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**The Clara cell – a 'Third Reich eponym'?**

Authors:

Andreas Winkelmann, Dr. med., MSc.

Institute of Cell Biology and Neurobiology, Center for Anatomy

Charité – Universitätsmedizin Berlin, Germany

Thorsten Noack, Dr. med.

Institute of the History of Medicine

Heinrich-Heine-Universität Düsseldorf, Germany

Corresponding author:

Dr. Andreas Winkelmann, Institute of Cell Biology and Neurobiology, Center for Anatomy,

Charité – Universitätsmedizin Berlin, Schumannstr. 20/21, D-10117 Berlin, Germany;

Tel. +49-30-450528260, Fax. +49-30-450528900, E-Mail: [andreas.winkelmann@charite.de](mailto:andreas.winkelmann@charite.de)

**Word count** - excluding title page, abstract, references, acknowledgments and figures: 3058

## **ABSTRACT**

### **Introduction**

German anatomist Max Clara (1899-1966) described the "Clara cell" of the bronchiolar epithelium in 1937. We investigated Clara's relationship to National Socialism and his use of tissue from executed prisoners for research purposes, both largely unknown to date.

### **Methods**

Analysis of material from historical archives and publications of Clara and his co-workers.

### **Results**

Clara was appointed as Chair of Anatomy in Leipzig in 1935. He owed his career, at least in part, to Nazi support. He was an active member of the Nazi party (NSDAP) and engaged in university politics, including by making anti-Semitic statements about other academics in appointment procedures. Nevertheless, he also supported prosecuted colleagues.

Much of his histological research in Leipzig, including his original description of the bronchial epithelium, was based on tissue taken from prisoners executed in nearby Dresden.

### **Discussion**

Max Clara was an active and outspoken Nazi and his histological research exploited the rising number of executions during the Nazi period. Clara's discovery is thus linked to the Nazi system. The facts given in the paper invite a discussion about the eponym's neglected history and its continued and problematic use in medical terminology.

**Keywords:** bronchioli, Clara cell-protein, histology, research ethics, National Socialism,

## **INTRODUCTION**

In 1937, Leipzig anatomist Max Clara described a new secretory cell type in the human bronchial epithelium [1], which has been known as the "Clara cell" since at least 1955 [2]. With the identification of a specific Clara cell protein (CC10, identical with CC16 or uteroglobin) [3], which may play a role as a clinical biomarker of lung disease [4], and with the characterisation of a "Clara-like cell" in neuroepithelial bodies of the airway lining [5] in the 1980's, interest in the cell and its function has intensified. The term "Clara cell" has been in widespread international use since this time (Fig. 1).

At the same time, there has been considerable interest in eponymous scientific discoveries by researchers with a connection to Nazi Germany, such as Hans Reiter [6], Friedrich Wegener [7], Julius Hallervorden and Hugo Spatz [8]. It is therefore surprising that Clara's documented support of the Nazi movement [9,10] has not drawn more attention, particularly as his oft-cited original description [1] was based on tissue taken from executed prisoners, a material source that is dubious at best by today's ethical standards. We have therefore attempted to clarify Clara's involvement in National Socialism and the ethical context of the original description of "his" cell. To our knowledge, no other eponym in respiratory medicine – except for Wegener's granulomatosis (see discussion) – originated in the Third Reich.

## **METHODS**

We have examined relevant literature, documents held in historical archives in Berlin, Leipzig, Dresden, and Munich, and the publications of Clara and his co-workers.

## **RESULTS**

### **Max Clara's career**

Max Clara (Fig. 2) was born in 1899 in a village near Bozen in South Tyrol, then part of Austria. Having studied medicine in Innsbruck, Austria, and Leipzig, Germany, Clara's first

position was at the Institute of Histology and Embryology in Innsbruck in 1923. After the sudden death of his father in 1924, Clara left this post to carry on his father's general practice in his home village, which had come under Italian rule in 1919. He continued his histological research in his spare time and, from 1929 on, also lectured in an unpaid position at the University of Padua, Italy [11].

In 1935, to the annoyance of established anatomists [12], Clara was appointed Chair of Anatomy at Leipzig University, and in October 1942, assumed the prestigious Chair of Anatomy in Munich, which he held until the end of the war. Like many other Nazi Party members in public office, Clara was arrested by the US army in October 1945 [13]. After his release in October 1946, Clara could not find a permanent position at Munich University or elsewhere in Germany despite many desperate efforts [14]. His status within German academia after 1945 seems to have been one of *persona non grata* (see below). In 1950, he finally accepted a professorship for histology at the University of Istanbul, Turkey, which he retained until 1961 [15]. Max Clara died in Munich in 1966.

