The artisan biotechnologist

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An artisan is "*a skilled craft worker who makes or creates material objects partly or entirely by hand.*"[1] Often, they might have a guild qualification, or their skills are recognised in some other way, like their reputations. Lucy Hargreaves described how biotechnology originated from "*ancient times when people harnessed living organisms for their benefit…*"[2] She also wrote about how "*a Hungarian agricultural engineer conceived the term biotechnology.*" [2] And the European Commission says, "*… biotechnology can be used to manufacture bio-based products...*"[3] So, with these ideas in mind, artisans are biotechnologists. Biotechnology fits the World Health Organization's idea that One Health is "*an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.*" [4, 5, 6]

[Please include the following call-out quote: "The World Health Organization describes One Health as "*an approach to designing and implementing programmes, policies, legislation and research in which multiple sectors communicate and work together to achieve better public health outcomes.*""]

It is important to highlight that the European Commission uses the OECD definition of biotechnology. This definition might help people draw a connection between what farmers produce, what craftspeople and food producers manufacture, and what is on our supermarket shelves and in our homes.

The OECD defines biotechnology as "*... biotechnology applies science and technology to living organisms, as well as parts, products and models of them, to alter living or non-living materials to produce knowledge, goods and services. Biotechnology can be used to manufacture bio-based products (biomanufacturing). It can also be part of the solution to address many societal and environmental challenges, such as climate mitigation and adaptation, access to and sustainably using natural resources, restoring vital nature systems, food supply and security, and human health*."[7]

As the EMWA journal Editor-in-Chief says, "*Ask 10 people what "biotechnology" means and you will get 10 different answers.*" (Figure 1)[8] This article touches upon five of the 10 biotechnology research areas illustrated in Figure 1 (1. Agriculture, Environment, 2. Marine, 3. Industrial, 4. Medical, Healthcare, 5. Food Production, Nutrition). Perhaps confusingly, bioinformatics, nanobiotechnology, legal, and ethics, while research areas on their own, apply to all the other research areas. So, in fact, this article touches upon seven of the ten biotechnology research areas, as illustrated in Figure 1.

Commented [JB1]: Hi EMWA production team,

Can I reuse this image? It is from From the Editor Biotechnology issue December 2023.

Billiones R. From the Editor. Biotechnology – diverse as the colours of the rainbow. *Med Writ.* 2023;32(4): 6–7. doi: 10.56012/jewm8154

