

# Class of 1923: looking back at the authors of JEB's first issue

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## ABSTRACT

Journal of Experimental Biology was launched in 1923 as The British Journal of Experimental Biology, with a single issue being published in the October of that year. As we celebrate our centenary, we look back at that first issue and the zoologists publishing their work in the new journal, and draw comparisons to the JEB that we know today. Much has changed since the publication of the first issue of JEB, in the worlds of both science and publishing, and we eagerly anticipate the next 100 years of discovery.

**KEY WORDS:** Centenary, Journal of Experimental Biology, History of science

## Launching a new journal

Around the time of the journal launch, British zoology was stuck in a descriptive rut. The zoologist and author G. P. Wells (son of H. G. Wells) depicts the majority of zoologists at that time as being 'obsessed by comparative anatomy and descriptive embryology' (Davies et al., 2013). However, there was a growing movement advocating an experimental approach, and among their number was a group of scientists who recognised the need for a journal that would publish the resulting experimental biology papers. Writing in *Nature*, they explained that 'Great Britain at the present moment compares very unfavourably with other countries in facilities for the publication of researches in experimental biology, especially on the zoological side' (Crew et al., 1923). This led to the foundation of The British Journal of Experimental Biology as a quarterly publication with an annual subscription price of 40 shillings (approximately £2/\$2.5). The Managing Editor was Francis Crew, Director of the Animal Breeding Research Department at The University of Edinburgh, and the Editorial Board included a range of eminent British zoologists (Fig. 1). The new journal had a strong connection with the Society for Experimental Biology (SEB), which we maintain today through the charitable support of the society by our publisher, The Company of Biologists.

As we shall see, there are several interesting connections between the JEB authors from this issue (Fig. 1). Several of them worked together, while others shared similar research interests or backgrounds. In this Perspective, we give a brief history of these JEB pioneers, and consider how they and their inaugural JEB papers compare with the journal and community that we know today (Box 1).

## Lancelot Hogben and Francis Crew

As well as being co-founders of JEB, Lancelot Hogben and Francis Crew were close colleagues at the University of Edinburgh. Together, they ran the Animal Breeding Research Department, which they had

established themselves by renovating an abandoned fever hospital (Hogben, 1974). Crew had recruited Hogben as Deputy Director of this new institute because of Hogben's expertise in cytology and genetics, which Crew recognised as increasingly important fields of study (Hogben, 1974; Sarkar, 1996). However, Hogben had switched his focus to endocrinology by the time he was headhunted by Crew (Sarkar, 1996). Indeed, their joint paper, the first article in the first issue of JEB, focuses on the development of the endocrine system (Hogben and Crew, 1923). Their approach is one that many JEB authors would recognise today. The manuscript starts with an observation of an interesting natural phenomenon (the high prevalence of premature abortions in Dexter cattle). This observation is used as the basis for a question regarding basic biology: there was speculation that these premature abortions may be a result of thyroid deficiency in the calves, so the authors ask: 'At what stage in vertebrate development do endocrine glands begin to function?'

It was already known that thyroid secretions promote axolotl metamorphosis, so, by feeding axolotls the thyroid glands of bovine foetuses at different developmental stages, Hogben and Crew aimed to determine roughly when this gland becomes functional. They also employ a histological approach, noting at which stage the thyroid first begins to resemble a mature gland. Combining these data, they conclude that the thyroid gland becomes active around 6 months into development, and thyroid deficiency can therefore be ruled out as a cause of the premature abortions. Given the known role of hormones in amphibian development, part of the authors' motivation was to provide a comparative view of endocrine function during development across vertebrates. Thus, the comparative perspective that is at the heart of JEB can be traced right back to our first issue.

Hogben and Crew would work together until Hogben moved departments, becoming a senior lecturer in Edinburgh's medical school and then an assistant professor at McGill University, Canada (Hogben, 1974; Sarkar, 1996). Both men became involved in war work during the Second World War, which was a reunion of sorts – Crew was made Director of Biological Research at the War Office and invited Hogben to join him (Hogben, 1974; Sarkar, 1996).

Hogben's studies in the endocrinology field contributed to the development of an early pregnancy test (Sarkar, 1996). He was also involved in the 'Nature vs Nurture' debate that took place in the early 20th century, being a proponent of the idea that phenotypes arise from interactions between genetics and environment. It has been suggested that this may have influenced his opposition to eugenics (Sarkar, 1996).