### **Clara and National Socialism**

While Clara was undoubtedly an accomplished histological researcher, he had virtually no experience in gross anatomy on taking up his first professorship in Leipzig in 1935. Many sources show that his striking career advancements in 1935 and 1942 were largely due to political support within the Nazi establishment, including the SA (storm troopers) and Max de Crinis, a prominent Nazi physician at the Ministry of Higher Education [12,16-19]. De Crinis (1889–1945) held the Chair of Neurology and Psychiatry of Charité Medical School in Berlin from 1939. He was centrally involved in SS activities and is widely regarded as a key figure in the Nazi "euthanasia" program, in which tens of thousands of psychiatric patients were murdered [20].

Immediately on arriving in Leipzig from Italy, Clara joined the NSDAP (National Socialist German Worker's Party, membership number: 3610105) [21]. His inaugural address in Leipzig, attended by representatives of all NSDAP organisations and held "not in tails, but in simple brownshirt" [22], was a political demonstration rather than an academic ceremony. His speech, published in a well-known general medical journal, explicitly welcomed the "National Socialist revolution of 1933" and urged scientists to "join the marching columns of our *Führer*" [9].

From 1936 to 1942, Clara actively participated in the *Nationalsozialistischer Deutscher Dozentenbund* [National Socialist German League of Lecturers]. He was the League's branch head (*Dozentenbundsführer*) for Leipzig University, and also Acting District Head (*kommissarischer Gaudozentenführer*) of Saxony from late 1941. To our knowledge, Clara never joined any other NSDAP sub-organisations, such as the SA or SS. The organisation *Dozentenbund* was founded in 1935 to represent NSDAP interests within academia and to foster the development of National Socialist science [23]. While the content of Clara's scientific publications is not political and did not contribute to a racist or anti-Semitic "pseudoscience", he actively participated in university politics, including by providing politically biased appraisals for scholarships, intimidating dissenting colleagues [24] and influencing appointment procedures. For example, in 1937, Clara's appraisal prevented the appointment of Gerhard Gesemann from Prague to a newly founded chair for Slavonic studies in Leipzig; Clara's 16-page expert assessment accused Gesemann of collaboration with Jewish professors, thus going "against the concept of the Nordic Race" [18,25].

In another appointment process, for the Chair of Otorhinolaryngology in Leipzig, Clara favoured a different candidate to that of the local NSDAP *Gauleiter* [district leader]. The subsequent quarrel with the powerful and autocratic *Gauleiter* resulted in an official reprimand of Clara by the Supreme Party Court in September 1942, a ruling mitigated but

upheld in an appeal hearing in February 1943 [26]. We do not know whether this ruling had any consequences for Clara.

As *Gaudozentenführer*, Clara wrote an introduction to a national academic directory of 1942, in which he stated “with pride that science has contributed to the great plans of the *Führer*” and called for scientists to submit to the reigning ideology and to be ready to secure the German claim to European leadership “intellectually as much as by the politics of force” [10]. Clara also agitated for the NSDAP in the *Anatomische Gesellschaft*, the society of German-speaking anatomists. In 1939, he and the outspoken National Socialist Eduard Pernkopf formed half of the four-member executive committee [27]. The Viennese anatomist Pernkopf is well-known for his anatomical atlas, which has been recently proven to be based, at least in part, on specimens from executed Nazi victims [28]. Clara's and Pernkopf's attempts to transform the *Anatomische Gesellschaft* into a National Socialist organisation met with resistance and had limited success [29], and Clara's name does not appear in its membership lists after the post-war re-establishment of the society in 1949. This as much as his futile search for a post after 1946 demonstrates that Clara's career, so closely allied with the NSDAP, saw him ostracized in German post-war academia.

The controversial post-war denazification process [30,31] classified Clara as a *Mitläufer* (follower) in June 1947, but cleared him upon appeal the following year [32]. Clara had successfully argued that his quarrel with the *Gauleiter* had been an act of “active resistance” against party leaders, which had eventually led, against his wishes, to his posting to the Chair of Anatomy in Munich in late 1942. This version of the facts is, however, unlikely. Firstly, his remuneration package in Munich was much more handsome than that in Leipzig [13]. Secondly, archived letters from the Ministry of Education demonstrate that Clara actively strived for this post from at least 1941 [17,19]. Therefore, his posting could also be interpreted as an effective promotion and his alleged “active resistance” against the *Gauleiter*

as a power struggle within NSDAP. But the Denazification Tribunal did not refer to the mentioned sources and, by this time, acquittals by such tribunals were already very common [30].

