}\rho_{hs} + X_{332}\rho_{hs} + X_{338}\rho_{hs} + X_{339}\rho_{hs} + X_{345}\rho_{hs} + X_{346}\rho_{hs} \\
&\quad + X_{318}(\rho_h + \rho_{hs} + \theta_h) + X_{350}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{321}(\eta_h^p + \theta_h) + X_{317}(\rho_h + \rho_{hs}) - X_{182}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{323}}{\partial t} &= \Lambda_s X_{316} + \Lambda_c X_{288} \\
&\quad - X_{323}(\Lambda_h + \mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_c) \\
&\quad - X_{183}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{324}}{\partial t} &= \Lambda_h X_{323} - X_{324}(\mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s + \sigma_c) \\
&\quad + \Lambda_s X_{317} + \Lambda_c X_{289} - X_{184}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{325}}{\partial t} &= \Lambda_s X_{318} - X_{325}(\mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \sigma_c + \theta_h) \\
&\quad + \Lambda_c X_{290} + X_{324}\sigma_h - X_{185}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{326}}{\partial t} &= \Lambda_s X_{319} + \Lambda_c X_{291} - X_{326}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_g + \sigma_s + \sigma_c - \Lambda_h(\zeta_h - 1)) - X_{186}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{327}}{\partial t} &= \Lambda_s X_{320} + \Lambda_c X_{292} - X_{327}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_h + \sigma_s + \sigma_c) - \Lambda_h X_{326}(\zeta_h - 1) - X_{187}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{328}}{\partial t} &= \Lambda_s X_{321} + \Lambda_c X_{293} + X_{327}\sigma_h - X_{328}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_s + \sigma_c + \theta_h) - X_{188}\sigma_g(\epsilon_g - 1)
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{329}}{\partial t} &= \Lambda_s X_{322} + \Lambda_c X_{294} + X_{327}\eta_h^p + X_{324}\rho_h \\
&\quad - X_{329}(\mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \sigma_c + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{328}(\eta_h^p + \theta_h) + X_{325}(\rho_h + \theta_h) - X_{189}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{330}}{\partial t} &= \Lambda_c X_{295} + X_{323}\sigma_s \\
&\quad - X_{330}(\Lambda_h + \mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \tau_s) \\
&\quad - X_{190}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{331}}{\partial t} &= \Lambda_h X_{330} - X_{331}(\mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c + \tau_s) \\
&\quad + \Lambda_c X_{296} + X_{324}\sigma_s - X_{191}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{332}}{\partial t} &= \Lambda_c X_{297} - X_{332}(\mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \tau_s + \theta_h) \\
&\quad + X_{331}\sigma_h + X_{325}\sigma_s - X_{192}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{333}}{\partial t} &= \Lambda_c X_{298} + X_{326}\sigma_s - X_{333}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_g + \sigma_c + \tau_s - \Lambda_h(\zeta_h - 1)) - X_{193}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{334}}{\partial t} &= \Lambda_c X_{299} + X_{327}\sigma_s - X_{334}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_h + \sigma_c + \tau_s) - \Lambda_h X_{333}(\zeta_h - 1) - X_{194}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{335}}{\partial t} &= \Lambda_c X_{300} + X_{334}\sigma_h + X_{328}\sigma_s - X_{335}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_c + \tau_s + \theta_h) - X_{195}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{336}}{\partial t} &= \Lambda_c X_{301} + X_{334}\eta_h^p + X_{331}\rho_h + X_{329}\sigma_s \\
&\quad - X_{336}(\mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \tau_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{335}(\eta_h^p + \theta_h) + X_{332}(\rho_h + \theta_h) - X_{196}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{337}}{\partial t} &= \Lambda_c X_{302} + X_{330}\tau_s \\
&\quad - X_{337}(\Lambda_h + \mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_s) \\
&\quad - X_{197}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{338}}{\partial t} &= \Lambda_h X_{337} - X_{338}(\mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c + \theta_s) \\
&\quad + \Lambda_c X_{303} + X_{331}\tau_s - X_{198}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{339}}{\partial t} &= \Lambda_c X_{304} - X_{339}(\mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_h + \theta_s) \\
&\quad + X_{338}\sigma_h + X_{332}\tau_s - X_{199}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{340}}{\partial t} &= \Lambda_c X_{305} + X_{333}\tau_s - X_{340}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_g + \sigma_c + \theta_s - \Lambda_h(\zeta_h - 1)) - X_{200}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{341}}{\partial t} &= \Lambda_c X_{306} + X_{334}\tau_s - X_{341}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_h + \sigma_c + \theta_s) - \Lambda_h X_{340}(\zeta_h - 1) - X_{201}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{342}}{\partial t} &= \Lambda_c X_{307} + X_{341}\sigma_h + X_{335}\tau_s - X_{342}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_g + \sigma_c + \theta_h + \theta_s) - X_{202}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{343}}{\partial t} &= \Lambda_c X_{308} + X_{341}\eta_h^p + X_{338}\rho_h + X_{336}\tau_s \\
&\quad - X_{343}(\mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \theta_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) \\
&\quad + X_{342}(\eta_h^p + \theta_h) + X_{339}(\rho_h + \theta_h) - X_{203}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{344}}{\partial t} &= \Lambda_c X_{309} + X_{337}\theta_s \\
&\quad - X_{344}(\Lambda_h + \gamma_s(0) + \mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c) \\
&\quad - X_{204}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{345}}{\partial t} &= \Lambda_h X_{344} + \Lambda_c X_{310} + X_{338}\theta_s \\
&\quad - X_{345}(\gamma_s(0) + \mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_c) \\
&\quad - X_{205}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{346}}{\partial t} &= \Lambda_c X_{311} + X_{345}\sigma_h + X_{339}\theta_s \\
&\quad - X_{346}(\gamma_s(0) + \mu + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_c + \theta_h) \\
&\quad - X_{206}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{347}}{\partial t} &= \Lambda_c X_{312} + X_{340}\theta_s - X_{347}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \mu + \nu_g + \sigma_c - \Lambda_h(\zeta_h - 1)) - X_{207}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{348}}{\partial t} &= \Lambda_c X_{313} + X_{341}\theta_s - X_{348}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_g + \sigma_h + \sigma_c) - \Lambda_h X_{347}(\zeta_h - 1) - X_{208}\sigma_g(\epsilon_g - 1)
\end{aligned}
$$

$$\frac{\partial X_{349}}{\partial t} = \Lambda_c X_{314} + X_{348}\sigma_h + X_{342}\theta_s - X_{349}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \mu + \nu_g + \sigma_c + \theta_h) - X_{209}\sigma_g(\epsilon_g - 1)$$

$$\frac{\partial X_{350}}{\partial t} = \Lambda_c X_{315} + X_{348}\eta_h^p + X_{345}\rho_h + X_{343}\theta_s - X_{350}(\gamma_s(0) + \mu + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_c + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{349}(\eta_h^p + \theta_h) + X_{346}(\rho_h + \theta_h) - X_{210}\sigma_g(\epsilon_g - 1)$$

$$\frac{\partial X_{351}}{\partial t} = X_{379}(\gamma_s(0)+\rho_s+\rho_{hs}) - X_{351}(\Lambda_h+\Lambda_s+\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) + X_{358}(\rho_s + \rho_{hs}) + X_{365}(\rho_s + \rho_{hs}) + X_{372}(\rho_s + \rho_{hs}) - X_{211}\sigma_g(\epsilon_g - 1) - X_{316}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{352}}{\partial t} = \Lambda_h X_{351} + X_{359}\rho_s + X_{366}\rho_s + X_{373}\rho_s - X_{352}(\Lambda_s + \mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h) + X_{380}(\gamma_s(0) + \rho_s) - X_{212}\sigma_g(\epsilon_g - 1) - X_{317}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{353}}{\partial t} = X_{360}\rho_s + X_{367}\rho_s + X_{374}\rho_s + X_{352}\sigma_h - X_{353}(\Lambda_s + \mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_h + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \theta_h) + X_{381}(\gamma_s(0) + \rho_s) - X_{213}\sigma_g(\epsilon_g - 1) - X_{318}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{354}}{\partial t} = X_{361}\eta_s^p + X_{368}\eta_s^p + X_{375}\eta_s^p + X_{382}(\eta_s^p + \gamma_s(0)) - X_{354}(\Lambda_s + \eta_c^p + \eta_g^p + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) - X_{214}\sigma_g(\epsilon_g - 1) - X_{319}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{355}}{\partial t} = X_{362}\eta_s^p + X_{369}\eta_s^p + X_{376}\eta_s^p - X_{355}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \nu_c + \nu_g + \sigma_h) + X_{383}(\eta_s^p + \gamma_s(0)) - \Lambda_h X_{354}(\zeta_h - 1) - X_{215}\sigma_g(\epsilon_g - 1) - X_{320}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{356}}{\partial t} = X_{363}\eta_s^p + X_{370}\eta_s^p + X_{377}\eta_s^p + X_{355}\sigma_h - X_{356}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \mu + \nu_c + \nu_g + \theta_h) + X_{384}(\eta_s^p + \gamma_s(0)) - X_{216}\sigma_g(\epsilon_g - 1) - X_{321}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{357}}{\partial t} = X_{364}(\rho_s + \rho_{hs}) + X_{371}(\rho_s + \rho_{hs}) + X_{378}(\rho_s + \rho_{hs}) - X_{357}(\Lambda_s + \mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \rho_{hc} + \rho_{hg} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{355}\eta_h^p + X_{359}\rho_{hs} + X_{360}\rho_{hs} + X_{366}\rho_{hs} + X_{367}\rho_{hs} + X_{373}\rho_{hs} + X_{374}\rho_{hs} + X_{380}\rho_{hs} + X_{381}\rho_{hs} + X_{353}(\rho_h + \rho_{hs} + \theta_h) + X_{385}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{356}(\eta_h^p + \theta_h) + X_{352}(\rho_h + \rho_{hs}) - X_{217}\sigma_g(\epsilon_g - 1) - X_{322}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{358}}{\partial t} = \Lambda_s X_{351} - X_{358}(\Lambda_h + \mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s) - X_{218}\sigma_g(\epsilon_g - 1) - X_{323}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{359}}{\partial t} = \Lambda_h X_{358} + \Lambda_s X_{352} - X_{359}(\mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \sigma_s) - X_{219}\sigma_g(\epsilon_g - 1) - X_{324}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{360}}{\partial t} = \Lambda_s X_{353} + X_{359}\sigma_h - X_{360}(\mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_s + \theta_h) - X_{220}\sigma_g(\epsilon_g - 1) - X_{325}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{361}}{\partial t} = \Lambda_s X_{354} - X_{361}(\eta_c^p + \eta_g^p + \eta_s^p + \mu + \nu_c + \nu_g + \sigma_s - \Lambda_h(\zeta_h - 1)) - X_{221}\sigma_g(\epsilon_g - 1) - X_{326}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{362}}{\partial t} = \Lambda_s X_{355} - X_{362}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \nu_g + \sigma_h + \sigma_s) - \Lambda_h X_{361}(\zeta_h - 1) - X_{222}\sigma_g(\epsilon_g - 1) - X_{327}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{363}}{\partial t} = \Lambda_s X_{356} + X_{362}\sigma_h - X_{363}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \mu + \nu_c + \nu_g + \sigma_s + \theta_h) - X_{223}\sigma_g(\epsilon_g - 1) - X_{328}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{364}}{\partial t} = \Lambda_s X_{357} + X_{362}\eta_h^p + X_{359}\rho_h - X_{364}(\mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{sc} + \rho_{sg} + \rho_{scg} + \sigma_s + \rho_{hc} + \rho_{hg} + \rho_{hs} + \rho_{hcg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg}) + X_{363}(\eta_h^p + \theta_h) + X_{360}(\rho_h + \theta_h) - X_{224}\sigma_g(\epsilon_g - 1) - X_{329}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{365}}{\partial t} = X_{358}\sigma_s - X_{365}(\Lambda_h + \mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \tau_s) - X_{225}\sigma_g(\epsilon_g - 1) - X_{330}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{366}}{\partial t} = \Lambda_h X_{365} + X_{359}\sigma_s - X_{366}(\mu + \nu_c + \nu_g + \rho_c + \rho_g + \rho_h + \rho_s + \rho_{cg} + \rho_{hc} + \rho_{hg} + \rho_{sc} + \rho_{sg} + \rho_{hs} + \rho_{hcg} + \rho_{scg} + \rho_{hsc} + \rho_{hsg} + \rho_{hscg} + \sigma_h + \tau_s) - X_{226}\sigma_g(\epsilon_g - 1) - X_{331}\sigma_c(\epsilon_c - 1)$$

