

# Quelles certitudes contient le hasard?

Raphaël Lachièze-Rey

# Des certitudes dans le hasard?



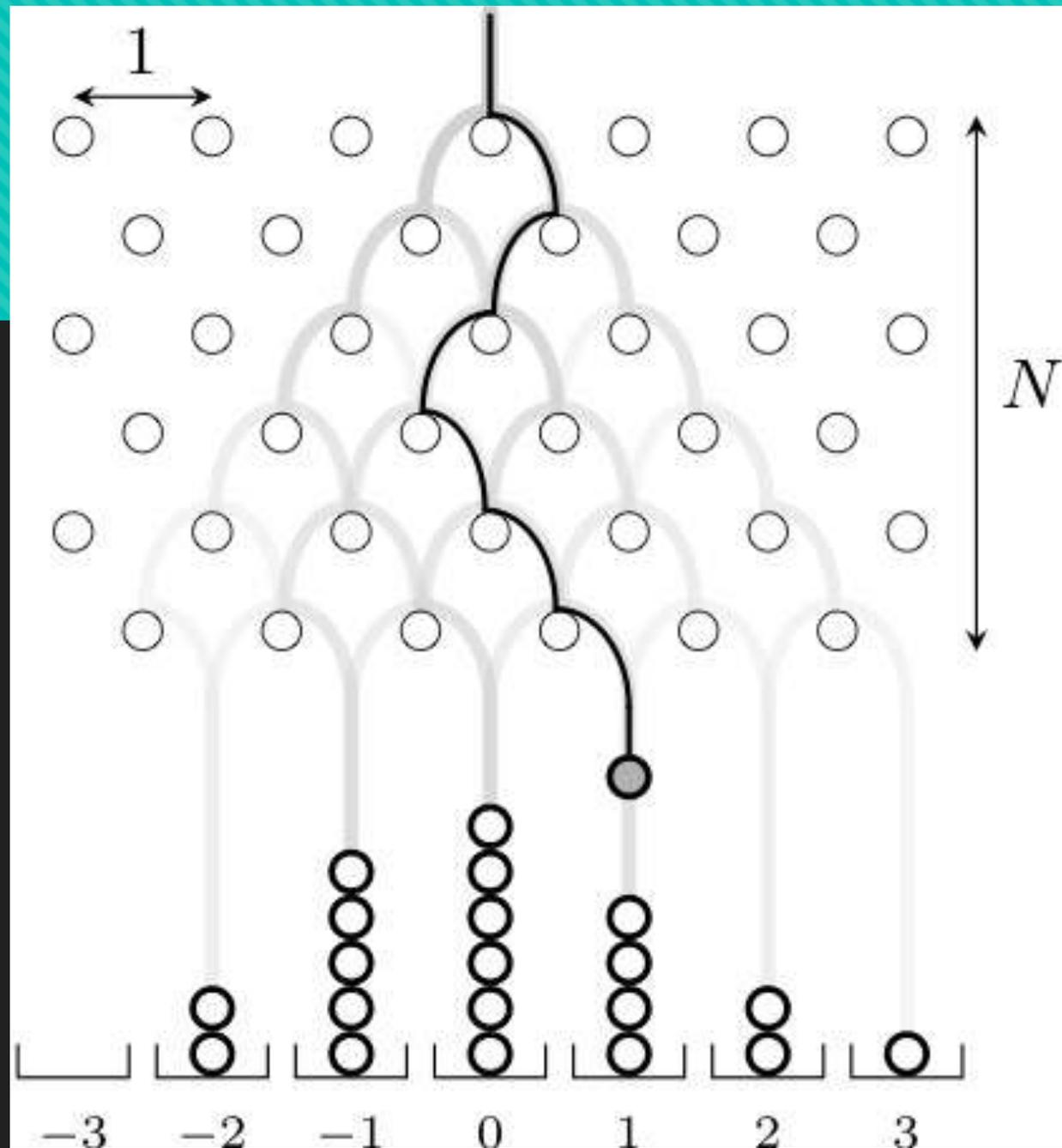
# Ces choses qui devraient vous surprendre

	Total	Filles	Garçons	Filles pour 100 garçons
<b>2014</b>	781 167	399 284	381 883	104,6
<b>2015</b>	760 421	389 181	371 240	104,8
<b>2016</b>	744 697	381 310	363 387	104,9
<b>2017</b>	730 242	373 716	356 526	104,8
<b>2018</b>	719 737	369 121	350 616	105,3
<b>2019</b>	714 029	364 924	349 105	104,5

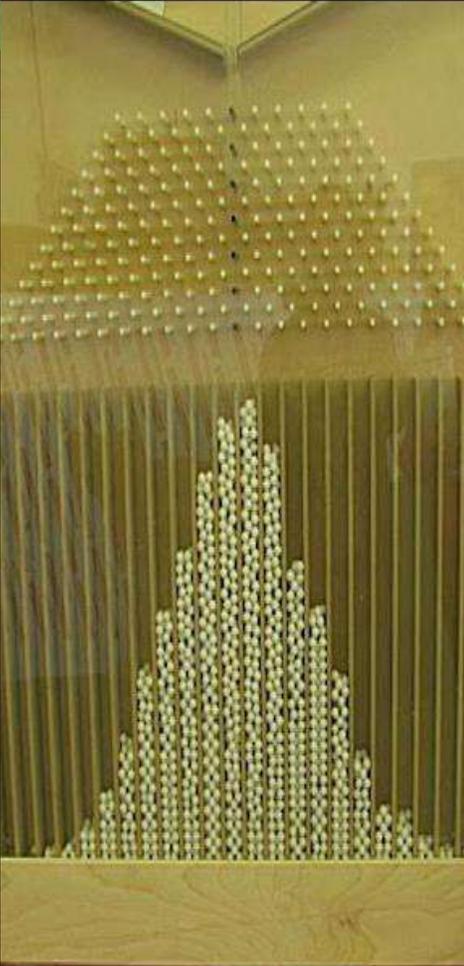
# Le chant des foules



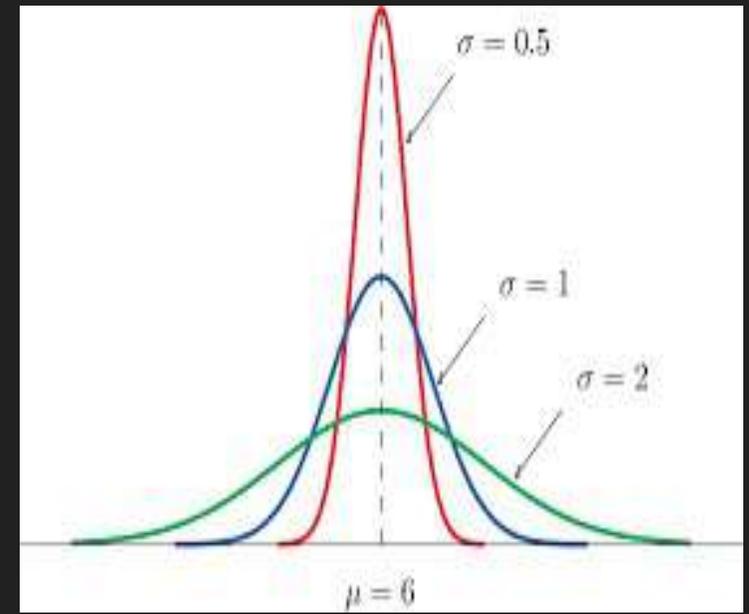
# La planche de Galton



# Théorème central limite



Plus de billes

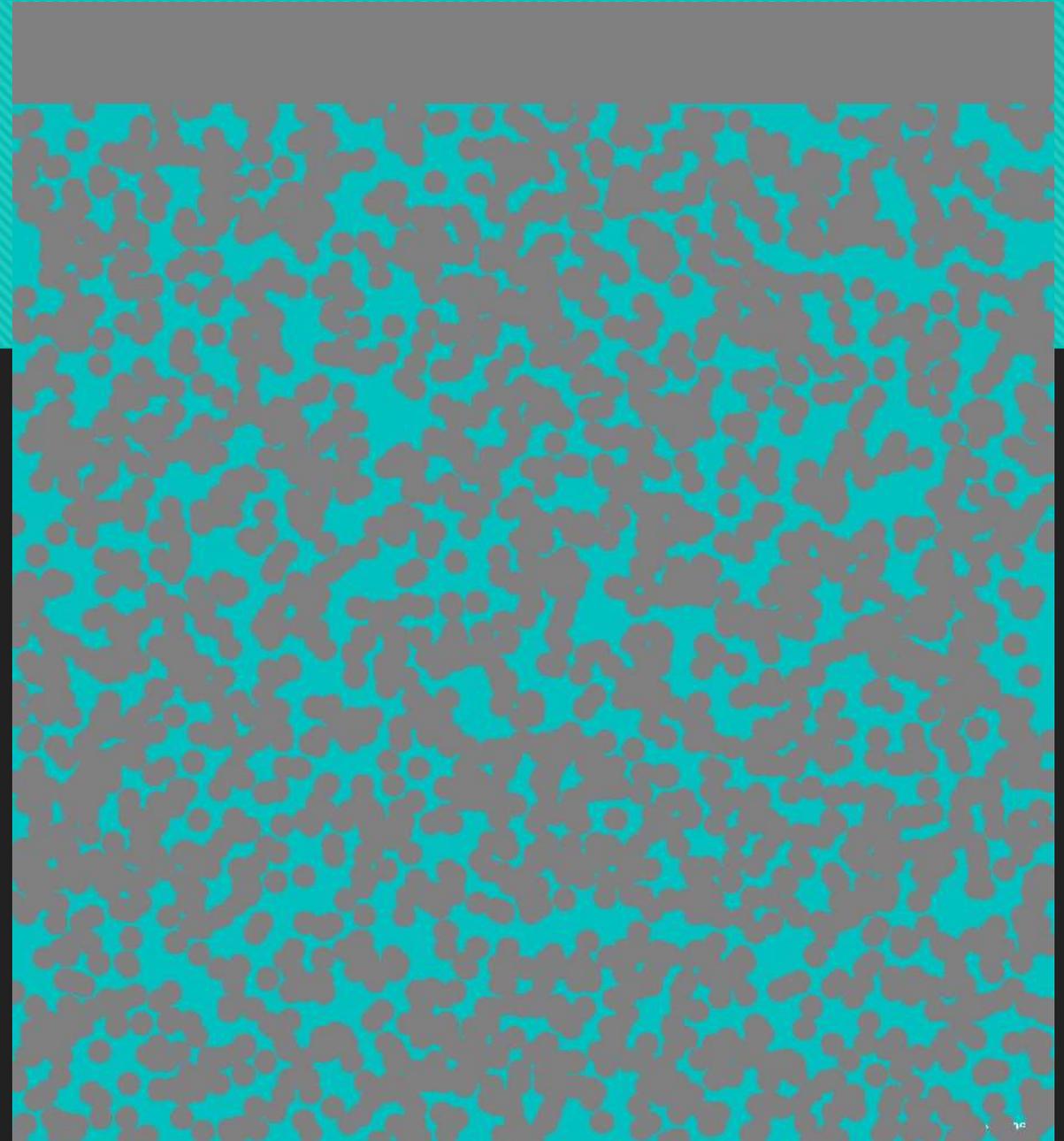


# Des conséquences concrètes!

- Dépouillement de **250 bureaux** (sur 85000 en tout!)
- Le résultat se stabilise au bout de **40 bureaux**
- Même pas 0,01% des votants!

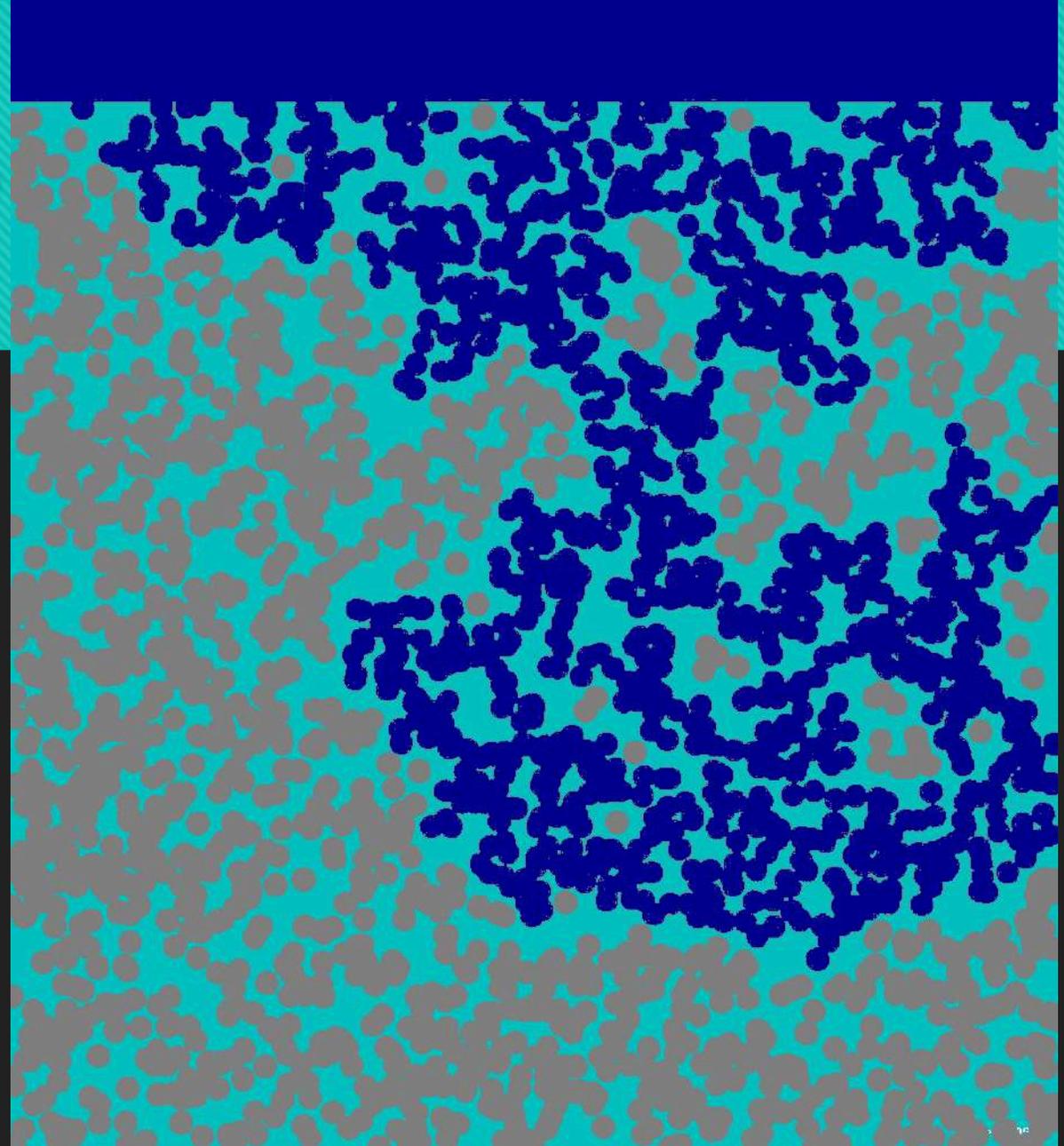
Année	Estimation du score du vainqueur à 20 heures	Score définitif du vainqueur
1974	50,9% (Sofres)	50,81%
1981	51,7% (C2I Bull)	51,76%
1988	53,9% (Bull BVA)	54,02%
1995	52% (CSA)	52,64%
2002	82,1% (Ipsos)	82,21%
2007	53% (Ipsos)	53,06%

# Imperméabilité



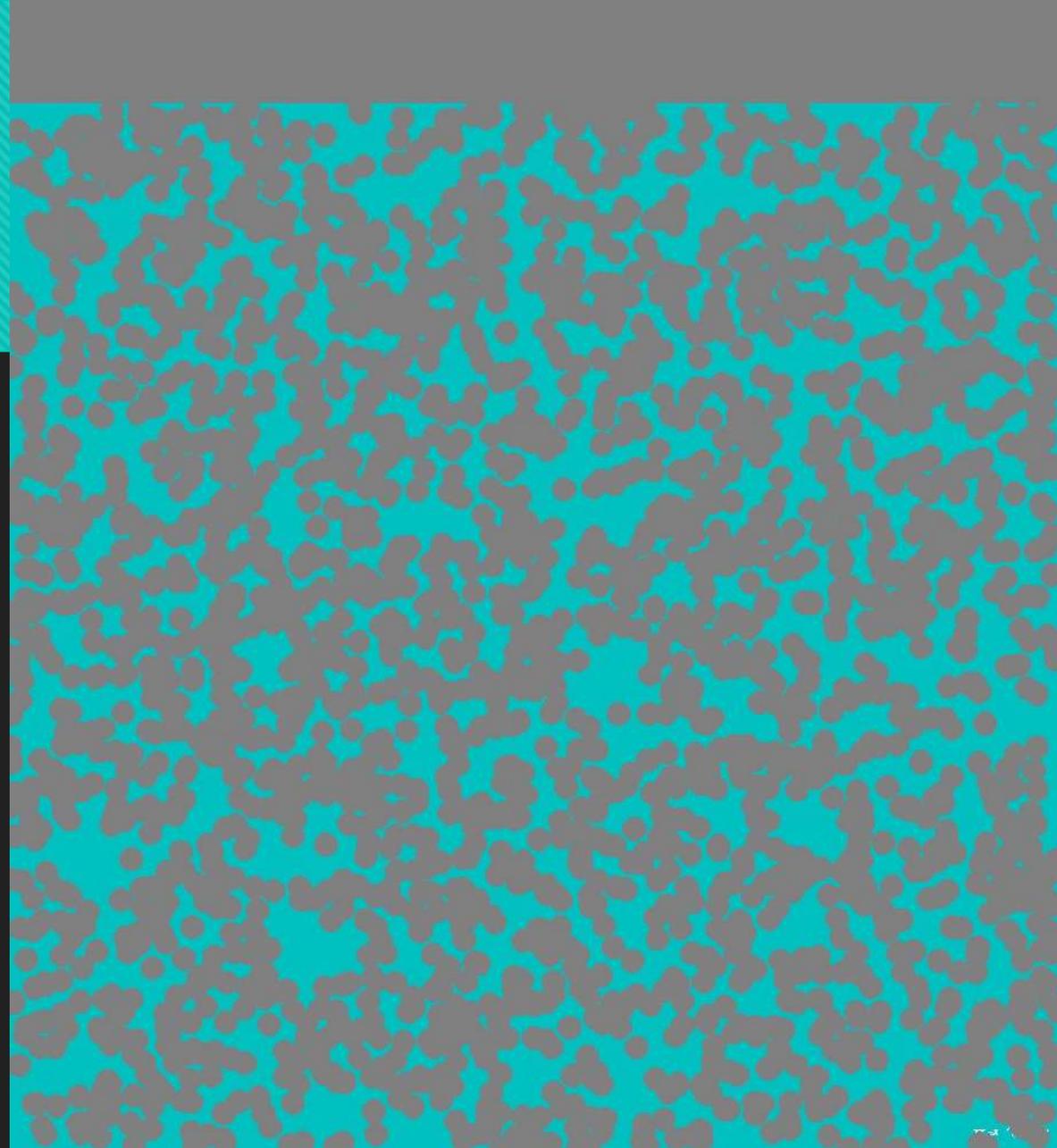
# Matériau imperméable?

Oui!



