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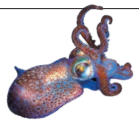

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Support Ismail Serageldin

Egypt's courts must listen to dozens of Nobel prizewinners who have defended the founder of the Alexandria Library.

Next week, an appeals court in Egypt will consider the case of Ismail Serageldin — the retired founding director of the Bibliotheca Alexandrina, or Alexandria Library — who has been convicted of negligent management of the library and sentenced to three-and-a-half years in jail. Some 90 Nobel prizewinners, among others, have signed a letter of concern stating their confidence in Serageldin's integrity. The guilty verdict he received appears to be a miscarriage of justice. The sentence is cruel and unduly harsh. He should go free.

Serageldin disputes the charges, which many fear are politically motivated. He is a forthright proponent of a liberal interpretation of Islam who was appointed by the regime that was overthrown in the 2011 revolution in Egypt, part of the Arab Spring uprising across the Middle East. His case is significant in a region where the hopes of the Arab Spring — including those for a flourishing of education and science — have mostly been dashed.

The political turmoil that followed the uprising against the regime of Egypt's then-president, Hosni Mubarak, was a time for opportunists. Some library workers with grudges, together with those who considered Serageldin a Mubarak stooge, issued more than 100 different accusations against him, ranging from corruption to money laundering. Prosecutors investigated for more than a year. Finding no evidence, they dropped the criminal charges and instead referred three minor accusations of negligent management to an administrative court in 2012.

One of the three charges claims that the 110 permanent library staff (the other 2,300 employees are on renewable contracts) were not given enough to do, and thus their government salaries were being wasted. Another refers to a collective life-insurance policy that had been taken out on behalf of staff, which they objected to. The charge claims that Serageldin, who cancelled the policy after three years, deceived the board of directors into agreeing to repay staff for the contributions they had made. The third charge claims that Serageldin incorrectly negotiated a favourable rent for a cafeteria to operate in the Bibliotheca Alexandrina, without putting it out to public tender.

Nothing happened for a few years while the court waited for the prosecution to submit a technical report about the case, which finally arrived this year. Serageldin says that the report led him to expect a dismissal of all charges. Instead, the court found him guilty. And rather than dishing out the usual modest fine for such cases, it issued a prison sentence, something usually reserved for cases in which negligence leads to loss of life.

The ruling incited a media storm in Egypt and the international academic community. The letter from the Nobel prizewinners declares that they have "confidence in the integrity of Ismail Serageldin" and notes their appreciation of his work in the creation of the library, which they describe as "a beacon of enlightened values for the region and for the world".

The Mediterranean city of Alexandria became the main intellectual and cultural centre of the ancient Hellenic world when the original Bibliotheca Alexandrina was created there in the fourth century BC. Many of the great scientists in the region worked there, from Euclid to Archimedes. It burnt down in the second century AD and scholarship in the region went into decline.

"The library is now a thriving haven of scholarship, rationalism and internationalism."

Serageldin returned to Egypt from abroad to revive the library in 2001, recreating its spirit for the digital age. He wanted to do something meaningful for his country and left a prestigious post as vice-president of the World Bank to do so.

The library is now a thriving haven of scholarship, rationalism and internationalism. It has gained respect, nationally as well internationally. During the days of the Arab Spring, impassioned employees and other supporters formed a human chain to protect the facility from being plundered. By contrast, tens of thousands of manuscripts and books were lost in a fire after clashes at the Institut d'Egypte in Cairo. (Fortunately some of the documents, including the 20 scholarly volumes of the historically valuable *Description de l'Égypte* commissioned by Napoleon in the early nineteenth century, had at least been digitalized at the Bibliotheca Alexandrina.)

Now, it is Serageldin himself who needs support from all who care about what he achieved and what it stands for. ■

Inflamed brains

Studies highlight link between immune response and unusual neural wiring.

A century ago, a largely forgotten, worldwide epidemic that would kill nearly a million people was beginning to take hold. Labelled as sleepy sickness — or more properly encephalitis lethargica — the disease caused a number of bizarre mental and physical symptoms and frequently left people in a catatonic state, sometimes for decades. (Oliver Sacks described his successful treatment of some of them in 1969, in the book *Awakenings*.) The cause has never been officially pinned down, but the most common suggestion is that some kind of infectious agent triggered an autoimmune response, which targeted and inflamed part of the brain.

The role of the immune system in mental disorders is subject to much important research at the moment. The onset of conditions

from depression and psychosis to obsessive–compulsive disorder has been linked to the abrupt changes in biology and physiology that occur when the body responds to infection, especially in childhood. And some researchers have traced the possible chain of events back a generation. Studies have highlighted that pregnant women could react to infection in a way that influences their baby's developing brain, which could lead to cognitive and neurodevelopmental problems in the child.

One consequence of this 'maternal immune activation' (MIA) in some women could be to increase the risk of autism in their children. And two papers published online this week in *Nature* (S. Kim *et al. Nature* http://dx.doi.org/10.1038/nature23910; 2017 and Y. S. Yim *et al. Nature* http://dx.doi.org/10.1038/nature23909; 2017) use animal models to examine how this might happen, as well as suggest some possible strategies to reduce the risk.