$$
\begin{aligned}
\frac{\partial X_{367}}{\partial t} &= X_{366}\sigma_h + X_{360}\sigma_s \\
&\quad - X_{367}(\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\tau_s+\theta_h) \\
&\quad - X_{227}\sigma_g(\epsilon_g-1) - X_{332}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{368}}{\partial t} &= X_{361}\sigma_s - X_{368}(\eta_c^p+\eta_g^p+\eta_s^p+\mu+\nu_c+\nu_g+\tau_s-\Lambda_h(\zeta_h-1)) - X_{228}\sigma_g(\epsilon_g-1) - X_{333}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{369}}{\partial t} &= X_{362}\sigma_s - X_{369}(\eta_c^p+\eta_g^p+\eta_h^p+\eta_s^p+\mu+\nu_c+\nu_g+\sigma_h+\tau_s) - \Lambda_h X_{368}(\zeta_h-1) - X_{229}\sigma_g(\epsilon_g-1) - X_{334}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{370}}{\partial t} &= X_{369}\sigma_h + X_{363}\sigma_s - X_{370}(\eta_c^p+\eta_g^p+\eta_h^p+\eta_s^p+\mu+\nu_c+\nu_g+\tau_s+\theta_h) - X_{230}\sigma_g(\epsilon_g-1) - X_{335}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{371}}{\partial t} &= X_{369}\eta_h^p + X_{366}\rho_h + X_{364}\sigma_s \\
&\quad - X_{371}(\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_s+\rho_{cg}+\rho_{sc}+\rho_{sg}+\rho_{scg}+\tau_s+\rho_{hc}+\rho_{hg}+\rho_{hs}+\rho_{hcg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&\quad + X_{370}(\eta_h^p+\theta_h) + X_{367}(\rho_h+\theta_h) - X_{231}\sigma_g(\epsilon_g-1) - X_{336}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{372}}{\partial t} &= X_{365}\tau_s - X_{372}(\Lambda_h+\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\theta_s) \\
&\quad - X_{232}\sigma_g(\epsilon_g-1) - X_{337}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{373}}{\partial t} &= \Lambda_h X_{372} + X_{366}\tau_s \\
&\quad - X_{373}(\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_h+\theta_s) \\
&\quad - X_{233}\sigma_g(\epsilon_g-1) - X_{338}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{374}}{\partial t} &= X_{373}\sigma_h + X_{367}\tau_s \\
&\quad - X_{374}(\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\theta_h+\theta_s) \\
&\quad - X_{234}\sigma_g(\epsilon_g-1) - X_{339}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{375}}{\partial t} &= X_{368}\tau_s - X_{375}(\eta_c^p+\eta_g^p+\eta_s^p+\mu+\nu_c+\nu_g+\theta_s-\Lambda_h(\zeta_h-1)) - X_{235}\sigma_g(\epsilon_g-1) - X_{340}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{376}}{\partial t} &= X_{369}\tau_s - X_{376}(\eta_c^p+\eta_g^p+\eta_h^p+\eta_s^p+\mu+\nu_c+\nu_g+\sigma_h+\theta_s) - \Lambda_h X_{375}(\zeta_h-1) - X_{236}\sigma_g(\epsilon_g-1) - X_{341}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{377}}{\partial t} &= X_{376}\sigma_h + X_{370}\tau_s - X_{377}(\eta_c^p+\eta_g^p+\eta_h^p+\eta_s^p+\mu+\nu_c+\nu_g+\theta_h+\theta_s) - X_{237}\sigma_g(\epsilon_g-1) - X_{342}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{378}}{\partial t} &= X_{376}\eta_h^p + X_{373}\rho_h + X_{371}\tau_s \\
&\quad - X_{378}(\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_s+\rho_{cg}+\rho_{sc}+\rho_{sg}+\rho_{scg}+\theta_s+\rho_{hc}+\rho_{hg}+\rho_{hs}+\rho_{hcg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&\quad + X_{377}(\eta_h^p+\theta_h) + X_{374}(\rho_h+\theta_h) - X_{238}\sigma_g(\epsilon_g-1) - X_{343}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{379}}{\partial t} &= X_{372}\theta_s - X_{379}(\Lambda_h+\gamma_s(0)+\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&\quad - X_{239}\sigma_g(\epsilon_g-1) - X_{344}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{380}}{\partial t} &= \Lambda_h X_{379} + X_{373}\theta_s \\
&\quad - X_{380}(\gamma_s(0)+\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\sigma_h) \\
&\quad - X_{240}\sigma_g(\epsilon_g-1) - X_{345}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{381}}{\partial t} &= X_{380}\sigma_h + X_{374}\theta_s \\
&\quad - X_{381}(\gamma_s(0)+\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_h+\rho_s+\rho_{cg}+\rho_{hc}+\rho_{hg}+\rho_{sc}+\rho_{sg}+\rho_{hs}+\rho_{hcg}+\rho_{scg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}+\theta_h) \\
&\quad - X_{241}\sigma_g(\epsilon_g-1) - X_{346}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{382}}{\partial t} &= X_{375}\theta_s - X_{382}(\eta_c^p+\eta_g^p+\eta_s^p+\gamma_s(0)+\mu+\nu_c+\nu_g-\Lambda_h(\zeta_h-1)) - X_{242}\sigma_g(\epsilon_g-1) - X_{347}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{383}}{\partial t} &= X_{376}\theta_s - X_{383}(\eta_c^p+\eta_g^p+\eta_h^p+\eta_s^p+\gamma_s(0)+\mu+\nu_c+\nu_g+\sigma_h) - \Lambda_h X_{382}(\zeta_h-1) - X_{243}\sigma_g(\epsilon_g-1) - X_{348}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{384}}{\partial t} &= X_{383}\sigma_h + X_{377}\theta_s - X_{384}(\eta_c^p+\eta_g^p+\eta_h^p+\eta_s^p+\gamma_s(0)+\mu+\nu_c+\nu_g+\theta_h) - X_{244}\sigma_g(\epsilon_g-1) - X_{349}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{385}}{\partial t} &= X_{383}\eta_h^p + X_{380}\rho_h + X_{378}\theta_s \\
&\quad - X_{385}(\gamma_s(0)+\mu+\nu_c+\nu_g+\rho_c+\rho_g+\rho_s+\rho_{cg}+\rho_{sc}+\rho_{sg}+\rho_{scg}+\rho_{hc}+\rho_{hg}+\rho_{hs}+\rho_{hcg}+\rho_{hsc}+\rho_{hsg}+\rho_{hscg}) \\
&\quad + X_{384}(\eta_h^p+\theta_h) + X_{381}(\rho_h+\theta_h) - X_{245}\sigma_g(\epsilon_g-1) - X_{350}\sigma_c(\epsilon_c-1) \\
\frac{\partial X_{386}}{\partial t} &= X_{414}(\gamma_s(0)+\rho_s+\rho_{hs}) - X_{386}(\Lambda_h+\Lambda_s+\gamma_c(0)+\mu+\nu_c+\nu_g+\rho_g+\rho_{hg}+\rho_{sg}+\rho_{hsg}) \\
&\quad + X_{393}(\rho_s+\rho_{hs}) + X_{400}(\rho_s+\rho_{hs}) + X_{407}(\rho_s+\rho_{hs}) + X_{316}\epsilon_c\sigma_c - X_{246}\sigma_g(\epsilon_g-1)
\end{aligned}
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\begin{aligned}
\frac{\partial X_{387}}{\partial t} &= \Lambda_h X_{386} + X_{394}\rho_s + X_{401}\rho_s + X_{408}\rho_s - X_{387}(\Lambda_s + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h) \\
&\quad + X_{415}(\gamma_s(0) + \rho_s) + X_{317}\epsilon_c\sigma_c - X_{247}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{388}}{\partial t} &= X_{395}\rho_s + X_{402}\rho_s + X_{409}\rho_s + X_{387}\sigma_h - X_{388}(\Lambda_s + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_h) \\
&\quad + X_{416}(\gamma_s(0) + \rho_s) + X_{318}\epsilon_c\sigma_c - X_{248}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{389}}{\partial t} &= X_{396}\eta_s^p + X_{403}\eta_s^p + X_{410}\eta_s^p - X_{389}(\Lambda_s + \eta_c^p + \eta_g^p + \gamma_c(0) + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) \\
&\quad + X_{417}(\eta_s^p + \gamma_s(0)) + X_{319}\epsilon_c\sigma_c - X_{249}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{390}}{\partial t} &= X_{397}\eta_s^p + X_{404}\eta_s^p + X_{411}\eta_s^p - X_{390}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h) \\
&\quad + X_{418}(\eta_s^p + \gamma_s(0)) + X_{320}\epsilon_c\sigma_c - \Lambda_h X_{389}(\zeta_h - 1) - X_{250}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{391}}{\partial t} &= X_{398}\eta_s^p + X_{405}\eta_s^p + X_{412}\eta_s^p + X_{390}\sigma_h - X_{391}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_h) \\
&\quad + X_{419}(\eta_s^p + \gamma_s(0)) + X_{321}\epsilon_c\sigma_c - X_{251}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{392}}{\partial t} &= X_{390}\eta_h^p + X_{394}\rho_{hs} + X_{395}\rho_{hs} + X_{401}\rho_{hs} + X_{402}\rho_{hs} + X_{408}\rho_{hs} + X_{409}\rho_{hs} + X_{415}\rho_{hs} + X_{416}\rho_{hs} + X_{399}(\rho_s + \rho_{hs}) \\
&\quad + X_{406}(\rho_s + \rho_{hs}) + X_{413}(\rho_s + \rho_{hs}) + X_{388}(\rho_h + \rho_{hs} + \theta_h) - X_{392}(\Lambda_s + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_{hg} + \rho_{sg} + \rho_{hsg}) \\
&\quad + X_{420}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{391}(\eta_h^p + \theta_h) + X_{387}(\rho_h + \rho_{hs}) + X_{322}\epsilon_c\sigma_c - X_{252}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{393}}{\partial t} &= \Lambda_s X_{386} - X_{393}(\Lambda_h + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_s) + X_{323}\epsilon_c\sigma_c - X_{253}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{394}}{\partial t} &= \Lambda_h X_{393} + \Lambda_s X_{387} - X_{394}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \sigma_s) + X_{324}\epsilon_c\sigma_c - X_{254}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{395}}{\partial t} &= \Lambda_s X_{388} + X_{394}\sigma_h - X_{395}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_s + \theta_h) + X_{325}\epsilon_c\sigma_c - X_{255}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{396}}{\partial t} &= \Lambda_s X_{389} - X_{396}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_s - \Lambda_h(\zeta_h - 1)) + X_{326}\epsilon_c\sigma_c - X_{256}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{397}}{\partial t} &= \Lambda_s X_{390} - X_{397}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h + \sigma_s) + X_{327}\epsilon_c\sigma_c - \Lambda_h X_{396}(\zeta_h - 1) - X_{257}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{398}}{\partial t} &= \Lambda_s X_{391} + X_{397}\sigma_h - X_{398}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_s + \theta_h) + X_{328}\epsilon_c\sigma_c - X_{258}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{399}}{\partial t} &= \Lambda_s X_{392} - X_{399}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_s) \\
&\quad + X_{397}\eta_h^p + X_{394}\rho_h + X_{398}(\eta_h^p + \theta_h) + X_{395}(\rho_h + \theta_h) + X_{329}\epsilon_c\sigma_c - X_{259}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{400}}{\partial t} &= X_{393}\sigma_s - X_{400}(\Lambda_h + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \tau_s) + X_{330}\epsilon_c\sigma_c - X_{260}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{401}}{\partial t} &= \Lambda_h X_{400} + X_{394}\sigma_s - X_{401}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \tau_s) + X_{331}\epsilon_c\sigma_c - X_{261}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{402}}{\partial t} &= X_{401}\sigma_h + X_{395}\sigma_s - X_{402}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \tau_s + \theta_h) + X_{332}\epsilon_c\sigma_c - X_{262}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{403}}{\partial t} &= X_{396}\sigma_s - X_{403}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{333}\epsilon_c\sigma_c - X_{263}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{404}}{\partial t} &= X_{397}\sigma_s - X_{404}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h + \tau_s) + X_{334}\epsilon_c\sigma_c - \Lambda_h X_{403}(\zeta_h - 1) - X_{264}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{405}}{\partial t} &= X_{404}\sigma_h + X_{398}\sigma_s - X_{405}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \tau_s + \theta_h) + X_{335}\epsilon_c\sigma_c - X_{265}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{406}}{\partial t} &= X_{404}\eta_h^p - X_{406}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \tau_s) + X_{401}\rho_h \\
