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JUSTINE LEE HIRTEN

Ruddy turnstones (*Arenaria interpres*) drawn by Justine Lee Hirten.

ILLUSTRATION: GET EYES ON YOUR RESEARCH

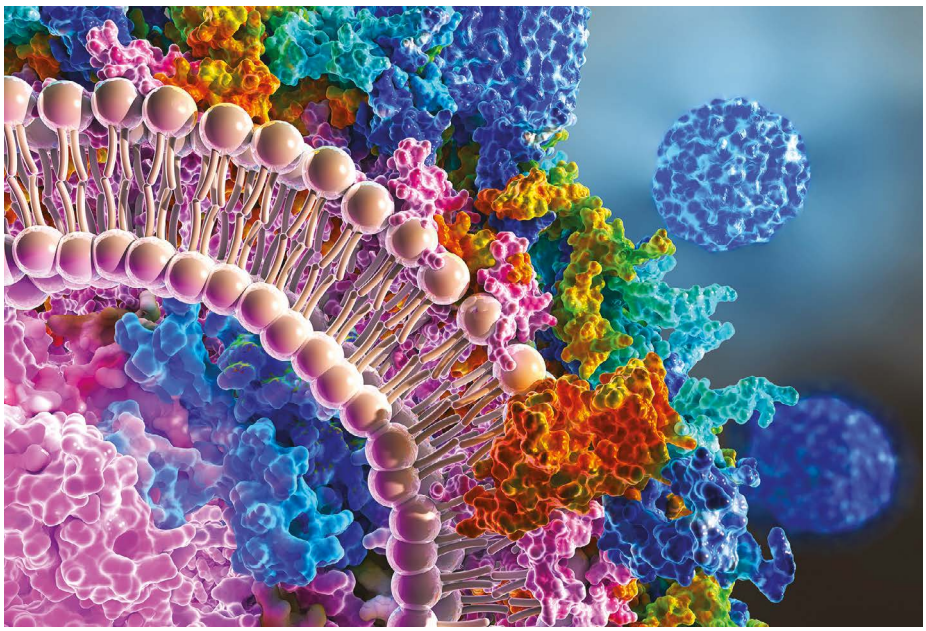
Three scientific artists explain how to use attractive visuals to garner the attention your work deserves. **By Andy Tay**

Whether in papers, posters or public display, science often benefits from good illustration and graphic design. A grasp of visual communication and a talent for showing information are important skills, but most scientists never receive any formal training in them. *Nature* sought advice from three people with experience in scientific illustration.

FIONA NAUGHTON
MAKE USE OF ANALOGIES TO EXPLAIN CONCEPTS

During my PhD, I got frustrated searching for images for conference presentations and lab meetings and not finding exactly what I needed, so I decided to create my own. It wasn't easy at first, but eventually I found a style that works for me, using metaphor and analogy to explain my research.

I use 2D cartoon cats and anecdotes about cat behaviour to demonstrate the structural properties of 3D protein molecules and how they function. I chose cats because they can be expressive and I find them fun to draw. To explain how a particular cell-membrane protein transports bile-acid substrates, for example, I drew cats changing position as they play with



A cell membrane and proteins depicted by Ella Marushchenko.

a mouse to demonstrate the mechanism by which the cats (proteins) move the mouse (substrate) from the outside of a cell to the inside. That illustration won me the first prize in the Art of Science Image Contest at the 2020 Biophysical Society meeting in San Diego, California.

Using analogies helps me narrow a topic down to the most crucial elements needed to explain it to my audience, and to colleagues with different levels of expertise. Analogies also make my presentations more memorable at busy conferences: it's easy to be curious and spark up a conversation with someone whose posters are covered in cartoon cats. Of course, I might not use this analogous style if it's confusing or overcomplicates an idea – instead, I'll keep things simple and draw a more conventional diagram.

I started illustrating digitally, but eventually found that hand drawing works much better for me. I start my process by thinking, 'How can I create a broad analogy of my science?' Then I focus my message to a few main points and convey them through my drawings. I tend to create rough sketches of individual key components on paper, and then plan the overall layout and draw the final figure before scanning it to my laptop for some basic touches like adding colours. It is important to find a style that suits you.

Fiona Naughton is a postdoc at Arizona State University, Tempe.

EXTRA RESOURCES

Software and images to get you started.

Inkscape: Free and user-friendly drawing software with an active online community that shares drawing tips and resources.
Autodraw: A free program from Google, based on machine learning. Users can draw shapes and the software will suggest objects that they resemble, providing illustrations contributed to its database by artists.
Sci Draw: A repository of drawings of scientific objects such as cells and animals, uploaded by scientists. Users can download the images and use them for free.
Noun Project: A generic image repository with more than two million icons, many of which are available for free.

JUSTINE LEE HIRTEN
DO PREPARATORY RESEARCH BEFORE DRAWING

One common issue at my zoological illustration and painting workshops is that scientists feel that they are not artistic enough – and artists feel that they are not scientific enough. I encourage my students to accept themselves as legitimate members of both the creative and the scientific communities, and tell them that they should study and network in both fields to be successful. Scientists truly want artists in their community, and vice versa.

I advise my students not to rush into drawing: background research is important. I cannot emphasize enough how much my zoological illustrations are improved by spending time observing anatomy, movement and behaviour before drawing anything. A good zoological illustration will be recognizable and accurate, but a great one will have the qualities that are harder to capture – an animal's weight, internal structure, demeanour, presence and essence. This comes only from researching and observing patiently.

Before you start drawing, try to look for materials to provide inspiration. For zoological illustrations, I recommend community science projects such as eBird and iNaturalist. The international Guild of Natural Science Illustrators has a website with great resources for new illustrators (see 'Extra resources').

Justine Lee Hirten is a scientific and zoological illustrator at California State University, Monterey Bay.

ELLA MARUSHCHENKO
KNOW YOUR AUDIENCE AND WHAT THEY WANT

ELLA MARU STUDIO

I own and manage a studio that creates art and illustrations for the scientific community. I also create illustrations for scientists' press releases. These often get picked up by news websites and social-media platforms, helping to show the general public that science can be simple and beautiful.

Scientific illustration is a very creative process and for me there is no step-by-step protocol. I usually start by reading the scientific material and thinking about the best way to convey a particular idea and message. I start drawing digitally and then modify the colours, lighting and angle of view to create the most attractive figures possible. I discuss the illustrations with my colleagues in the studio and with my husband, who has a PhD in material sciences, to get their feedback.

For figures in research articles and grant proposals catering to an expert audience, the key is scientific accuracy instead of beauty. Figures do not have to be eye-catching; artistic effects could distract the audience from the message. To make an effective article or proposal figure, it is important to consider and incorporate all relevant technical details and highlight them clearly.

But for figures on journal covers and in press releases, the key is simplicity, to attract readers' attention to the research. The audience could include the public and scientists from other fields. These figures do not always have to be 100% scientifically accurate (as long as they're not actively misleading), but they should be eye-catching. For this kind of figure, I recommend choosing one main object to focus on and using the surrounding space to make this object the centre of attention.

Ella Marushchenko is a professional illustrator in Charleston, South Carolina.

Interviews by Andy Tay.
Interviews have been edited for length and clarity.