



## And the Winners Are

Voting for board members was different this year due to COVID-19. Since getting together in person was not an option, voting for new board members was done by email.

We are pleased to announce that two board members were approved by a large number of members responding to the email. The "new" board members are Leslie Martin and Susan Smith. We were delighted that both decided to run again for the board. They are valuable members, and we are glad their contributions as board members will continue through 2023.



## Thank You for Supporting GAGives@ #GivingTuesday

by Donna Mayer Todd

The 2020 GA Gives @#GivingTuesday, the online platform for non-profit fund raising and awareness, has come and gone. This year of 2020 being what it has, one ushering in twin pandemics to the USA, we did not have an idea of what to expect for the day. We have all experienced anxiety and sacrifice this year, some sadly and more deeply and long lasting, and the same can be said of our communities. The wonder was if we could raise any money for ACE simply by describing who we are and by asking. Well, we did! **The good news is that \$1,625 was donated to ACE for the December campaign. Add to that, the \$125 donated in May** to the additional and special GA Gives @#GivingTuesday

and our total 2020 fundraising from this effort is \$1,750.

We had 11 donations in December and most of them were from you. Thank you so much for the support! Thank you also to those who made an appeal for ACE on social media. That is how this particular word is spread, how we differentiate ourselves from all of the other worthy non-profits also seeking donations at the same time. We received our final donation from a friend of a member, and he knew about ACE and GA Gives @#GivingTuesday from a Facebook post our member made. We can make a difference for the great apes by utilizing our personal outreach in emails, on Facebook or Twitter, etc.!

Finally, please keep a good thought for our member who donated the \$1,000 we used for matching funds. This member wishes to remain an anonymous donor, but we know they are

committed to ACE by their generous support and participation. Feeling grateful for you, Anonymous!

Wishing you all (or y'all) a healthy and joyous new year, one in which we can soon see and spend time with our friends and loved ones again, without fear of virus transmission. One in which we can gather together again for activities to benefit the conservation of the four great apes.



## HBH Fundraising

We appreciate everyone who purchased HoneyBaked Ham gift cards during the holidays. The figures aren't in yet, but we know this campaign was a success because of YOU!

Thank you.



## ACE Members Are Interesting People

Our interesting member highlighted in this issue is Jennifer Reineck. Jenny has been active in ACE since 2015.

## Jenny Reineck

When I was a young girl, Jane Goodall was my idol. I read all of her books, subscribed to wildlife biology magazines, and dreamed of becoming a primatologist. I loved visiting Zoo Atlanta as a child and looking at the amazing gorillas.

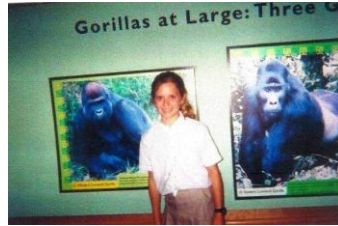


photo by J Reineck  
Jenny's 5th grade school field trip to Zoo Atlanta

As life changes, so do our interests and priorities, and I ended up going to business school at Elon University in North Carolina. Fun fact: I've never been a big Europe person (yes, I have been to Europe), so when I was in college and was trying to decide on a study abroad program, I actually decided to take an international accounting and finance course in the Cayman Islands. (This class credit supported my minor in Accounting.)



photo by J Reineck  
Jenny at the Sea Turtle Center in the Cayman Islands, 2011

While I was a student at Elon, I volunteered once a week at a nursing home. When I eventually moved back to my hometown of Atlanta, I missed volunteering. So it was actually my love of giving back to my community, rather than an interest in animals, that re-kindled my relationship with Zoo Atlanta in 2012. I fell in love with the community, the volunteer program, and the people I've met at our lovely zoo.



photo by J Reineck  
Jenny working Enrichment Day table, 2013

It was around this time that I also re-discovered my love of the Great Apes. As I went through Docent Training, I became enamored with orangutans. I was thrilled to find out that there existed a non-profit within the volunteer community that was specifically dedicated to saving great apes, so I knew I had to be involved with ACE,

As I began to share my love of the zoo with my parents, my mother began to take a keen interest in elephants. This worked out great for me, because she loved them so much

that she offered to take me and my sister on a trip to South Africa to see them in the wild. So in September 2016, we boarded the sixteen hour flight that would take us to the other side of the world. That was the trip of a lifetime that I will never forget!



