

For my daughters:

April 6, 2020

## The Coronavirus Pandemic

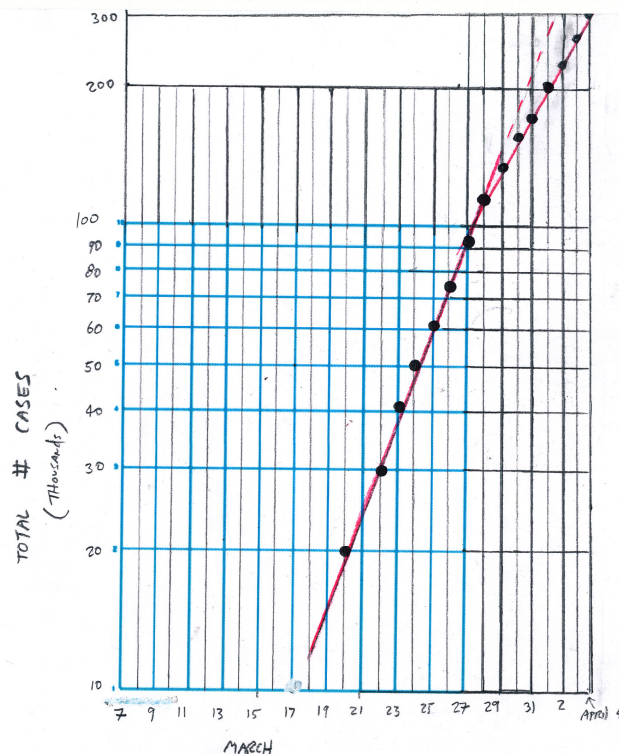
### *Have We Got There Yet?*

Since I wrote you a week ago, the coronavirus pandemic has continued apace. In those seven days, 215,534 more Americans have been infected with covid-19, and 7,452 have died. Yesterday alone 27, 820 more became infected, and 1,188 died. Not a pretty picture. I would not be writing to paint it for you if the view was uniformly black. In fact, things are looking up. We seem to be reaching the peak of the infection cycle – the number of new cases reported each day is no longer increasing. A lot of people are still dying, and many more will die, but we can anticipate things will now begin to get better.

### TOTAL NUMBER OF COVID-9 CASES LESS THAN EXPECTED

Let's start by taking another look at the overall level of coronavirus infection in the United States. I started collecting daily data since March 11, when the total number of cases was only a few hundred and there were as yet no deaths. We made a log graph of the data in the previous letter I wrote you, which rose as a straight line. If we now update this graph, the function (the red line) breaks around March 27, swinging to the right – the number of Americans infected in the United States is slowing, and rather dramatically! Very, very good news. What happened around March 27 to reduce infections? “Shelter-in-place” orders were given in most states then. God bless the governors who did so.