Kim *et al.* looked at the impact of MIA on the brains and behaviour of mice. They found that pregnant female animals exposed to circumstances similar to a viral infection have offspring that are more likely to show atypical behaviour, and they unpick some of the cellular and molecular mechanisms responsible. Some of their results confirm what scientists already suspected: pregnancy changes the female mouse's immune response, specifically, by turning on the production of a protein called interleukin-17a. But the authors also conducted further experiments that give clues about the mechanisms at work.

The types of bacteria in the mouse's gut seem to be important. When the scientists used antibiotics to wipe out common gut microorganisms called segmented filamentous bacteria in female mice, this seemed to protect the animals' babies from the impact of the simulated infection. The offspring of mice given the antibiotic treatment did not show the unusual behaviours, such as reduced sociability and repetitive actions. Segmented filamentous bacteria are known to encourage cells to produce more interleukin-17a, and an accompanying News & Views article (C. M. Powell *Nature* http://dx.doi.org/10.1038/nature24139; 2017) discusses one obvious implication: some pregnant women could use diet or drugs to manipulate their gut microbiome to reduce the risk of harm to their baby if an infection triggers their immune response. Much science still needs to be done before such a course could be recommended — not least further research to confirm and build on these results.

Yim *et al.* analysed the developing brain of mice born to mothers who showed MIA. They traced the abnormalities to a region called the dysgranular zone of the primary somatosensory cortex (S1DZ). The authors genetically engineered the mice so that neurons in this region could be activated by light, and they showed that activation of S1DZ induced the same telltale atypical behaviours, even in mice that were born to mothers with no MIA.

"It's tempting to draw parallels with mechanisms that might increase the risk of autism in some people."

It's unusual to be able to demonstrate such a direct link between the activities of brain regions and specific behaviours — although plenty of work on mental disorders makes a strong theoretical case for linking particular conditions to over- and underactive brain zones and circuitry.

Encephalitis lethargica, for example, has been linked to changes in the deep regions of the basal ganglia, and the disease produces symptoms that are similar to those often seen in autism, including stereotyped and repetitive behaviours. Yim *et al.*'s study shows that the S1DZ region projects to one of those deep brain regions — the striatum — and that this connection helps to trigger repetitive actions in the animals. But S1DZ also connects to a separate, distinct, region in the cortex, and this is what seems to drive the changes in sociability.

Taking the two studies together, it's tempting to draw parallels with mechanisms that might increase the risk of autism in some people and explain some of its symptoms. Scientists and others should be cautious about doing so — much can change when results from animal models are applied to human biology. But the studies do offer some intriguing leads. ■

Face the heat

The giraffe's long neck could have evolved to help the animals keep their cool.

How did the giraffe get its long neck? The obvious answer — and some of you are probably shouting it at the page or screen right now — is that it evolved as a benefit that allowed the animals to reach and eat higher leaves. Perhaps. Probably, even. That was certainly Charles Darwin's explanation. But it's not certain, and other possible origins for one of the animal kingdom's most distinctive features are still a topic of debate among zoologists and evolutionary biologists alike.

One such idea is reported in the *Journal of Arid Environments* (G. Mitchell *et al. J. Arid Environ.* **145,** 35–42; 2017). Long-necked giraffes, scientists argue, can point their heads and necks towards the Sun, exposing less of their skin and making it easier for them to keep cool and survive the hot, dry conditions they often endure.

Improved thermoregulation is one of the later evolutionary explanations offered for the giraffe's long neck — a debate that goes back to before the time of Darwin. The French naturalist Jean-Baptiste Lamarck suggested that giraffes' necks became stretched as they constantly reached for foliage (an idea very much ahead of its time but for which he is sometimes unfairly ridiculed). Darwin and his contemporary Alfred Russel Wallace then famously turned this Lamarckism on its head, pointing out that the long neck would have come first, and this would have handed the taller individuals a significant advantage over shorter giraffes.

That idea stood largely unchallenged until, in a letter to this journal in 1949, Chapman Pincher took issue and pointed out that the legs of a giraffe are also unusually long (all the better for a swift escape from predators) (C. Pincher *Nature* **164,** 29–30; 1949). The long neck, he said, must therefore have evolved as a way for the animal to be able to reach past its own legs when it leans to reach the ground to take a drink of water. (Never very popular, Pincher's suggestion lasted only as long as it took scientists to find and examine fossil ancestors of the giraffe, and point out that those animals had managed perfectly well with long legs and short necks for millions of years.)

Other, more credible, alternatives to the dominant 'competing browsers' idea have emerged. One of the most popular is that long necks help male giraffes use their heads to bash rivals, or that females prefer them. Both would suggest that long-necked males are sexually selected.

And then there is thermoregulation. Originally, the suggestion was that long necks (and legs) significantly tilted the balance between volume and surface area that determines how quickly animals (and other bodies) gain and lose heat. Giraffes might look as if they have a larger than usual surface area compared with barrel shaped rhinos, elephants and others — but do they? It turns out that few people have tried to measure the surface area of enough giraffes to be sure. That's what the scientists do in the latest study.

They looked at measurements made for dozens of giraffes culled in Zimbabwe. They found that, pound for pound, the surface area of a giraffe is actually no larger than would be expected for any other animal of the same mass. And the creatures are no better at keeping cool, until, the scientists go on to suggest, they turn to face the Sun — as many giraffes are seen to do on hot days. ■