photo by J Reineck  
Jenny, sister and mom with tour tracker and guide, 2016

We saw elephants (including very tiny little babies!), rhinos, lions, white lions, cape buffalos, giraffes, leopards, cheetahs, ostriches, warthogs, African wild dogs, hyenas, vultures, spiders, and more. Going into this trip, I thought I would be the most thrilled by the lions or the elephants, but one afternoon on our evening game drive, we came across a huge family of hyenas that had a bunch of tiny little babies! This actually ended up being my favorite sighting of the entire trip, probably because it was the most unexpected.



photo by J Reineck  
Baby hyenas at Timbavati  
Private Game Reserve, 2016

I have put my marketing degree to good use while I make my living as the social media guru at NCR Corporation - you may have seen our big new building as you drive down I-85 on your way to the zoo. That is literally what I do for my job - I run the social media accounts for NCR Corporation. We have a lot of fun on the rooftop garden of our building. Pre -COVID we would have a free Happy Hour every Thursday at 4 pm called "Fun Thursday" where you could walk up to the bar and order a drink from the CEO. I also serve on the Board of Directors as the Website Chair for the Atlanta Chapter of the American Marketing Association.



photo by J Reineck  
Fun Thursday at NCR's  
Rooftop Garden

For fun I also like to go golfing with my Dad (especially at the annual Gorilla Golf

tournament!), go hiking, camping, backpacking, running, but also just laze around and watch Netflix at home.



photo by Gene Todd  
Jenny was a winner at GG  
2018

One of my most favorite hobbies is rock climbing. My roommate and I go climbing at the indoor climbing gym Stone Summit a few times each week, and we recently learned how to lead climb - this means that instead of being tied into a rope that is already attached to the wall at the top, we have to clip our rope into the wall as we climb our way up - it is very challenging but also very fun.



photo by J Reineck  
Jenny rock climbing

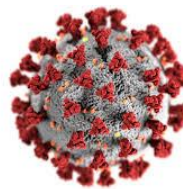
While I know 2020 has been a tough year for everyone, I am looking forward to when things are "back to normal" and

I can once again do my regular volunteer duties at Zoo Atlanta, attend ACE meetings and fundraising events, and see all of my friends again. I miss you all - please wear your mask, be safe, and stay healthy for me!



**"We are at a crisis point. If we don't radically change our attitudes toward the natural world, things are going to get much, much worse. Pandemics will become increasingly common. What we are experiencing now will seem mild by comparison."**

*Thomas Gillespie, associate professor in Emory's Department of Environmental Sciences and Rollins School of Public Health*



## Zoonotic Diseases

### How Pathogens Jump Species

by Megan Hockman

It starts with an animal. Not a specific kind of animal, and generally not one that is trying to do any harm. But inside that animal lies a pathogen -- a microscopic parasite

that has spent lifetimes reproducing inside its animal carrier -- primed by evolution and ready to take on a new host, should the opportunity arise.

With the growing human population, cities and towns popping up in previously untouched areas, farms and livestock encroaching on wildlife habitats, and rapid climate change, these opportunities abound. The good news is that zoonotic pathogens are making the leap from animals to humans under the spotlight of unprecedented scientific observation.

"We can't afford to just focus on one pathogen or one animal. It's really important to get a general understanding of the interactions of different species and how changes in the environment are driving zoonotic disease transmission." says Thomas Gillespie, a disease ecologist in Emory's Department of Environmental Sciences and the Rollins School of Public Health. "The majority of emerging infectious diseases are coming from wildlife, and most of that wildlife is in tropical forests."

Some scientists seek to predict the future of outbreaks with sophisticated mathematical tools and programming. Others go directly to outbreak sites



to track, and attempt to contain, the spread of the disease. Still others focus on the mechanisms that allow the pathogens to make jumps between seemingly disparate species. All seek to protect humans from the next unknown threat, whenever and wherever it inevitably emerges.

This emergence is a byproduct of contact with infected animals as well as the nature of viral evolution. Most viruses are programmed for survival within a certain host. This includes factors like the virus' ability to attach to host cells. Like a microscopic lock-and key mechanism, proteins on the surface of virus particles are shaped in specific ways that allow them to bind with receptors on host cells.

These interactions can be very specific -- they determine which cells are bound (infections of cells in the respiratory tract may cause a cough, while those of the stomach can cause nausea and diarrhea) and which organisms the virus can infect.

If that key changes shape because the virus has mutated, it may be able to open new locks, infect a new host, and cause an outbreak. "How an emerging pathogen spreads through a species tends to be 'a black box' until it causes an outbreak among people," Gillespie

says. The Zika virus, for instance, was first identified in monkeys in Uganda in 1947 but was not widely studied until recently, after it started sweeping through human populations.