## Charles Maurice Yonge

Charles Maurice Yonge was another University of Edinburgh researcher. Indeed, in the introduction to his paper, he states that some of the work was carried out in Francis Crew's lab, with the help of Lancelot Hogben. Yonge initially studied modern history but moved to Edinburgh to take up forestry (Morton, 1992). The forestry degree included a zoology course and, according to a memoir of Yonge's life published by the Royal Society, it was the influence of the

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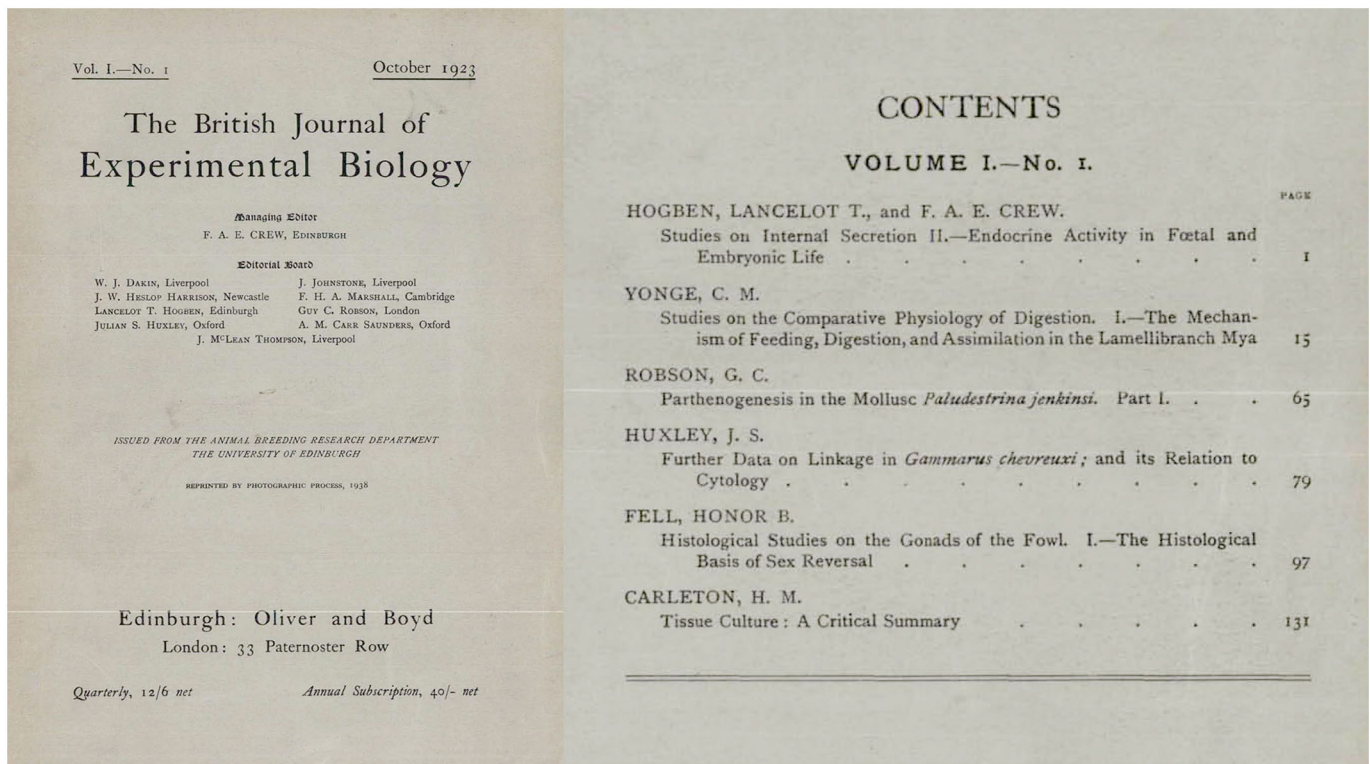


Fig. 1. Cover page (left) and contents page (right) from the first issue of *The British Journal of Experimental Biology*.

‘charismatic’ Crew that instilled a passion for the subject in Yonge (Morton, 1992).

Yonge finished his undergraduate degree in 1922 (Morton, 1992), so presumably would have just started his PhD when his manuscript was published in JEB. Being a published author at such an early career stage is even more impressive considering that this is a single-author paper. Of course, early-career researchers (ECRs) remain important contributors to JEB’s pages; these researchers will shape the science of tomorrow. Approximately three-quarters of JEB papers published today have at least one ECR author.