&\quad + X_{399}\sigma_s + X_{405}(\eta_h^p + \theta_h) + X_{402}(\rho_h + \theta_h) + X_{336}\epsilon_c\sigma_c - X_{266}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{407}}{\partial t} &= X_{400}\tau_s - X_{407}(\Lambda_h + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_s) + X_{337}\epsilon_c\sigma_c - X_{267}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{408}}{\partial t} &= \Lambda_h X_{407} + X_{401}\tau_s - X_{408}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h + \theta_s) + X_{338}\epsilon_c\sigma_c - X_{268}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{409}}{\partial t} &= X_{408}\sigma_h + X_{402}\tau_s - X_{409}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_h + \theta_s) + X_{339}\epsilon_c\sigma_c - X_{269}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{410}}{\partial t} &= X_{403}\tau_s - X_{410}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{340}\epsilon_c\sigma_c - X_{270}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{411}}{\partial t} &= X_{404}\tau_s - X_{411}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h + \theta_s) + X_{341}\epsilon_c\sigma_c - \Lambda_h X_{410}(\zeta_h - 1) - X_{271}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{412}}{\partial t} &= X_{411}\sigma_h + X_{405}\tau_s - X_{412}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_h + \theta_s) + X_{342}\epsilon_c\sigma_c - X_{272}\sigma_g(\epsilon_g - 1)
\end{aligned}
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\begin{aligned}
\frac{\partial X_{413}}{\partial t} &= X_{411}\eta_h^p - X_{413}(\gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_s) \\
&\quad + X_{408}\rho_h + X_{406}\tau_s + X_{412}(\eta_h^p + \theta_h) + X_{409}(\rho_h + \theta_h) + X_{343}\epsilon_c\sigma_c - X_{273}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{414}}{\partial t} &= X_{407}\theta_s - X_{414}(\Lambda_h + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg}) + X_{344}\epsilon_c\sigma_c - X_{274}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{415}}{\partial t} &= \Lambda_h X_{414} + X_{408}\theta_s - X_{415}(\gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \sigma_h) \\
&\quad + X_{345}\epsilon_c\sigma_c - X_{275}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{416}}{\partial t} &= X_{415}\sigma_h + X_{409}\theta_s - X_{416}(\gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_h + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg} + \theta_h) + X_{346}\epsilon_c\sigma_c - X_{276}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{417}}{\partial t} &= X_{410}\theta_s - X_{417}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) + X_{347}\epsilon_c\sigma_c - X_{277}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{418}}{\partial t} &= X_{411}\theta_s - X_{418}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h) + X_{348}\epsilon_c\sigma_c - \Lambda_h X_{417}(\zeta_h - 1) - X_{278}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{419}}{\partial t} &= X_{418}\sigma_h + X_{412}\theta_s - X_{419}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_h) + X_{349}\epsilon_c\sigma_c - X_{279}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{420}}{\partial t} &= X_{418}\eta_h^p - X_{420}(\gamma_s(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_g + \rho_s + \rho_{hg} + \rho_{sg} + \rho_{hs} + \rho_{hsg}) \\
&\quad + X_{415}\rho_h + X_{413}\theta_s + X_{419}(\eta_h^p + \theta_h) + X_{416}(\rho_h + \theta_h) + X_{350}\epsilon_c\sigma_c - X_{280}\sigma_g(\epsilon_g - 1) \\
\frac{\partial X_{421}}{\partial t} &= X_{449}(\gamma_s(0) + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) - X_{421}(\Lambda_h + \Lambda_s + \Lambda_c + \gamma_g(0) + \mu + \nu_g) + X_{491}(\nu_c + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) \\
&\quad + X_{456}(\rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) + X_{428}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{435}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) \\
&\quad + X_{442}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{526}(\gamma_c(0) + \nu_c) + X_{463}(\rho_{sc} + \rho_{hsc}) + X_{470}(\rho_{sc} + \rho_{hsc}) + X_{477}(\rho_{sc} + \rho_{hsc}) \\
&\quad + X_{484}(\rho_{sc} + \rho_{hsc}) + X_{498}(\rho_{sc} + \rho_{hsc}) + X_{505}(\rho_{sc} + \rho_{hsc}) + X_{512}(\rho_{sc} + \rho_{hsc}) + X_{519}(\rho_{sc} + \rho_{hsc}) + X_{141}\epsilon_g\sigma_g \\
\frac{\partial X_{422}}{\partial t} &= \Lambda_h X_{421} + X_{464}\rho_{sc} + X_{471}\rho_{sc} + X_{478}\rho_{sc} + X_{485}\rho_{sc} + X_{499}\rho_{sc} + X_{506}\rho_{sc} + X_{513}\rho_{sc} + X_{520}\rho_{sc} \\
&\quad - X_{422}(\Lambda_s + \Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_{hc} + \rho_{hs} + \rho_{hsc} + \sigma_h) + X_{450}(\gamma_s(0) + \rho_s + \rho_{sc}) + X_{492}(\nu_c + \rho_c + \rho_{sc}) \\
&\quad + X_{527}(\gamma_c(0) + \nu_c) + X_{429}(\rho_s + \rho_{sc}) + X_{436}(\rho_s + \rho_{sc}) + X_{457}(\rho_c + \rho_{sc}) + X_{443}(\rho_s + \rho_{sc}) + X_{142}\epsilon_g\sigma_g \\
\frac{\partial X_{423}}{\partial t} &= X_{465}\rho_{sc} + X_{472}\rho_{sc} + X_{479}\rho_{sc} + X_{486}\rho_{sc} + X_{500}\rho_{sc} + X_{507}\rho_{sc} + X_{514}\rho_{sc} + X_{521}\rho_{sc} + X_{422}\sigma_h \\
&\quad - X_{423}(\Lambda_s + \Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_{hc} + \rho_{hs} + \rho_{hsc} + \theta_h) + X_{451}(\gamma_s(0) + \rho_s + \rho_{sc}) + X_{493}(\nu_c + \rho_c + \rho_{sc}) \\
&\quad + X_{528}(\gamma_c(0) + \nu_c) + X_{430}(\rho_s + \rho_{sc}) + X_{437}(\rho_s + \rho_{sc}) + X_{458}(\rho_c + \rho_{sc}) + X_{444}(\rho_s + \rho_{sc}) + X_{143}\epsilon_g\sigma_g \\
\frac{\partial X_{424}}{\partial t} &= X_{431}\eta_s^p + X_{438}\eta_s^p + X_{459}\eta_c^p + X_{445}\eta_s^p + X_{529}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{424}(\Lambda_s + \Lambda_c + \eta_g^p + \gamma_g(0) + \mu + \nu_g - \Lambda_h(\zeta_h - 1)) + X_{452}(\eta_s^p + \gamma_s(0)) + X_{494}(\eta_c^p + \nu_c) + X_{144}\epsilon_g\sigma_g \\
\frac{\partial X_{425}}{\partial t} &= X_{432}\eta_s^p + X_{439}\eta_s^p + X_{460}\eta_c^p + X_{446}\eta_s^p - X_{425}(\Lambda_s + \Lambda_c + \eta_g^p + \eta_h^p + \gamma_g(0) + \mu + \nu_g + \sigma_h) \\
&\quad + X_{530}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{453}(\eta_s^p + \gamma_s(0)) + X_{495}(\eta_c^p + \nu_c) + X_{145}\epsilon_g\sigma_g - \Lambda_h X_{424}(\zeta_h - 1) \\
\frac{\partial X_{426}}{\partial t} &= X_{433}\eta_s^p + X_{440}\eta_s^p + X_{461}\eta_c^p + X_{447}\eta_s^p + X_{425}\sigma_h - X_{426}(\Lambda_s + \Lambda_c + \eta_g^p + \eta_h^p + \gamma_g(0) + \mu + \nu_g + \theta_h) \\
&\quad + X_{531}(\eta_c^p + \gamma_c(0) + \nu_c) + X_{454}(\eta_s^p + \gamma_s(0)) + X_{496}(\eta_c^p + \nu_c) + X_{146}\epsilon_g\sigma_g \\
\frac{\partial X_{427}}{\partial t} &= X_{425}\eta_h^p + X_{464}\rho_{hsc} + X_{465}\rho_{hsc} + X_{471}\rho_{hsc} + X_{472}\rho_{hsc} + X_{478}\rho_{hsc} + X_{479}\rho_{hsc} + X_{485}\rho_{hsc} + X_{486}\rho_{hsc} + X_{499}\rho_{hsc} \\
&\quad + X_{500}\rho_{hsc} + X_{506}\rho_{hsc} + X_{507}\rho_{hsc} + X_{513}\rho_{hsc} + X_{514}\rho_{hsc} + X_{520}\rho_{hsc} + X_{521}\rho_{hsc} + X_{462}(\rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) \\
&\quad + X_{434}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{441}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{448}(\rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{532}(\gamma_c(0) + \nu_c) \\
&\quad + X_{423}(\rho_h + \rho_{hc} + \rho_{hs} + \rho_{hsc} + \theta_h) - X_{427}(\Lambda_s + \Lambda_c + \gamma_g(0) + \mu + \nu_g) + X_{455}(\gamma_s(0) + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) \\
&\quad + X_{497}(\nu_c + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) + X_{422}(\rho_h + \rho_{hc} + \rho_{hs} + \rho_{hsc}) + X_{426}(\eta_h^p + \theta_h) + X_{429}(\rho_{hs} + \rho_{hsc}) \\
&\quad + X_{430}(\rho_{hs} + \rho_{hsc}) + X_{436}(\rho_{hs} + \rho_{hsc}) + X_{437}(\rho_{hs} + \rho_{hsc}) + X_{457}(\rho_{hc} + \rho_{hsc}) + X_{458}(\rho_{hc} + \rho_{hsc}) \\
&\quad + X_{443}(\rho_{hs} + \rho_{hsc}) + X_{444}(\rho_{hs} + \rho_{hsc}) + X_{450}(\rho_{hs} + \rho_{hsc}) + X_{451}(\rho_{hs} + \rho_{hsc}) + X_{469}(\rho_{sc} + \rho_{hsc}) \\
&\quad + X_{476}(\rho_{sc} + \rho_{hsc}) + X_{492}(\rho_{hc} + \rho_{hsc}) + X_{493}(\rho_{hc} + \rho_{hsc}) + X_{483}(\rho_{sc} + \rho_{hsc}) + X_{490}(\rho_{sc} + \rho_{hsc}) \\
&\quad + X_{504}(\rho_{sc} + \rho_{hsc}) + X_{511}(\rho_{sc} + \rho_{hsc}) + X_{518}(\rho_{sc} + \rho_{hsc}) + X_{525}(\rho_{sc} + \rho_{hsc}) + X_{147}\epsilon_g\sigma_g \\
\frac{\partial X_{428}}{\partial t} &= \Lambda_s X_{421} - X_{428}(\Lambda_h + \Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s) \\
&\quad + X_{498}(\nu_c + \rho_c + \rho_{hc}) + X_{533}(\gamma_c(0) + \nu_c) + X_{463}(\rho_c + \rho_{hc}) + X_{148}\epsilon_g\sigma_g \\
\frac{\partial X_{429}}{\partial t} &= \Lambda_h X_{428} + \Lambda_s X_{422} + X_{464}\rho_c - X_{429}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_s) \\
&\quad + X_{534}(\gamma_c(0) + \nu_c) + X_{499}(\nu_c + \rho_c) + X_{149}\epsilon_g\sigma_g \\
\frac{\partial X_{430}}{\partial t} &= \Lambda_s X_{423} + X_{465}\rho_c + X_{429}\sigma_h - X_{430}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s + \theta_h) \\
&\quad + X_{535}(\gamma_c(0) + \nu_c) + X_{500}(\nu_c + \rho_c) + X_{150}\epsilon_g\sigma_g
\end{aligned}
$$