### PREVIOUS CORONAVIRUSES

COVID-19 is not the first deadly coronavirus to make the jump from animals to humans. Both severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) are coronaviruses classified as zoonotic viral diseases, meaning the first humans infected acquired these viruses directly from animals.

SARS was initially present in an as-yet unknown animal reservoir, perhaps bats, and was passed to civet cats, relatives of the mongoose. Evidence shows that as it circulated in the civet cats, it gained mutations that allowed it to cross over into humans in 2002-2003. More than 8,000 people worldwide became sick with SARS and 774 died.

Larry Anderson, Marcus Chair of Infectious Diseases at Emory and a member of Emory's vaccine research center, was with the Respiratory and Enteric Viruses branch of the Centers for Disease Control and Prevention (CDC) at the time of the 2002 SARS

outbreak. Like many new diseases, he says "SARS started out as a disease of unknown etiology."

After a doctor identifies a new disease, scientists must figure out the causative agent. From there, it's a matter of controlling spread. The ease of this control depends on a severity of disease. In the case of pathogens like Ebola, people have severe symptoms. Those exhibiting these symptoms can be quarantined and healthy individuals can avoid contact.

**In the case of diseases like the current COVID-19, "transmission happens before serious illness does, which means it's much harder to use classic public health measures," says Anderson. Some people who are sick are asymptomatic, so they can spread disease without knowing it.**

Evidence suggests that MERS, first identified in 2012 during an outbreak in the Arabian Peninsula, was transferred from bats to camels to humans. Since then, the virus has been endemic in camels of that area and has infected more than 2,000 people and causes more than 700 deaths.



### WHEN VIRUSES JUMP SPECIES

Normally, we have specific mechanisms to avoid mutations as our cells reproduce, aptly named cellular proofreading. Viruses, however, are not programmed in this way - - they accumulate mutations rapidly and in a variety of ways.

Imagine a genome as an instruction manual, each chapter detailing how to assemble part of a machine. During infection, these chapters tell the cell how to make an entire virus. As the virus replicates inside of a cell, it copies down this manual thousands of times and packages it into new virions which carry those instructions. During the copying process, however, mistakes happen.

Influenza virus, for example makes approximately one error per new genome -- that's the equivalent to one miscopied word per new instruction manual. In a viral context, the miscopied word can have a big impact and result in the encoded machines severally malfunctioning. A virus can also swap out entire sections of its genome with other viruses of the same type, like swapping entire chapters of the manual. Usually, this is bad for

the virus -- the new parts don't fit together and the virus can't form a productive infection.

Sometimes, however, this works to the virus' advantage. That's how the swine flu outbreak occurred in 2009. By swapping sections of its genome, a virus can combine parts of machinery that fit different hosts and subsequently cross species borders, provided that these parts work together successfully.

The mistakes made during replication, whether to a single piece of one protein or in exchange of entire sequences, are random. It's difficult to know which viruses will evolve to infect new hosts and which species will be responsible for outbreaks.



### **FLIERS AND FAST BREEDERS**

Many animal species harbor pathogens -- some of which they live with and are largely unaffected by. A common example is bats.

"One quarter of mammal species overall are bats, and each of these myriad bat species carries a suite of different pathogens," says Gillespie. "Bats are able to host different viruses without getting sick. So bats, and the pathogens that bats carry,

are numerous. And bats and humans are both mammals. This relatedness means we're more likely to get a pathogen from a bat than from a cricket, for instance."

But bats are far from the only reservoirs of zoonotic pathogens. Influenza virus is housed primarily in aquatic birds, but in 2009 emerged from swine into humans, causing a global pandemic. The "swine flu," caused by the H1N1 virus strain that started in pigs, killed hundred of thousands of people worldwide during the first year the virus circulated. Unlike COVID-19, 80 percent of H1N1 virus-related deaths were estimated to have occurred in people younger than 65 years of age -- primarily children and young and middle-aged adults.

Rodents are another common host and make particularly good reservoirs, possibly because of their "live fast, die young" strategy.

**Quantitative disease ecologist Sarah Bowden, an adjunct professor at Emory, says "fast-living species that reproduce quickly and frequently tend to be better reservoirs for pathogens."**

A case in point: Deer mice, which were linked to a hantavirus outbreak

in 1993 that caused severe pulmonary disease.