Yonge starts his paper confidently, claiming that the process of invertebrate digestion has been neglected by zoologists and that he is ready to put this to rights, starting with his study of the soft-shell clam *Mya arenaria* (Yonge, 1923). The manuscript is a leviathan, coming in at almost 50 pages and integrating the existing literature with Yonge’s own observations. Yonge’s paper is unambiguously a comparative physiology study and would fall within the scope of JEB today. Indeed, the journal still publishes a reasonable number of papers on the topic of digestion in various species. The paper actually forms part of a series of three articles published in JEB – the other two address the physiology of digestion in the Norway lobster and the ascidian *Ciona intestinalis*.

### Guy Robson

Like Yonge, Guy Robson moved into science from the arts. He entered academic life as a classicist but switched to zoology during his undergraduate studies at New College, Oxford, and went on to become an expert in Mollusca (Hindle, 1945). Robson’s article focuses on the mud snail *Paludetrina jenkinsi* (Robson, 1923). In the paper, Robson makes a careful study of reproduction in this snail, aiming to determine once and for

all whether it can undergo parthenogenesis. This had been posited by another scientist, A. E. Boycott, but Robson notes that this was largely based on the fact that all adults observed were carrying young, leading to the conclusion that no males existed.

Robson started his study by collecting samples from 23 different locations. After dissecting them to inspect their reproductive systems, he recorded no evidence of male gametes or male organs. Next, he followed his snails through several cycles of reproduction. At the time of writing, Robson had reared four or five generations of snails and checked as many individuals as possible for evidence of spermatozoa. Finding none, he concluded that parthenogenesis was probably taking place. Quick to point out the caveats, he admits that it was not possible for him to fully examine all the individuals, as he was somewhat overwhelmed by snails: ‘There is thus no absolute certainty that the animals that reproduce themselves have not had a male phase; but there is a pretty strong presumptive case against it.’

Much of the work presented in Robson’s paper is descriptive, except for one section of experimental work in which snail cultures were raised under different conditions of temperature, salinity, pollution and feeding regime, to determine whether any of these treatments might induce the appearance of males. It is interesting to note Robson’s apparent surprise at the range of conditions that these creatures can tolerate (including London tap water): ‘It may be remarked that the resistance to adverse conditions shown by this animal is very remarkable. They will live for years in water in which their faeces are allowed to accumulate, in which the oxygen supply is very much reduced, and in which a large accumulation of bacterial slime is formed. They will also resist desiccation for three or more days’. Anyone who is familiar with JEB will know that much research in the journal today concerns the mechanisms that

**Box 1. Comparing the first issue with the JEB of today**

Looking back at JEB's first issue, several things leap out at the modern reader: the issue contains mainly single-author papers; some of the papers are very long, only three of the articles include images and most articles have their own contents lists. Some of the reference lists are also startlingly short. For example, Hogben and Crew's paper contains just six references. Remarkably, all the papers from the first issue of JEB have been cited within the last 10 years, with Yonge's paper being referenced as recently as 2022 (Table 1).

It is striking how small the community seems to have been when the first issue was published: the six papers represent contributions from just two universities, Edinburgh and Oxford (although Robson was based at London's Natural History Museum). We now publish research not only from the UK, but from across the globe, including North and South America, Europe, Australia and New Zealand, Asia and Africa. Similarly, the scientists who make up our Editorial Board represent a broad geographic spread. Today, the fields covered by JEB are so wide ranging that it is very unlikely that any single individual could claim to have close working connections in all of them. It is noticeable, too, that Honor Fell is the only female author represented in the first issue, given the struggle for representation faced by women in science at that time. Although significant progress has been made, this remains an ongoing issue today.

	Volume 1, issue 1 (October 1923)	Volume 225, issues 19 and 20 (October 2022)
Number of papers	6	26
Average number of authors	1.2	5.2
Ratio of male:female authors	6:1	Approx. 2:1
Percentage of papers with female authors	17% (1/6)	77% (20/26)
Number of different countries in which authors are located	1 (all UK)	16 (Australia, Canada, Colombia, Denmark, France, Germany, Israel, Japan, Mexico, New Zealand, Panama, Poland, Spain, The Netherlands, UK, USA)
Average number of display items per article	11 (range 0–29) No subpanels in figures	6 (range 3–10) Approx. 18 separate subpanels per paper (each equivalent to 1 figure/table in 1923)
Maximum number of display items	–	10
Average length of research paper (words)	8000 (note that Yonge's paper is 15,700 words long)	6500
Recommended length of research paper (words)	6000	7000
Average number of references provided per article	32	61
Editorial Board	1 Editor, 9 Editorial Board members	11 Editors, 53 Editorial Board members
Ratio of male:female Editors/Editorial Board members	10:0	Approx. 2:1
Number of countries in which Editors/Editorial Board members are located	1 (all UK)	15 (Australia, Brazil, Canada, China, Denmark, Germany, India, Israel, Japan, New Zealand, Norway, South Africa, Switzerland, UK, USA)

The first issue also contains a high proportion of descriptive work. Today, we would define Huxley's paper as purely descriptive, and the papers by Yonge, Robson and Fell are predominantly so. Now, we focus on publishing work that is experimental in approach, and is mechanistic and hypothesis-driven. As a field of research shifts and changes, so must the scope of the relevant journals. Looking back through early issues of JEB, it is interesting to see how a field of research can evolve, becoming increasingly mechanistic as more is known.

