Better together

Just as humans thrive from being part of a community, genetics and genomics benefit from interdisciplinary collaboration and knowledge integration.

> “not all questions will be answerable by genetics and genomics alone”

In times of social distancing, the importance of interaction and communication is ever more evident. Three articles in the current issue of *Nature Reviews Genetics* highlight the benefits of interdisciplinary dialogue from very different perspectives: between experimental and computational specialties; between science and the humanities; and between genomic researchers and Indigenous communities.

Technological advances over the past two decades have enabled the development of high-throughput, quantitative approaches such as genomics, transcriptomics, epigenomics, proteomics and metabolomics. In their Review[1], Eckhardt, Hultquist et al. describe how these omics methods can promote an understanding of biology as systems, which can range in scale from a set of molecules to a single cell, organism or even ecosystem. These omics technologies evolve continuously, with ever-expanding applications, as do the computational tools for analysis and integration of the large-scale data sets they produce. The authors emphasize how this evolution makes interdisciplinary collaboration an essential component of systems biology — especially in the context of infectious disease research, which requires consideration of both the host and the pathogen. They summarize a set of important principles to ensure exponential returns: partnership between technological, computational and experimental experts at all steps of the research project; project organization and leadership that set clear expectations from the outset; and open, regular communication that fosters a shared understanding and respectful culture.

Promoting a shared view is also a cornerstone of the Review by Racimo et al.[2] on sociocultural insights inferred from ancient DNA studies, which illustrates how multidisciplinary dialogue is pivotal to achieve an integrated view of human history. As the degree of overlap between biological and cultural processes varies, reconstructing the human past remains a complex endeavour that needs to be addressed by interdisciplinary teams, with ancient genomics contributing one perspective to add to the insights gained from other disciplines such as anthropology, archaeology, history or linguistics. The authors propose that a way to accelerate this integration is by establishing new scientific programmes that train scientists jointly in these disciplines, promoting “‘admixture’ among fields”[2].

Discipline-specific language and interpretation is an important barrier to achieving a shared goal of all scientists — discovering and spreading knowledge. This hurdle can be overcome to some extent by setting clear standards for dissemination and reporting. Indeed, findability, accessibility, interoperability and reusability underpin the FAIR data principles[3], which have been put forth by a diverse set of stakeholders representing academia, industry, funding agencies and scholarly publishers. While sharing information that is understandable across disciplines can provide a basis for successful interdisciplinary research, as discussed in the Perspective by Hudson et al.[4], an open science environment is challenging for Indigenous rights and interests. Indigenous communities have seen comparatively little of the societal benefits from participating in genomic research, despite an increasing awareness of the value of improving diversity and inclusion in genomics[5]. Unrestricted access to genomic data ignores the risks to Indigenous communities, such as re-identification, and risks alienating these individuals, thus effectively limiting access and benefit-sharing. The authors provide practical recommendations for the handling and sharing of Indigenous genomic data with the aim of achieving mutual benefit for the research community and Indigenous communities participating in genomic research; for example, the CARE principles for Indigenous data governance[6] complement FAIR principles but are people- and purpose-oriented and do not ignore historical contexts.

In the (slightly modified) words of John Donne, no (hu)man is an island. Neither are scientific disciplines, and not all questions will be answerable by genetics and genomics alone. Importantly, when interdisciplinary collaboration or research leads to new solutions, all disciplines, communities and stakeholders benefit.

1. Eckhardt, M. et al. A systems approach to infectious disease. *Nat. Rev. Genet.* https://doi.org/10.1038/s41576-020-0212-5 (2020).
2. Racimo, F. et al. Beyond broad strokes: sociocultural insights from the study of ancient genomes. *Nat. Rev. Genet.* https://doi.org/10.1038/s41576-020-0218-z (2020).
3. Wilkinson, M. et al. The FAIR guiding principles for scientific data management and stewardship. *Sci. Data* **3**, 160018 (2016).
4. Hudson, M. et al. Rights, interests and expectations: Indigenous perspectives on unrestricted access to genomic data. *Nat. Rev. Genet.* https://doi.org/10.1038/s41576-020-0228-x (2020).
5. Diversity matters. *Nat. Rev. Genet.* **20**, 495 (2019).
6. Global Indigenous Data Alliance. CARE principles for Indigenous data governance. *GIDA* https://www.gida-global.org/care (2019).