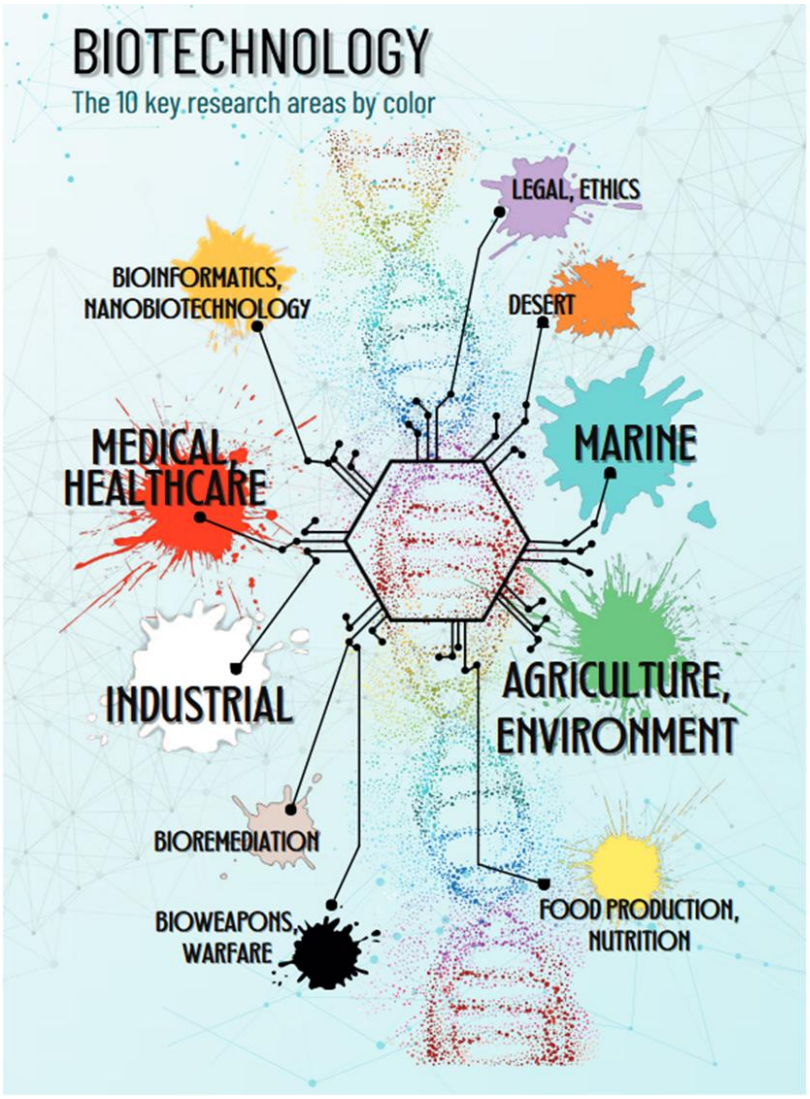

Figure 1. Biotechnology research areas.[8]

Artisan product raw materials

Most artisan products contain bio-based ingredients that are generally grown during agriculture (Table 1). For example, grains, fruits, and vegetables used in baking, brewing, and distilling; wood used to make furniture, chopping boards, musical instruments, and ornaments (Is tree growing a form of agriculture?); dairy products used in food production, animal hair to make clothes and soft furnishings, various meat products to eat, and byproducts of meat production that often make clothes and other things, for example, footwear, belts, bags, skins, and strings for musical instruments, and filters for wine production. As an aside, many pharmaceutical products result from a fermentation process step during manufacture, similar to fermentation processes used in food and drink production. So, people working in any department in the pharmaceutical industry can probably transfer their skills to similar artisan product manufacturing and vice versa.

It is important to note that humans have evolved as omnivores and often have diets of animal and non-animal products - humans are top predators.[9] And humans co-evolved with animals, so while some practices are inhumane towards animals (and humans), other practices benefit humans and animals, such as pet ownership.

[Please table 1 near here]

Table 1. Some raw materials used by some craftspeople.

Who might use what raw product?

Some products		Some craftspeople
Animal products		Artist
	Red meat	Armorer
	White meat	Baker
	Seafood	Basketmaker
	Poultry	Blacksmith
	Hair	Bladesmith
	Feathers	Cook
	Skin	Cooper
	Gut	Coppersmith
	Oil	Dyer
	Eggs	Furrier
	Dairy products	Glassblower
	Butter	Gunsmith
	Cheese	Hatter
	Cream	Joiner
	Milk	Locksmith
		Luthier
Non-animal products		Musical instrument maker
	Beans	Nailsmith
	Cereal stalks	Potter
	Fruit	Ropemaker
	Fungi	Saddler
	Grains	Shoemaker
	Nuts	Stonemason
	Reeds	Tailor
	Seeds	Tanner
	Vegetables	Weaver
	Wood	Wheelright

Looking at the Table 1 "Some craftspeople" list, you might think, "*But glass and stone aren't bio-based*." Yet glass is made by melting silica or sand, and sand is often composed of fish skeletons and sea fish shells. Some stone is of biological origin, for example, some sedimentary rocks. And undoubtedly, craftspeople who make glass, stone, and metal products probably use bio-based tools in their manufacturing processes. Believe it or not, there are biometals.[10] For example, we can go to a health

food shop and buy supplements like zinc, copper, iron, calcium, potassium, and sodium that are needed in optimal amounts to be healthy.

Agriculture in Ireland

The City & Guilds website shows many professions requiring skilled craftspeople.[11] "*City & Guilds has a long history in Ireland, having the first formal arrangement in 1902 with the then Department of Agriculture & Technical Instruction.*" [10]

Agriculture provides raw materials for skilled craftspeople to do their work, so agriculture is very important. Teagasc (Te-ag-ask) is Ireland's Agriculture and Food Development Authority, and in 2017, it highlighted the importance of agriculture to the Irish economy.[12] Teagasc says that in 2016, the agri-food sector in Ireland "*generated 7% of gross value added (€13.9 billion), 9.8% of Ireland's merchandise exports and provided 8.5% of national employment. When employment in inputs, processing and marketing is included, the agri-food sector accounts for almost 10% of employment.*" [11] Teagasc highlights Ireland's agricultural land use and farm structure (Table 2).