Yonge's paper aside, the research topics covered in issue 1 are very different to those currently published in the journal. Some of the most popular fields published in JEB today, such as ecophysiology and neuroethology, were yet to be established in 1923. In fact, George A. Bartholomew, regarded as one of the founders of the field of animal ecophysiology, would have been just four years old when the first issue of the journal went to press. Another notable absence from the first issue is the field of biomechanics. Today, biomechanics research is a core topic for JEB. This is a field with deep historical roots: it can be traced all the way back to Aristotle and his book 'De Motu Animalium' (On the Movement of Animals). However, it is not until 1926 (Vol. 4, issue 4) that a paper on biomechanics first appears in JEB. Interestingly, this paper is co-authored by Lancelot Hogben, one of the authors who appears in the very first issue. To see the way JEB topics have changed over the past 100 years, take a look at our historical word clouds in the accompanying Editorial (Franklin, 2023).

define tolerance limits in the face of fluctuating abiotic factors such as temperature, oxygen level and salinity; of course, today, this work has gained new significance given the impacts of climate change.

**Julian Huxley**

Julian Huxley was born into the now famous Huxley family in 1887, a lineage that featured scholars including Aldous and Andrew. His grandfather, Thomas, was known as 'Darwin's Bulldog' (Whitman, 1975). During his career, he published on subjects ranging from ontogeny to mating behaviours in birds, with the latter work producing observations that were important for testing Darwin's theory of sexual selection (Baker, 1976).

Huxley's article in JEB's first issue concerns the mechanism of crossing-over of genetic material during meiosis in the crustacean *Gammarus chevreuxi* (Huxley, 1923). Crossing-over 'shuffles' the

genetic material and is an important cause of genetic variation in offspring. In the article, Huxley notes that *G. chevreuxi* has small, short chromosomes, yet exhibits a high incidence of cross-over events. As is fitting for JEB, Huxley takes a comparative approach by comparing *G. chevreuxi* with *Drosophila*, in which genes must be located far apart on a chromosome to facilitate high cross-over rates. A mechanism for crossing-over had been previously proposed for *Drosophila* by Thomas Hunt Morgan, but Huxley argued that the same mechanism cannot explain the frequency of crossing-over that he observed in *G. chevreuxi*.

At the time of writing, Huxley was a Fellow at New College, Oxford. He went on to publish in JEB a further six times, largely focusing on *G. chevreuxi* but with occasional forays into the effects of hormones on water regulation in salamanders or the consequences of injecting antibodies into pregnant rabbits. He is seen as a controversial figure today. Although he spoke out against

**Table 1. Citation of papers published in the first issue of JEB**

Author	Article title	Total citations	Year of last citation	Example citing journals
Lancelot T. Hogben, Francis A. E. Crew	Studies on internal secretion II. Endocrine activity in foetal and embryonic life	11	2016	Journal of Morphology, American Journal of Anatomy
Charles M. Yonge	Studies on the comparative physiology of digestion: I.—the mechanism of feeding, digestion, and assimilation in the lamellibranch mya	132	2022	Journal of Experimental Marine Biology and Ecology, Comparative Biochemistry and Physiology Part B, Canadian Journal of Zoology, Nature
Guy C. Robson	Parthenogenesis in the mollusc <i>Paludestrina jenkinsi</i> : Part I	34	2017	Molecular Ecology, Journal of Zoology
Julian S. Huxley	Further data on linkage in <i>Gammarus chevreuxi</i> ; and its relation to cytology	11	2013	Journal of the Marine Biological Association of the United Kingdom
Honor B. Fell	Histological studies on the gonads of the fowl	69	2017	Journal of Experimental Zoology, American Journal of Anatomy, Journal of Morphology, Proceedings of the Royal Society of London
Harry M. Carleton	Tissue culture: a critical summary	21	2015	PLoS One, Biological Reviews, Scientific Reports

the racism of the Nazi regime during the 1930s (Huxley, 1936), he was an advocate of eugenics (Weindling, 2012). This put him at odds with JEB co-founder Lancelot Hogben. Some have argued that Huxley sought to position eugenics within a landscape of social reform, but this conclusion is debated (Whitman, 1975; Weindling, 2012). Alongside his academic work, Huxley also held positions including Secretary of the Zoological Society (1935–1942) and Director General of UNESCO (1946–1948) (Whitman, 1975; Baker, 1976).