"Previously hantavirus had not been associated with a pulmonary condition," says infectious disease epidemiologist Robert Breiman of Emory's Global Health Institute. "It was a virus that hadn't been identified before, and it appeared in these deer mice."

Wild animals that migrate or have large territories also make effective vectors.

"If you cover a broader area, you're inherently more likely to encounter more species you can transmit pathogens to," Bowden says.

Zoonosis is a wide spread, complex, and multifaceted phenomenon. It does not discriminate between borders, and by nature does not always discriminate between hosts.

Humans, agree scientists, have created conditions for these pathogens to thrive, and rapid human expansion will undoubtedly contribute to the emergence of new disease.

In some places, this is common to hunt wildlife for food. Rural communities may rely on meat from local forests and savannas -- whether

chimpanzees, bats, rodents, or other species. These animals can be carriers of diseases, including Ebola, Marburg, HIV/AIDS, and anthrax.

"Anthrax is primarily zoonotic and wouldn't cause human disease unless there was close contact (between animals and humans)" says Breiman.

Whether an individual is hunting, butchering, or consuming these animals -- or is, perhaps, a child just playing near their habitats -- pathogens have ample opportunity to cross over and wreak havoc.

Public health workers focus on educating and developing safer practices for hunting and butchering.

But domesticated and farm animals can transmit disease as well. Pigs, chickens, turkeys, and waterfowl transmit swine and avian flus. Cows and camels play host to bacterial species like Brucella.

"In parts of East Africa, people really love unpasteurized milk from both cows and camels," says Breiman, who spent nine years in Kenya as an epidemiologist. "Both animals, if infected with Brucella, can excrete it into the milk," which can infect those who drink it.

To add to the problem, livestock rarely show symptoms of infection with Brucella, so it's hard to know that the milk poses a risk.

Even if an animal appears sick, that is no guarantee it won't be consumed. "There will be all sorts of clues that an animal was sick and died, but [people] will go ahead and eat it because it's nutrition and it costs money," Breiman says.

In "wet markets" around the world, animals alive and dead, including wild and exotic species, can be purchased for consumption or for use in traditional medicines.

Civet cat, for instance, is a delicacy in some parts of China. "I was told people would eat it in the winter because they felt it increased their immunity to respiratory disease," Breiman says.

Animals in these markets are caged next to each other, which allows them to share pathogens. In the wild, many of these animals would never be close enough for this transfer to occur.

The adaptations that happen during infection of a new host can have the unwanted side effect of making them able to infect people, too.

Humans have created an environment in which this is possible, and multiple

outbreaks have occurred as a result.



## CONNECTIVITY AND CLIMATE CHANGE

Sometimes, however, our encounters with animals are unintentional -- a result of rapid human expansion and the resultant narrowing of animal habitats.

"We are in an extremely connected world, a world that's vastly more connected than it was even back in the early 2000s when the SARS epidemic happened," Bowden says. "That is just going to inherently increase the likelihood of new people coming into contact with new things that can make them sick."

While there are many species known to transmit disease to humans, there are plenty that we haven't encountered yet. That is changing as we travel more and expand our reach into untouched areas with remote species and pathogens.

"Things are already there and primed to go, and the storm sort of comes together at the perfect moment." Bowden says. But that doesn't stop researchers from trying to predict outbreak likelihood from what we do know.

Researchers like Bowden have adapted mathematical modeling

techniques to better understand where risk of an outbreak lies.

"Prediction allows us to look at the relative risk or the likelihood of a pathogen emerging in different areas of the world," she says.

She looks at different factors -- the risk landscape on a spatial scale (where on a map is infection most likely), different known reservoirs (which animals are common carriers, and where they are located), and different pathogens (what germs/diseases are commonly found in an area).

**"We can drill through these and look for places where risk is high on all three planes," Bowden says. "That allows us to say, 'Relative to everywhere else in the world, given the large players in a disease outbreak, here's where we think risk is highest.'"**

Many of these factors are changing rapidly, however, and models will have to change to account for that.

Climate change, Bowden says, is "a huge consideration in disease ecology. It is causing species' geographic ranges to expand or shift. They can bring new pathogens with them or come into contact with ones they hadn't encountered before. In

both cases, we're likely to experience unforeseen outbreaks."