$$\frac{\partial X_{431}}{\partial t} = \Lambda_s X_{424} + X_{466}\eta_c^p + X_{536}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{431}(\Lambda_c + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_s - \Lambda_h(\zeta_h - 1)) + X_{501}(\eta_c^p + \nu_c) + X_{151}\epsilon_g\sigma_g$$

$$\frac{\partial X_{432}}{\partial t} = \Lambda_s X_{425} + X_{467}\eta_c^p + X_{537}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{432}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \sigma_s) + X_{502}(\eta_c^p + \nu_c) + X_{152}\epsilon_g\sigma_g - \Lambda_h X_{431}(\zeta_h - 1)$$

$$\frac{\partial X_{433}}{\partial t} = \Lambda_s X_{426} + X_{468}\eta_c^p + X_{432}\sigma_h + X_{538}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{433}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_s + \theta_h) + X_{503}(\eta_c^p + \nu_c) + X_{153}\epsilon_g\sigma_g$$

$$\frac{\partial X_{434}}{\partial t} = \Lambda_s X_{427} + X_{432}\eta_h^p + X_{464}\rho_{hc} + X_{465}\rho_{hc} + X_{499}\rho_{hc} + X_{500}\rho_{hc} + X_{539}(\gamma_c(0) + \nu_c) + X_{469}(\rho_c + \rho_{hc}) + X_{430}(\rho_h + \rho_{hc} + \theta_h) - X_{434}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s) + X_{504}(\nu_c + \rho_c + \rho_{hc}) + X_{433}(\eta_h^p + \theta_h) + X_{429}(\rho_h + \rho_{hc}) + X_{154}\epsilon_g\sigma_g$$

$$\frac{\partial X_{435}}{\partial t} = X_{428}\sigma_s - X_{435}(\Lambda_h + \Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \tau_s) + X_{505}(\nu_c + \rho_c + \rho_{hc}) + X_{540}(\gamma_c(0) + \nu_c) + X_{470}(\rho_c + \rho_{hc}) + X_{155}\epsilon_g\sigma_g$$

$$\frac{\partial X_{436}}{\partial t} = \Lambda_h X_{435} + X_{471}\rho_c + X_{429}\sigma_s - X_{436}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \tau_s) + X_{541}(\gamma_c(0) + \nu_c) + X_{506}(\nu_c + \rho_c) + X_{156}\epsilon_g\sigma_g$$