[Please include the following call-out quote: "Agriculture provides raw materials for skilled craftspeople to do their work, so agriculture is very important."]

[Please table 2 near here]

Table 2. Agricultural land use and farm structure in Ireland around 2016 (taken from the Teagasc website).[11]

- Irish agriculture is primarily a grass-based industry.
- The Census of Agriculture 2016 showed there were 137,500 farms compared to 139,860 farms in the 2010 Census of Agriculture.
- The utilised agricultural area has declined marginally since the 2010 Census of Agriculture to 4,886,600 hectares. The average size of agricultural holding also decreased to 32 ha.
- Approximately 84% (4.09 million ha) of agricultural area is devoted to grass (silage, hay and pasture), circa 9% (0.44 million ha) is in commonage and rough grazing and the remainder circa 9% (0.35 million ha) is allocated to cereals and other crop production.
- There are approximately 137,500 family farms in Ireland with an average size of 32.4 hectares per holding according to the Farm Structure Survey of 2016.

I wonder what numbers Teagasc would come up with for 2024. The Irish Farmers Journal has an article on how there were almost eight thousand fewer farmers in Ireland in 2022 compared to 2011 – so that means around 8000 families might still be adversely affected in some way.[13] In 2011, the Irish Census reported 73,146 farmers in Ireland, compared to 61,472 farmers in 2022. I hear from people I talk to that support for agriculture in Ireland is not good. Poor support for agriculture is terrible for the general public, considering most of the products we buy in supermarkets contain farmed raw materials grown during agriculture. In addition, agriculture provides a lot of employment opportunities.

We should be making life easier for farmers, not more difficult. As I wrote in the EMWA journal December 2024 issue, "… *farmers are One Health custodians who have not always realised it. I also think*

governments have designated farmers as One Health custodians without necessarily realising it."[14, 15, 16, 17, 18]

Tips for aspiring and seasoned medical writers

If you are an aspiring medical writer or a seasoned medical writer who wants to pivot into another area of medical writing, this is one way you could do it. You could interview your local craftspeople about what they do, transcribe what they say, and write an article about it. An interview article in the EMWA journal 2023 Biotechnology December issue gives a good example of the shape you might like your article to take.[19]

[Please include the following call-out quote: "If you are an aspiring medical writer or a seasoned medical writer who wants to pivot into another area of medical writing, this is one way you could do it."]

Think up some interview questions (Table 3), consider using a recording device to record your interview conversation(s), and either transcribe what is recorded by ear or, if you are interested in artificial intelligence (AI), figure out a way to incorporate transcription software which might help you. Most importantly, maintain a flexible approach and listen to what your interviewees say because their perspectives are very important. By the way, AI is probably more commonly known as artificial insemination in animal husbandry sectors. So, it might be a good idea to avoid using the AI acronym depending on who you interview and your article's target audience.

And the other area of medical writing I am referring to is One Health. One Health includes environmental health and is intended to lead to the better health of our planet – Gaia Theory is related and interesting

to look up.[20] Medical writing does not traditionally cover the environment's health, so there are many opportunities for medical writers here. And people are already doing One Health work under terms not associated with medical writing.

[Please table 3 near here]

Table 3. Some interview question suggestions.

How is what you do sustainable?
Why should your community buy directly from you?
What obstacles are in the way of your business supplying directly to your community?
Have you heard of the circular economy and how does it fit with what you do?
Are you eligible for government incentives for what you do?
What do you think is the best way to bring new business your way?
How does what you do relate to what other producers do?

Restaurant chefs and home cooks might be biotechnologists too

One definition says, "*… biotechnology can be used to manufacture bio-based products...*" And when you cook something, it is generally bio-based, and the product of what you cook is eaten by whoever – family, friends, community. Merriam-Webster dictionary definitions of "*manufacture*" include "*something made from raw materials by hand or by machinery,* " "*to produce according to an organized plan and with division of labor,* " "*the act or process of producing something,* " "*to make into a product suitable for use,*" and "*to produce as if by manufacturing : create*."[21]

Heston Blumenthal, the chef, "*is known for using molecular gastronomy and a scientific approach to cooking.*"[22] Thinking about this a bit more, if restaurant chefs are artisan biotechnologists, does that mean people who cook in their homes are biotechnologists? They are working with bio-based products like flour, eggs, meat, bread, milk, butter, fruit, vegetables, spices, and whatever else they prepare food with.

