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Article

Popularising Croll: an opportunity for expression and creativity

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ABSTRACT: James Croll (1821–1890) was a gifted scientist whose revolutionary theories had a profound impact on our understanding of the Earth's climate, ice ages and glaciation. While his contributions are recognised by an increasing number of modern-day scientists, in the public domain his legacy has been all but forgotten. Popularising Croll's story brings its own challenges: we know more about the science than we do about the man, and his theories do not lend themselves to quick and easy explanation. While Croll's scientific theories, presented alone, risk being viewed as complex and difficult to digest, his lifelong struggle against adversity is a compelling story with the potential for widespread public appeal. In recent years, interested individuals and institutions have begun to increase public awareness of Croll through talks and lectures, exhibitions, theatrical events and articles in print and online. There are many more possibilities that are worth investigating, in order to inspire and engage people locally, nationally and even internationally. Croll's story is fascinating from many points of view, and is open to interpretation by people of different ages and backgrounds. Perhaps even the gaps in our knowledge can be turned to advantage, allowing for imagination, creativity and expression.

KEY WORDS: climate, climatology, Earth, environment, glaciology, ice ages, science communication, the arts.

James Croll is one of the most brilliant Scottish scientists of the 19th Century. He was the first scientist to propose that both the eccentricity of the Earth's orbit and the effects of precession (the gradual change in orientation of the Earth's axis of rotation) were key factors in triggering ice ages; he considered the effects of reflected heat and sunlight on global ice sheets; he calculated the age of the Sun, the thickness of the Antarctic ice and the effects of the Gulf Stream. In his lifetime, he earned the praise and respect of Charles Darwin, Sir John Herschel, Sir Joseph Hooker and Sir Charles Lyell, among many others. He achieved all this while battling against monumental odds: poverty, social stigma, lack of formal education and health problems which caused recurring pain. Yet, in spite of his accomplishments, James Croll is still virtually unknown to the general public. How can we address this so that Croll's life and work are more widely known and appreciated?

This paper examines the challenges that we face in communicating Croll's story to the public. Very little has been written and published about his life, and what has been published is similar in content. Scientific concepts require careful explaining, and we are largely starting from scratch, because Croll's name is unknown to most people outside his particular fields of study. I will go on to look at what has already been done to remedy this, and suggest new ways in which Croll's story can reach a wider audience. I believe there is an opportunity here for many kinds of artists – authors, screenwriters, actors, visual artists or storytellers – to investigate Croll's world, experience it through their own eyes, and interpret it in new and creative ways.

1. The challenges

What makes a popular life story? Some key elements could be conflict, dramatic events, a struggle against the odds and a fascinating character. James Croll gives us all of these: his family were poor, and they were made destitute while he was still a child; he had lifelong physical ailments to contend with; he was blessed with a brilliant mind but had little or no formal education; and he tried several spectacularly unsuitable jobs before finding his true vocation (Irons 1896).

Croll's life, however, does not follow the stereotypical 'rags to riches' or 'obscurity to fame' trajectory. While this makes his story more interesting in close-up, it does not give us a ready-made, publicly recognised figure as a starting point for creative or biographical works. He is still, to most intents and purposes, unknown. Admittedly, in his later years Croll was respected and admired by his peers, many of whom were leading lights in their specialist academic field, but his modesty was such that he neither sought nor received wider acclaim. We are, therefore, almost starting from scratch when it comes to explaining the story of Croll and his achievements.

This brings us to another challenge. While we can sketch out a timeline of Croll's life in terms of major events, there is a scarcity of material giving us personal insights. Ideally, to gain a balanced impression, we should be reading Croll's journals and memoirs (which sadly do not exist except for his brief and incomplete autobiographical notes), and first-hand accounts by a wide range of people who knew him at different periods in his life.

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These would give a revealing glimpse into his personal relationships, outside the realm of his work. Unfortunately, such records are hard to find. As a result, we see Croll largely through the eyes of male contemporaries who knew him first and foremost as a scientist.

There is also a lack of diversity in the available sources. The single authoritative work on Croll's life is the 'Autobiographical sketch of James Croll, with memoir of his life and work' by James Campbell Irons (Irons 1896). This contains a brief and incomplete autobiography written when Croll was an elderly man; letters between Croll and fellow scientists; and further biographical information by Campbell Irons and his brother, the Rev David E. Irons. James Campbell Irons was one of Croll's friends who urged him to write an autobiographical sketch, and he and his brother undertook the task of publication, with all proceeds to be donated to Croll's widow. Invaluable though it is, the book has a couple of drawbacks in that the biographical section is written in retrospect, towards the end of Croll's life; and it is written from the viewpoint of close friends, when a broader collection of opinions and impressions would be desirable.