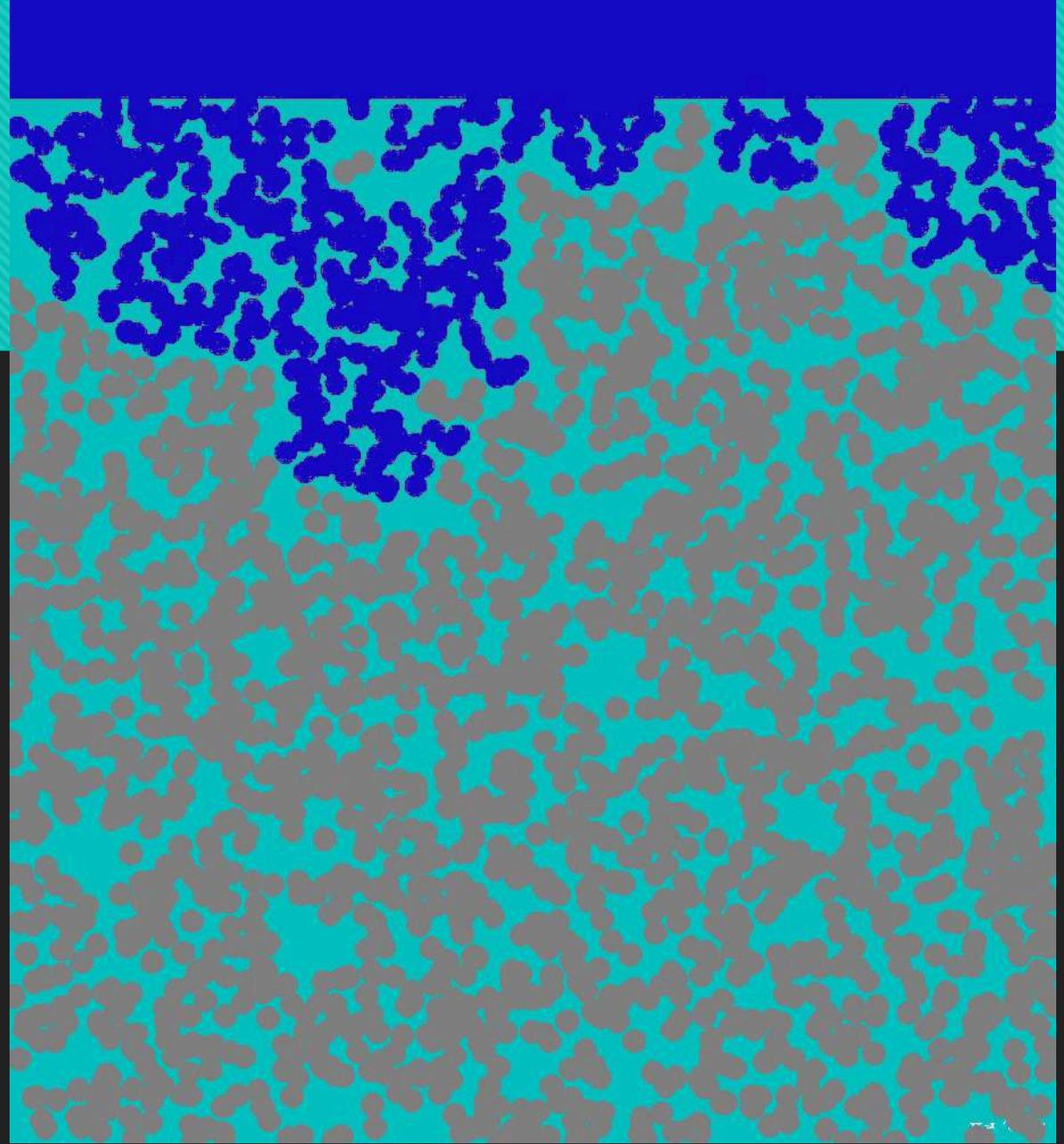
# Matériau imperméable

- Nouvelle tentative



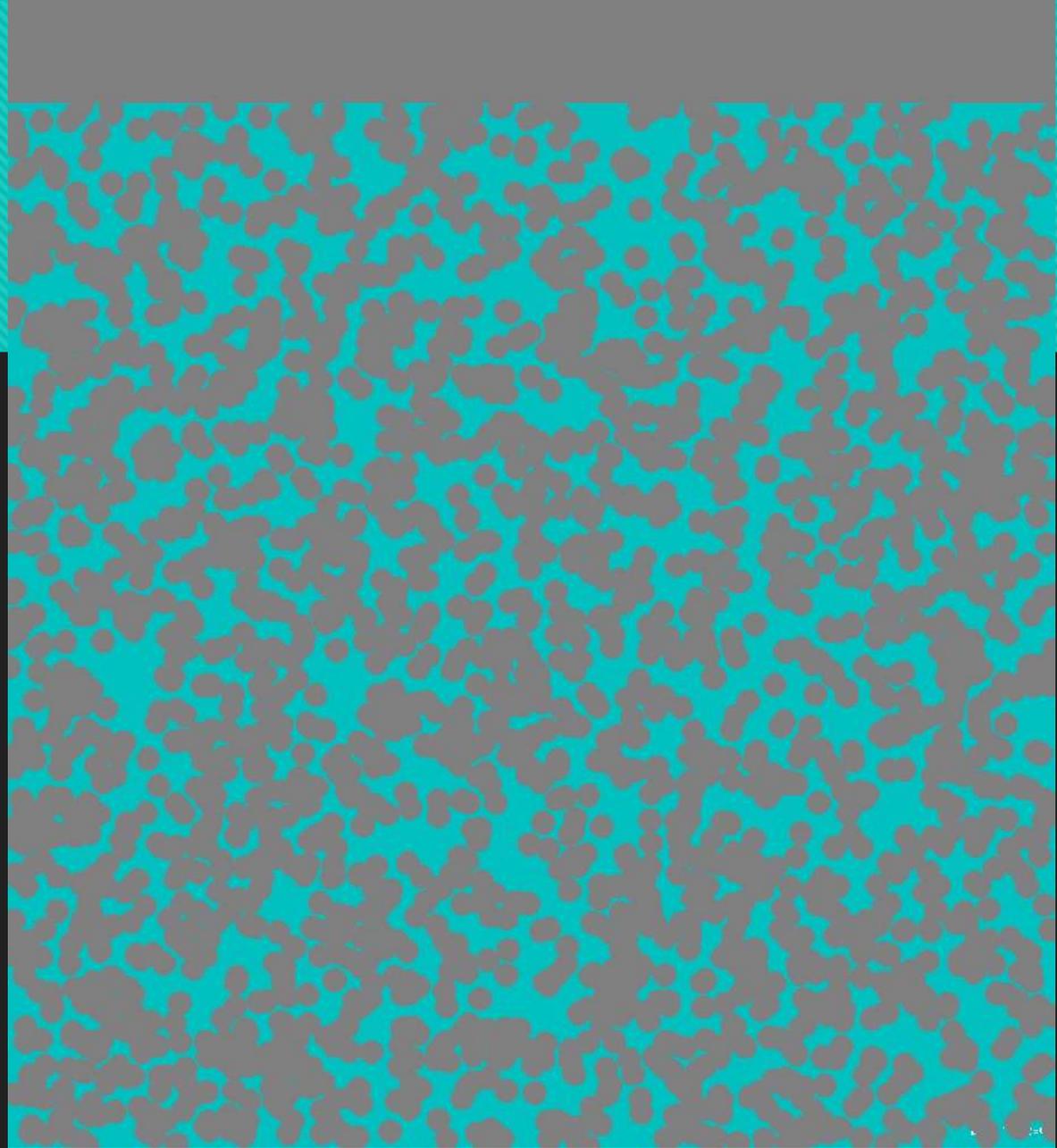
# Matériau imperméable?

- Oui!



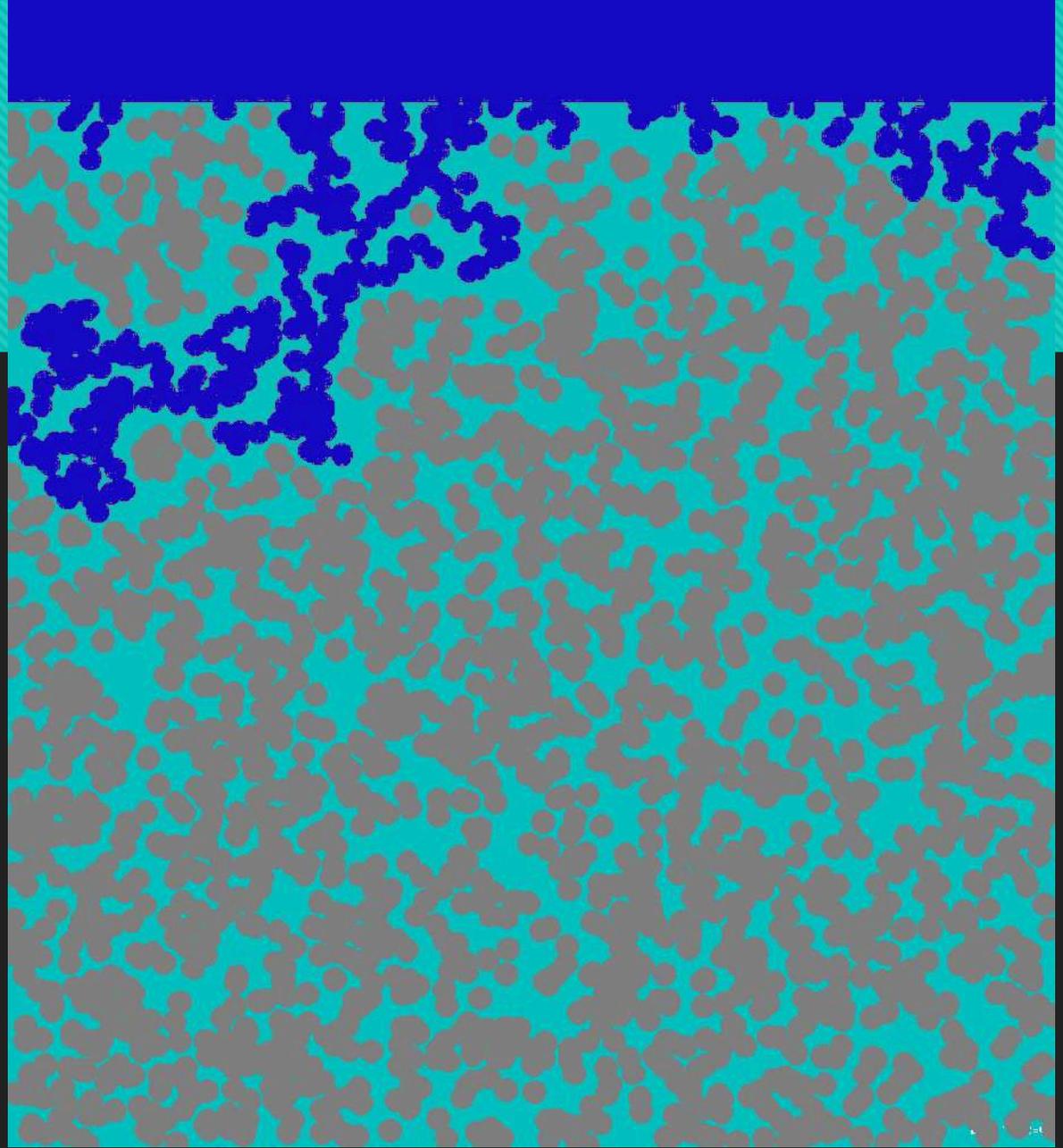
# Matériau imperméable

- Nouvelle tentative



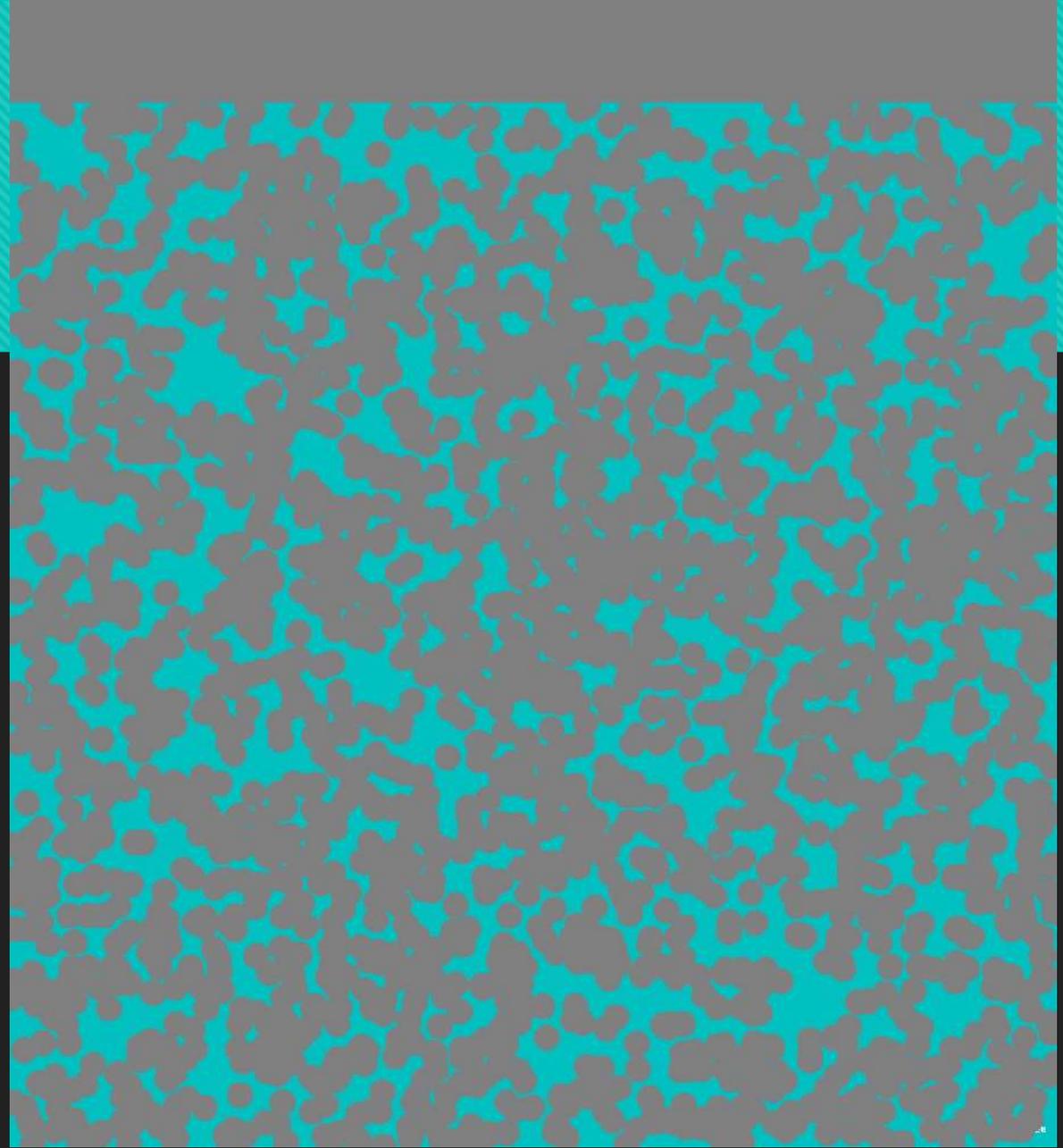
# Matériau imperméable?

- Oui!



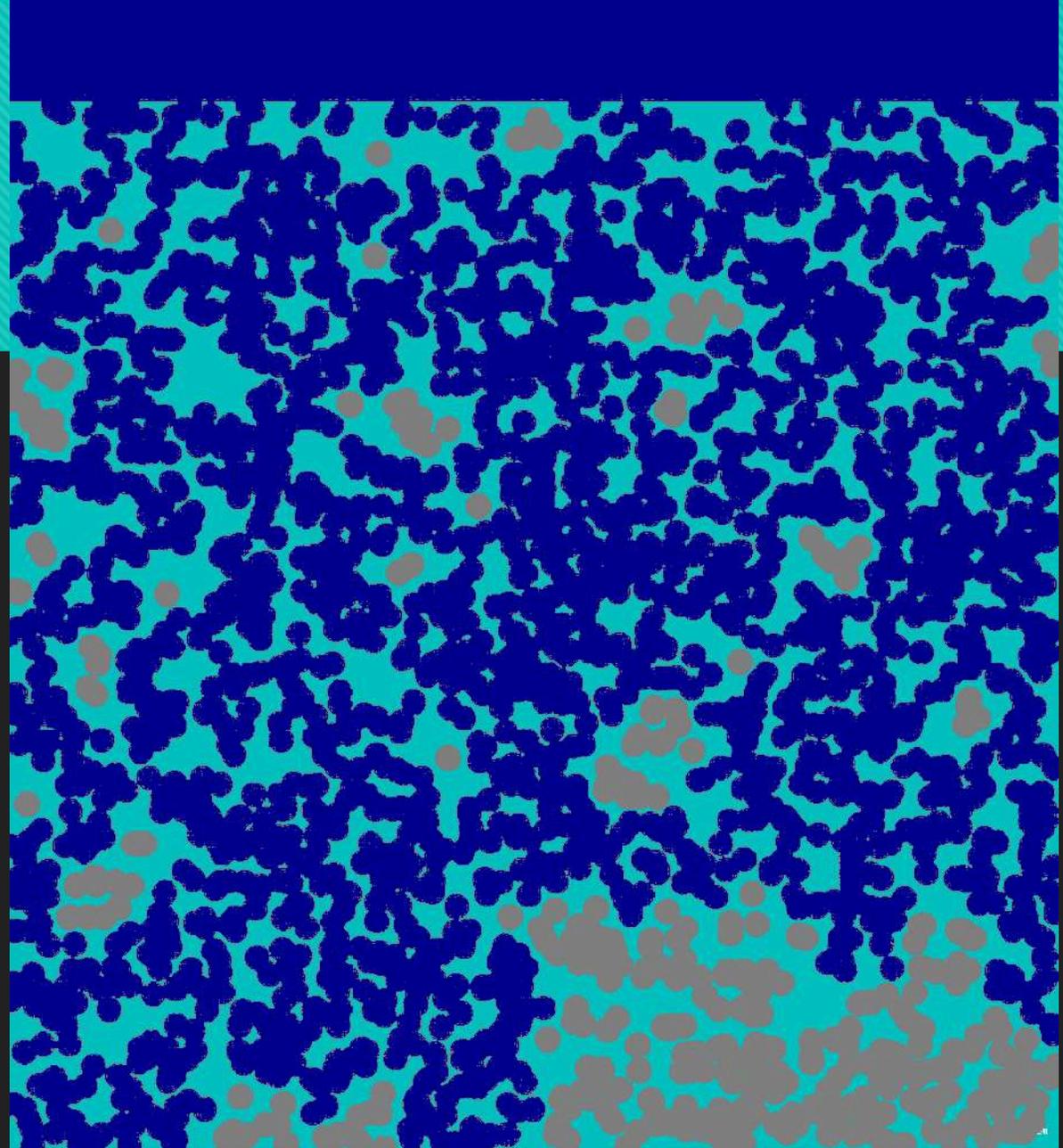
# Matériau imperméable

- Et si j'augmente un tout petit peu le rayon des trous?



# Matériau imperméable?

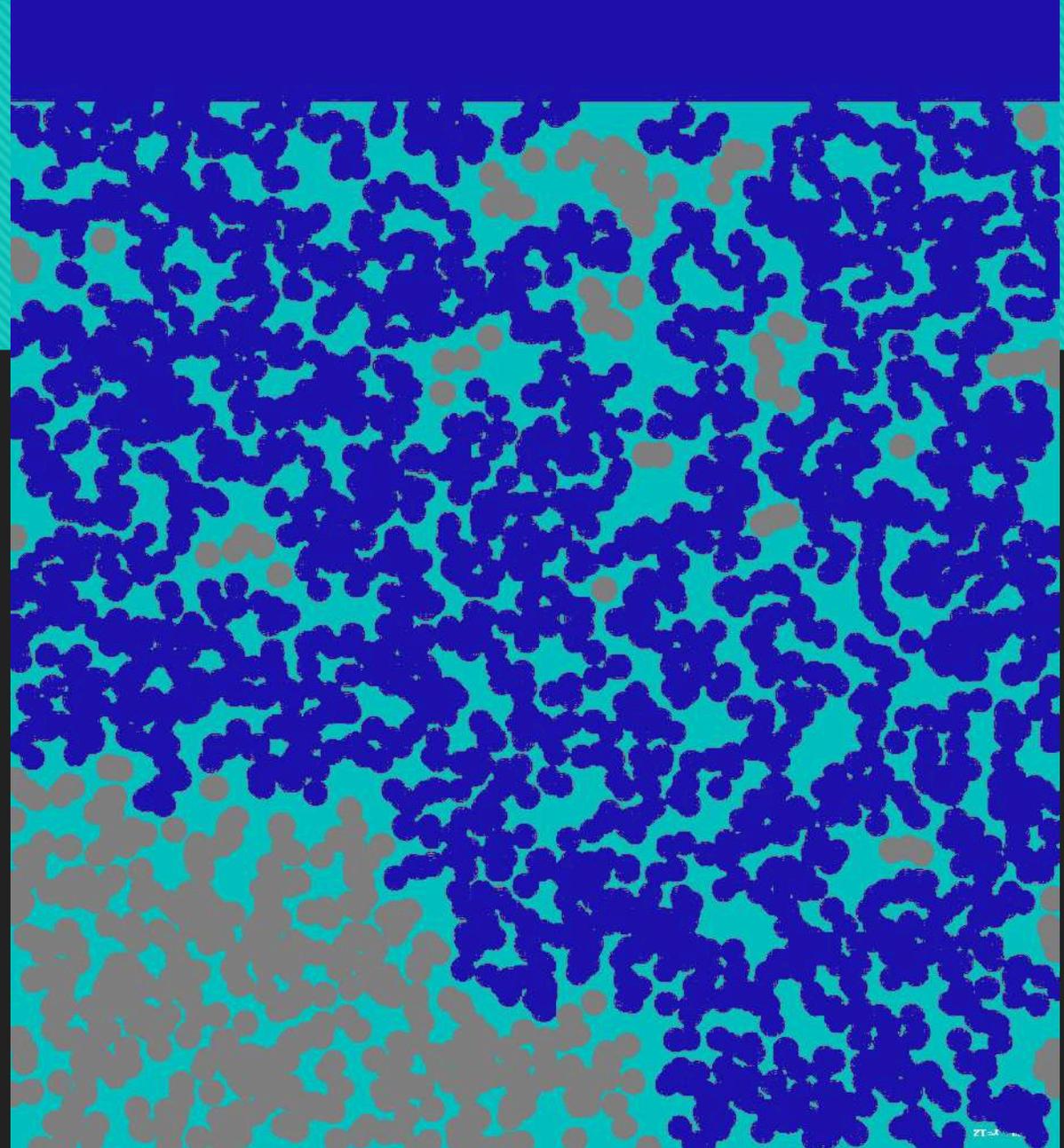
Non!



# Nouvelle tentative

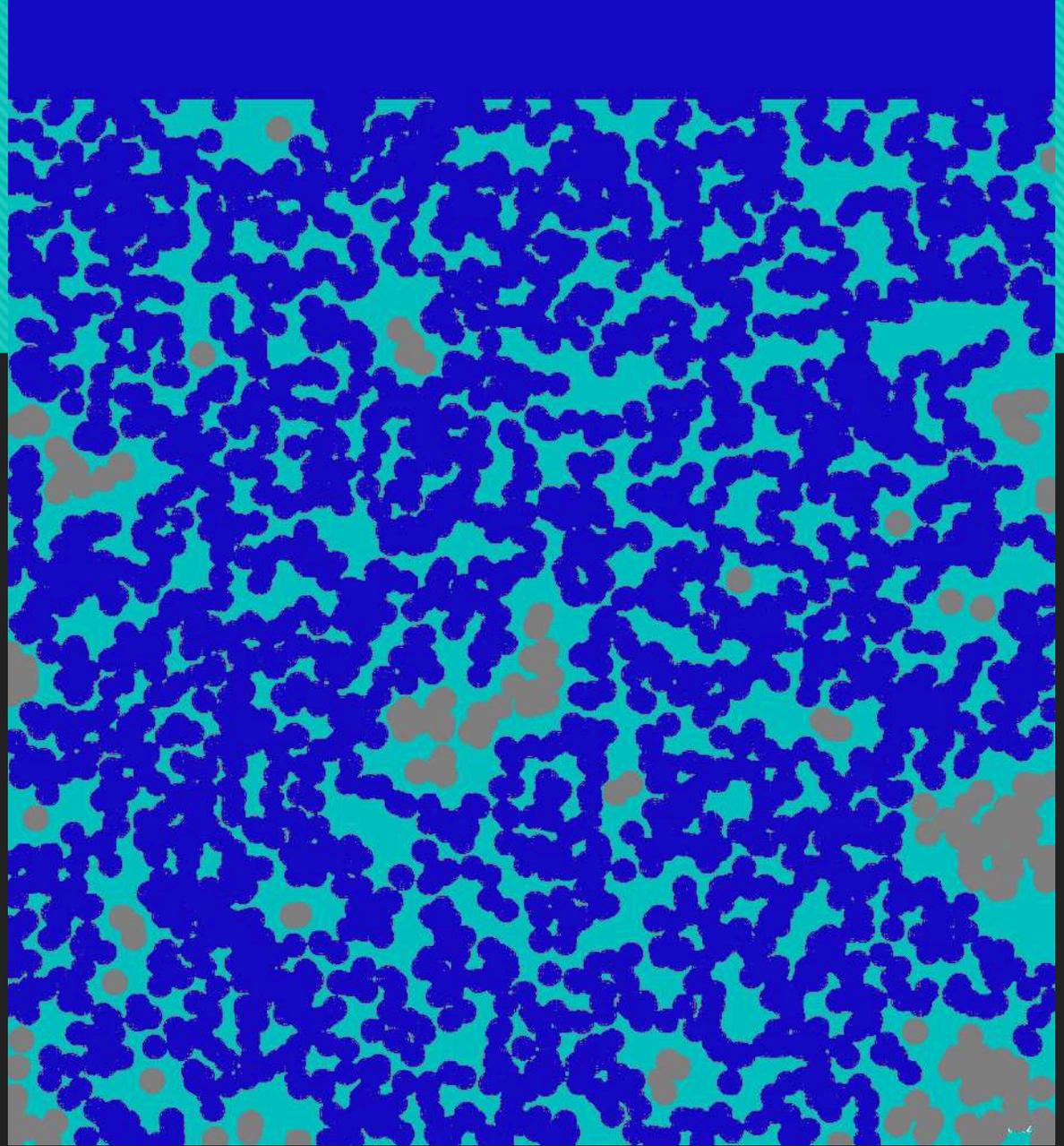
# Matériau imperméable?