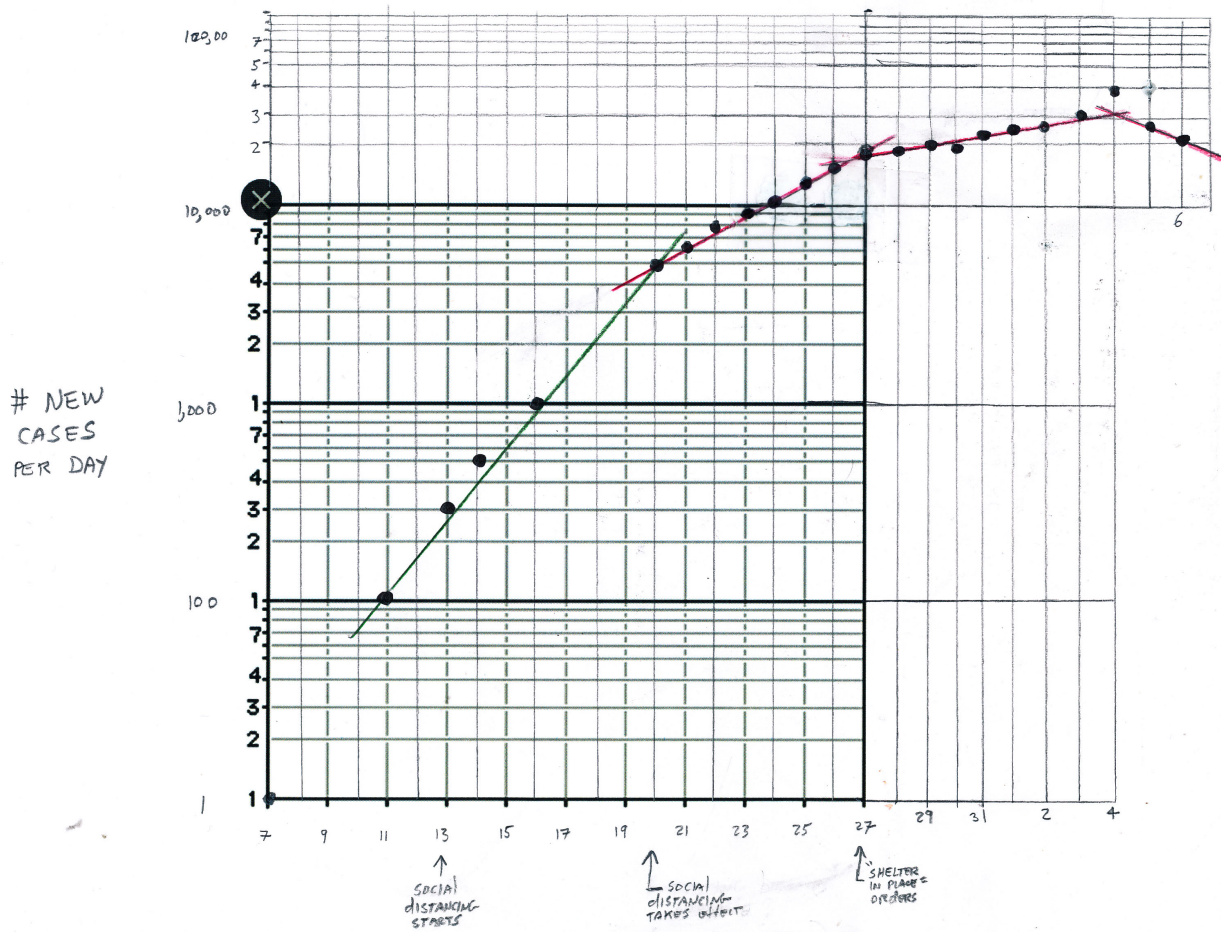
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As I told you in my previous letter, the World Health Organization has estimated from European data that the  $r_0$  number for covid-19 (the average number of persons an infected person will infect) is about 2.2 – every infected person tends to infect two people. That is a big number, comparable to the 1918 flu epidemic that killed millions worldwide. What social distancing attempts to achieve is a lessening of this  $r_0$  number, by reducing the likelihood that an infected person will get close enough to another person to infect him or her. And boy has distancing worked! As of April 4, some three hundred thousand Americans have become infected, while the outbreak unabated (e.g. the number on the [total # cases] axis of the graph where the straight red line intersects April 4 on the [date] axis) would have infected easily half a million.

### SOCIAL DISTANCING IS DOING ITS JOB

In my previous letter to you three, I pointed out that the social distancing Dr Fauci has been urging on our nation really works. You were able to see this clearly in the break in the red function line of the “ugly” log graph of daily new cases. So what has all this distancing achieved since then? If we reexamine this issue, updating our graph with more recent data, we again see the power of nation-wide social distancing. Over a few days on about March 27, most (unfortunately not all) state governors issued “shelter-in-place” orders, closing shops, bars and restaurants, and sending everyone home from work. This had a disastrous effect on the economy, but immediate slowed further the spread of the virus. You can see this clearly in the graph: the red function line breaks to a much shallower slope on March 27.



## WE HAVE REACHED THE PEAK

And that's not all you can see in this graph of daily new cases. Look at the upper right corner: The plot peaks on April 4! I cannot help but pat myself on the back, as this is the exact date in my previous letter that I had predicted daily new cases would peak. I based that prediction (informed guess) on what had happened in China and Italy in previous weeks. Not bad for an old not-really-Irish (according to AncestryDNA, but what do they know) guy.