Another issue which must be addressed is the science itself. The theories, formulae and statistics that inhabited Croll's brain were complex, demanding dedication and years of study for non-specialists simply to comprehend them. While the discoveries that he made were groundbreaking, they are almost impossible to condense into bite-sized nuggets that would tempt a newspaper reader or a bookshop browser. They are perhaps better demonstrated through the use of exhibitions that make use of models and graphics. The method of offering the information, therefore, is just as important as the information itself.

The risk in attempting to popularise Croll is that the science overshadows the man, because we know so much about the first, and comparatively little about the second. Instinctively, the public prefer the human aspect, because it is relatable and accessible. The overall challenge, therefore, is to communicate Croll's story in a creative way that appeals to a modern audience, while keeping the science in perspective – ideally, making it available in greater depth to those who wish to investigate further.

Even among scientists, Croll's work was soon eclipsed by more dominant figures. Professor Kevin J. Edwards, University of Aberdeen, observes:

> His reputation had diminished by the time of his death and he has been overshadowed by the similar 'achievements' of the Serbian mathematician Milutin Milanković (1879–1958) – we know the orbital theory by its expression as *The Milankovitch Theory* rather than *The Croll-Milankovitch Theory*. (Notes on *Earth and Environmental Science Transactions of the Royal Society of Edinburgh* (EESTRSE) publication, January 2020)

2. Croll publicity to date

Until recently, Croll's work was known only to a select number of academics involved in Quaternary research or glaciology. Now, however, his contributions are beginning to be more widely acknowledged. A number of academics in the field of geosciences have published scientific papers and led discussions about Croll's work, and several of them are contributing to this special volume of EESTRSE. This publication, along with a conference and other events, will play an important role in increasing public awareness of Croll's achievements.

Mike Robinson, Chief Executive of the Royal Scottish Geographical Society (RSGS), who lives close to Croll's former home in Wolfhill, has researched aspects of Croll's life and has located his grave in Cargill cemetery. Robinson gives regular public talks on Croll, entitled 'Joiner, Janitor, Genius'. These are illustrated with a presentation of images and graphics explaining the significance of Croll's work. Over the last ten years, Mike has also given talks to most of the geological societies in Scotland, and a talk at Wolfhill Village Hall where an information panel about Croll (Fig. 1) has now been installed (Mike Robinson, pers. comm. 2020).

In early 2020, Mike spoke to a group of writers at Perth Theatre about Croll's story, and the writers were tasked with creating a response. This resulted in a staged theatrical event with actors, performances and readings. In addition, Professor Iain Stewart,