Non!

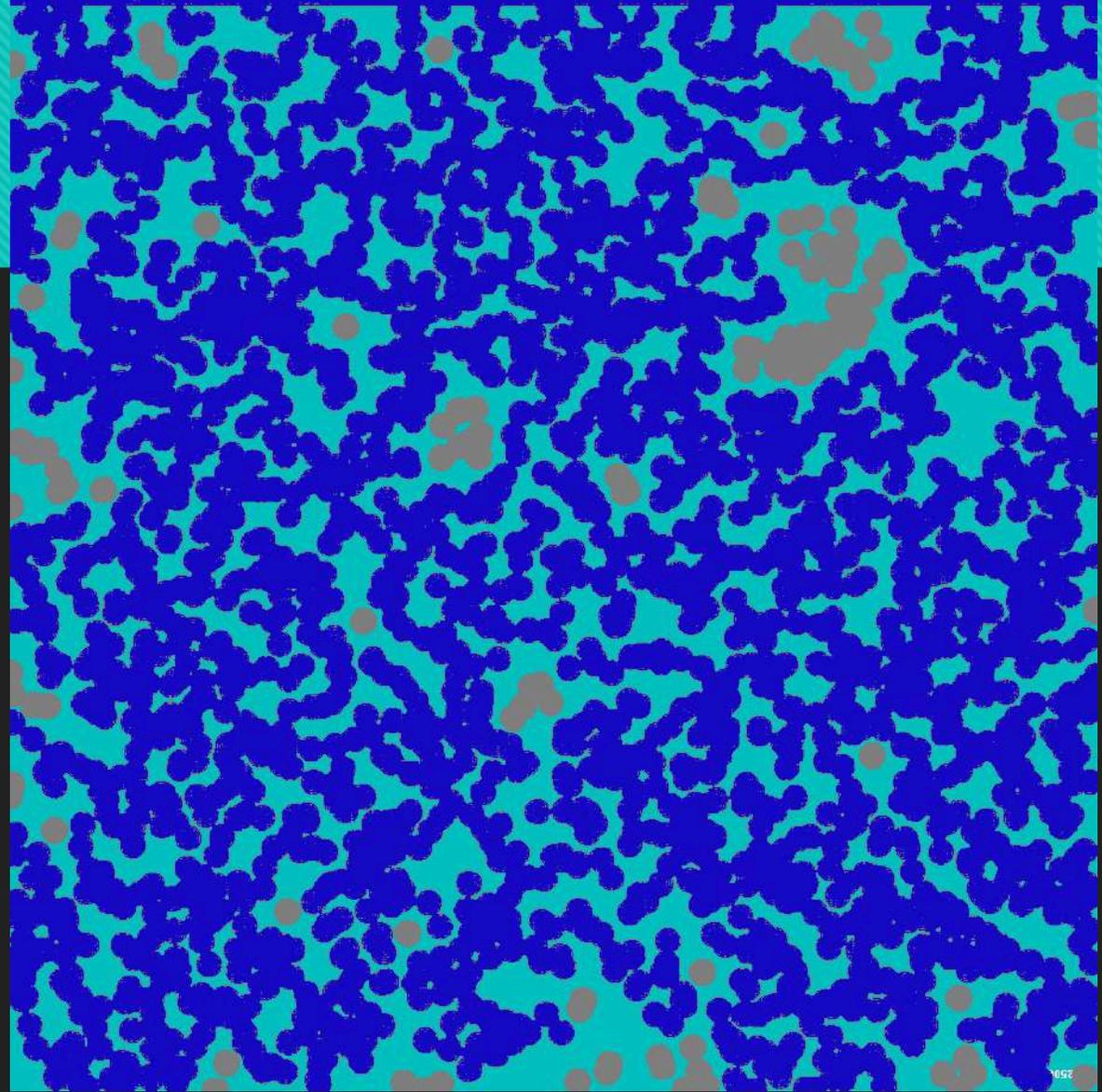


# Matériau imperméable

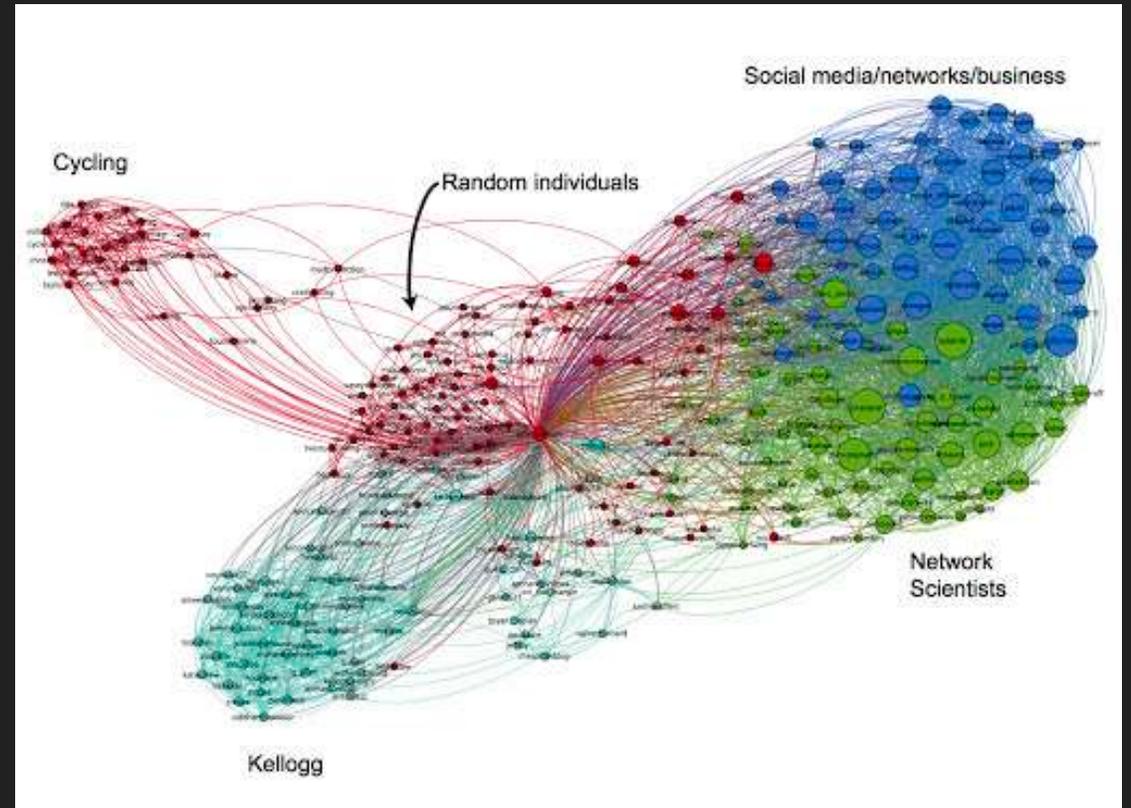
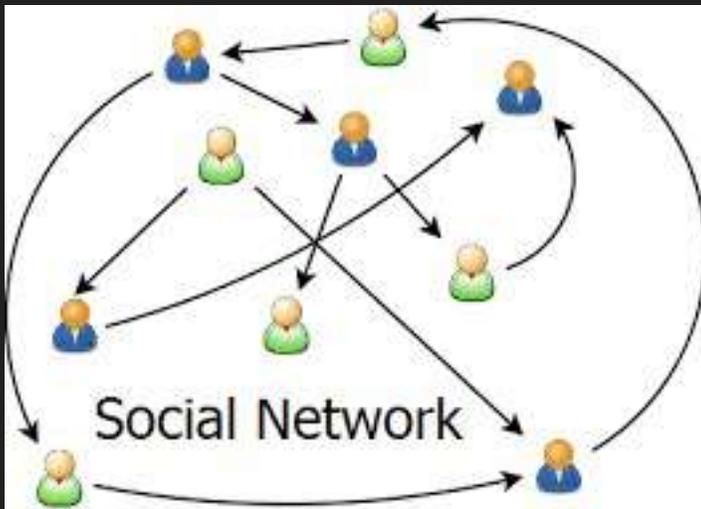
Non!



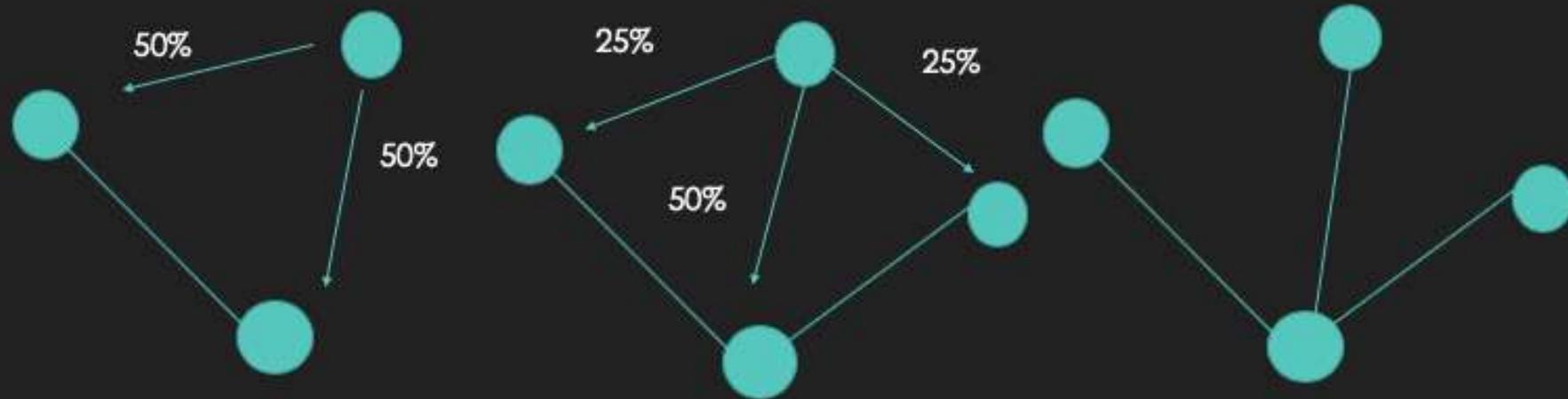
Etc...etc...



# Des certitudes dans les réseaux sociaux?



# Comment se construit un réseau social?

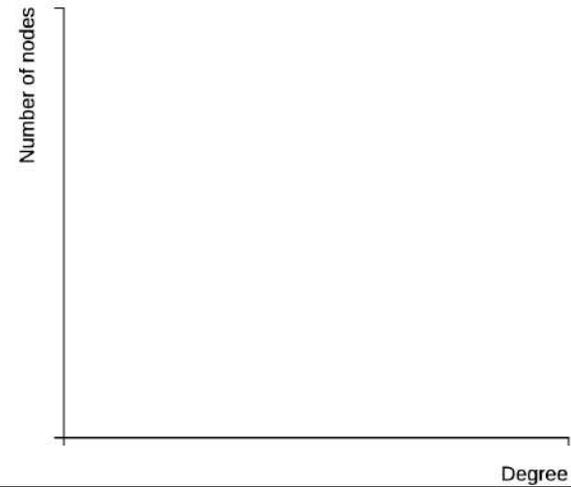


New connections:

Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

1 individus



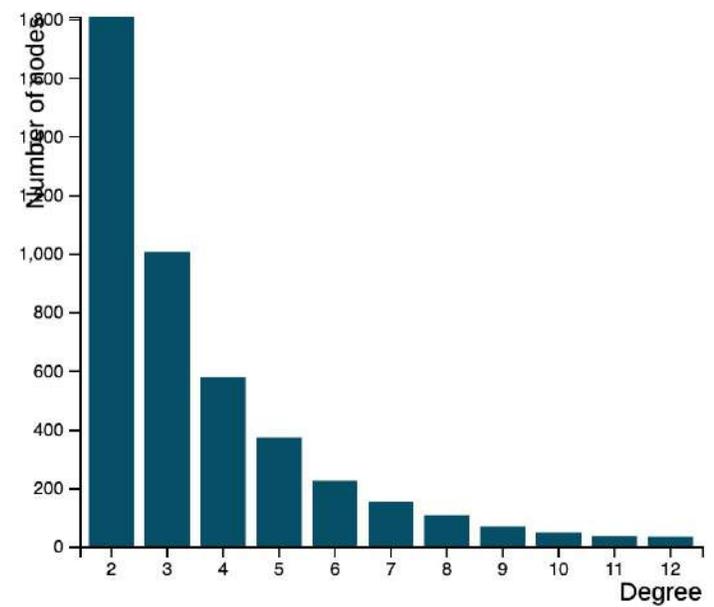


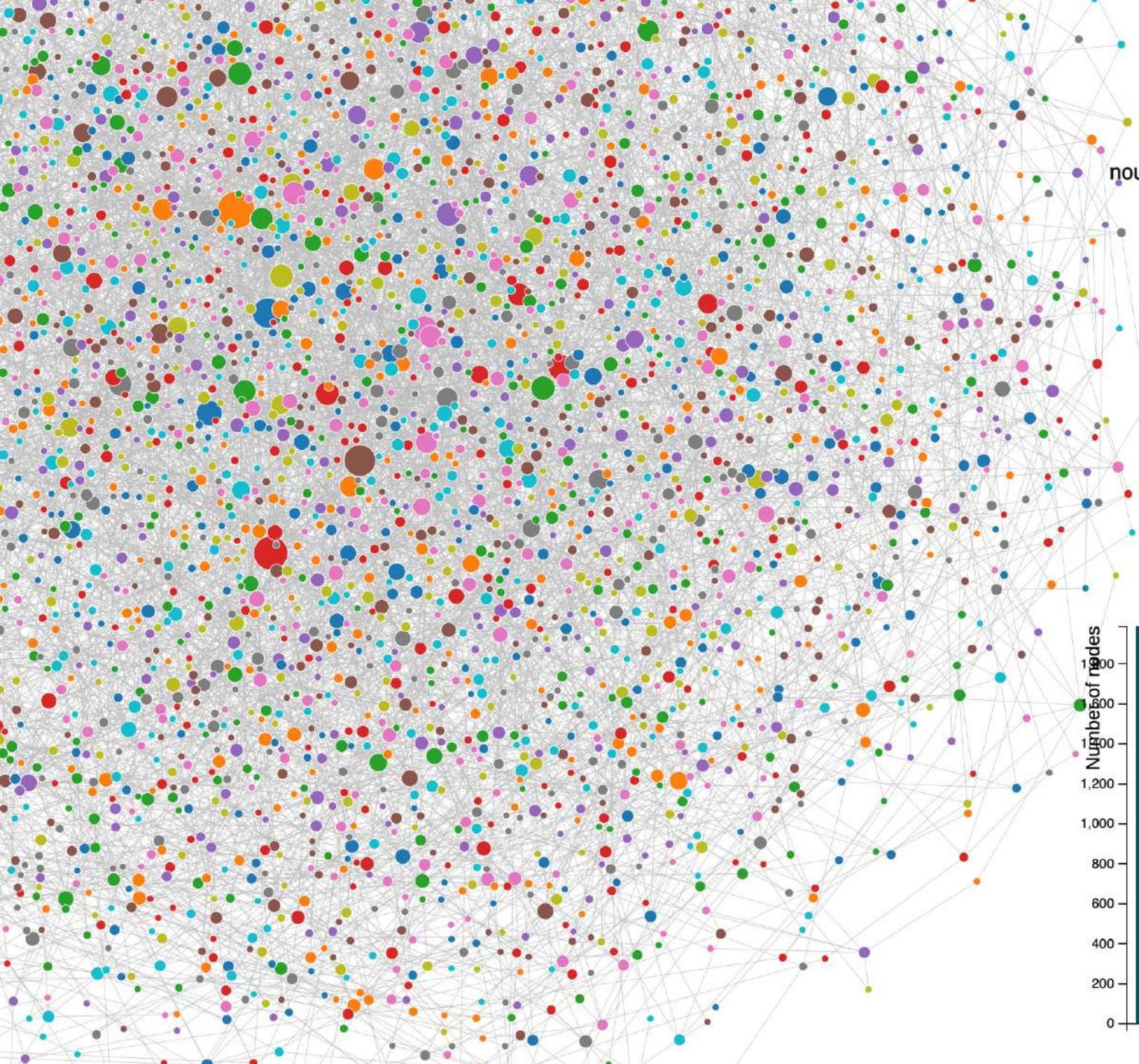
New connections:   
Rumor starters (%)   
Envoyer

nouvelles connections: 2, starters proportion: 0.02

4554 individus

Next step

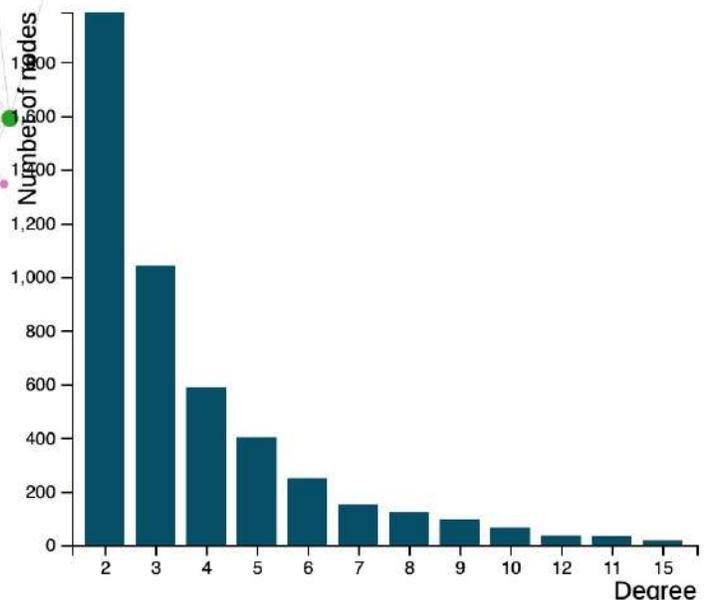




New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4892 individus

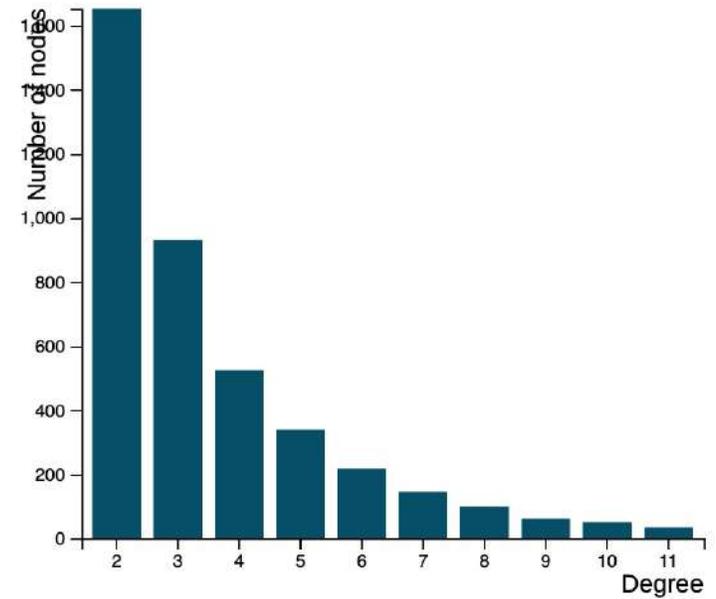




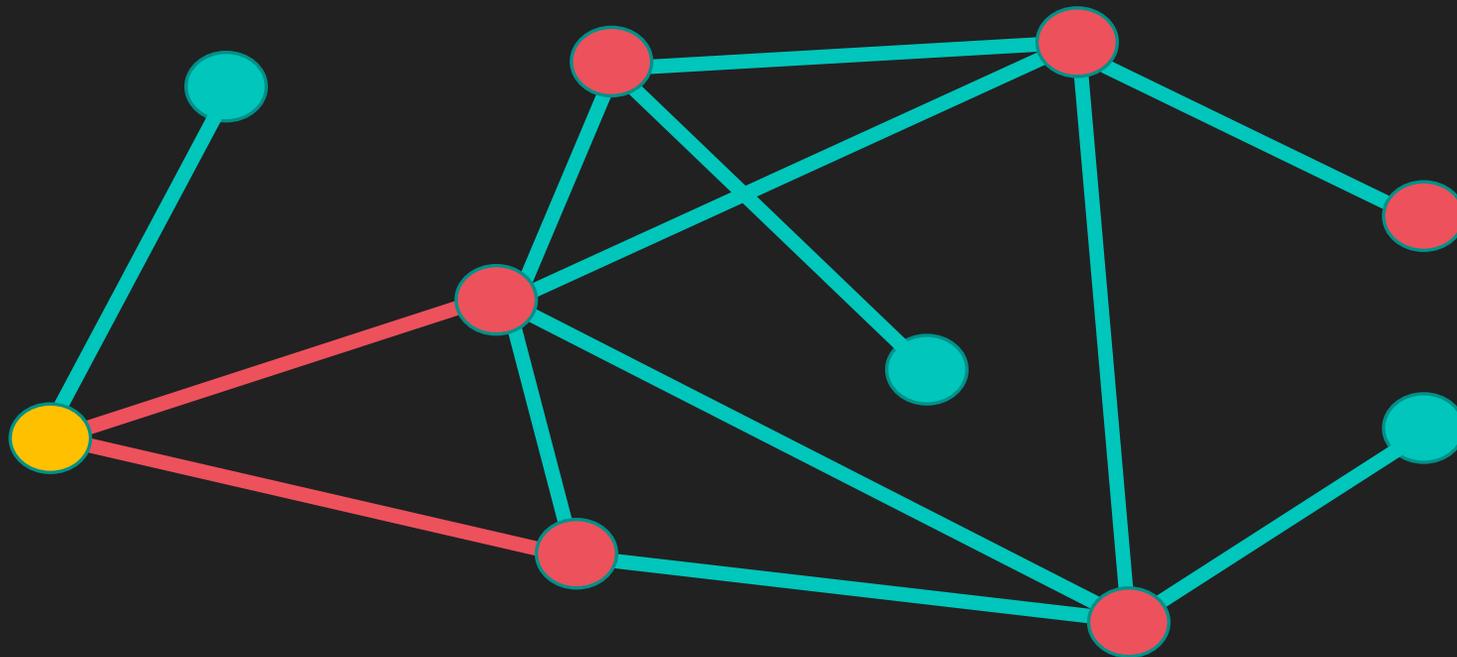
New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