Tours, drawing connections, and artisan crafts

I went on a film studio tour and was taught about all the different craftspeople involved in creating individual costumes, including armour and weapons, other props, sets, and musical scores. I realised that by watching television series and movies and going to the cinema, I am looking at the work of craftspeople.[23, 24] I think we take much of what we have for granted. We do not think about where it comes from and how it affects our lives—a lot of what we have started as a raw material grown by farmers.

Just thinking of movies, it is important to consider that some branches of medical writing focus on pictures, script writing, storyboards, graphics, and more. Many of the pictures and graphics in this issue were worked on by the EMWA graphics team.

The circular economy and artisan crafts

Some craftspeople might be part of the circular economy without realising it. The European Parliament defines the circular economy as "*a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible*."[25] There are also some circular economy incentives to consider (Table 4).

[Please table 4 near here]

Table 4. Some circular economy information.

Title	Website
Circular Economy Innovation Grant Scheme (CEIGS) 2024	https://www.gov.ie/en/service/a42cc-circular-economy-innovation-grant-scheme-ceigs-2024/
The Circular Economy Programme 2021-2027	https://www.epa.ie/publications/circular-economy/resources/EPA_Circular_Economy_2021_Programme_Apr22_Web.pdf
Circular Economy Innovation Fund 2024 for small businesses	https://www.communityfoundation.ie/wp-content/uploads/Criteria-CE-Innovation-Fund-Small-Businesses.pdf
The Irish Environmental Protection Agency (EPA)	https://www.epa.ie/environment-and-you/circular-economy/
Tax relief for family backing new businesses	https://www.neh.gov.ie/business-supports/start-up-capital-incentive-

So, if a dairy farmer diversifies what he does and ventures into brewing, reuses his spent brewing grain when he feeds it to his dairy herd, are his farming and brewing businesses part of the circular economy? Reuse is considered part of the circular economy, so his farm and brewery must be part of the circular economy. Does that mean the farm and brewery are eligible for one grant each (so two grants in total) because they are separate businesses? To join the circular economy, maybe large brewing companies could arrange to give their spent brewing grain to farmers for their animals. What happens to spent brewing grain usually?

My parallel thought is from my experience about twenty years ago. A supermarket in Scotland binned food that still looked, smelled, and felt okay. The food was binned because it was past its sell-by date, and as far as supermarket policies went, the food was spent. Some of my friends were chased away from supermarket bins for trying to "*reuse*" discarded food – then and now, my friends hate food waste and love a bargain. One supermarket reasoned with my friends that they were stealing the binned food, and my friends reasoned that the supermarket put the food in the bin, so the discarded food was fair game.

Company policies are developed based on country laws and regulations to help the company comply with laws and regulations. I wonder what supermarkets do with spent food now. In 2024, the Irish Environmental Protection Agency estimated that Ireland generated 750 thousand tonnes of food waste in 2022[26] – Ireland is a small country! And I wonder if there are regulations to prevent spent grain being given to animals because the regulations could change to allow it. Regulations protect the public and change depending on how loudly the public shouts – so shout loud and use your vote!

[Please include the following call-out quote: "… shout loud and use your vote!"]

If a farmer shares agricultural equipment, does that mean that he and whoever he shares his equipment with are part of the circular economy? Is each lender (farmer) and lendee eligible for circular economy incentives?

If a farmer leases to another party, say a milk vending machine or an area of his farm for brewing, cheese making, or weaving, does that mean his business and the party he leases to are eligible for circular economy incentives?

When I read "*Tax relief for family backing new businesses,*" [7] (Table 4) I think of farmers diversifying or supplying what they do directly to their communities. Still, I don't know if they qualify for this tax relief or its ins and outs. I wonder about "*old*" businesses and if they qualify for tax relief – maybe they need to open a new part of their business, and perhaps the new part needs to be listed as a separate business. It would not surprise me if there are accountants familiar with the ins and outs of various types of financial relief for artisan businesses.