### Honor Fell

Born in Yorkshire in the first year of the 20th century, Honor Fell began her career by completing an undergraduate degree and PhD at the University of Edinburgh, where she was a contemporary of Hogben and Crew (Hogben, 1974; Vaughan, 1987). Indeed, writing in the 1970s, Hogben refers to her as one of the graduate students from his institute who went on to become a successful researcher; she had been made a Dame and a Fellow of the Royal Society by that point (Hogben, 1974).

Fell's paper (Fell, 1923) was published at a pivotal moment in her career. Around the same time that her manuscript was settling amongst the pages of JEB's first issue, she moved to work at the Strangeways Research Laboratory in Cambridge (Vaughan, 1987). Fell became director of the institute in the late 1920s; her tenure would last until 1970 (Vaughan, 1987) and, as a woman at the helm of an independent institute, it is tempting to imagine that it would have been a trailblazing one. She is also, of course, the only woman to have authored a paper in the first issue of JEB (see Box 1).

Much of Fell's own research concerned bone physiology and rheumatoid arthritis. She is remembered as a pioneer of organ culture techniques, which she developed in the pursuit of her research questions (Vaughan, 1987). These techniques allow researchers to study organ function in the laboratory setting and are still an active and important area of research today, particularly in the biomedical field. Alongside her work, Fell took a keen interest in mentoring young scientists.

Interestingly, the final paper in the first issue of JEB (Carleton, 1923) discusses tissue culture, but Fell's work at this time was focused on sex determination in fowl. In her paper, Fell applies histological techniques to carefully examine the cellular basis of the

appearance of male characteristics in hens. Most strikingly, she finds that the process of spermatogenesis in these adult animals seems reminiscent of the process that occurs in embryos. From her observations, she concludes that these newly formed male gametes are somatic cells that have dedifferentiated.

Given her scientific interests, Fell would seem to be an unlikely contributor to JEB today. Her publications would be more likely to appear in our sister journal, *Development*. However, Fell did publish in JEB on two subsequent occasions: one of these was a transcript for the second ever annual George Bidder lecture, which was given by Fell at the SEB meeting in 1972 (Fell, 1972).

### Harry Carleton

The issue ends with an article from Harry Carleton (Carleton, 1923), who was based at the University of Oxford. During his career, Carleton would work with fellow JEB author Guy Robson, authoring an article on the South African cuttle fish *Doratosepien confusa* (Carleton and Robson, 1924). He was an expert in histology, a subject on which he wrote a textbook, 'Carleton's Histological Technique' (Carleton, 1957). First published in 1926, it was reissued several times and is still available in many university libraries.

Appropriately, Carleton's paper closes the first issue of JEB by looking to the future. It reads like a Review article, providing an overview of the history and latest approaches in the tissue culture field. It offers an insight into the different methodologies being implemented at the time and covers important considerations for any researcher looking to attempt the technique. Of course, Review and Commentary articles are still important to the journal today; these articles allow both established researchers and those who might be new to a field to obtain an overview of a particular topic. Given the huge volume of publications that are available today, this function might be even more critical now than it was in 1923.

As any good Review should, the paper highlights current mysteries and unknowns within the topic in question. Carleton even identifies an issue in the literature that will be familiar to many researchers working today: confusion over the definition of technical terms. Specifically, he notes that both 'differentiation' and 'dedifferentiation' have been interpreted differently by various scientists. Finally, he highlights the importance of adequately citing

the literature: ‘The days are gone when a scientific worker could launch out into research and be sure that what he observed had never been observed before. Consequently the authors who omit adequate reference to the work of their colleagues do an injustice both to science and to previous workers.’ Together, these insights and concerns give the paper a fresh feel, despite it being drafted a century ago.

### How far we have come

Looking back at the first issue of JEB, it is interesting to reflect on just how far we have come. The journal of today would surely be something of a marvel to those first authors, not just in terms of the breadth and detail of its science, and the depth of knowledge that modern research techniques have afforded us, but also in terms of the journal’s global reach and engaged community. We can only imagine what the next 100 years of discovery in experimental biology will bring.

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