4192 individus



# Comment se propage une rumeur?



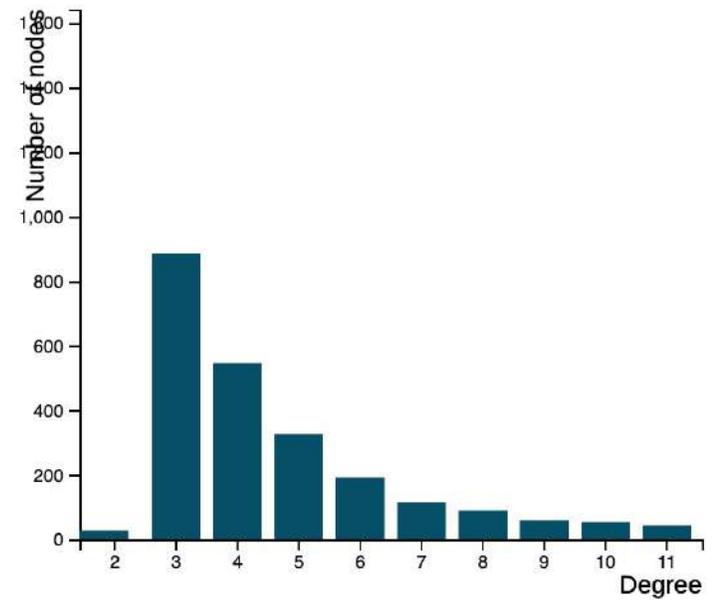
<https://helios.mi.parisdescartes.fr/~rlachiez//vulga/timeworld21/barabasi/index.html>

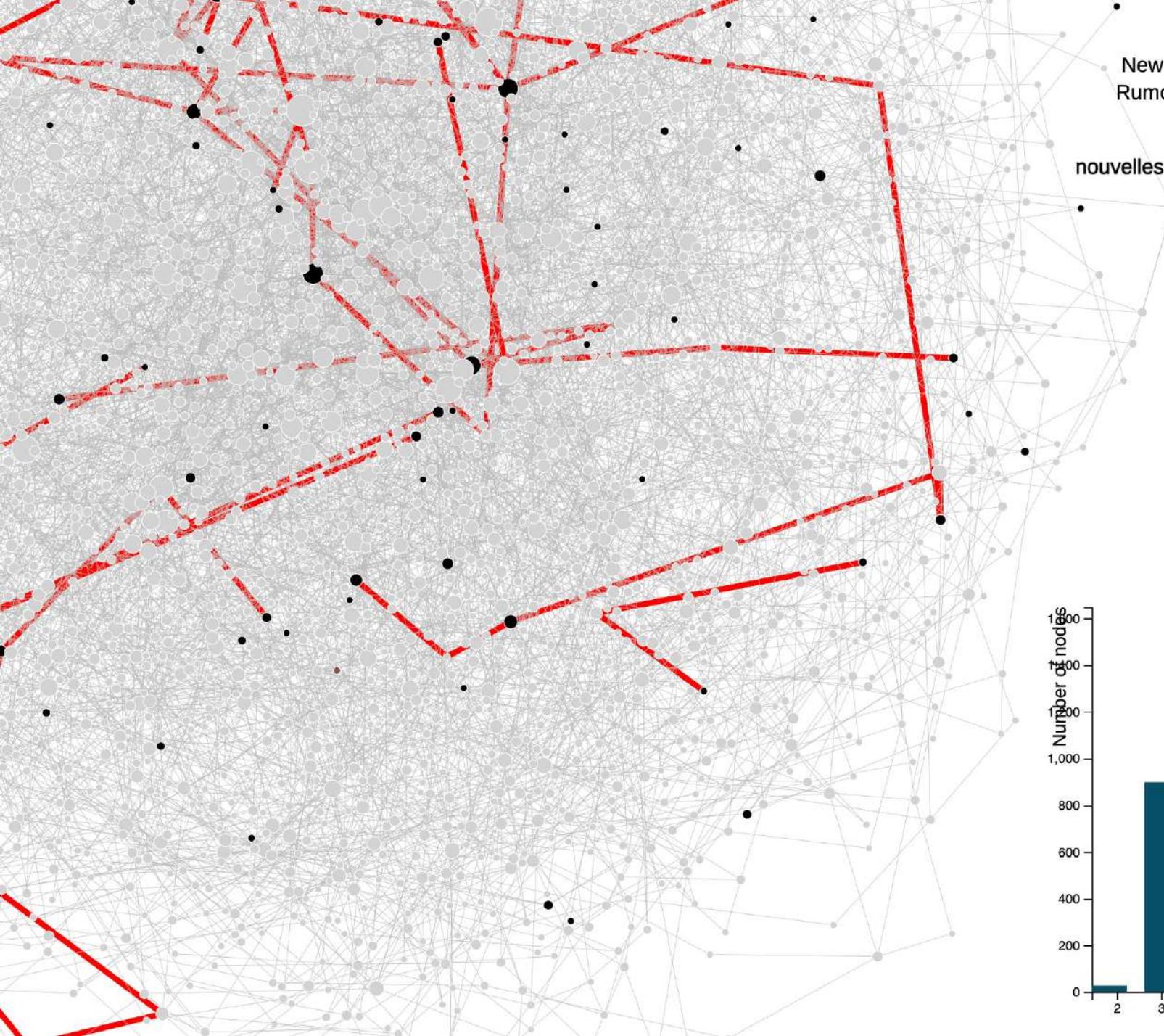


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4086 individus

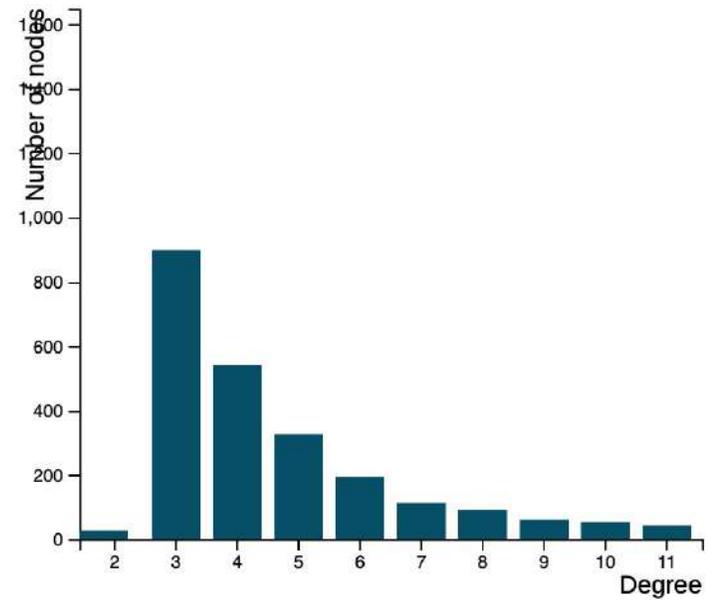


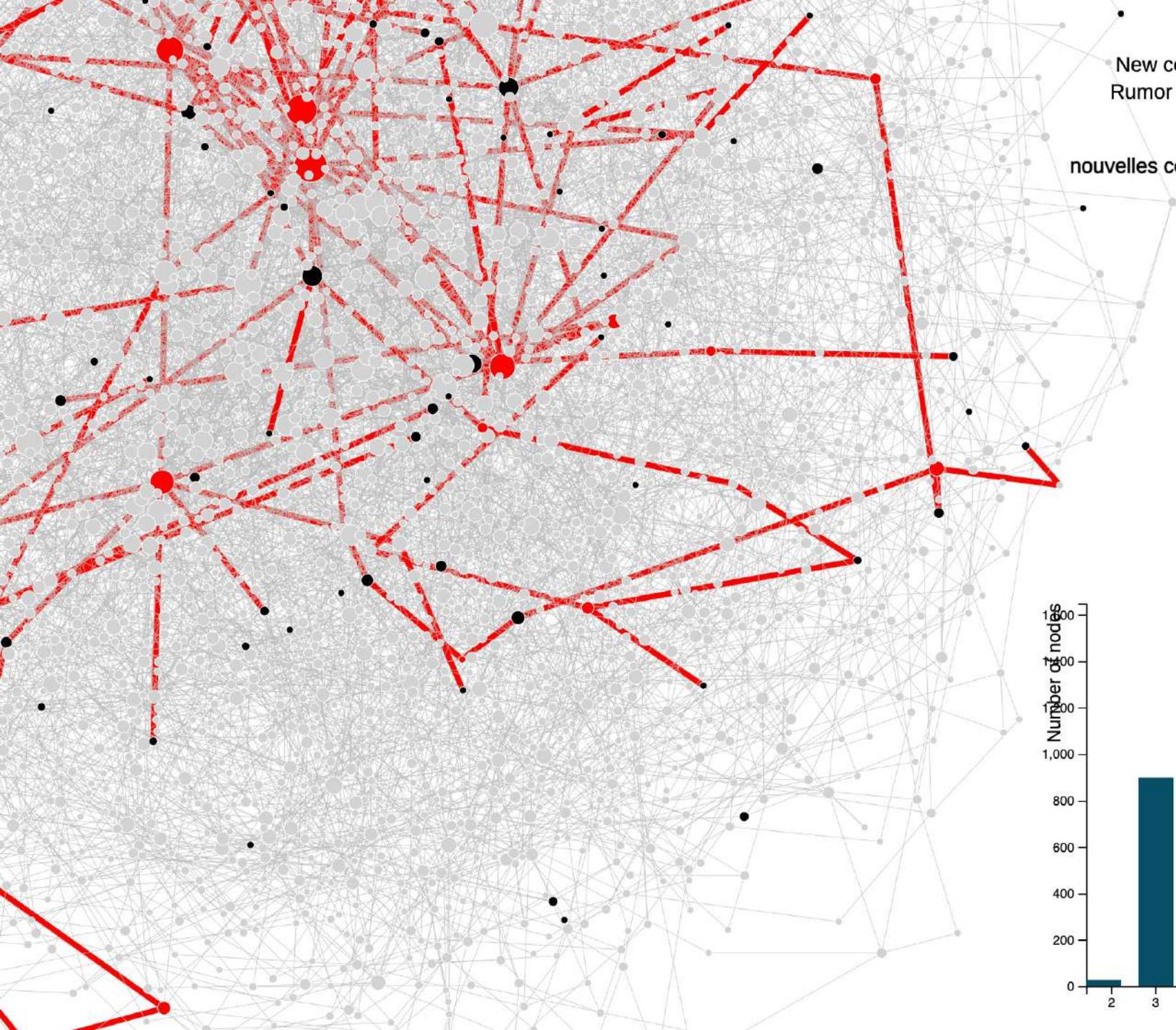


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4106 individus  
3978 sains  
25 incubent  
102 infectés

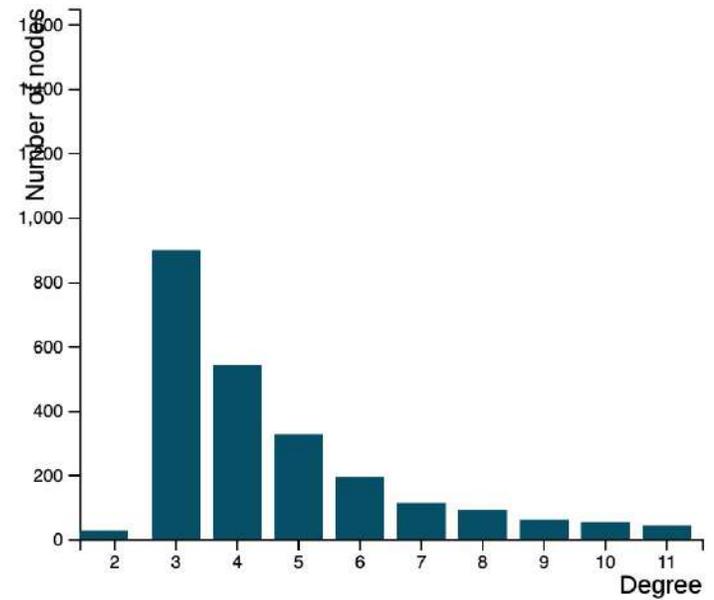


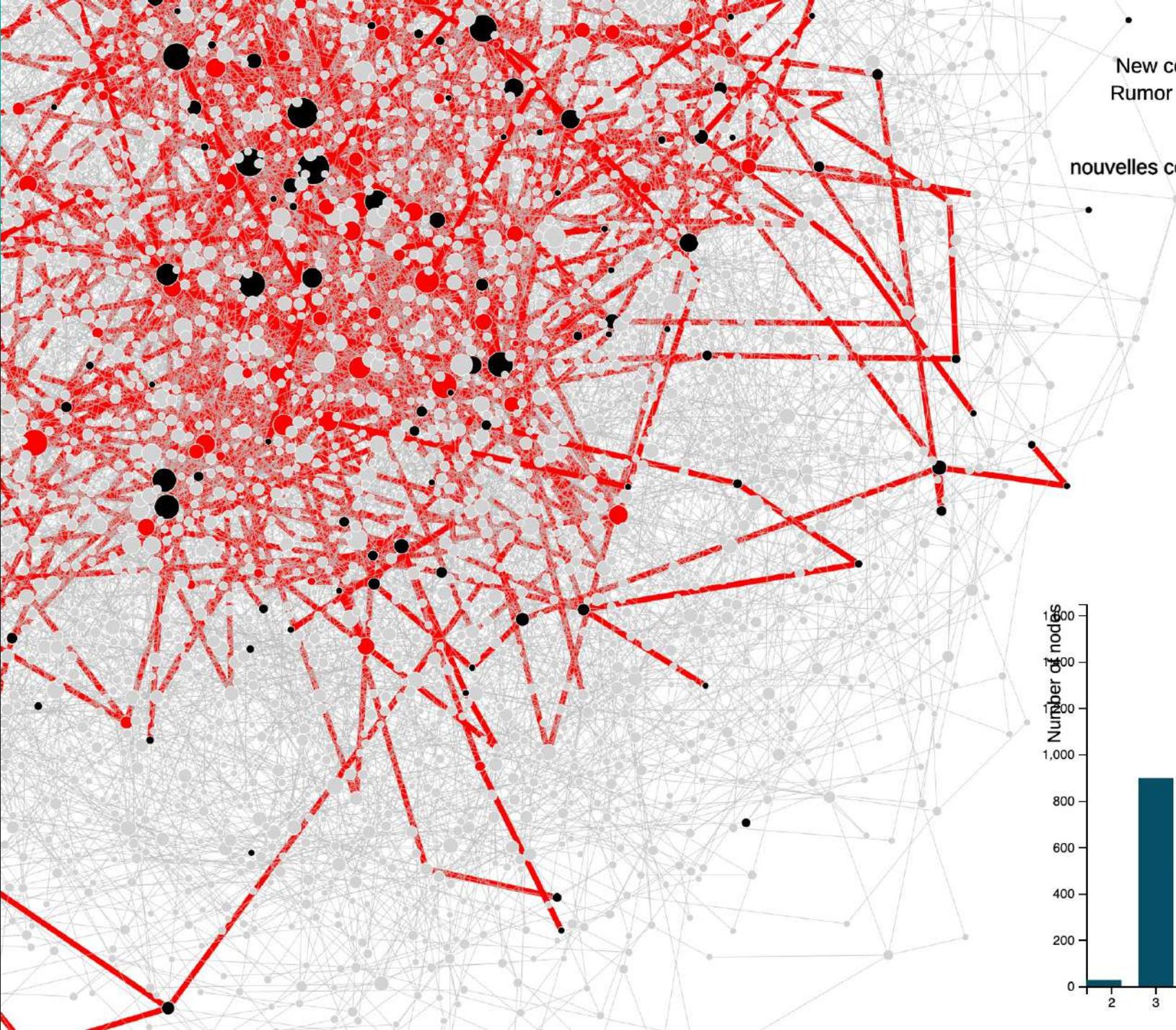


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4106 individus  
3949 sains  
30 incubent  
127 infectés

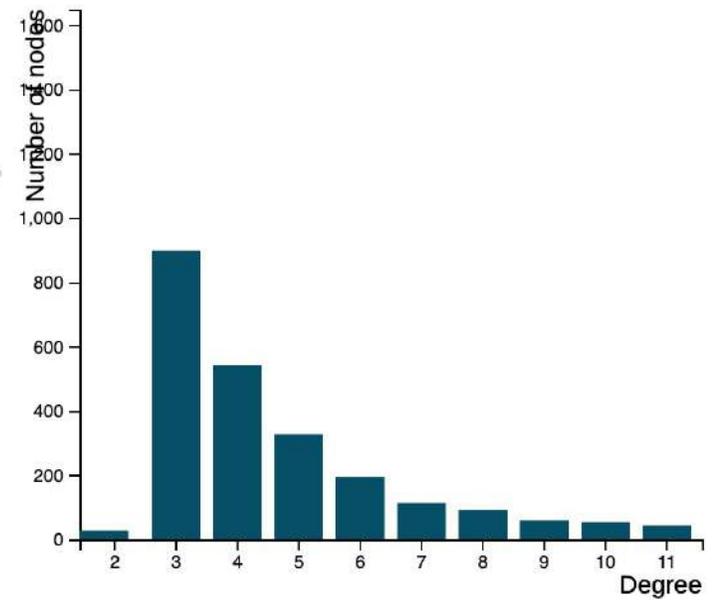


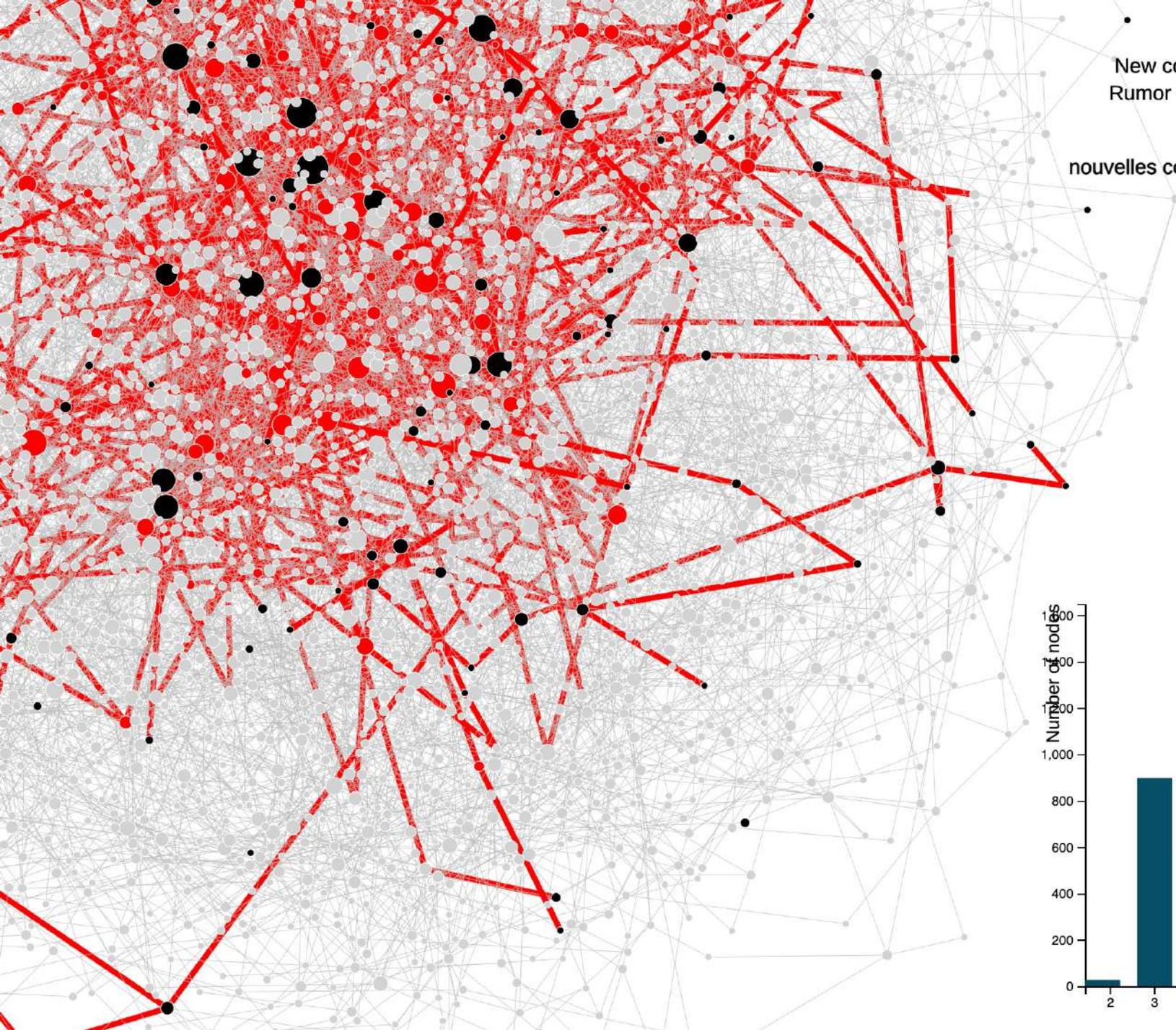


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4106 individus  
3719 sains  
147 incubent  
240 infectés