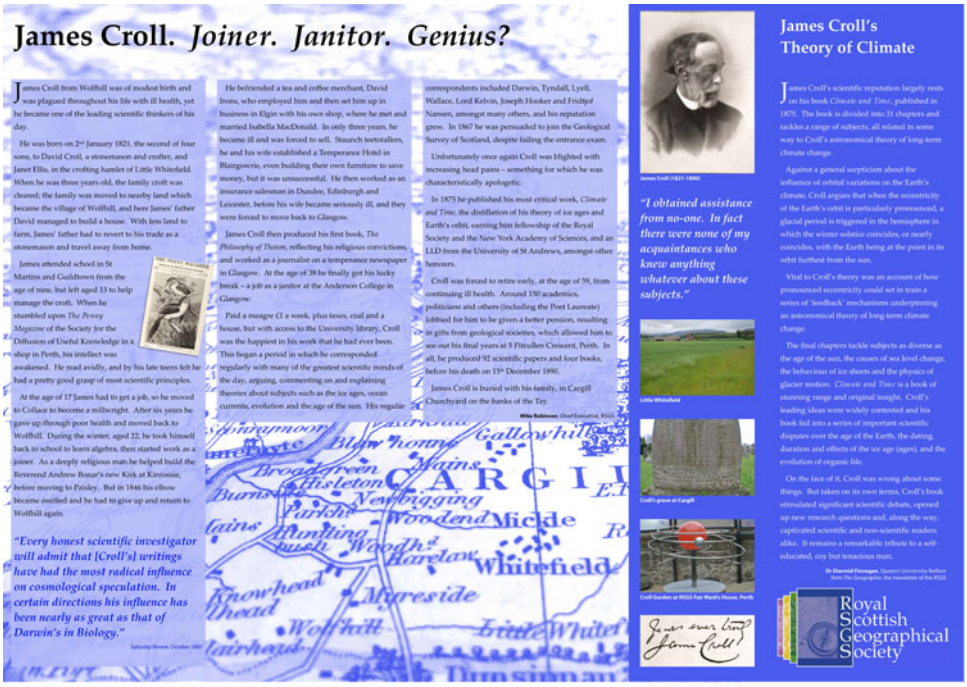


Figure 1 Information panel at Wolfhill Village Hall (photo: M. Robinson).

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Professor of Geoscience Communication at the University of Plymouth and President of the RSGS, mentioned James Croll in Episode 3 of his TV series *Men of Rock* (BBC2 2010).

At the RSGS headquarters in Perth, an outdoor space called the 'Croll Garden' (Fig. 2) was opened in 2016. A specially commissioned interactive sculpture demonstrates the movement of the Earth around the Sun, and information panels celebrate Croll in pictures and words. This is an ideal learning environment for visitors, including school groups. Stones from Collace quarry, near Croll's birthplace, were used in creating the garden, and this collaboration raised Croll's profile still further. The Society has also commissioned artwork by an artist who lives in one of Croll's former homes.

Anderson's Institution, where Croll worked as janitor and undertook much of his research, was the forerunner of the University of Strathclyde. On its website, the University includes a summary of Croll's life and career in its section about notable alumni (University of Strathclyde 2020). The University's Archives and Special Collections department includes an entry on Croll in its online catalogue (University of Strathclyde Archives 2020), and in 2014 published a blog post about him for a series entitled 'The University of Strathclyde in 50 objects', celebrating the 50th anniversary of the University's charter (University of Strathclyde Archives 2014).

The website of the Geological Society of Glasgow (2020) includes the text of a paper entitled 'On the reason why the change of climate in Canada since the Glacial Epoch has been less complete than in Scotland.' This was read to the Society on Croll's behalf on 22 March 1866. There are numerous other online papers and articles (e.g., Finnegan 2011), and an entry on the *Gazetteer for Scotland* website (Gittings 2021).

James Croll's theories are more popularly examined in *Ice ages: solving the mystery* by Imbrie & Imbrie (1979). The book, like others, explores the evolution of ice age theories and the key scientists whose work helped to advance our understanding of the Earth's glacial periods.

The James Croll Medal is presented periodically by the Quaternary Research Association (2020). 'The highest award of the QRA, the Croll Medal is normally awarded to a member who has not only made an outstanding contribution to the field of Quaternary science, but whose work has also had a significant international impact.' (Quaternary Research Association 2020)

3. Possibilities for promoting public awareness of Croll

There are many ways in which the public could be made aware of Croll's life story and scientific contributions. In his youth, Croll was an avid reader of the *Penny Magazine*, which contained news and articles on all aspects of science. I am currently working with Mike Robinson of RSGS and illustrator Dylan Gibson to produce a replica magazine that will tell Croll's story in pictures and words, as well as explaining some of the science behind his theories. It will be tailored for children of late primary or early secondary school age.

A second book or booklet, aimed at adult readers, would be another good way of telling Croll's story. It could be promoted to audiences in and around Croll's birthplace in Perthshire (perhaps at museums and visitor centres as well as in bookshops) and to a national and international readership, targeting those interested in the history of science as well as the specific fields to which Croll contributed. Perhaps a more immediate and dynamic way to tell Croll's story would be to see it interpreted on stage or in film. For example, his work could be the subject of a TV documentary, a theatrical production, a radio play, or even an opera!

It would be good to see Croll included in the local or national school curriculum, either in terms of his life (historical) or his work (scientific). This could stimulate schools to organise visits to key geological sites, or to visitor centres such as that within the RSGS headquarters in Perth. This would help to nurture local awareness of and pride in Croll's achievements within Perthshire and Scotland as a whole.

An exhibition would be an effective way of explaining Croll's theories visually, while also telling the story of his personal life. Or a 'Croll Stroll' – a walk or drive – could be designed for visitors interested in Croll's life, perhaps taking in key historical sites or places of geological interest. These walks and trails could be illustrated on a tourism information website such as that hosted by Visit Scotland.