*Emory Health Digest, Summer 2020*



**SARS-CoV-2 is the latest in a long list of pathogens that have jumped from animals to human beings, triggering pandemics that have killed hundreds of millions.**



**COVID-19 underscores the urgent need to understand and control the intersection of animal and human health. Genetic analysis of the virus shows it likely too a single spillover event from an infected animal to a human to start the pandemic.**



**By one count 70% of emerging diseases can be traced back to wildlife, and since 1980 the number of outbreaks per year has more than tripled.**



**Nearly 1.7 million as yet undiscovered viruses are believed to exist in**



wildlife, and Thomas Gillespie, a disease ecologist at Emory, notes that **we still lack data for almost 90% of zoonotic viruses in wild mammal species.**



**The 21st century has already experienced four major spillovers: SARS (horseshoe bats via civet cats), H1N1 flu (pig), MERS (bats via camel), and COVID-19 (bats via an intermediate).**



**Humans and animals share this planet, and increasingly they share deadly pathogens as well. If we don't fully recognize that shared threat, COVID-19 won't be the last zoonotic pandemic.**



**Instituting buffer zones between wild animal and human habitats could decrease human animal contact events.**



**The growing industrialization of meat production around the world plays a role as well, as pathogens pass from wild animals into packed livestock farms, where the viruses can be amplified as they burn through domestic animals.**

Bryan Walsh, Axios



## Spotlighting Non-Profit Groups ACE Supports

We are highlighting Goulougo Triangle Ape Project in this newsletter. ACE first started supporting this non-profit in 2010, and since then they have included ACE on their website as a Partner.



How did this group begin? The Nouabalé-Ndoki National Park was founded in 1993 as part of an initiative to maintain the pristine forests of the Ndoki region. The area was not included in the National Park and the Goulougo Triangle was scheduled for logging. In collaboration with the Congolese government and the local logging company, several conservation organizations undertook a global campaign to seek

protected status for the Goulougo Triangle.



photo by GTAP  
Goulougo Triangle Ape Project map

*The overall mandate of the Goulougo Triangle Ape Project is to contribute to the conservation and management of chimpanzees and gorillas by identifying the ecological and social needs governing these apes and use this information to develop conservation strategies that can be replicated in other areas to ensure the long-term survival of Africa's great apes.*

The Goulougo Triangle Ape Project's "action-oriented" research is intended to assist the government in managing their forest resources in particular regarding great apes. At the regional level, the following institutions are key resources: Congo Basin Forest Partnership (CBFP), Central Africa Forest Commission (COMIFAC), International Union for the Conservation of Nature (IUCN), and Great

Apes Survival Partnership (GRASP).



photo by GTAP

The Goulougo Triangle Ape Project is built on a team-based approach. The success of the conservation and research activities of the Goulougo Triangle Ape Project is largely due to the support and active involvement of Congolese government officials, wildlife biologists, university students and local stakeholders.

### Valuable Partnerships include:

- \* Ministère de l'Economie Forestière, Republic of Congo
- \* Ministère de la Recherche Scientifique et Technologique, Republic of Congo
- \* Congo Program, Wildlife Conservation Society
- \* Lester E. Fisher Center for the Study and Conservation of Apes, Lincoln Park Zoo
- \* Arcus Foundation
- \* Great Ape Conservation Fund, U.S. Fish and Wildlife Service
- \* Houston Zoo
- \* Indianapolis Zoo
- \* Columbus Zoological Park
- \* Washington University
- \* National Geographic Society
- \* Saint Louis Zoo
- \* Minnesota Zoo

- \* Ape Conservation Effort
- \* Max Planck Institute of Evolutionary Anthropology
- \* Brevard Zoological Park
- \* Association of Zoos and Aquariums, Ape TAG

### Valuable Collaborators

The Goulougo Triangle Ape Project has developed collaborative research partnerships with scientists from North America, Africa, Europe, and Asia. One of the strengths of this project is the diverse perspectives, experiences, and resources that individuals and the organizations they represent bring to this project. There are seventeen collaborators with GTAP doing groundbreaking work. To read more about them, go to [www.Congo-apes.org](http://www.Congo-apes.org).



photo by GTAP  
Data collection

### Research

There is an urgent need to develop well-defined strategies for the long-term conservation of chimpanzees and gorillas in the Congo Basin. A significant number of remaining chimpanzee and gorilla populations in western equatorial Africa reside in active timber concessions, many of which are within areas identified as being exceptional for the

conservation of these apes. The conservation outlook of these endangered apes would improve significantly if forestry companies were prepared to make a few changes to management policies in logging concessions. One of the Goulougo Triangle Ape Project's main scientific objectives is to document the effects of logging operations on apes in northern Congo and use this information to develop and evaluate recommendations to reduce the impact of timber extraction on chimpanzees and gorillas.