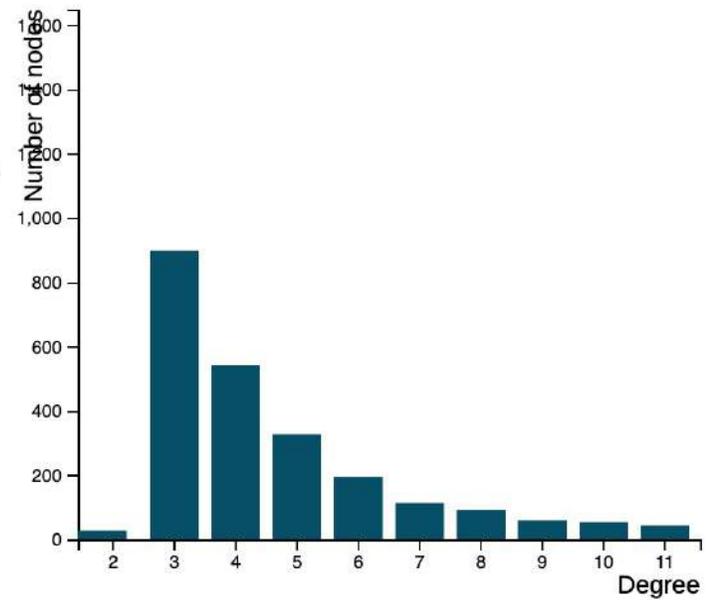




New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4106 individus  
3719 sains  
147 incubent  
240 infectés

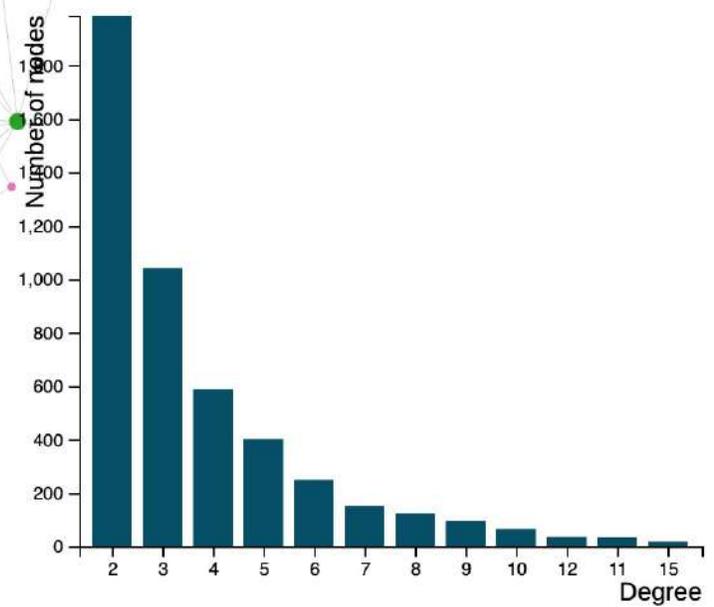


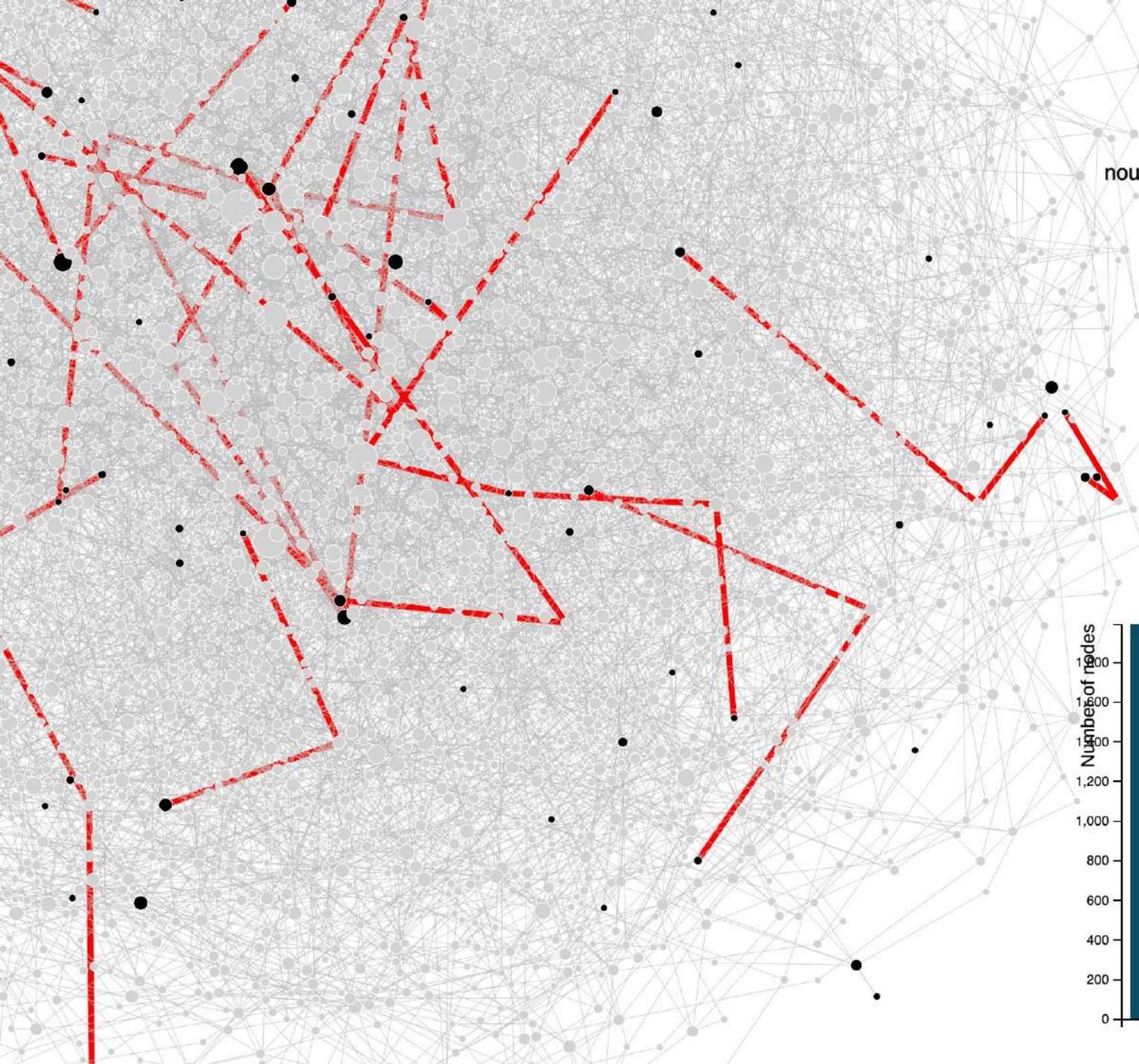


New connections:   
Rumor starters (%):

nouvelles connections: 2, starters proportion: 0.02

4892 individus

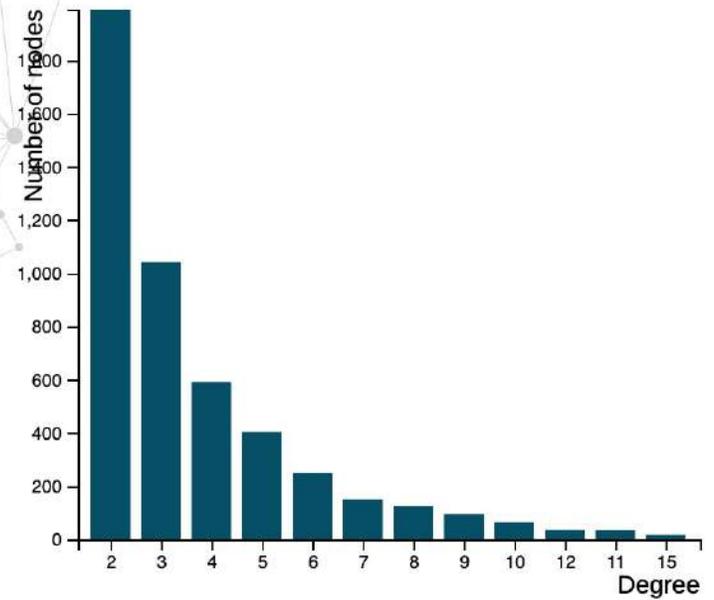


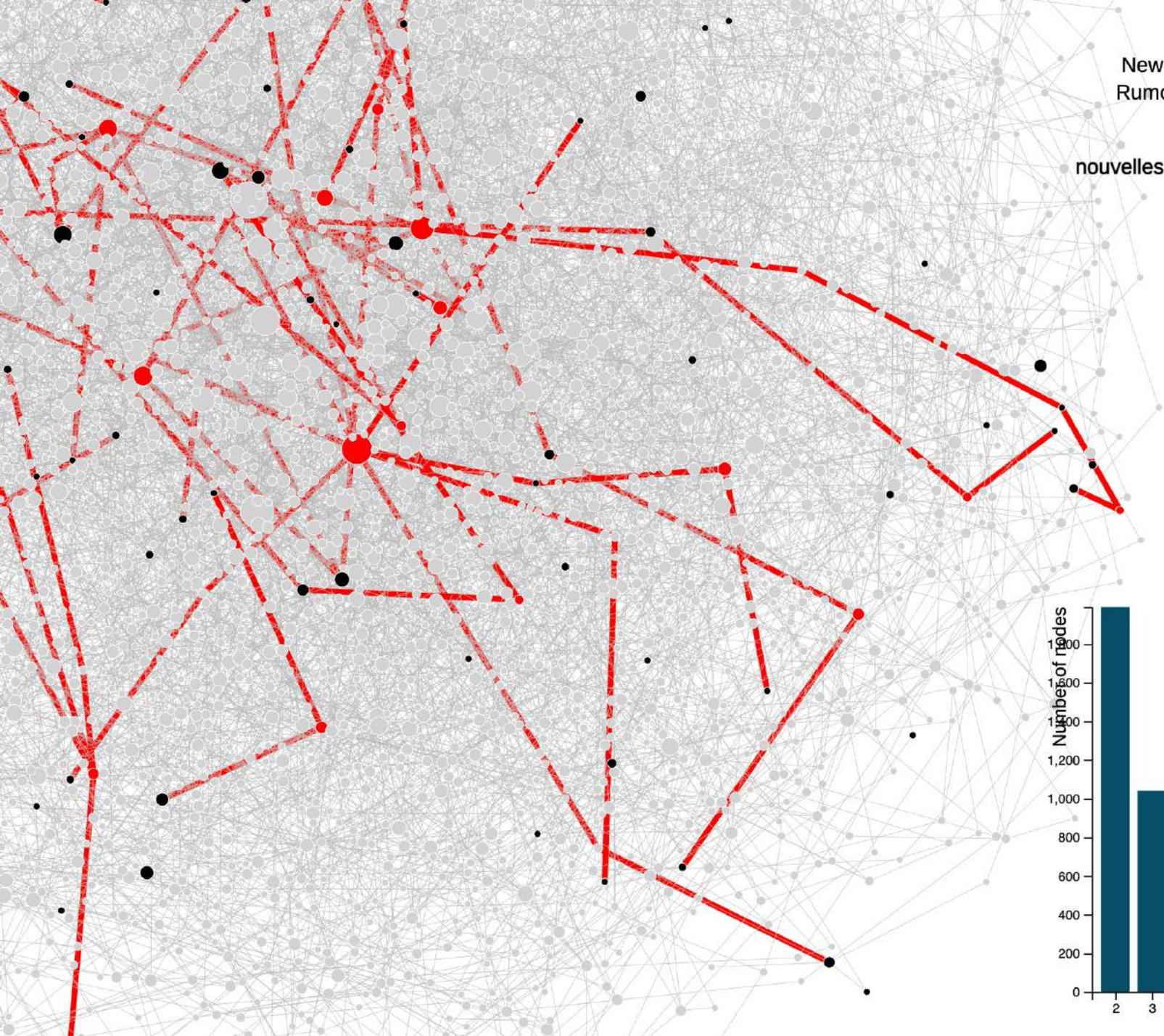


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4779 sains  
21 incubent  
100 infectés

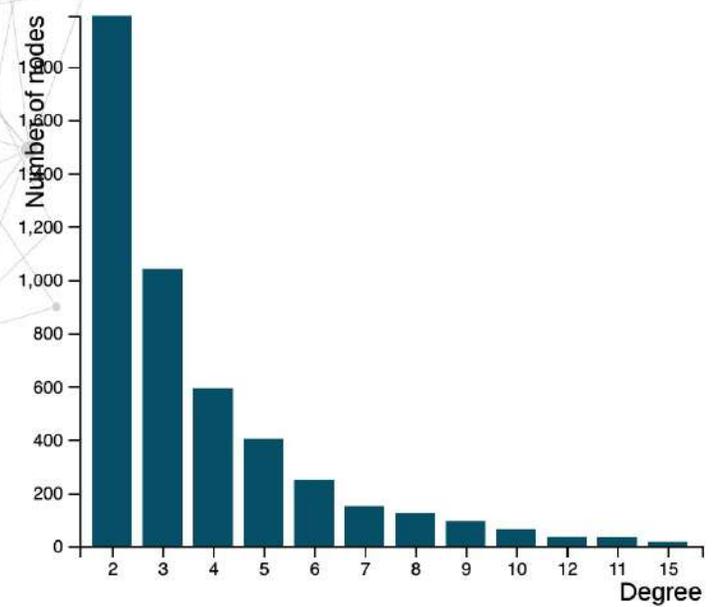


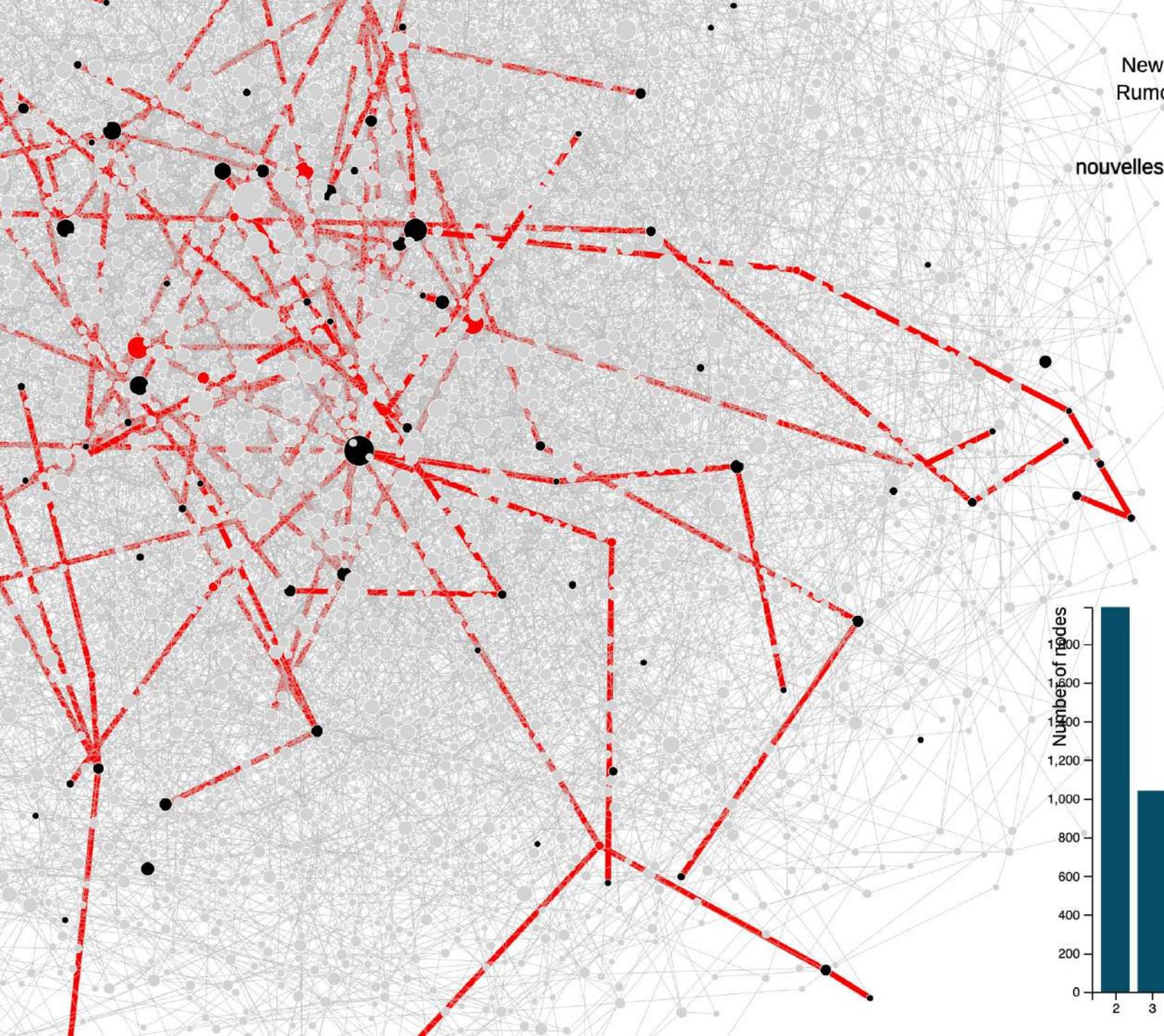


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4765 sains  
15 incubent  
121 infectés

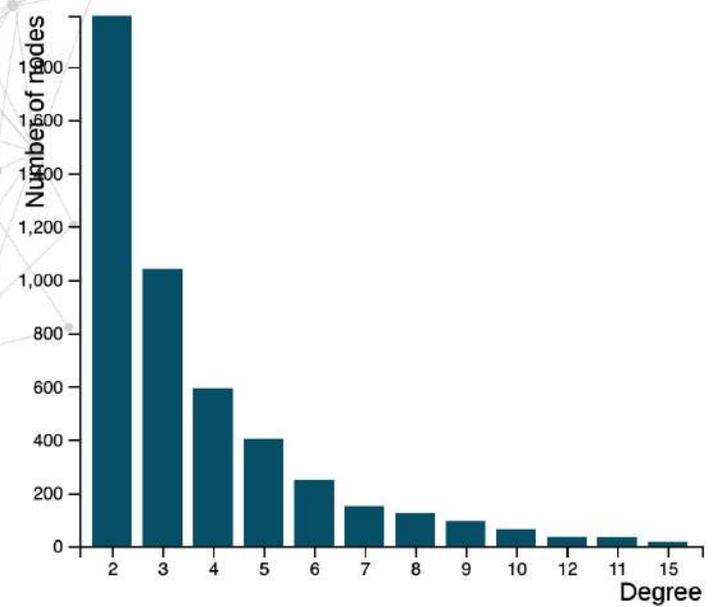


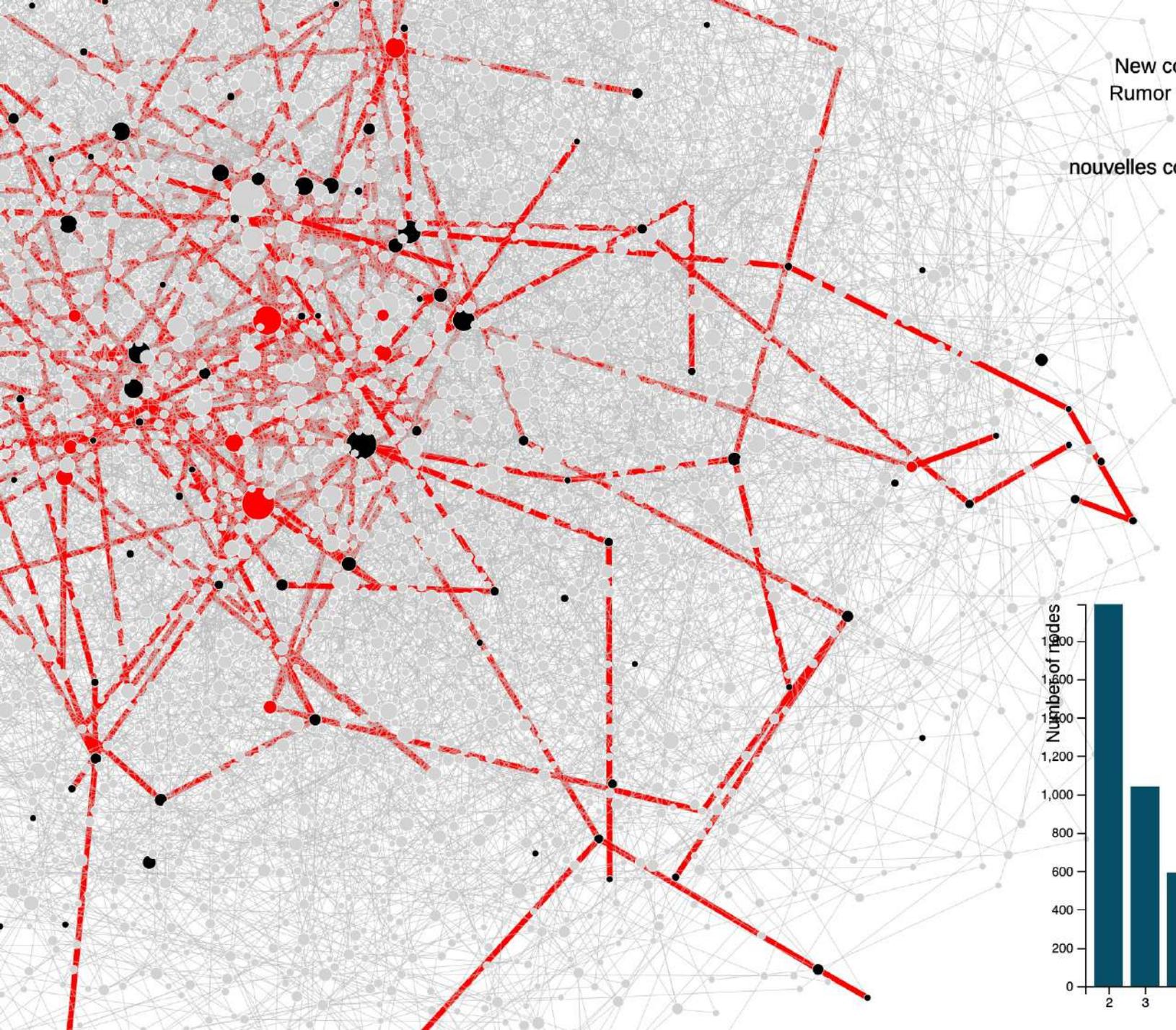


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4750 sains  
15 incubent  
136 infectés