## LOOKING PAST THE PEAK

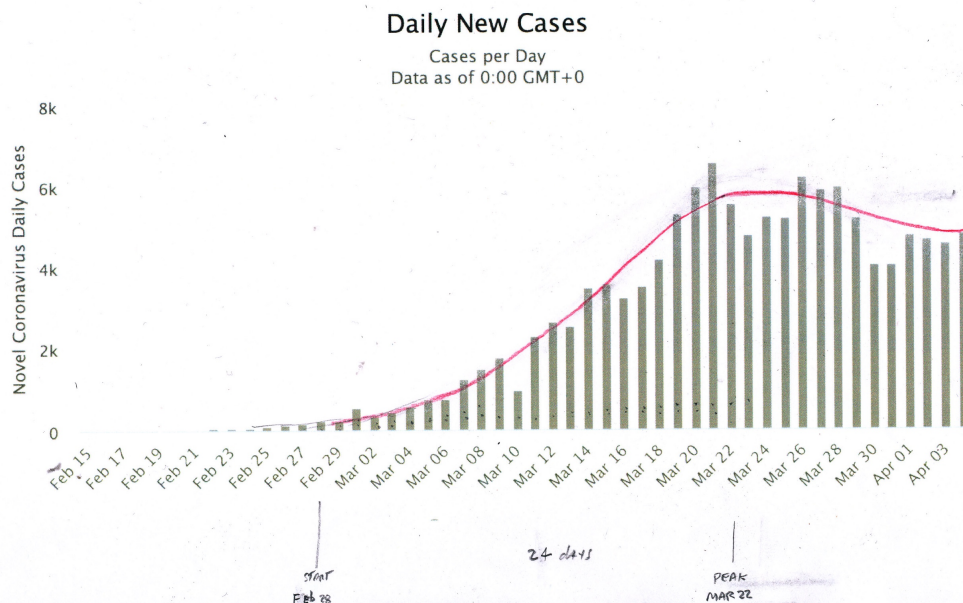
I am sure all three of you are asking "When will this be over? I HATE social distancing!" I wish I could tell you *soon* and reassure you that the danger has now passed, but I cannot. I know that you miss your friends, and that there is little joy in being alone day after day. Loving you as much as I do, I cannot do a thing to lessen that load. What I can do is to try to better inform you of what tomorrow will be like. How? By taking a look at what is happening in Europe, where the coronavirus pandemic started earlier and is further along. The two countries in Europe with the most covid-19 cases are Italy and Spain. By looking at what happened in these two countries, we can make an informed guess as to what may be coming our way.

### Italy

Italy is third to the United States and Spain in total number of covid-19 cases, with 128,948 cases as of yesterday, when they had 4,805 new cases reported (and they are not done yet). They had their first cases sooner than we did, reaching 100 cases daily (my arbitrary start point) on Feb 28. Like us, they reacted slowly, starting social distancing only weeks later, just as we did here. Italy only instituted a total lockdown on March 9 (we still have not). Here is how the coronavirus pandemic has progressed there:

### Daily New Cases in Italy

128,948 cases on 4/5/20



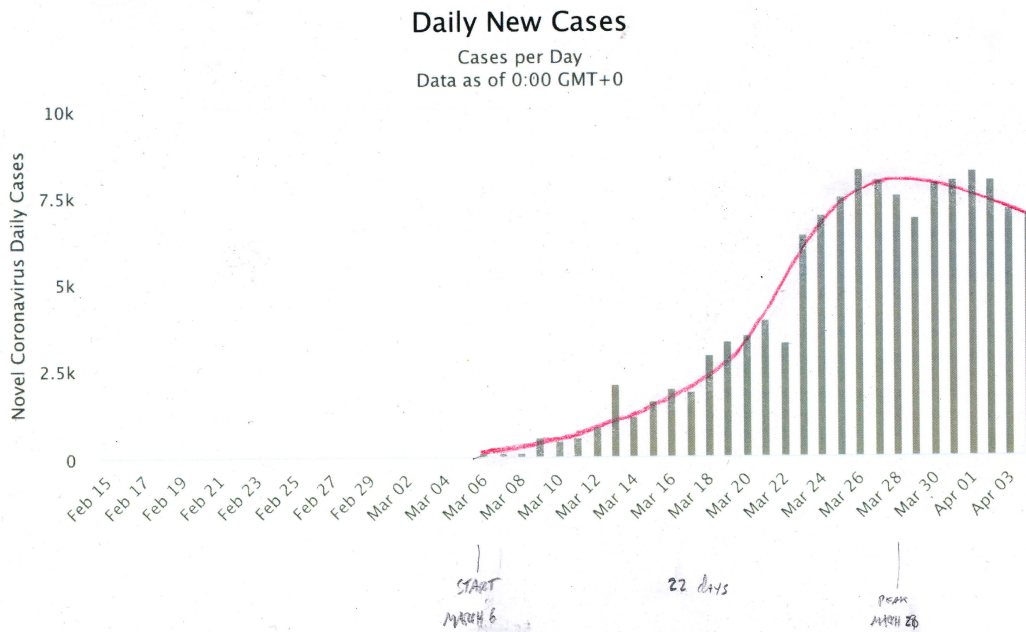
The rate of increase peaked in Italy on March 22, which was 24 days after the start of the epidemic in northern Italy on Feb 28. While the data are a little rough, somewhere around that day seems to have been the apex, the day with the most rapid rate of increase. As I pointed out to you in my earlier letter, 24 days is twice as long as it took the rate of increase to peak in China, no doubt reflecting the far less rigid social distancing implemented by the Italians. That's the good news. The bad news is that the rate of increase in Italy seems to have reached a plateau, not a peak: While the number of new cases daily is falling, the drop is only gradual. How much more misery is Italy looking at? There is no crystal ball we can peer into, but if this continues to follow the path we have seen in China (2/3 of cases after the peak), the Italians are not even half-way done. They can expect another 250,000 cases occurring over the next two months.