Public talks by academics and other researchers are a great way of reaching a large and receptive audience. These talks could be supported by articles in the local press, and they could be used to promote other Croll-related events, with support from electronic communication channels such as social media and blog posts, which could be utilised to publish in-depth articles, interviews or nuggets of information.



Figure 2 The Croll Garden at RSGS headquarters in Perth (photo: K. J. Edwards).

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The United Nations Climate Change Conference (COP26) will be held in Glasgow in November 2021. At this event, delegates including heads of state, climate experts and negotiators will come together to agree coordinated action to tackle climate change. In addition, there will be opportunities to discuss climate change issues and to share knowledge. Because of Croll's strong links with Glasgow and his recognition as one of the world's first climate scientists, COP26 offers an ideal opportunity to highlight his achievements and legacy. It also offers an opportunity for UK-based climate scientists and researchers to forge new contacts with international counterparts.

Finally, a Croll-themed single malt whisky, 'The Last Dram', is a fun idea largely inspired by Croll's response on being offered a dram by a friend, a couple of days before he died. 'I'll take a wee drop o' that' he exclaimed, 'I don't think there's much fear o' me learning to drink now!' (Irons 1896, p. 488).

It would be ideal if the public become actively engaged. People of different ages, and from different backgrounds, could be invited to interpret his story, perhaps drawing out individual strands and themes, or simply sharing their impressions on hearing about him. These are just a few suggestions, and no doubt more ideas will be put forward in the coming year.

4. Ideas as a writer: suggestions to make Croll more accessible to the public

When bringing Croll to the attention of the public, the first thing we have to address is the perception of 'difficult science', because that can be immediately and permanently off-putting. On the other hand, we have Croll's personal story, which has a widespread and timeless appeal. This makes a good starting point. I believe that, if the human aspect is compelling enough, it is not essential that audiences fully understand the science, although once they are drawn in they may well be inspired to investigate it further. It is interesting to note that the combination of complex science (or mathematics) and a brilliant but tortured mind has been used to good effect in recent Hollywood movies such as 'A Beautiful Mind' (2001) and 'The Imitation Game' (2014).

What do we have to work with? Croll possessed a mind of extraordinary brilliance: that much is clear. What is not so clear is his underlying character. Intended as a loving tribute, Irons (1986) portrays him in a highly flattering light. But what about the real person? We know little or nothing, for instance, about his relationship with his wife. We have no real idea about his daily interactions with family and friends. Much of what we know relates to Croll as an elderly man; it is easy to forget that he was once a young lad, 'full of fun and frolic' (Irons 1986, p. 53). But this is an important thing to remember. In communicating Croll's personal story to the public, we must try to reveal what lay in his heart, as well as in his mind.

The gaps in our knowledge of Croll's personal life can perhaps be turned to advantage. There is potential here for creativity and expression, for using the known facts as a basis on which to build a vibrant, three-dimensional character. Imagined scenarios and conversations could emerge from our knowledge of real-life events. Important episodes in Croll's life could be dramatised in this way – for example, childhood, his early jobs, his appointment as janitor and his emergence as a respected scientist. These could take the shape of a full-length play, or brief snapshots interspersing a documentary.

5. Conclusions

There are several difficulties to overcome if we wish to share Croll's story with the wider public. As a scientist, he is virtually unknown; his theories, although brilliant, are difficult to encapsulate in ways that will capture the attention of the browsing reader or shopper; and our available reference material relates largely to his professional life, leaving us with a somewhat vague impression of his personal relationships, which might hold a more immediate human appeal.

Much has been done in recent years, in order to bring Croll to the public's attention. Talks, theatrical events, articles in print and online, a Croll Garden and a Croll Medal have all helped to promote public awareness. Looking to the future, there are many more possibilities in the form of exhibitions, live performances, books, media articles and guided walks; it is also worth remembering that the United Nations Climate Change Conference will be held in Glasgow in 2021. Some exciting projects are already under way, including a replica *Penny Magazine* for schools.

Croll possessed a truly brilliant mind, and this is one aspect of him that we can readily appreciate. I believe that if we can also share the 'back story' of how he allowed that brilliance to flourish despite the most overwhelming odds, we are sure to inspire more widespread public recognition and an appetite for further knowledge. Croll deserves our admiration both as one of the greatest scientists of his time, and as a man who would not be deterred by mere physical and social obstacles. Seen in this light, his story is timeless and infinitely inspiring.

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