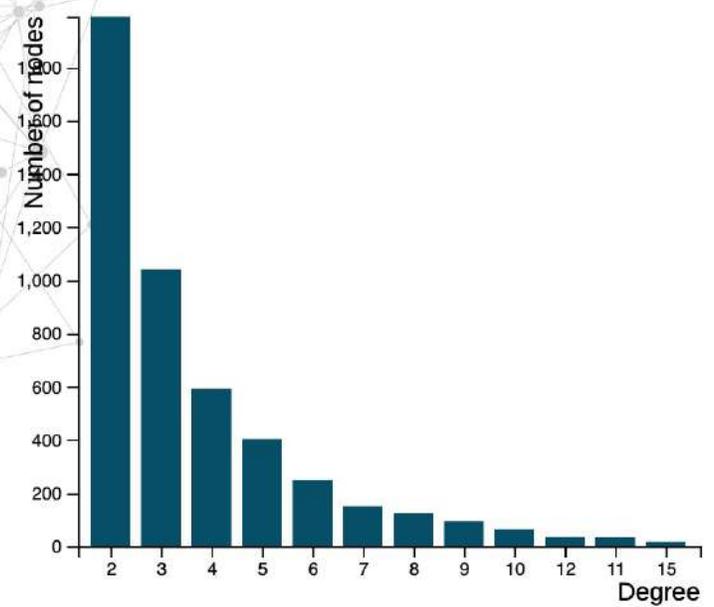


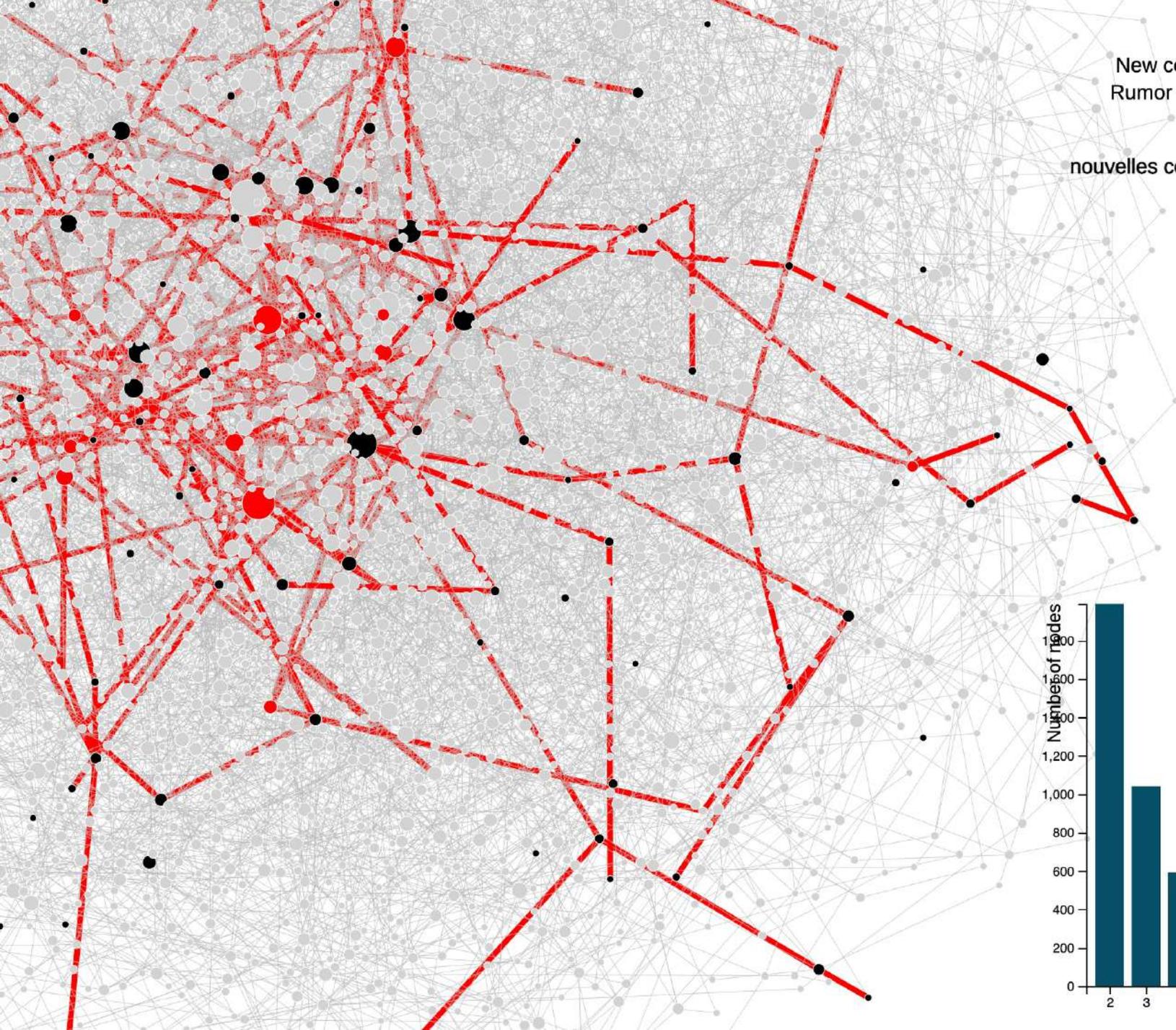


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4714 sains  
36 incubent  
151 infectés

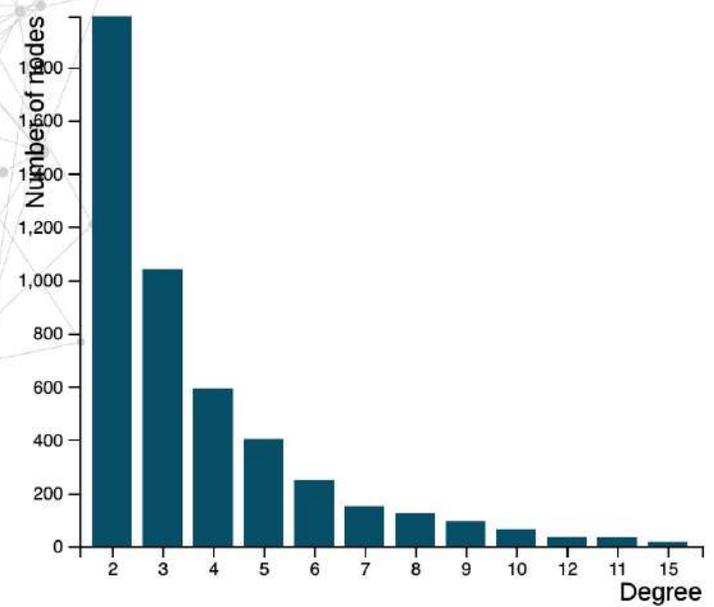


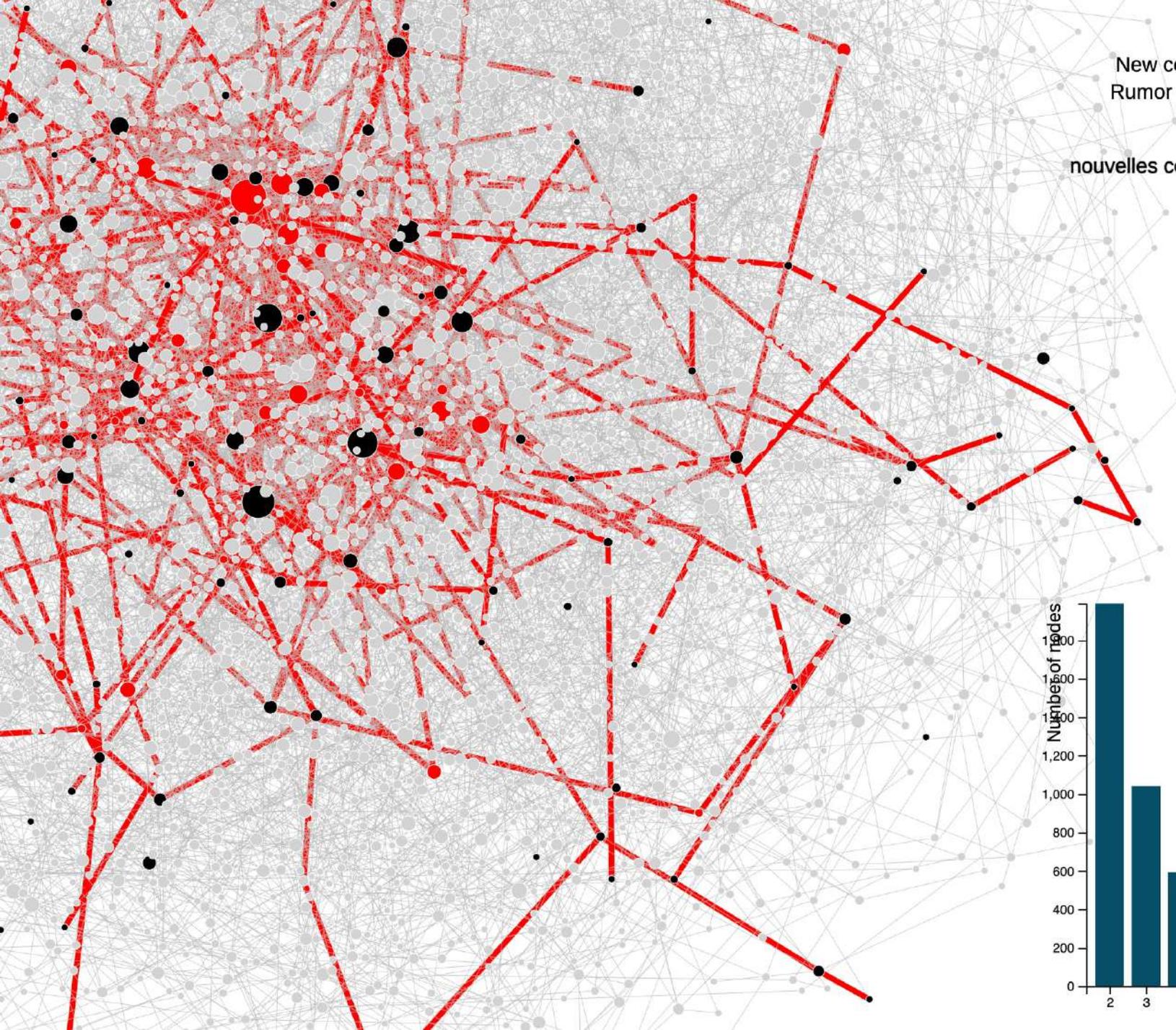


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4714 sains  
36 incubent  
151 infectés

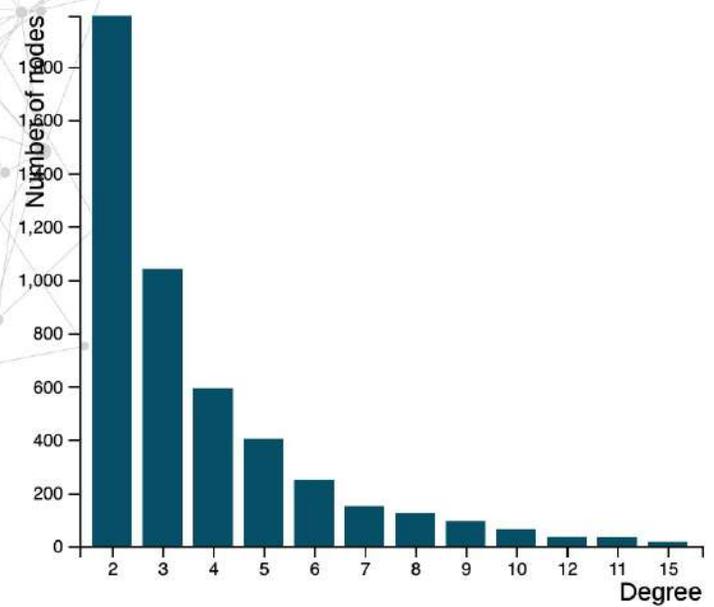


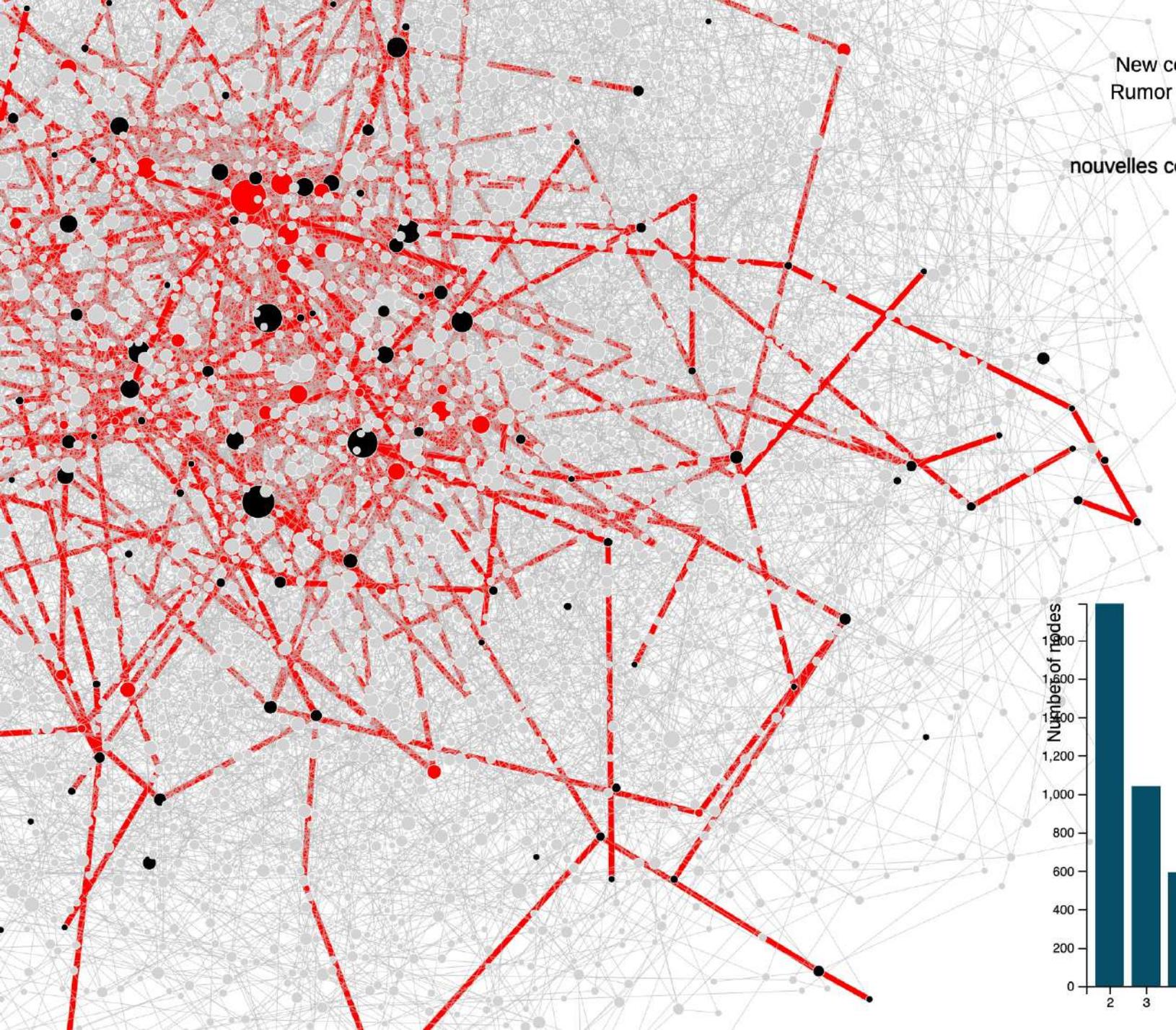


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4644 sains  
70 incubent  
187 infectés

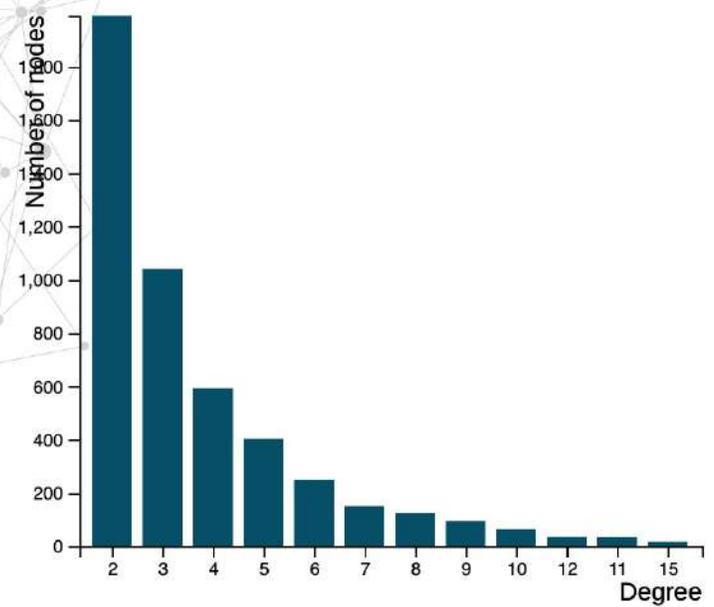


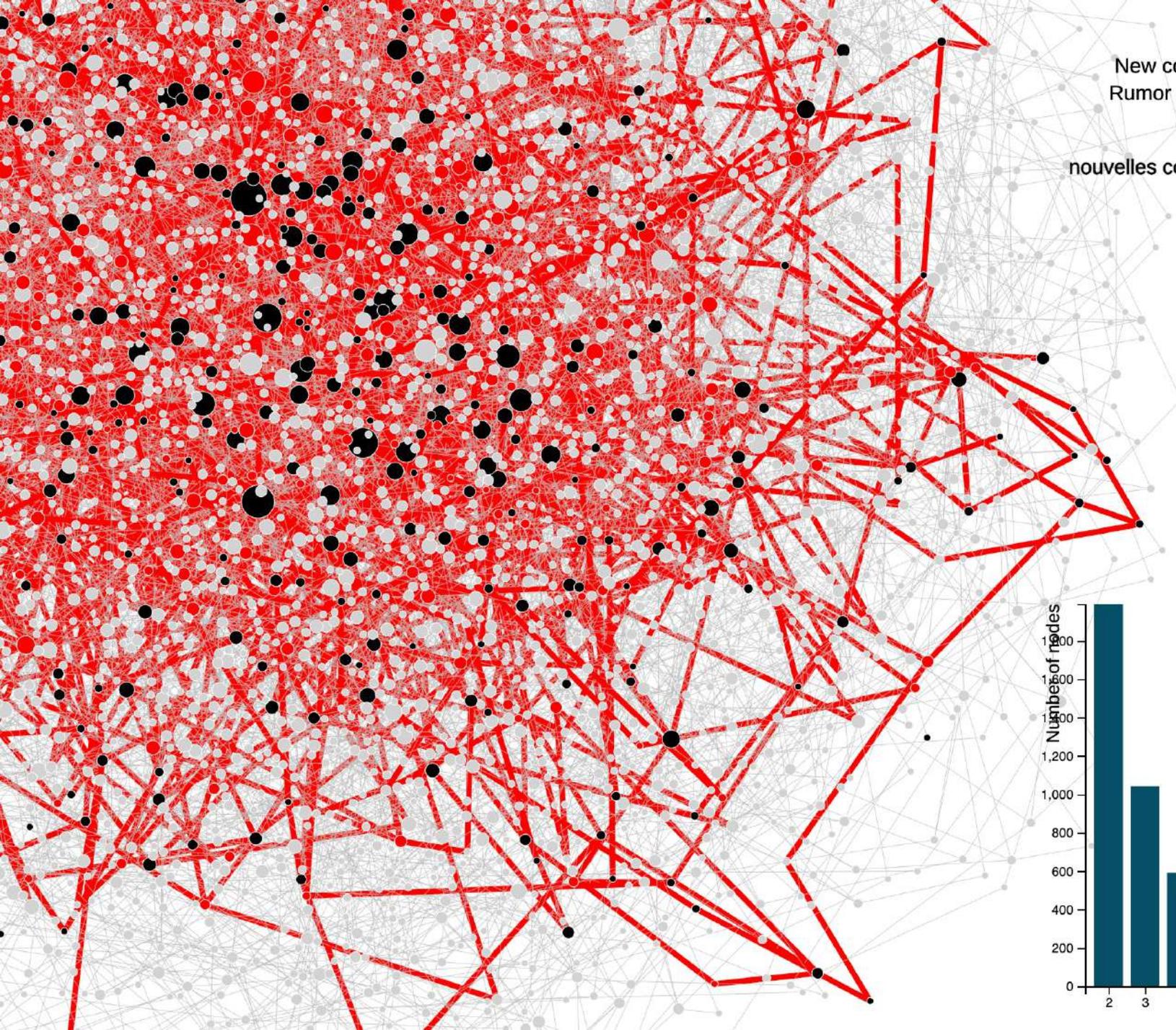


New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4644 sains  
70 incubent  
187 infectés