Suppose a farmer leases part of his farm to a family member who is setting up a new business, like milk vending to the community. Does that mean the farmer and the family member are eligible for circular economy incentives concerning leasing and tax relief for families backing new businesses?

Can tax relief be backdated?

The global bioeconomy and artisan crafts

"*Bioeconomy*" is a term used globally by governments and has been filtering into industries over the last few years. There are organisations in various countries that support bioeconomy activities. One of those organisations is the Irish Bioeconomy Foundation (IBF) in County Galway in the west of Ireland.[28] The IBF website shows the IBF helps with bioprocess design and scale-up, access to financing, and promotion and outreach. I wonder what bioeconomy financial incentives exist and if they are separate from circular economy incentives. The IBF website highlights European projects it is involved in, including RuralBioUp, BIOBec, BioeconomyVentures, ICT-BIOCHAIN, and MPowerBio.

[Please include the following call-out quote: "I wonder what bioeconomy financial incentives exist, and are they separate from circular economy incentives?"]

One of the IBF partners is BiOrbic, which helps create a circular sustainable bioeconomy.[29] BiOrbic says, "*The bioeconomy is the part of the economy which uses renewable resources from agriculture, forestry and the marine to produce food, feed, materials and energy, while reducing waste, in support of achieving a sustainable and climate neutral society.*" BiOrbic is involved in developing talent through academic institutions and industry to work in the circular bioeconomy.

In 2024, Gardossi *et al.* wrote a position paper for the Food and Agriculture Organization of the United Nations.[30] They said, "*Crop and livestock production, fisheries and aquaculture, and forestry generate the biomass and biological resources that provide the foundation of a sustainable bioeconomy. The agricultural sectors will also play a central role in ensuring that biomass can be steadily circulated throughout the entire bioeconomy in ways that optimizes the use of biological resources. The complex and diverse agrifood systems that produce, process and distribute food, feed, fibres, fuel and other products that all of us depend on will clearly need to be on the top of the agenda in any discussions about how to move toward a sustainable bioeconomy.*"

[Please include the following call-out quote: *"… agri… on the top of the agenda*."]

It is very common to go to a supermarket where I live in Ireland. Mainly while writing this article, I noticed where the food on the supermarket shelves comes from. Interestingly, the cold aisle glass doors are partly manufactured by one of the same companies that make laboratory glassware. Global involvement in the bioeconomy is most noticeable on the coffee and tea shelves. Coffee and tea come from places like countries in Africa, countries in South America, and countries in Asia. For years, there have been initiatives to support the raw product producers in those areas. Supermarket packaging often has a label highlighting producer support.

I buy a mixture of things at the supermarket because I can. I buy some frozen, some canned, some bottled, some fresh, some "*own brand*" things, and some artisan things. Artisan products tend to be more expensive, but getting them makes me happy. By buying an artisan product, if I can afford it, I am

telling myself that I am worth it, and I am telling myself that I am supporting the producer by buying it – it gives me a nice feeling and a good frame of mind.

Final remarks

I was shocked when some people told me the connection between farming and what is in the shops has been lost to many people. This connection was always highlighted to me while growing up, so I assumed everybody was still aware of it, but seemingly not.

Biotechnology is everywhere and is more understood by the general public than many think. The biotechnology used in pharmaceutical and medical device production is a small proportion of the biotechnology used on the planet. And biotechnology is already used by people who don't always realise it. Figure 1 helps illustrate these statements.

I think connections between biotechnology and how it impacts everyday life can and should be drawn. In addition, it is important to know that biotechnology might be animal or non-animal-based. Biotechnology should not be feared. And it is important to know how important farmers and agriculture are to our global health.

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Disclaimers

The opinions expressed in this article are the author's own and not necessarily shared by her employer or EMWA.

Disclosures and conflicts of interest

The author declares no conflicts of interest.

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Jen Bell went to agricultural college when she left school. Then, for a few years, she travelled and did seasonal work on farms, in orchards, and factories. After that, she continued her life science education as a "*mature student*." She worked in pharmaceutical and medical device manufacturing and distribution quality management roles from 2010 to 2018. She is interested in One Health which is concerned with threats to the animal-human-environment interface. Jen is passionate about the potential for biotechnology to improve lives. Today, she is a biotechnology consultant and freelance medical writer.

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