$$\frac{\partial X_{437}}{\partial t} = X_{472}\rho_c + X_{436}\sigma_h + X_{430}\sigma_s - X_{437}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \tau_s + \theta_h) + X_{542}(\gamma_c(0) + \nu_c) + X_{507}(\nu_c + \rho_c) + X_{157}\epsilon_g\sigma_g$$

$$\frac{\partial X_{438}}{\partial t} = X_{473}\eta_c^p + X_{431}\sigma_s + X_{543}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{438}(\Lambda_c + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{508}(\eta_c^p + \nu_c) + X_{158}\epsilon_g\sigma_g$$

$$\frac{\partial X_{439}}{\partial t} = X_{474}\eta_c^p + X_{432}\sigma_s + X_{544}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{439}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \tau_s) + X_{509}(\eta_c^p + \nu_c) + X_{159}\epsilon_g\sigma_g - \Lambda_h X_{438}(\zeta_h - 1)$$

$$\frac{\partial X_{440}}{\partial t} = X_{475}\eta_c^p + X_{439}\sigma_h + X_{433}\sigma_s + X_{545}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{440}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \tau_s + \theta_h) + X_{510}(\eta_c^p + \nu_c) + X_{160}\epsilon_g\sigma_g$$

$$\frac{\partial X_{441}}{\partial t} = X_{439}\eta_h^p + X_{471}\rho_{hc} + X_{472}\rho_{hc} + X_{506}\rho_{hc} + X_{507}\rho_{hc} + X_{434}\sigma_s + X_{546}(\gamma_c(0) + \nu_c) + X_{476}(\rho_c + \rho_{hc}) + X_{437}(\rho_h + \rho_{hc} + \theta_h) - X_{441}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \tau_s) + X_{511}(\nu_c + \rho_c + \rho_{hc}) + X_{440}(\eta_h^p + \theta_h) + X_{436}(\rho_h + \rho_{hc}) + X_{161}\epsilon_g\sigma_g$$

$$\frac{\partial X_{442}}{\partial t} = X_{435}\tau_s - X_{442}(\Lambda_h + \Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_s) + X_{512}(\nu_c + \rho_c + \rho_{hc}) + X_{547}(\gamma_c(0) + \nu_c) + X_{477}(\rho_c + \rho_{hc}) + X_{162}\epsilon_g\sigma_g$$

$$\frac{\partial X_{443}}{\partial t} = \Lambda_h X_{442} + X_{478}\rho_c + X_{436}\tau_s - X_{443}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \theta_s) + X_{548}(\gamma_c(0) + \nu_c) + X_{513}(\nu_c + \rho_c) + X_{163}\epsilon_g\sigma_g$$

$$\frac{\partial X_{444}}{\partial t} = X_{479}\rho_c + X_{443}\sigma_h + X_{437}\tau_s - X_{444}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_h + \theta_s) + X_{549}(\gamma_c(0) + \nu_c) + X_{514}(\nu_c + \rho_c) + X_{164}\epsilon_g\sigma_g$$

$$\frac{\partial X_{445}}{\partial t} = X_{480}\eta_c^p + X_{438}\tau_s + X_{550}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{445}(\Lambda_c + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{515}(\eta_c^p + \nu_c) + X_{165}\epsilon_g\sigma_g$$

$$\frac{\partial X_{446}}{\partial t} = X_{481}\eta_c^p + X_{439}\tau_s + X_{551}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{446}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \theta_s) + X_{516}(\eta_c^p + \nu_c) + X_{166}\epsilon_g\sigma_g - \Lambda_h X_{445}(\zeta_h - 1)$$

$$\frac{\partial X_{447}}{\partial t} = X_{482}\eta_c^p + X_{446}\sigma_h + X_{440}\tau_s + X_{552}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{447}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \theta_h + \theta_s) + X_{517}(\eta_c^p + \nu_c) + X_{167}\epsilon_g\sigma_g$$

$$\frac{\partial X_{448}}{\partial t} = X_{446}\eta_h^p + X_{478}\rho_{hc} + X_{479}\rho_{hc} + X_{513}\rho_{hc} + X_{514}\rho_{hc} + X_{441}\tau_s + X_{553}(\gamma_c(0) + \nu_c) + X_{483}(\rho_c + \rho_{hc}) + X_{444}(\rho_h + \rho_{hc} + \theta_h) - X_{448}(\Lambda_c + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_s) + X_{518}(\nu_c + \rho_c + \rho_{hc}) + X_{447}(\eta_h^p + \theta_h) + X_{443}(\rho_h + \rho_{hc}) + X_{168}\epsilon_g\sigma_g$$

$$\frac{\partial X_{449}}{\partial t} = X_{442}\theta_s - X_{449}(\Lambda_h + \Lambda_c + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{519}(\nu_c + \rho_c + \rho_{hc}) + X_{554}(\gamma_c(0) + \nu_c) + X_{484}(\rho_c + \rho_{hc}) + X_{169}\epsilon_g\sigma_g$$

$$\frac{\partial X_{450}}{\partial t} = \Lambda_h X_{449} + X_{485}\rho_c + X_{443}\theta_s - X_{450}(\Lambda_c + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h) + X_{555}(\gamma_c(0) + \nu_c) + X_{520}(\nu_c + \rho_c) + X_{170}\epsilon_g\sigma_g$$

$$\frac{\partial X_{451}}{\partial t} = X_{486}\rho_c + X_{450}\sigma_h + X_{444}\theta_s - X_{451}(\Lambda_c + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_h) + X_{556}(\gamma_c(0) + \nu_c) + X_{521}(\nu_c + \rho_c) + X_{171}\epsilon_g\sigma_g$$

$$
\begin{aligned}
\frac{\partial X_{452}}{\partial t} &= X_{487}\eta_c^p + X_{445}\theta_s + X_{557}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{452}(\Lambda_c + \eta_g^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g - \Lambda_h(\zeta_h - 1)) + X_{522}(\eta_c^p + \nu_c) + X_{172}\epsilon_g\sigma_g \\
\frac{\partial X_{453}}{\partial t} &= X_{488}\eta_c^p + X_{446}\theta_s + X_{558}(\eta_c^p + \gamma_c(0) + \nu_c) - X_{453}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \sigma_h) \\
&\quad + X_{523}(\eta_c^p + \nu_c) + X_{173}\epsilon_g\sigma_g - \Lambda_h X_{452}(\zeta_h - 1) \\
\frac{\partial X_{454}}{\partial t} &= X_{489}\eta_c^p + X_{453}\sigma_h + X_{447}\theta_s + X_{559}(\eta_c^p + \gamma_c(0) + \nu_c) \\
&\quad - X_{454}(\Lambda_c + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \theta_h) + X_{524}(\eta_c^p + \nu_c) + X_{174}\epsilon_g\sigma_g \\
\frac{\partial X_{455}}{\partial t} &= X_{453}\eta_h^p + X_{485}\rho_{hc} + X_{486}\rho_{hc} + X_{520}\rho_{hc} + X_{521}\rho_{hc} + X_{448}\theta_s + X_{560}(\gamma_c(0) + \nu_c) + X_{490}(\rho_c + \rho_{hc}) \\
&\quad + X_{451}(\rho_h + \rho_{hc} + \theta_h) - X_{455}(\Lambda_c + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_s + \rho_{sc} + \rho_{hs} + \rho_{hsc}) \\
&\quad + X_{525}(\nu_c + \rho_c + \rho_{hc}) + X_{454}(\eta_h^p + \theta_h) + X_{450}(\rho_h + \rho_{hc}) + X_{175}\epsilon_g\sigma_g \\
\frac{\partial X_{456}}{\partial t} &= \Lambda_c X_{421} - X_{456}(\Lambda_h + \Lambda_s + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc} + \sigma_c) \\
&\quad + X_{484}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{463}(\rho_s + \rho_{hs}) + X_{470}(\rho_s + \rho_{hs}) + X_{477}(\rho_s + \rho_{hs}) + X_{176}\epsilon_g\sigma_g \\
\frac{\partial X_{457}}{\partial t} &= \Lambda_h X_{456} + \Lambda_c X_{422} + X_{464}\rho_s + X_{471}\rho_s + X_{478}\rho_s \\
&\quad - X_{457}(\Lambda_s + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_c) + X_{485}(\gamma_s(0) + \rho_s) + X_{177}\epsilon_g\sigma_g \\
\frac{\partial X_{458}}{\partial t} &= \Lambda_c X_{423} + X_{465}\rho_s + X_{472}\rho_s + X_{479}\rho_s + X_{457}\sigma_h \\
&\quad - X_{458}(\Lambda_s + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \theta_h) + X_{486}(\gamma_s(0) + \rho_s) + X_{178}\epsilon_g\sigma_g \\
\frac{\partial X_{459}}{\partial t} &= \Lambda_c X_{424} + X_{466}\eta_s^p + X_{473}\eta_s^p + X_{480}\eta_s^p - X_{459}(\Lambda_s + \eta_c^p + \eta_g^p + \gamma_g(0) + \mu + \nu_g + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{487}(\eta_s^p + \gamma_s(0)) + X_{179}\epsilon_g\sigma_g \\
\frac{\partial X_{460}}{\partial t} &= \Lambda_c X_{425} + X_{467}\eta_s^p + X_{474}\eta_s^p + X_{481}\eta_s^p - X_{460}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \sigma_c) \\
&\quad + X_{488}(\eta_s^p + \gamma_s(0)) + X_{180}\epsilon_g\sigma_g - \Lambda_h X_{459}(\zeta_h - 1) \\
\frac{\partial X_{461}}{\partial t} &= \Lambda_c X_{426} + X_{468}\eta_s^p + X_{475}\eta_s^p + X_{482}\eta_s^p + X_{460}\sigma_h \\
&\quad - X_{461}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_g(0) + \mu + \nu_g + \sigma_c + \theta_h) + X_{489}(\eta_s^p + \gamma_s(0)) + X_{181}\epsilon_g\sigma_g \\
\frac{\partial X_{462}}{\partial t} &= \Lambda_c X_{427} + X_{460}\eta_h^p + X_{464}\rho_{hs} + X_{465}\rho_{hs} + X_{471}\rho_{hs} + X_{472}\rho_{hs} + X_{478}\rho_{hs} + X_{479}\rho_{hs} + X_{485}\rho_{hs} + X_{486}\rho_{hs} + X_{469}(\rho_s + \rho_{hs}) \\
&\quad + X_{476}(\rho_s + \rho_{hs}) + X_{483}(\rho_s + \rho_{hs}) + X_{458}(\rho_h + \rho_{hs} + \theta_h) - X_{462}(\Lambda_s + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc} + \sigma_c) \\
&\quad + X_{490}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{461}(\eta_h^p + \theta_h) + X_{457}(\rho_h + \rho_{hs}) + X_{182}\epsilon_g\sigma_g \\
\frac{\partial X_{463}}{\partial t} &= \Lambda_s X_{456} + \Lambda_c X_{428} - X_{463}(\Lambda_h + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s + \sigma_c) + X_{183}\epsilon_g\sigma_g \\
\frac{\partial X_{464}}{\partial t} &= \Lambda_h X_{463} + \Lambda_s X_{457} + \Lambda_c X_{429} - X_{464}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_s + \sigma_c) + X_{184}\epsilon_g\sigma_g \\
\frac{\partial X_{465}}{\partial t} &= \Lambda_s X_{458} + \Lambda_c X_{430} + X_{464}\sigma_h - X_{465}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s + \sigma_c + \theta_h) + X_{185}\epsilon_g\sigma_g \\
\frac{\partial X_{466}}{\partial t} &= \Lambda_s X_{459} + \Lambda_c X_{431} - X_{466}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_s + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{186}\epsilon_g\sigma_g \\
\frac{\partial X_{467}}{\partial t} &= \Lambda_s X_{460} + \Lambda_c X_{432} - X_{467}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \sigma_s + \sigma_c) + X_{187}\epsilon_g\sigma_g - \Lambda_h X_{466}(\zeta_h - 1) \\
\frac{\partial X_{468}}{\partial t} &= \Lambda_s X_{461} + \Lambda_c X_{433} + X_{467}\sigma_h - X_{468}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_s + \sigma_c + \theta_h) + X_{188}\epsilon_g\sigma_g \\
\frac{\partial X_{469}}{\partial t} &= \Lambda_s X_{462} + \Lambda_c X_{434} + X_{467}\eta_h^p - X_{469}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s + \sigma_c) \\
&\quad + X_{464}\rho_h + X_{468}(\eta_h^p + \theta_h) + X_{465}(\rho_h + \theta_h) + X_{189}\epsilon_g\sigma_g \\
\frac{\partial X_{470}}{\partial t} &= \Lambda_c X_{435} + X_{463}\sigma_s - X_{470}(\Lambda_h + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \tau_s) + X_{190}\epsilon_g\sigma_g \\
\frac{\partial X_{471}}{\partial t} &= \Lambda_h X_{470} + \Lambda_c X_{436} + X_{464}\sigma_s - X_{471}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_c + \tau_s) + X_{191}\epsilon_g\sigma_g \\
\frac{\partial X_{472}}{\partial t} &= \Lambda_c X_{437} + X_{471}\sigma_h + X_{465}\sigma_s - X_{472}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \tau_s + \theta_h) + X_{192}\epsilon_g\sigma_g \\
\frac{\partial X_{473}}{\partial t} &= \Lambda_c X_{438} + X_{466}\sigma_s - X_{473}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_c + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{193}\epsilon_g\sigma_g \\
\frac{\partial X_{474}}{\partial t} &= \Lambda_c X_{439} + X_{467}\sigma_s - X_{474}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \sigma_c + \tau_s) + X_{194}\epsilon_g\sigma_g - \Lambda_h X_{473}(\zeta_h - 1) \\
\frac{\partial X_{475}}{\partial t} &= \Lambda_c X_{440} + X_{474}\sigma_h + X_{468}\sigma_s - X_{475}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_c + \tau_s + \theta_h) + X_{195}\epsilon_g\sigma_g
\end{aligned}
$$