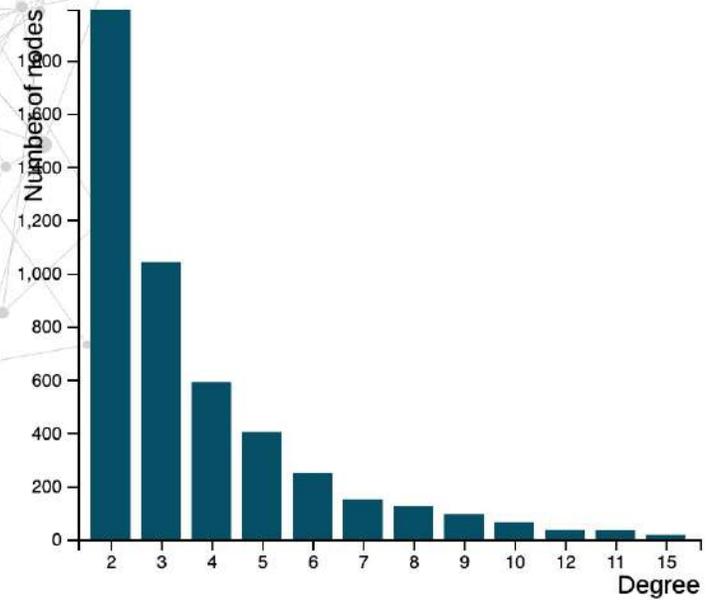




New connections:   
Rumor starters (%)

nouvelles connections: 2, starters proportion: 0.02

4901 individus  
4050 sains  
286 incubent  
565 infectés

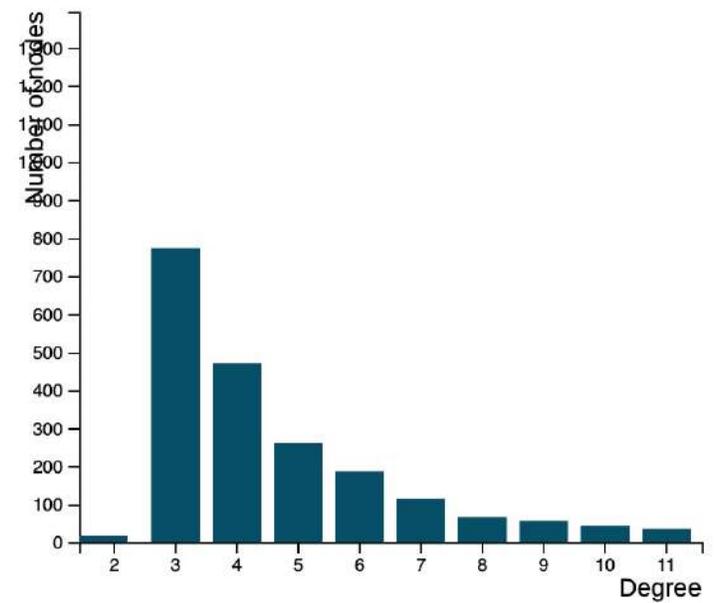


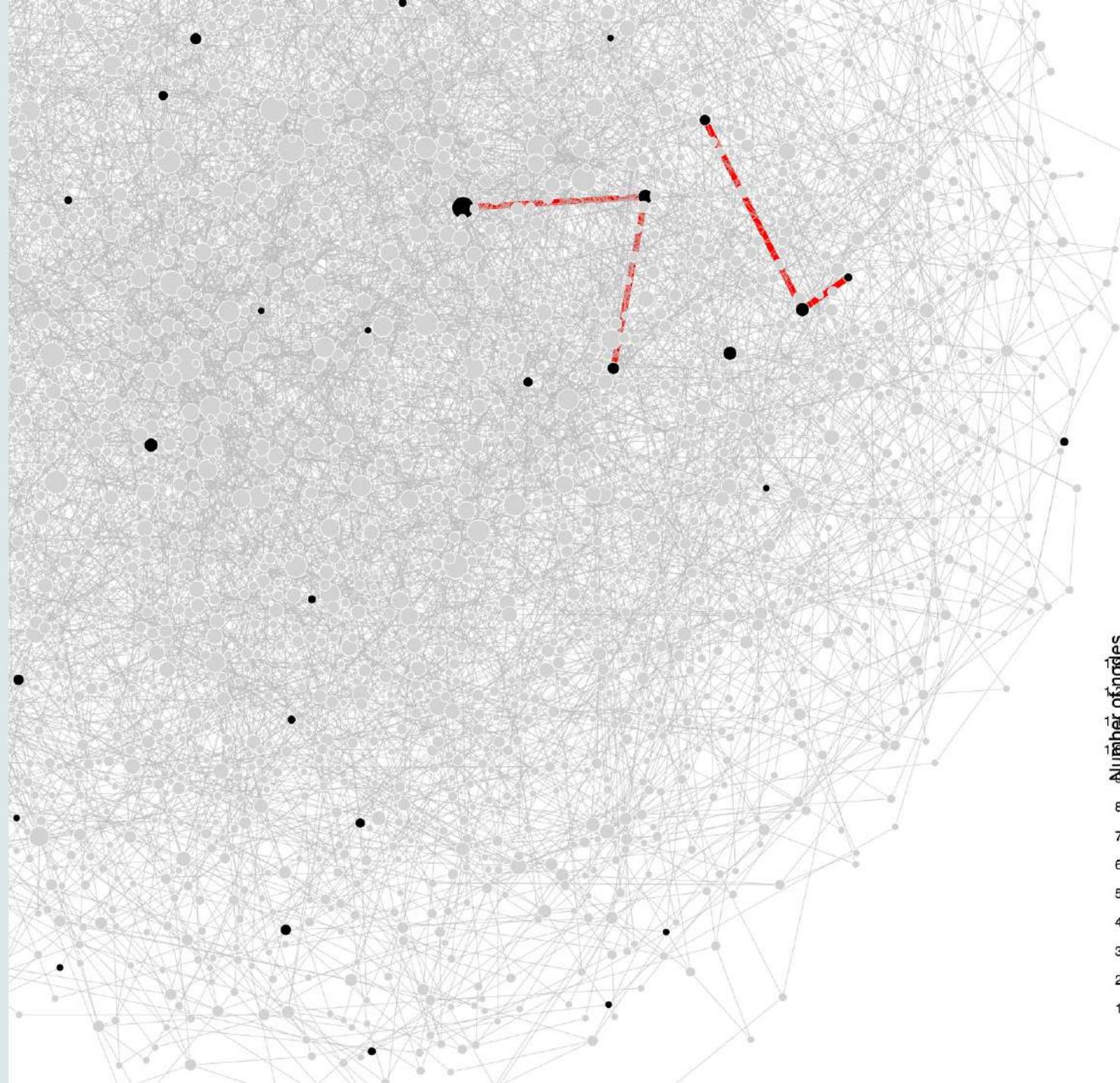


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

3519 individus

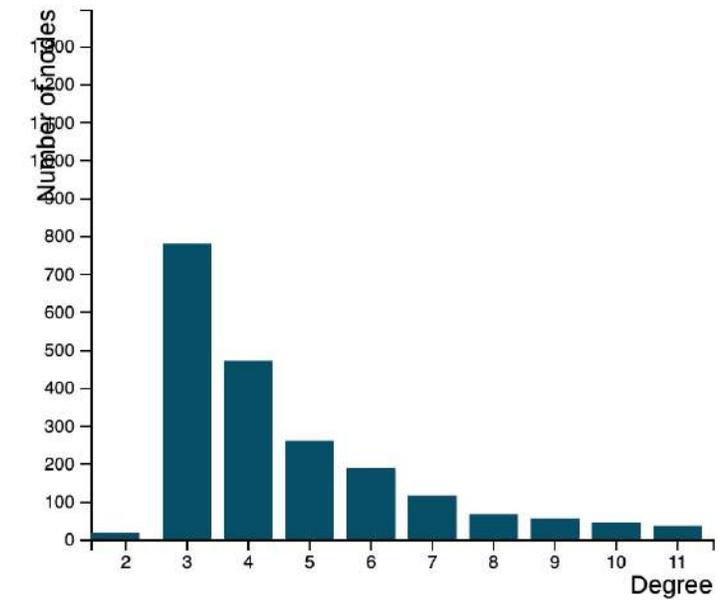




New connections:   
Rumor starters (%):

New connections: 2, starters proportion: 0.01

3528 individuals  
3488 sane  
0 incubes  
40 infected

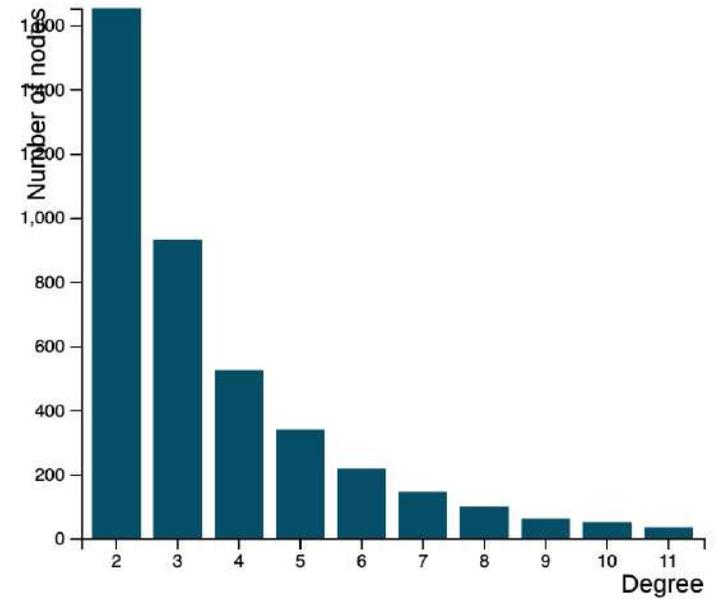


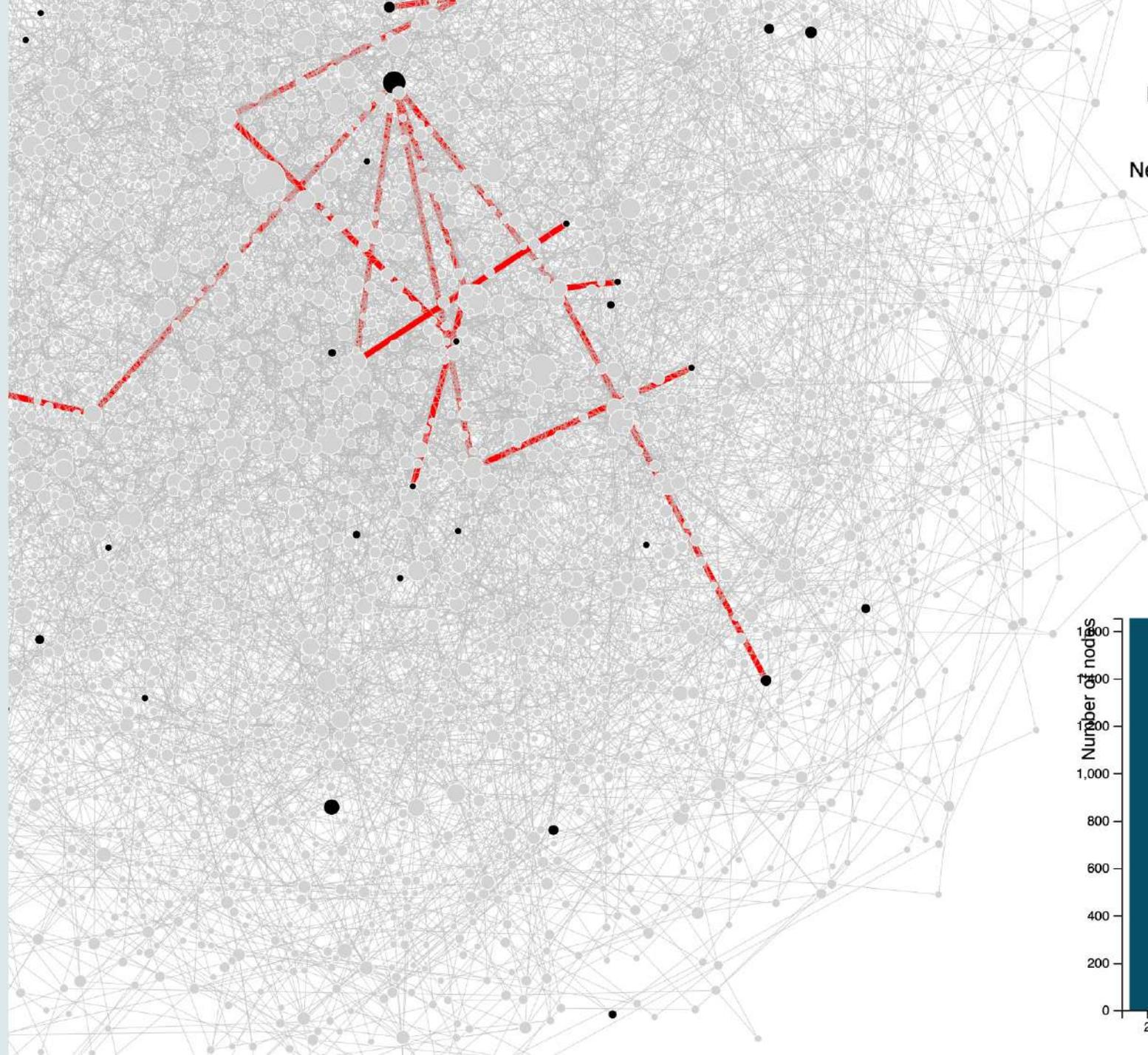


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

4192 individus

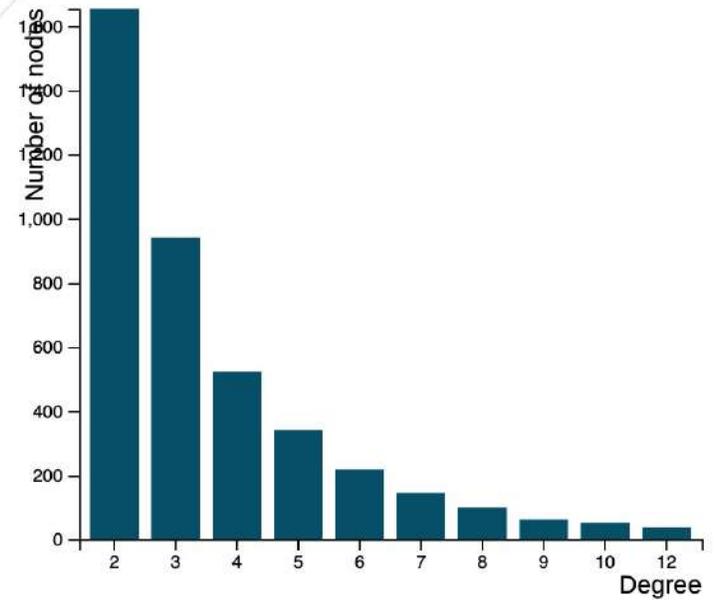


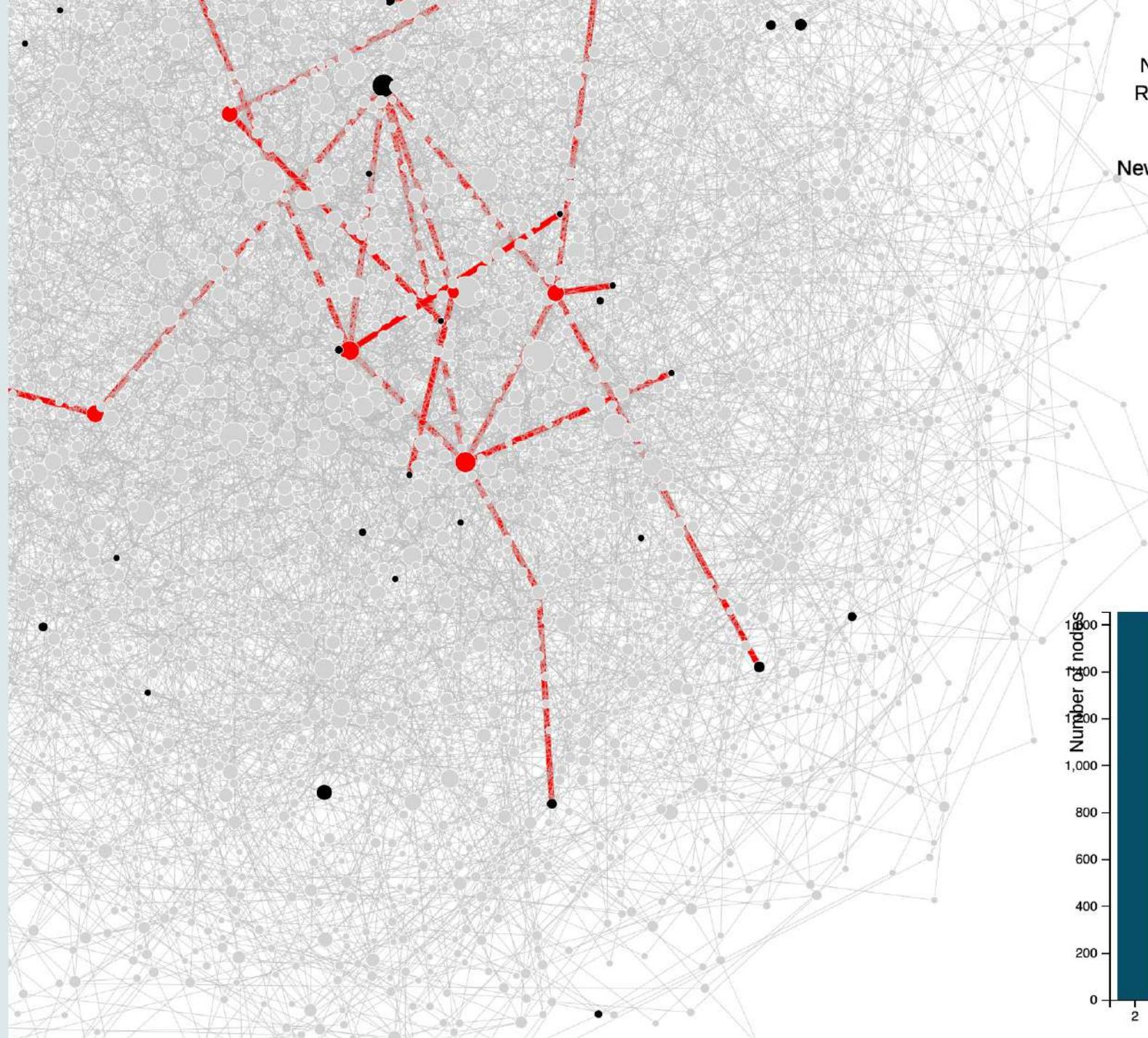


New connections:   
Rumor starters (%):

New connections: 2, starters proportion: 0.01

4201 individus  
4149 sane  
8 incube  
43 infected

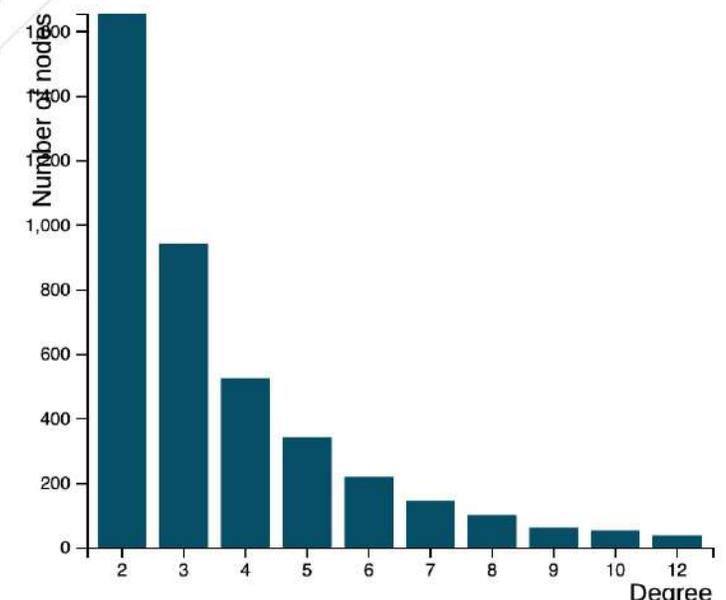


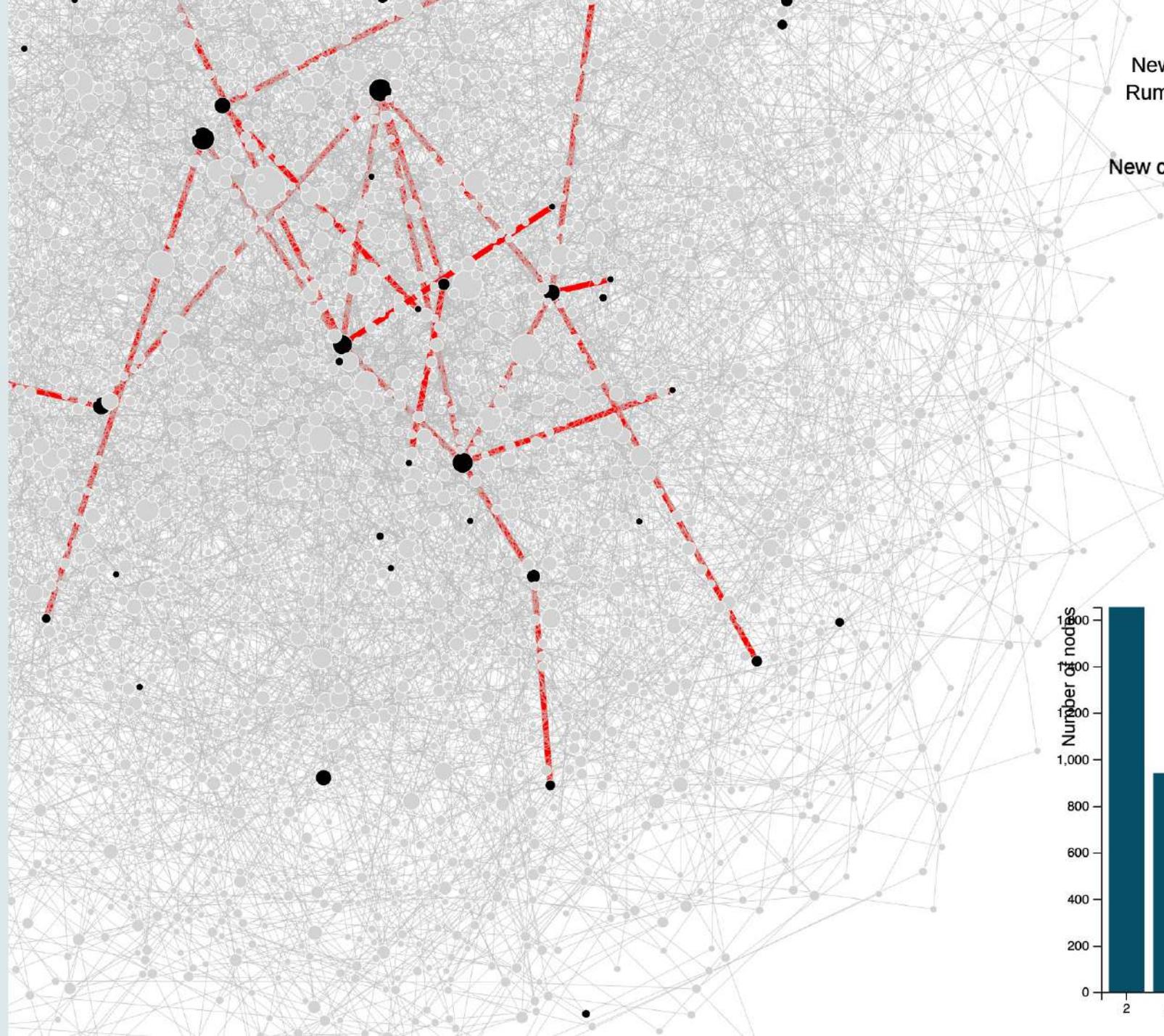


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

4201 individuals  
4147 sane  
3 incube  
51 infected

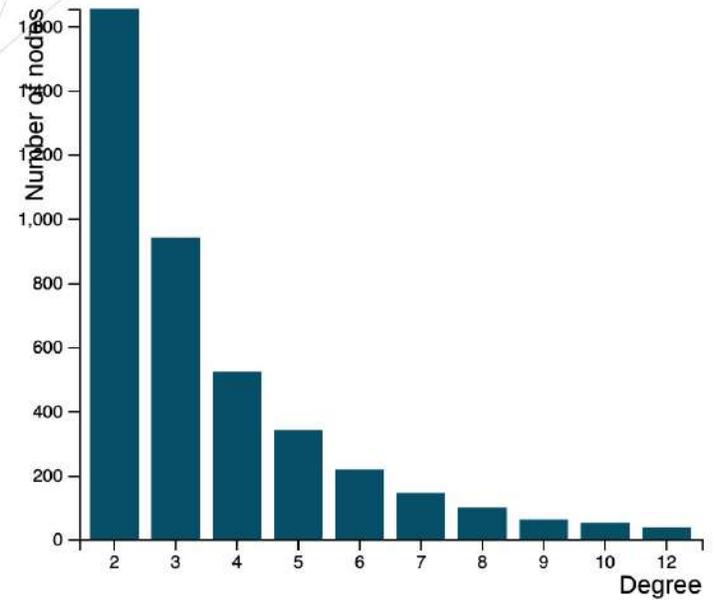




New connections:   
Rumor starters (%):