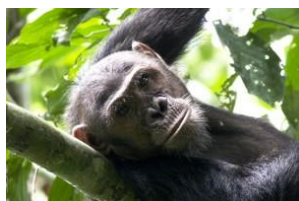


photo by GTAP  
Donny

### Counting Apes

Recent reports have shown that central subspecies of chimpanzee (*Pan troglodytes troglodytes*) and western lowland gorilla (*Gorilla gorilla gorilla*) populations in central Africa are rapidly declining due to disease epidemics (such as Ebola), commercial bushmeat hunting, and habitat destruction. The extent of these declines may never be known because precise baseline ape density estimates are not available from most central African forests. The methods must be refined and precise ape

density estimates obtained to provide appropriate conservation planning. Coexistence of chimpanzees and gorillas in this area is vital, and the data will help in management of the area.



photo by GTAP  
Studying area flora

### Forest Ecology

An advanced understanding of ape feeding ecology and floristic diversity is required to develop more comprehensive strategies to mitigate the negative impacts of logging on chimpanzees and gorillas. In theory, ape habitat selectivity is driven by abundance and distribution of food resources. The Goulougo Triangle Ape Project has documented more than a decade of observations of ape feeding ecology within the dense lowland forests of the Congo Basin. In addition, two identical phenological monitoring circuits of chimpanzee and gorilla food species have been discovered.



photo by GTAP  
Nicholas

The scientists of the GTAP have conducted botanical inventories in logged and unlogged forests. Remote sensing is proving to be a critical tool for assessing and monitoring forests and wildlife in the Congo Basin. Collaborating with scientists from the Woods Hole Research Center, the Project obtained satellite imagery to compare ape habitats in the Nouabalé-Ndoki National Park and Odzala National Park which are both located in northern Republic of Congo. Continuing our effort to better understand ape distribution and habitat use, scientists from the Max Planck Institute of Evolutionary Anthropology are identifying the distribution of preferred habitats for chimpanzees and gorillas and monitoring the effects of mechanized logging on the apes across the region.

### Preserving Fragile Cultures

Knowledge of chimpanzee tool using behavior has expanded. However, more than 50% of the range of chimpanzees in western equatorial Africa is currently allocated to logging concessions which is more than double the area of their range encompassed by protected areas (17%). Commercial logging in



northern Congo began at a relatively low intensity in the 1970s, primarily focusing on extraction of mahogany. However, advances in forestry technology and changes in timber product market values over the last ten years have tripled the number of tree species in northern Congo that are attractive to the international market. This means that we are in a race against time to document and protect chimpanzee cultures in the Congo Basin.



photo by GTAP  
Educational Resource Center

### Education

Educational resources are scarce in northern Congo, and contributions to the continuing education of the public-at-large can have a lasting impact. The Goulougo Triangle Ape Project has recently completed construction of an educational resource center which will be available to the residents of Bomassa and Bon Coin villages. Prompted by an independent initiative, private donation and support from Brevard Zoo, the Goulougo Triangle Ape Project staff will facilitate the creation of a Resource Center. Although still in its early stages, this initiative has

been very well received by the local population.

The mission of the Goulougo Triangle Ape Project Resource Center is to provide educational opportunities using innovative learning tools in a friendly atmosphere for the visitors. Emphasis will also be placed on providing materials for improving basic literacy in French, learning English as a second language and information on wildlife and conservation. Recognizing that a high proportion of the adult population in these villages is not literate, we will also strive to acquire a stock of current nature periodicals, picture books, audio resources, e-books, and artistic materials. Exposure and participation in an educational setting will help to identify and educate the current and future generations of conservation and civic leaders in this community.

For more information on GTAP see: [www.Congo-apes.org](http://www.Congo-apes.org).



### Did you know?

Painting one of a wind turbine's blades **black** can reduce bird strikes by over 70%.

*Sierra Magazine*  
Nov-Dec 2020

"The most perfect ape cannot draw an ape: only man can do that: but likewise only man regards the ability to do this as a sign of superiority."

Georg C. Lichtenberg

"In our every deliberation, we must consider the impact of our decisions on the next seven generations."

From the Great Law of the Iroquois Confederacy



### 2020 ACE Board

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Vice President - Donna Mayer Todd  
Secretary - Jane Barron  
Treasurer - Susan Smith

Board Members At Large:  
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Leslie Martin  
Gene Todd

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