$$
\begin{aligned}
\frac{\partial X_{476}}{\partial t} &= \Lambda_c X_{441} + X_{474}\eta_h^p - X_{476}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \tau_s) \\
&\quad + X_{471}\rho_h + X_{469}\sigma_s + X_{475}(\eta_h^p + \theta_h) + X_{472}(\rho_h + \theta_h) + X_{196}\epsilon_g\sigma_g \\
\frac{\partial X_{477}}{\partial t} &= \Lambda_c X_{442} + X_{470}\tau_s - X_{477}(\Lambda_h + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \theta_s) + X_{197}\epsilon_g\sigma_g \\
\frac{\partial X_{478}}{\partial t} &= \Lambda_h X_{477} + \Lambda_c X_{443} + X_{471}\tau_s - X_{478}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_c + \theta_s) + X_{198}\epsilon_g\sigma_g \\
\frac{\partial X_{479}}{\partial t} &= \Lambda_c X_{444} + X_{478}\sigma_h + X_{472}\tau_s - X_{479}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \theta_h + \theta_s) + X_{199}\epsilon_g\sigma_g \\
\frac{\partial X_{480}}{\partial t} &= \Lambda_c X_{445} + X_{473}\tau_s - X_{480}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_c + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{200}\epsilon_g\sigma_g \\
\frac{\partial X_{481}}{\partial t} &= \Lambda_c X_{446} + X_{474}\tau_s - X_{481}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_h + \sigma_c + \theta_s) + X_{201}\epsilon_g\sigma_g - \Lambda_h X_{480}(\zeta_h - 1) \\
\frac{\partial X_{482}}{\partial t} &= \Lambda_c X_{447} + X_{481}\sigma_h + X_{475}\tau_s - X_{482}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_g + \sigma_c + \theta_h + \theta_s) + X_{202}\epsilon_g\sigma_g \\
\frac{\partial X_{483}}{\partial t} &= \Lambda_c X_{448} + X_{481}\eta_h^p - X_{483}(\gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \theta_s) \\
&\quad + X_{478}\rho_h + X_{476}\tau_s + X_{482}(\eta_h^p + \theta_h) + X_{479}(\rho_h + \theta_h) + X_{203}\epsilon_g\sigma_g \\
\frac{\partial X_{484}}{\partial t} &= \Lambda_c X_{449} + X_{477}\theta_s - X_{484}(\Lambda_h + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c) + X_{204}\epsilon_g\sigma_g \\
\frac{\partial X_{485}}{\partial t} &= \Lambda_h X_{484} + \Lambda_c X_{450} + X_{478}\theta_s - X_{485}(\gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_c) + X_{205}\epsilon_g\sigma_g \\
\frac{\partial X_{486}}{\partial t} &= \Lambda_c X_{451} + X_{485}\sigma_h + X_{479}\theta_s - X_{486}(\gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c + \theta_h) + X_{206}\epsilon_g\sigma_g \\
\frac{\partial X_{487}}{\partial t} &= \Lambda_c X_{452} + X_{480}\theta_s - X_{487}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \sigma_c - \Lambda_h(\zeta_h - 1)) + X_{207}\epsilon_g\sigma_g \\
\frac{\partial X_{488}}{\partial t} &= \Lambda_c X_{453} + X_{481}\theta_s - X_{488}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \sigma_h + \sigma_c) + X_{208}\epsilon_g\sigma_g - \Lambda_h X_{487}(\zeta_h - 1) \\
\frac{\partial X_{489}}{\partial t} &= \Lambda_c X_{454} + X_{488}\sigma_h + X_{482}\theta_s - X_{489}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \sigma_c + \theta_h) + X_{209}\epsilon_g\sigma_g \\
\frac{\partial X_{490}}{\partial t} &= \Lambda_c X_{455} - X_{490}(\gamma_s(0) + \gamma_g(0) + \mu + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_c) \\
&\quad + X_{488}\eta_h^p + X_{485}\rho_h + X_{483}\theta_s + X_{489}(\eta_h^p + \theta_h) + X_{486}(\rho_h + \theta_h) + X_{210}\epsilon_g\sigma_g \\
\frac{\partial X_{491}}{\partial t} &= X_{519}(\gamma_s(0) + \rho_s + \rho_{hs}) - X_{491}(\Lambda_h + \Lambda_s + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) \\
&\quad + X_{498}(\rho_s + \rho_{hs}) + X_{505}(\rho_s + \rho_{hs}) + X_{512}(\rho_s + \rho_{hs}) + X_{211}\epsilon_g\sigma_g - X_{456}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{492}}{\partial t} &= \Lambda_h X_{491} + X_{499}\rho_s + X_{506}\rho_s + X_{513}\rho_s - X_{492}(\Lambda_s + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h) \\
&\quad + X_{520}(\gamma_s(0) + \rho_s) + X_{212}\epsilon_g\sigma_g - X_{457}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{493}}{\partial t} &= X_{500}\rho_s + X_{507}\rho_s + X_{514}\rho_s + X_{492}\sigma_h - X_{493}(\Lambda_s + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_h) \\
&\quad + X_{521}(\gamma_s(0) + \rho_s) + X_{213}\epsilon_g\sigma_g - X_{458}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{494}}{\partial t} &= X_{501}\eta_s^p + X_{508}\eta_s^p + X_{515}\eta_s^p - X_{494}(\Lambda_s + \eta_c^p + \eta_g^p + \gamma_g(0) + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) \\
&\quad + X_{522}(\eta_s^p + \gamma_s(0)) + X_{214}\epsilon_g\sigma_g - X_{459}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{495}}{\partial t} &= X_{502}\eta_s^p + X_{509}\eta_s^p + X_{516}\eta_s^p - X_{495}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_h) \\
&\quad + X_{523}(\eta_s^p + \gamma_s(0)) + X_{215}\epsilon_g\sigma_g - \Lambda_h X_{494}(\zeta_h - 1) - X_{460}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{496}}{\partial t} &= X_{503}\eta_s^p + X_{510}\eta_s^p + X_{517}\eta_s^p + X_{495}\sigma_h - X_{496}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \theta_h) \\
&\quad + X_{524}(\eta_s^p + \gamma_s(0)) + X_{216}\epsilon_g\sigma_g - X_{461}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{497}}{\partial t} &= X_{495}\eta_h^p + X_{499}\rho_{hs} + X_{500}\rho_{hs} + X_{506}\rho_{hs} + X_{507}\rho_{hs} + X_{513}\rho_{hs} + X_{514}\rho_{hs} + X_{520}\rho_{hs} + X_{521}\rho_{hs} + X_{504}(\rho_s + \rho_{hs}) \\
&\quad + X_{511}(\rho_s + \rho_{hs}) + X_{518}(\rho_s + \rho_{hs}) + X_{493}(\rho_h + \rho_{hs} + \theta_h) - X_{497}(\Lambda_s + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_{hc} + \rho_{sc} + \rho_{hsc}) \\
&\quad + X_{525}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{496}(\eta_h^p + \theta_h) + X_{492}(\rho_h + \rho_{hs}) + X_{217}\epsilon_g\sigma_g - X_{462}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{498}}{\partial t} &= \Lambda_s X_{491} - X_{498}(\Lambda_h + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s) + X_{218}\epsilon_g\sigma_g - X_{463}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{499}}{\partial t} &= \Lambda_h X_{498} + \Lambda_s X_{492} - X_{499}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \sigma_s) + X_{219}\epsilon_g\sigma_g - X_{464}\sigma_c(\epsilon_c - 1) \\
\frac{\partial X_{500}}{\partial t} &= \Lambda_s X_{493} + X_{499}\sigma_h - X_{500}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s + \theta_h) + X_{220}\epsilon_g\sigma_g - X_{465}\sigma_c(\epsilon_c - 1)
\end{aligned}
$$