### Spain

Spain has even more cases than Italy, 131,646 as of yesterday. The coronavirus outbreak started later in Spain, with 100 new cases first appearing in one day on March 6. However, with very little social distancing in Spain the disease has spread even more rapidly:

### Daily New Cases in Spain

131,646 CASES on 4/5/20



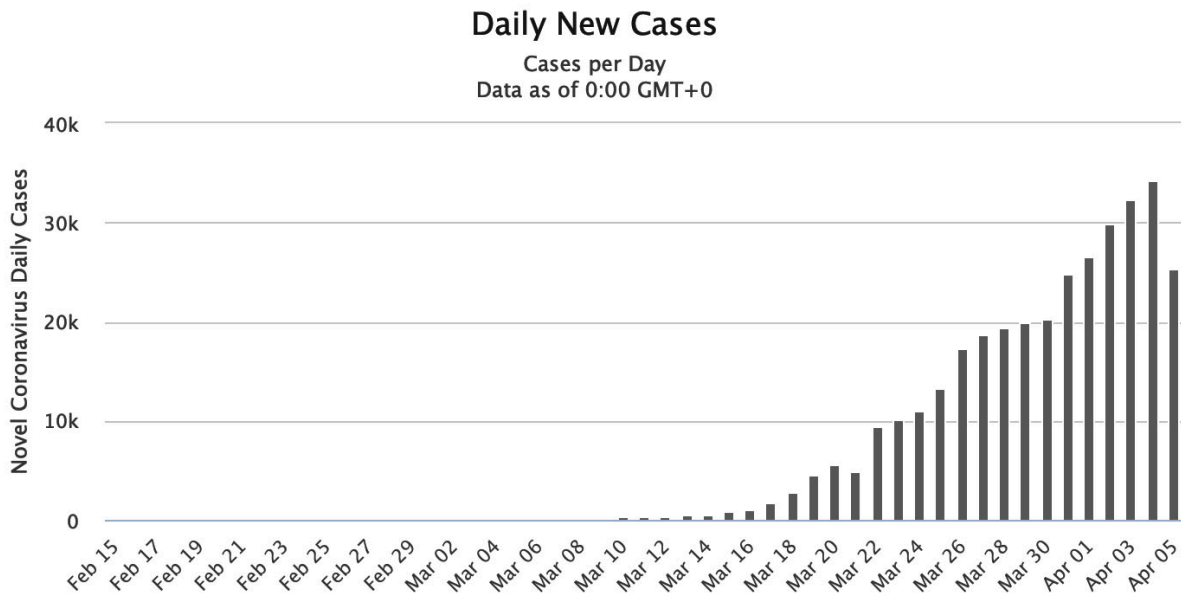
Please note the similarity to what happened in Italy. In both instances, the peak came in just over three weeks (24 days in Italy, 22 days in Spain), and in both instances we are seeing a plateau more than a peak, with many more cases to come. There is a little bit of bounce to the peak numbers, but I would be surprised if the Spanish weren't looking at even more future deaths than Italy. My guess is another 300,000 cases before July.



## United States

So where does that leave us? Well, when I looked at Italy and China in my last letter, I predicted that the coronavirus outbreak would peak in the United States 23 days after our outbreak started, on April 4. As you can see on the graph below, it did. That it did gives me some hope that looking at other countries does indeed yield a useful estimate of future events. The United States certainly shows the same shape of “new cases” graph as Italy and Spain, with a distance from start to peak of 23 days (remember, Italy had 24 days and Spain 22).

