How blackcurrants could help end bad (for the planet) hair days

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A hair dye derived from blackcurrant skins can transform bleached hair (left) into a multitude of shades including purple (right). Credit: American Chemical Society

Natural dyes extracted from blackcurrant waste created during Ribena fruit cordial manufacture have for the first time been used in an effective new hair dyeing technology, developed at the University of Leeds.

The global hair coloration industry is worth more than $10 billion a year,

with the number of people colouring their hair in professional salons and at home on the increase.

But some of the ingredients found in commonly-used synthetic hair dyes, which are derived from petrochemicals, are known irritants and can trigger severe allergic reactions.

There is also much debate about whether these ingredients also cause cancer.

Those used in permanent dyes and to achieve darker shades are of particular concern, although many colorants used in semi-permanent ones also carry risks.

Dyes that some may consider 'natural' - such as those including henna—usually escape scrutiny when it comes to health concerns, but the main natural colorant in henna is lawsone, which the EU Scientific Committee on Consumer Safety states is toxic.

What is more, it is thought up to 95% of all dyes end up washed down the drain; their effect on the environment is unknown.

Colour chemist Dr. Richard Blackburn and organic chemist Professor Chris Rayner, both from the University of Leeds, worked together to identify and isolate naturally-occurring alternatives—as well as a sustainable process to produce them.

Dr. Blackburn, who heads the Sustainable Materials Research Group in the School of Design, said: "Because of issues and concerns around conventional dyes, we wanted to develop biodegradable alternatives that minimise potential risks to health and offer consumers a different option."

Professor Rayner, from Leeds' School of Chemistry, said: "We've made it possible to have great hair colour, and to get it from nature in the most sustainable way possible."

With Leeds colleagues, they today publish a paper in the *Journal of Agricultural and Food Chemistry* describing how they combined expertise in extraction technology, hair science, coloration, and natural products chemistry to develop a new technology to extract anthocyanins from blackcurrant fruit waste for use in renewable dyes.

"Anthocyanins are pigments that provide colour to most berries, flowers, and many other fruits and vegetables," Dr. Blackburn explained. "They are non-toxic, water-soluble and responsible for pink, red, purple, violet, and blue and colours and are widely used as natural food colorants all over the world.

"We knew they bound strongly with proteins—hair is a protein—so we thought if we could find an appropriate source of these natural colours, we might be able to dye hair."

All but ten per cent of British blackcurrants are used in the production of Ribena; the berries are harvested in late summer and pressed for juice.

Professor Rayner said: "After being pressed, the skins remain as a waste product. They have very high concentrations of anthocyanins, and represent a sustainable supply of raw material because of how much blackcurrant cordial we drink.

"The extraction technology is based on sustainable concepts—the colour is extracted using a water-based process and special filters collect the anthocyanins that we want. We believe that if we are extracting natural and food-grade products, we should not use any toxic or hazardous chemicals to get them."

In a second, forthcoming paper, the researchers analyse the extract in detail and identify all of its natural compounds."We wanted to identify all of the natural compounds present to improve our technology and to ensure safety, which cannot be said of most 'natural' cosmetic brands, where there is little understanding of what is in 'natural extracts'," said Professor Rayner. "'Natural' does not necessarily equal safe."

The researchers tried grapes as well as blackcurrants, but the smaller berries were found to yield much more of the vital colourant.

They developed a patented hair dyeing technology that provides intense reds, purples and blues on hair that, when combined with a natural yellow, could provide a wide range of colours—including browns. The colours produced were stable for at least 12 washes—comparable with conventional semi-permanent dyes.

Now, the researchers are commercialising their patented technology through a University of Leeds spinout company, Keracol Limited under the brand Dr. Craft [web address live from 30/5]. The blackcurrant-based dyes should be on sale this summer.

"We've also just made the first natural purple shampoo," Dr. Blackburn added. "The blackcurrant extract is used in our Natural Purple Berry Brightening Serum to counteract brassy tones in blonde and grey hair. The anthocyanins work just as well as the synthetic dyes they are replacing."

Keracol has previously harnessed nature's chemistry with a sustainable skincare range made using the waste skins from the production of Marks & Spencer wines.

More information: Paul M. Rose et al. Application of Anthocyanins from Blackcurrant (Ribes nigrum L.) Fruit Waste as Renewable Hair

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