$$\frac{\partial X_{501}}{\partial t} = \Lambda_s X_{494} - X_{501}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_s - \Lambda_h(\zeta_h - 1)) + X_{221}\epsilon_g\sigma_g - X_{466}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{502}}{\partial t} = \Lambda_s X_{495} - X_{502}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_h + \sigma_s) + X_{222}\epsilon_g\sigma_g - \Lambda_h X_{501}(\zeta_h - 1) - X_{467}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{503}}{\partial t} = \Lambda_s X_{496} + X_{502}\sigma_h - X_{503}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_s + \theta_h) + X_{223}\epsilon_g\sigma_g - X_{468}\sigma_c(\epsilon_c - 1)$$

$$\begin{aligned}\frac{\partial X_{504}}{\partial t} &= \Lambda_s X_{497} - X_{504}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_s) + X_{502}\eta_h^p \\ &\quad + X_{499}\rho_h + X_{503}(\eta_h^p + \theta_h) + X_{500}(\rho_h + \theta_h) + X_{224}\epsilon_g\sigma_g - X_{469}\sigma_c(\epsilon_c - 1)\end{aligned}$$

$$\frac{\partial X_{505}}{\partial t} = X_{498}\sigma_s - X_{505}(\Lambda_h + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \tau_s) + X_{225}\epsilon_g\sigma_g - X_{470}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{506}}{\partial t} = \Lambda_h X_{505} + X_{499}\sigma_s - X_{506}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \tau_s) + X_{226}\epsilon_g\sigma_g - X_{471}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{507}}{\partial t} = X_{506}\sigma_h + X_{500}\sigma_s - X_{507}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \tau_s + \theta_h) + X_{227}\epsilon_g\sigma_g - X_{472}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{508}}{\partial t} = X_{501}\sigma_s - X_{508}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{228}\epsilon_g\sigma_g - X_{473}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{509}}{\partial t} = X_{502}\sigma_s - X_{509}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_h + \tau_s) + X_{229}\epsilon_g\sigma_g - \Lambda_h X_{508}(\zeta_h - 1) - X_{474}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{510}}{\partial t} = X_{509}\sigma_h + X_{503}\sigma_s - X_{510}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \tau_s + \theta_h) + X_{230}\epsilon_g\sigma_g - X_{475}\sigma_c(\epsilon_c - 1)$$

$$\begin{aligned}\frac{\partial X_{511}}{\partial t} &= X_{509}\eta_h^p - X_{511}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \tau_s) + X_{506}\rho_h \\ &\quad + X_{504}\sigma_s + X_{510}(\eta_h^p + \theta_h) + X_{507}(\rho_h + \theta_h) + X_{231}\epsilon_g\sigma_g - X_{476}\sigma_c(\epsilon_c - 1)\end{aligned}$$

$$\frac{\partial X_{512}}{\partial t} = X_{505}\tau_s - X_{512}(\Lambda_h + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_s) + X_{232}\epsilon_g\sigma_g - X_{477}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{513}}{\partial t} = \Lambda_h X_{512} + X_{506}\tau_s - X_{513}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h + \theta_s) + X_{233}\epsilon_g\sigma_g - X_{478}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{514}}{\partial t} = X_{513}\sigma_h + X_{507}\tau_s - X_{514}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_h + \theta_s) + X_{234}\epsilon_g\sigma_g - X_{479}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{515}}{\partial t} = X_{508}\tau_s - X_{515}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{235}\epsilon_g\sigma_g - X_{480}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{516}}{\partial t} = X_{509}\tau_s - X_{516}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_h + \theta_s) + X_{236}\epsilon_g\sigma_g - \Lambda_h X_{515}(\zeta_h - 1) - X_{481}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{517}}{\partial t} = X_{516}\sigma_h + X_{510}\tau_s - X_{517}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \mu + \nu_c + \nu_g + \theta_h + \theta_s) + X_{237}\epsilon_g\sigma_g - X_{482}\sigma_c(\epsilon_c - 1)$$

$$\begin{aligned}\frac{\partial X_{518}}{\partial t} &= X_{516}\eta_h^p - X_{518}(\gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_s) + X_{513}\rho_h \\ &\quad + X_{511}\tau_s + X_{517}(\eta_h^p + \theta_h) + X_{514}(\rho_h + \theta_h) + X_{238}\epsilon_g\sigma_g - X_{483}\sigma_c(\epsilon_c - 1)\end{aligned}$$

$$\frac{\partial X_{519}}{\partial t} = X_{512}\theta_s - X_{519}(\Lambda_h + \gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc}) + X_{239}\epsilon_g\sigma_g - X_{484}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{520}}{\partial t} = \Lambda_h X_{519} + X_{513}\theta_s - X_{520}(\gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \sigma_h) + X_{240}\epsilon_g\sigma_g - X_{485}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{521}}{\partial t} = X_{520}\sigma_h + X_{514}\theta_s - X_{521}(\gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_h + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc} + \theta_h) + X_{241}\epsilon_g\sigma_g - X_{486}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{522}}{\partial t} = X_{515}\theta_s - X_{522}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) + X_{242}\epsilon_g\sigma_g - X_{487}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{523}}{\partial t} = X_{516}\theta_s - X_{523}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g + \sigma_h) + X_{243}\epsilon_g\sigma_g - \Lambda_h X_{522}(\zeta_h - 1) - X_{488}\sigma_c(\epsilon_c - 1)$$

$$\frac{\partial X_{524}}{\partial t} = X_{523}\sigma_h + X_{517}\theta_s - X_{524}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g + \theta_h) + X_{244}\epsilon_g\sigma_g - X_{489}\sigma_c(\epsilon_c - 1)$$

$$\begin{aligned}\frac{\partial X_{525}}{\partial t} &= X_{523}\eta_h^p - X_{525}(\gamma_s(0) + \gamma_g(0) + \mu + \nu_c + \nu_g + \rho_c + \rho_s + \rho_{hc} + \rho_{sc} + \rho_{hs} + \rho_{hsc}) \\ &\quad + X_{520}\rho_h + X_{518}\theta_s + X_{524}(\eta_h^p + \theta_h) + X_{521}(\rho_h + \theta_h) + X_{245}\epsilon_g\sigma_g - X_{490}\sigma_c(\epsilon_c - 1)\end{aligned}$$

$$\begin{aligned}\frac{\partial X_{526}}{\partial t} &= X_{554}(\gamma_s(0) + \rho_s + \rho_{hs}) - X_{526}(\Lambda_h + \Lambda_s + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g) \\ &\quad + X_{533}(\rho_s + \rho_{hs}) + X_{540}(\rho_s + \rho_{hs}) + X_{547}(\rho_s + \rho_{hs}) + X_{246}\epsilon_g\sigma_g + X_{456}\epsilon_c\sigma_c\end{aligned}$$

$$\begin{aligned}\frac{\partial X_{527}}{\partial t} &= \Lambda_h X_{526} + X_{534}\rho_s + X_{541}\rho_s + X_{548}\rho_s - X_{527}(\Lambda_s + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_{hs} + \sigma_h) \\ &\quad + X_{555}(\gamma_s(0) + \rho_s) + X_{247}\epsilon_g\sigma_g + X_{457}\epsilon_c\sigma_c\end{aligned}$$

$$\begin{aligned}\frac{\partial X_{528}}{\partial t} &= X_{535}\rho_s + X_{542}\rho_s + X_{549}\rho_s + X_{527}\sigma_h - X_{528}(\Lambda_s + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_{hs} + \theta_h) \\ &\quad + X_{556}(\gamma_s(0) + \rho_s) + X_{248}\epsilon_g\sigma_g + X_{458}\epsilon_c\sigma_c\end{aligned}$$

$$\frac{\partial X_{529}}{\partial t} = X_{536}\eta_s^p + X_{543}\eta_s^p + X_{550}\eta_s^p - X_{529}(\Lambda_s + \eta_c^p + \eta_g^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) + X_{557}(\eta_s^p + \gamma_s(0)) + X_{249}\epsilon_g\sigma_g + X_{459}\epsilon_c\sigma_c$$