New connections: 2, starters proportion: 0.01

4201 individuals  
4146 sane  
0 incube  
55 infected

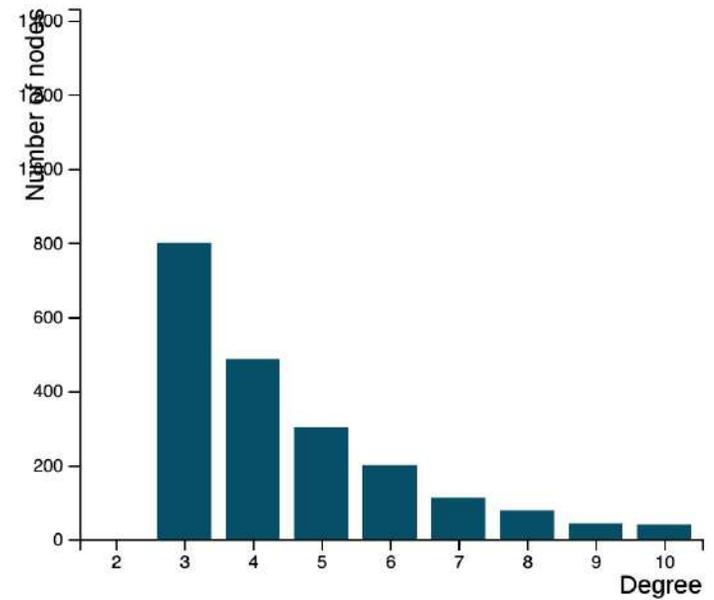


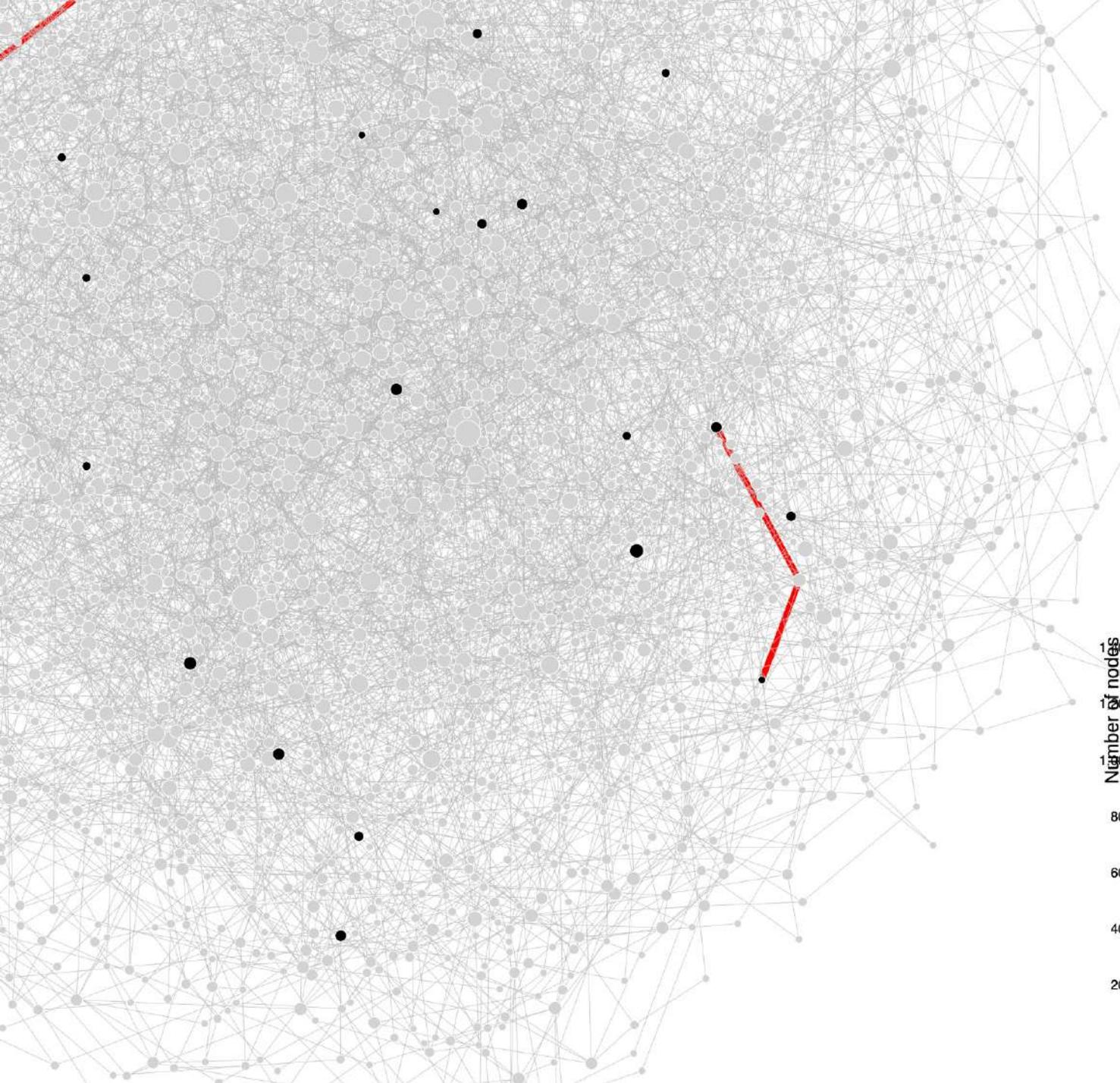


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

3652 individus

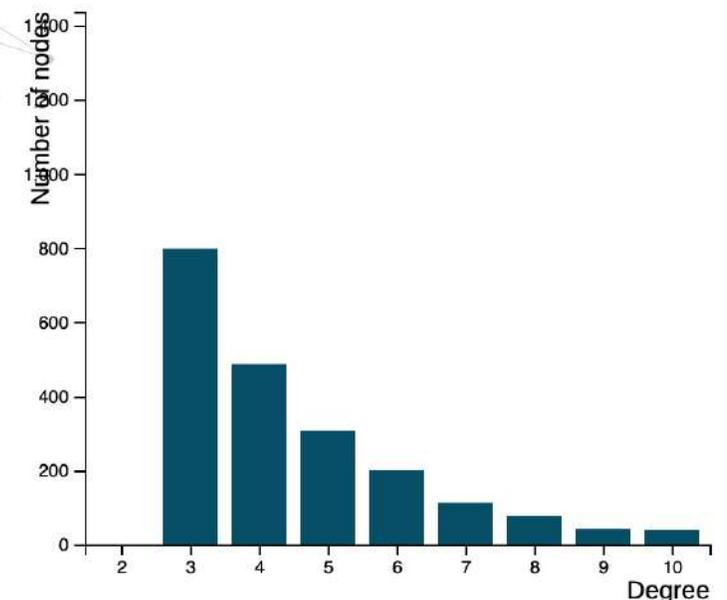


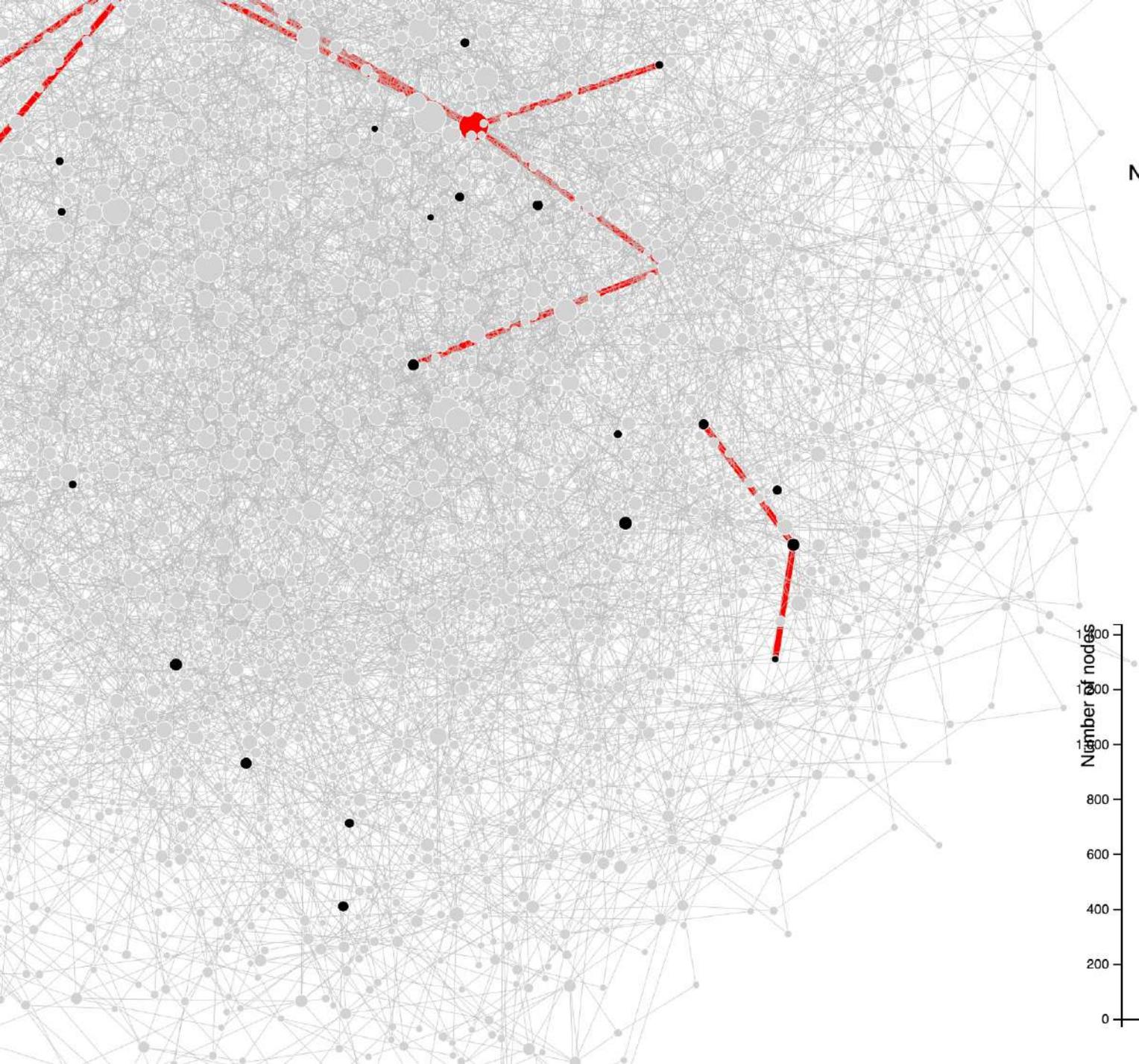


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

3661 individus  
3622 sane  
2 incube  
36 infected

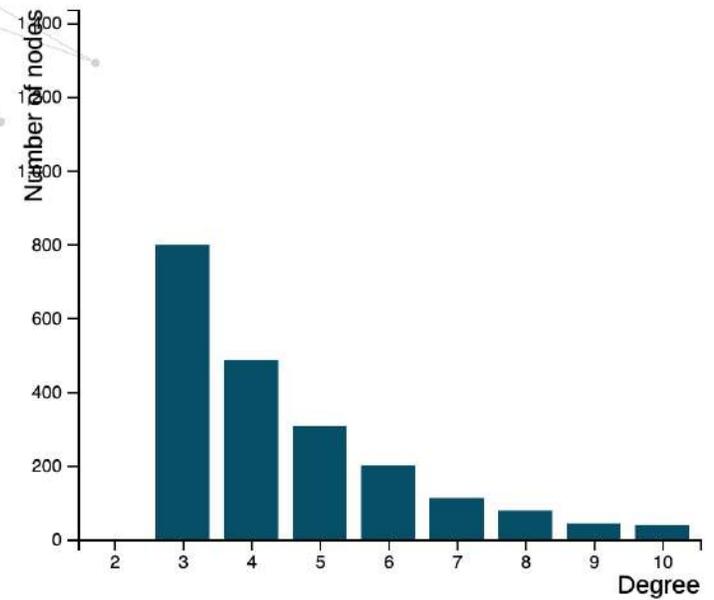


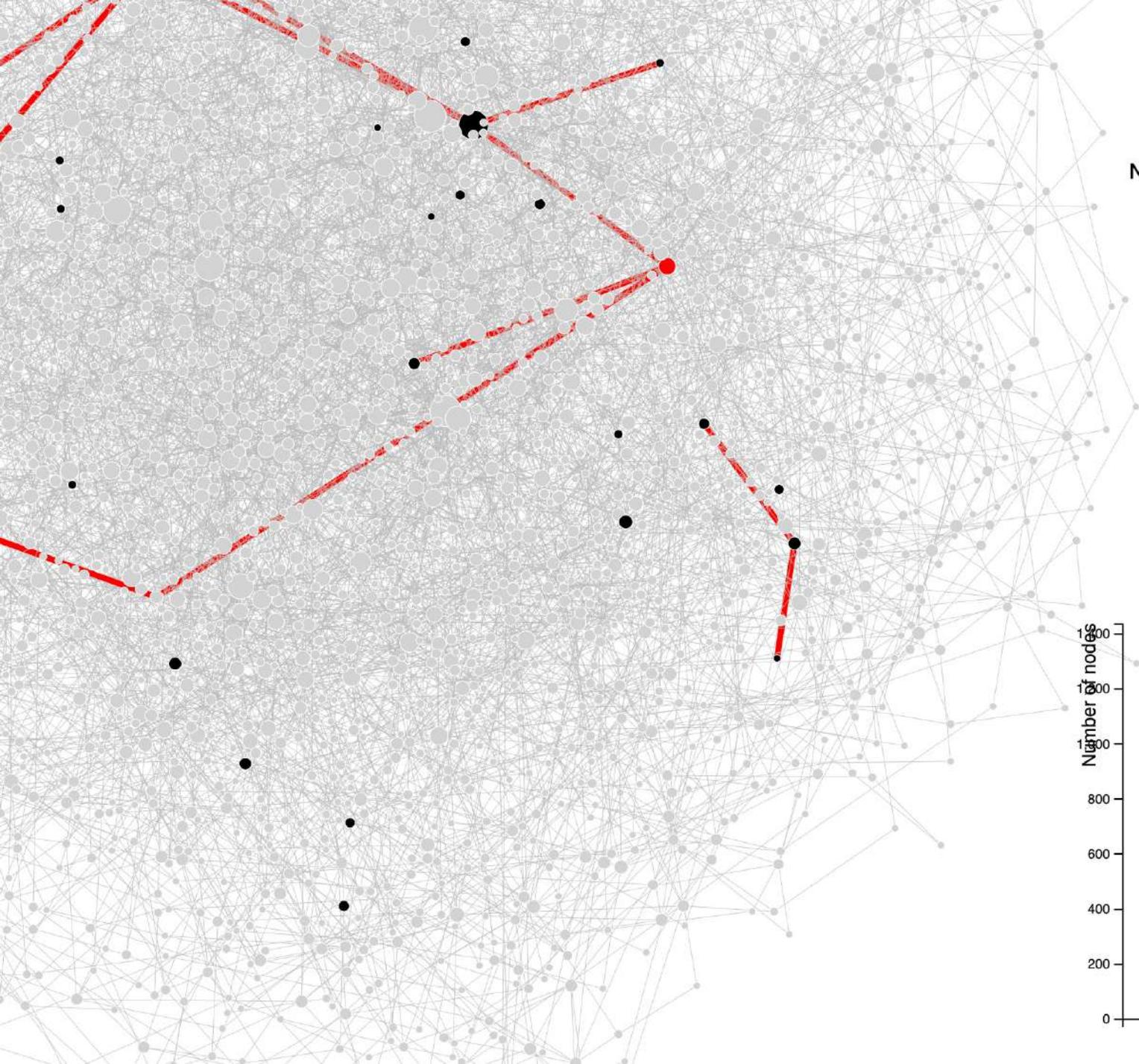


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

3661 individuals  
3619 sane  
2 incube  
40 infected

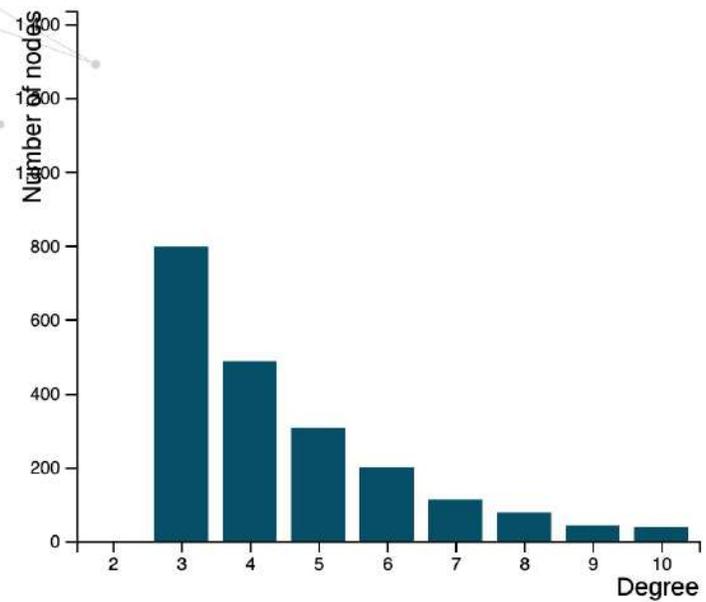


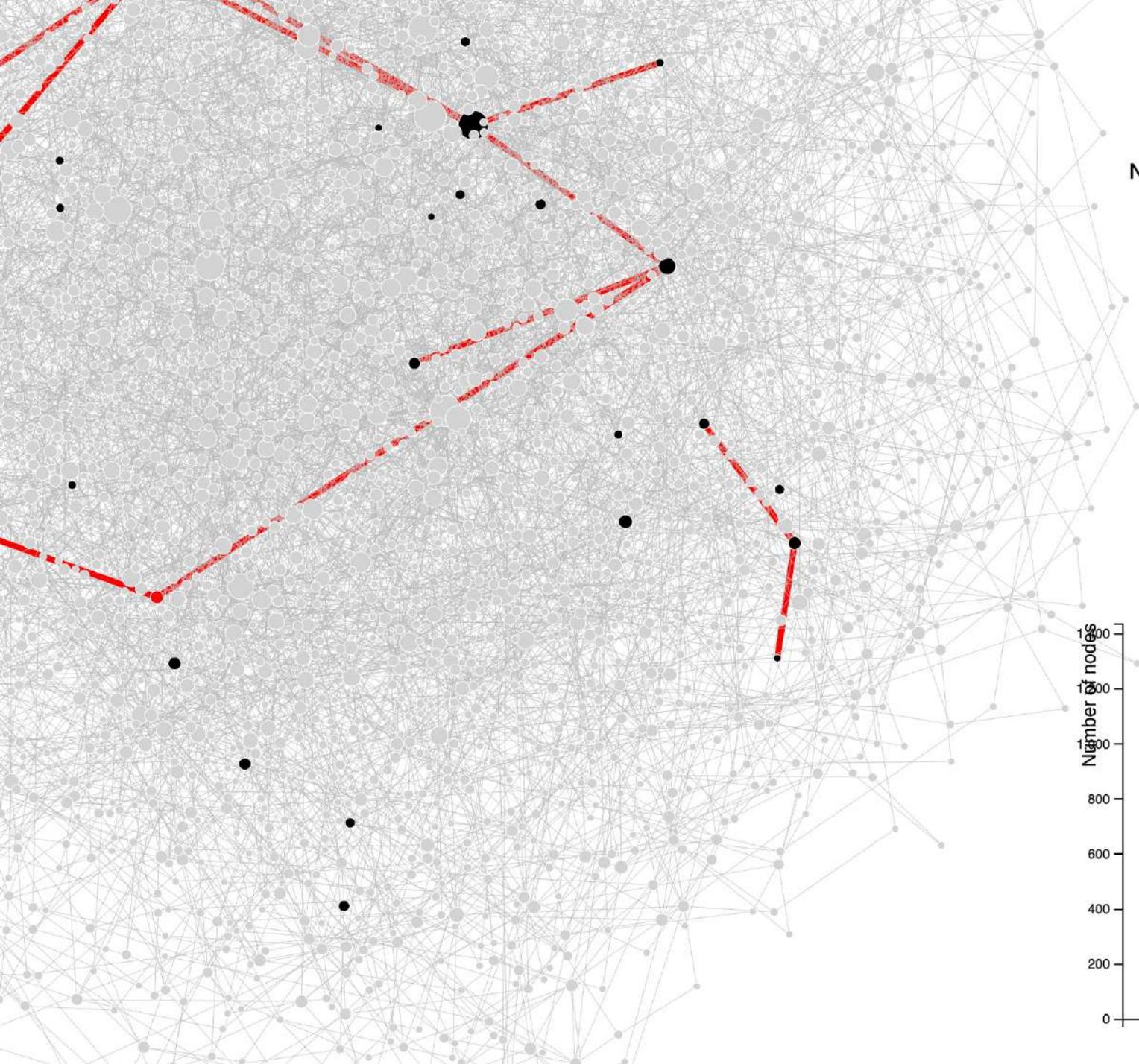


New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

3661 individuals  
3618 sane  
1 incube  
42 infected





New connections:   
Rumor starters (%)

New connections: 2, starters proportion: 0.01

3661 individuals  
3618 sane  
0 incube  
43 infected