## Daily New Cases in the United States



The discussion coming out of Washington has not focused on these data, but on the more immediate problem of obtaining respirators for the seriously ill and protective clothing and masks for the medical folk who will have to care for them. My analysis sheds no light on this issue. The data on new covid-19 cases presented in the graph above gives no indication of the seriousness of each of the new cases -- many people test positive but never become seriously ill. How many? I have no idea. But many DO become seriously ill, and for this reason there is a huge problem in centers of infection like NYC, where hospitals are already pushing their limit. Where are they going to put the two thirds of covid-19 cases that are still to come as the outbreak enters a one-to-two month long plateau? Where are they going to find all the respirators? After a very slow start, we are starting to manufacture the needed items at a rapid clip. Effective distribution will continue to be an issue, I suspect.

Can we “cure” covid-19 with a drug? No. While the White House (and particularly President Trump) has been promoting hydroxychloroquine as a treatment, Dr Fauci has repeatedly responded that there is no evidence to support this claim, only anecdotal reports on the internet. A number of anti-viral drugs are being tested by the CDC for their effectiveness in treating covid-19 patients, but no results yet. Until that day, all we have is hope and hype, not knowledge.

## READING MORE TEA LEAVES

Is this peak we have reached in new daily cases of covid-19 really a plateau, as it was in Italy and Spain? Or perhaps it is a true apex, and will have as steep a downslope, as some in Washington are predicting in the hope that people can soon get back to work. While it is too soon to unearth hard data on the subject (the United States only peaked yesterday!), I would be very surprised if we are not looking at a plateau. There is just no reason I can see to believe we will have a different outcome than Italy and Spain, when we made all of their mistakes – basically, both Italy and Spain waited far too long to institute wide-spread testing and severe social distancing, and we in the United States are following that same path. For example, only tomorrow will Missouri, your home state, mandate stay-in-place.

So you can see why I conclude that we, like Italy and Spain, are almost certainly looking at a plateau. As your father, this is the key point I want you three to focus on, the reason I am writing you this second letter: we are far from out of the woods. The over three hundred thousand covid-19 cases we have seen so far in the United States are perhaps a third of the million-plus cases we will see before it is safe to call things safe.

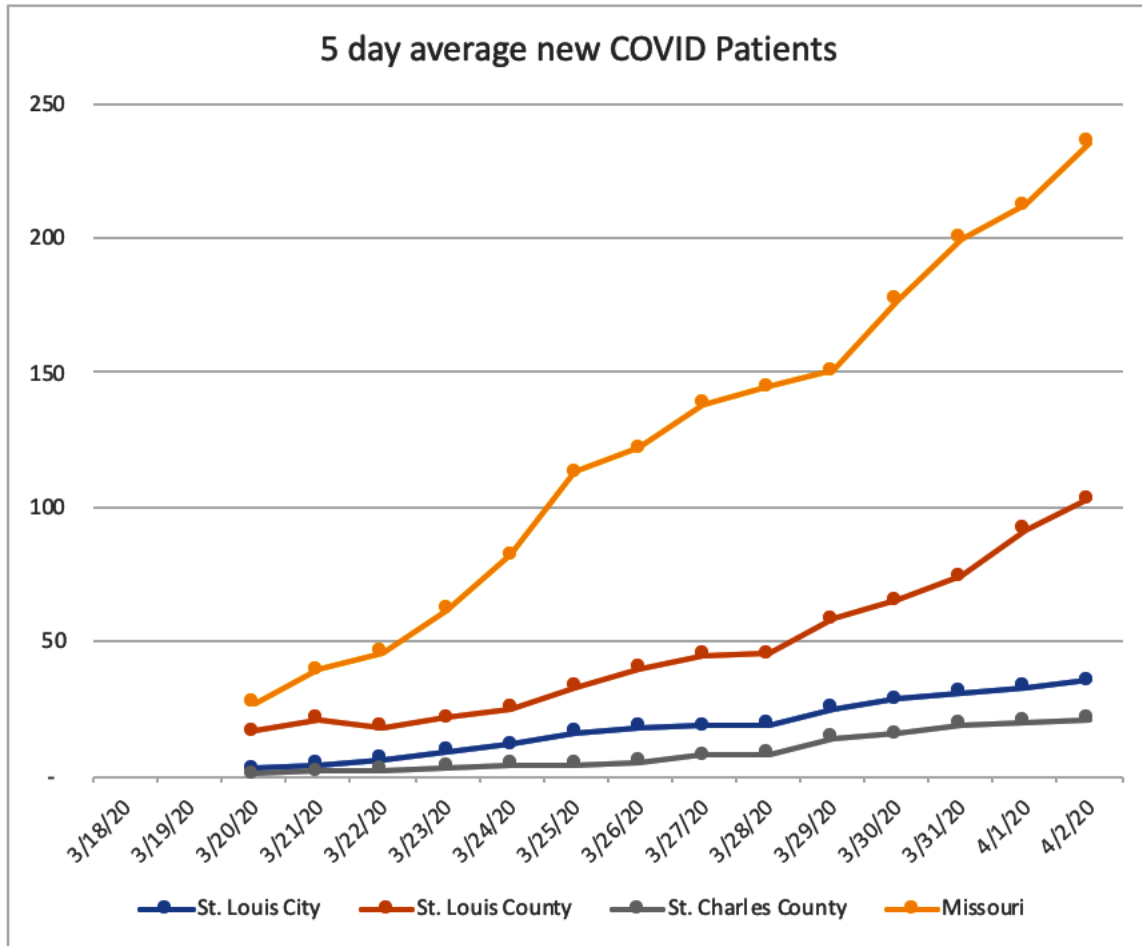
How long will we have to wait for all this to end? Figuring we will follow the same general course as Italy and Spain, we are about a third done, and are looking at some four weeks of more cases, fewer each day. How many cases in all? Probably twice what we have already seen, something like a million cases overall. Any chance of fewer cases, of a quicker end? I don't see it. The only country that has come all the way out of the pandemic is China, where new community-spread covid-19 cases continued to be seen for three weeks after they reached their peak. China has exercised far better social distancing, carried out nearly universal testing, and isolated everyone identified by this extensive testing as being infected. No way we beat their time to full recovery.