$$\frac{\partial X_{530}}{\partial t} = X_{537}\eta_s^p + X_{544}\eta_s^p + X_{551}\eta_s^p - X_{530}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h) + X_{558}(\eta_s^p + \gamma_s(0)) + X_{250}\epsilon_g\sigma_g + X_{460}\epsilon_c\sigma_c - \Lambda_h X_{529}(\zeta_h - 1)$$

$$\frac{\partial X_{531}}{\partial t} = X_{538}\eta_s^p + X_{545}\eta_s^p + X_{552}\eta_s^p - X_{531}(\Lambda_s + \eta_c^p + \eta_g^p + \eta_h^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_h) + X_{530}\sigma_h + X_{559}(\eta_s^p + \gamma_s(0)) + X_{251}\epsilon_g\sigma_g + X_{461}\epsilon_c\sigma_c$$

$$\frac{\partial X_{532}}{\partial t} = X_{530}\eta_h^p + X_{534}\rho_{hs} + X_{535}\rho_{hs} + X_{541}\rho_{hs} + X_{542}\rho_{hs} + X_{548}\rho_{hs} + X_{549}\rho_{hs} + X_{555}\rho_{hs} + X_{556}\rho_{hs} - X_{532}(\Lambda_s + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g) + X_{539}(\rho_s + \rho_{hs}) + X_{546}(\rho_s + \rho_{hs}) + X_{553}(\rho_s + \rho_{hs}) + X_{528}(\rho_h + \rho_{hs} + \theta_h) + X_{560}(\gamma_s(0) + \rho_s + \rho_{hs}) + X_{531}(\eta_h^p + \theta_h) + X_{527}(\rho_h + \rho_{hs}) + X_{252}\epsilon_g\sigma_g + X_{462}\epsilon_c\sigma_c$$

$$\frac{\partial X_{533}}{\partial t} = \Lambda_s X_{526} - X_{533}(\Lambda_h + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs} + \sigma_s) + X_{253}\epsilon_g\sigma_g + X_{463}\epsilon_c\sigma_c$$

$$\frac{\partial X_{534}}{\partial t} = \Lambda_h X_{533} + \Lambda_s X_{527} - X_{534}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \sigma_h + \sigma_s) + X_{254}\epsilon_g\sigma_g + X_{464}\epsilon_c\sigma_c$$

$$\frac{\partial X_{535}}{\partial t} = \Lambda_s X_{528} + X_{534}\sigma_h - X_{535}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \sigma_s + \theta_h) + X_{255}\epsilon_g\sigma_g + X_{465}\epsilon_c\sigma_c$$

$$\frac{\partial X_{536}}{\partial t} = \Lambda_s X_{529} - X_{536}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_s - \Lambda_h(\zeta_h - 1)) + X_{256}\epsilon_g\sigma_g + X_{466}\epsilon_c\sigma_c$$

$$\frac{\partial X_{537}}{\partial t} = \Lambda_s X_{530} - X_{537}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h + \sigma_s) + X_{257}\epsilon_g\sigma_g + X_{467}\epsilon_c\sigma_c - \Lambda_h X_{536}(\zeta_h - 1)$$

$$\frac{\partial X_{538}}{\partial t} = \Lambda_s X_{531} + X_{537}\sigma_h - X_{538}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_s + \theta_h) + X_{258}\epsilon_g\sigma_g + X_{468}\epsilon_c\sigma_c$$

$$\frac{\partial X_{539}}{\partial t} = \Lambda_s X_{532} + X_{537}\eta_h^p + X_{534}\rho_h - X_{539}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs} + \sigma_s) + X_{538}(\eta_h^p + \theta_h) + X_{535}(\rho_h + \theta_h) + X_{259}\epsilon_g\sigma_g + X_{469}\epsilon_c\sigma_c$$

$$\frac{\partial X_{540}}{\partial t} = X_{533}\sigma_s - X_{540}(\Lambda_h + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs} + \tau_s) + X_{260}\epsilon_g\sigma_g + X_{470}\epsilon_c\sigma_c$$

$$\frac{\partial X_{541}}{\partial t} = \Lambda_h X_{540} + X_{534}\sigma_s - X_{541}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \sigma_h + \tau_s) + X_{261}\epsilon_g\sigma_g + X_{471}\epsilon_c\sigma_c$$

$$\frac{\partial X_{542}}{\partial t} = X_{541}\sigma_h + X_{535}\sigma_s - X_{542}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \tau_s + \theta_h) + X_{262}\epsilon_g\sigma_g + X_{472}\epsilon_c\sigma_c$$

$$\frac{\partial X_{543}}{\partial t} = X_{536}\sigma_s - X_{543}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \tau_s - \Lambda_h(\zeta_h - 1)) + X_{263}\epsilon_g\sigma_g + X_{473}\epsilon_c\sigma_c$$

$$\frac{\partial X_{544}}{\partial t} = X_{537}\sigma_s - X_{544}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h + \tau_s) + X_{264}\epsilon_g\sigma_g + X_{474}\epsilon_c\sigma_c - \Lambda_h X_{543}(\zeta_h - 1)$$

$$\frac{\partial X_{545}}{\partial t} = X_{544}\sigma_h + X_{538}\sigma_s - X_{545}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \tau_s + \theta_h) + X_{265}\epsilon_g\sigma_g + X_{475}\epsilon_c\sigma_c$$

$$\frac{\partial X_{546}}{\partial t} = X_{544}\eta_h^p + X_{541}\rho_h + X_{539}\sigma_s - X_{546}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs} + \tau_s) + X_{545}(\eta_h^p + \theta_h) + X_{542}(\rho_h + \theta_h) + X_{266}\epsilon_g\sigma_g + X_{476}\epsilon_c\sigma_c$$

$$\frac{\partial X_{547}}{\partial t} = X_{540}\tau_s - X_{547}(\Lambda_h + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs} + \theta_s) + X_{267}\epsilon_g\sigma_g + X_{477}\epsilon_c\sigma_c$$

$$\frac{\partial X_{548}}{\partial t} = \Lambda_h X_{547} + X_{541}\tau_s - X_{548}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \sigma_h + \theta_s) + X_{268}\epsilon_g\sigma_g + X_{478}\epsilon_c\sigma_c$$

$$\frac{\partial X_{549}}{\partial t} = X_{548}\sigma_h + X_{542}\tau_s - X_{549}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \theta_h + \theta_s) + X_{269}\epsilon_g\sigma_g + X_{479}\epsilon_c\sigma_c$$

$$\frac{\partial X_{550}}{\partial t} = X_{543}\tau_s - X_{550}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_s - \Lambda_h(\zeta_h - 1)) + X_{270}\epsilon_g\sigma_g + X_{480}\epsilon_c\sigma_c$$

$$\frac{\partial X_{551}}{\partial t} = X_{544}\tau_s - X_{551}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h + \theta_s) + X_{271}\epsilon_g\sigma_g + X_{481}\epsilon_c\sigma_c - \Lambda_h X_{550}(\zeta_h - 1)$$

$$\frac{\partial X_{552}}{\partial t} = X_{551}\sigma_h + X_{545}\tau_s - X_{552}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_h + \theta_s) + X_{272}\epsilon_g\sigma_g + X_{482}\epsilon_c\sigma_c$$

$$\frac{\partial X_{553}}{\partial t} = X_{551}\eta_h^p + X_{548}\rho_h + X_{546}\tau_s - X_{553}(\gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs} + \theta_s) + X_{552}(\eta_h^p + \theta_h) + X_{549}(\rho_h + \theta_h) + X_{273}\epsilon_g\sigma_g + X_{483}\epsilon_c\sigma_c$$

$$\frac{\partial X_{554}}{\partial t} = X_{547}\theta_s - X_{554}(\Lambda_h + \gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs}) + X_{274}\epsilon_g\sigma_g + X_{484}\epsilon_c\sigma_c$$

$$\frac{\partial X_{555}}{\partial t} = \Lambda_h X_{554} + X_{548}\theta_s - X_{555}(\gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \sigma_h) + X_{275}\epsilon_g\sigma_g + X_{485}\epsilon_c\sigma_c$$

$$\frac{\partial X_{556}}{\partial t} = X_{555}\sigma_h + X_{549}\theta_s - X_{556}(\gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_h + \rho_s + \rho_{hs} + \theta_h) + X_{276}\epsilon_g\sigma_g + X_{486}\epsilon_c\sigma_c$$

$$\frac{\partial X_{557}}{\partial t} = X_{550}\theta_s - X_{557}(\eta_c^p + \eta_g^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g - \Lambda_h(\zeta_h - 1)) + X_{277}\epsilon_g\sigma_g + X_{487}\epsilon_c\sigma_c$$

$$\frac{\partial X_{558}}{\partial t} = X_{551}\theta_s - X_{558}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \sigma_h) + X_{278}\epsilon_g\sigma_g + X_{488}\epsilon_c\sigma_c - \Lambda_h X_{557}(\zeta_h - 1)$$

$$\frac{\partial X_{559}}{\partial t} = X_{558}\sigma_h + X_{552}\theta_s - X_{559}(\eta_c^p + \eta_g^p + \eta_h^p + \eta_s^p + \gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \theta_h) + X_{279}\epsilon_g\sigma_g + X_{489}\epsilon_c\sigma_c$$

$$\begin{aligned}\frac{\partial X_{560}}{\partial t} = {} & X_{558}\eta_h^p + X_{555}\rho_h + X_{553}\theta_s - X_{560}(\gamma_s(0) + \gamma_g(0) + \gamma_c(0) + \mu + \nu_c + \nu_g + \rho_s + \rho_{hs}) \\ & + X_{559}(\eta_h^p + \theta_h) + X_{556}(\rho_h + \theta_h) + X_{280}\epsilon_g\sigma_g + X_{490}\epsilon_c\sigma_c\end{aligned}$$