CONCLUSION

Simmons and his colleagues concluded their article on researcher freedom with an old truth that bears repetition: "Our goal as scientists is not to publish as many articles as we can, but to discover and disseminate truth." But, as Simmons et al. acknowledge, too many scientists have lost sight of this goal.[172] The foregoing recommendations would be good for science even if modern science were not in such urgent need of reform. But the existence of the irreproducibility crisis means that changes like the ones we suggest have become a matter of urgent necessity.

Figure 28: Johannes Vermeer, *The Astronomer* (1668)

The battle against the present scourge of irreproducibility in science is not entirely new. Science has always imposed constraints on human nature in the service of truth. Empiricism, the obligation to gather data, forces scientists to submit their preconceptions to experimental proof. Rigorous precision, including the use of statistical methods, serves to check laziness and carelessness. Science's struggle for empiricisim and precision has always been fought against the all-too-human incentives to pursue predetermined conclusions, professional advancement—or both at once.

So the shortcomings of modern statistics-based research should not surprise us too much. Yet they have done great harm, and they undermine faith in the power and promise of science itself. We need new incentives, new institutional mechanisms, and a new awareness of all the ways in which science can go wrong.

The pursuit of scientific truth requires the public to scrutinize and critique the activity of scientific professionals, and to join with them to reform the practice of modern science.

The challenges daunt, but they should also exhilarate. We sometimes hear that professionals have thoroughly institutionalized science, and that its increasing sophistication means that it has become the province of credentialed technicians. The crisis of reproducibility shows that this is not so. The pursuit of scientific truth requires the public to scrutinize and critique the activity of scientific professionals, and to join with them to reform the practice of modern science.