Why didn't we do as well as China? The answer to this question will be argued about for a long time in this election year. My opinion? We didn't do as well as China because the United States, unlike China, declined to use the World Health Organization's simple antibody-based test for covid-19. Back in January, over a month before the first recognized case, the Chinese posted a new mysterious virus to the WHO and within a week Berlin virologists had produced a simple diagnostic test for what proved to be covid-19. By the end of February, the WHO had shipped out tests to 60 countries. We refused to accept this help, electing instead to develop our own test. You know how well THAT turned out.

Bottom line: There is no way we get through this more quickly than the Chinese did. Figure on six weeks at a minimum (mid-May). Actually, to be on the safe side I wouldn't make any plans that involve travel or parties until June. Then we should have a hell of an all-hands-on-deck family party.

## SO WHAT SHOULD WE BE DOING?

We are going to be looking at some 800,000 more covid-19 cases over the next six weeks. Not very good news, but I don't see any other way to look at the data. Saint Louis is doing fine, far better than St. Louis County (with about the same number of people) or the State of Missouri:



Where does that leave our family? What should each of us do to reach June without Covid-19 infection? Nikki, you live in New York, within the densest cluster of Covid-19 in the United States (still more than a third of all cases, although Gov. Como says deaths in NYC have peaked!) and are doing all the right things. You should continue to wear a cotton face mask like your mother has made for you when you go running in Central Park, keeping away from other runners; wear a N-95 face mask when you must go where there are numerous people, like the grocery store. Caitlin, there is considerably less infection in Santa Fe, but I would still avoid crowded places. I don't see a problem with you visiting friends so long as you keep a reasonable distance apart – no hugs, please. Suzanne, you were wonderful for insisting that the Atlanta VA provide you with a way to work from home during the outbreak. Little babies like Jed need extra care.

## We Are A Family – Apart But Together



We are a family. No one of us is alone. The middle of May is the soonest I see us able to actually rub noses – and that's if state governors don't relax social distancing (I fear they will). Safer to plan on June first as freedom day. Until that day, you three should continue your social distancing, as your mother and I will. Shelter at home. Don't hug, shake hands, or kiss others. Wear facemasks when you go out. Hardest of all for me, don't pet other people's dogs. In the meantime, we should have more Zoom D'arties (day-time parties) so we can see and talk together as a family, even if only on a computer screen. If we have a Zoom cocktail party next Sunday, Mom has promised to make me a quarantini (don't ask). Always remember, we are in this as a family, together in every way but distance. Until summer, please live carefully. Your mother and I will give you each a real big hug at the other end of these hard days.

Dad