It should, however, also be noted that the denazification records include additional affidavits describing Clara's support for a "half-Jewish" doctoral candidate prior to 1938 and for fellow anatomist Titus von Lanz, who was prosecuted by the Nazis for having a Jewish wife [33]. Nevertheless, von Lanz later joined his colleagues' efforts to prevent Clara from returning to his post at the Anatomy department of Munich University [17].

### **Clara's "material" and the Clara cell**

In 1937, Clara described a new cell type in the terminal bronchioli, which he characterised morphologically as having secretory granules and a dome-shaped apical surface without cilia (Fig. 3) [1]. Clara described the material as "stemming exclusively from executed individuals, who were preserved by vascular injection immediately after death" [1] and added that he assumed this "rather extensive and perfectly fixed material" had given him an advantage over previous researchers. Of Clara's 25 publications between 1935 and 1945 [11], 9 were based on tissue from executed prisoners. At least 14 papers published by co-workers at his Leipzig institute were also based on such tissue.

The extensive use of the bodies of the executed for anatomical purposes was based on the rising number of executions during the Nazi era. However, the bodies of executed prisoners had been used prior to the Nazi regime, and the practice was sanctioned by laws passed as early as 1877. These laws remained in place during the 1930s, with the Nazi authorities merely passing decrees in 1933 and 1939 that regulated the distribution of bodies from specific centralised execution sites to individual anatomical departments throughout the country [29,34,35]. Clara's institute in Leipzig was regularly allocated bodies from executions

in nearby Dresden, where more than 1300 prisoners were put to death between 1933 and 1945, most for political reasons. Specifically in Dresden, many prisoners had been resistance fighters from Bohemia and Moravia, captured after the German occupation in 1938, and Poland, after its defeat in 1939 [36,37]. However, we have been unable to link the specific names of specific executed prisoners to any of Clara's publications to date.

Clara was not simply a passive recipient of the bodies. Only a week after assuming his post as director of the Anatomical Institute in Leipzig, he wrote to the Saxon State Ministry of Education urging it to extend laws permitting the use of bodies of executed prisoners. As the law of 1877 still precluded anatomical dissection if the relatives requested the body, Clara now suggested changing the law to allow anatomical dissection regardless of the family's wishes [38]. He also suggested that, until the law was changed, researchers should dissect such bodies regardless of whether they had appropriate authorization, but camouflage their illegal actions by preserving the external appearance of the bodies, a suggestion supported by the Chief Prosecutor of Dresden [39].

In March 1936, the Ministry finally consented to dissection even if relatives had requested the bodies, but forbade any removal of organs [40]. This effectively prohibited Clara's histological research if the bodies were indeed claimed by the families, but, given Clara's documented objections, we do not know whether he adhered to the decision. A formal decree stipulating that the families no longer be informed of the execution was only issued in 1942 [35]. As this regulation led to desperate relatives approaching the anatomical institutes in search of the remains of their loved ones, Clara later suggested to the local prison administration in Munich that the anatomical use of the bodies should not be disclosed at all to the relatives [41].

Source texts also indicate that Clara [42] and his co-workers [43,44] experimented on at least one of the prisoners sentenced to execution. To investigate the effect of oral vitamin C uptake



on the histochemical localisation of ascorbic acid in cerebral cells, the man was administered vitamin C tablets for five days prior to his death [42-44]. It is implausible that a prisoner awaiting his execution would be given vitamin C for other reasons than as part of an experiment.

### **The establishment of the “Clara cell” as eponym**

As for the post-war establishment of the term "Clara cell" in medical terminology, it seems that the first authors to quote Clara's original description were Andrew and Burns in 1947 [45]. The British authors stated that the cells were "described first by Clara in man and rabbit" and were investigated "in material from executed individuals" – but did not refer to the cells by the eponym. To our knowledge, the first to use the eponym – in its French version "cellule de Clara" – was Policard in 1955 in an ultrastructural description of the bronchioli of the rat [2]. It seems that the eponym was then promoted, at least in Germany, by Erich Schiller, a pupil of Clara [46]. None of these publications or others from that time period quoting Clara's paper [47,48] contain any indication of a critical stance towards Clara himself or the source of his research material. And while his former colleagues from Munich, in their statement of 1948 (see above, [17]), were very critical of Clara's National Socialist engagement, they do not mention his research either. Moreover, Clara himself continued to use the specimens in the post-war period. Even seven years after the Nazi era, in a publication again based on histological specimens from the war years, his identification of the source of his specimens was limited to the statement, "healthy individuals, who died a sudden death after variable duration of imprisonment" [49].

### **DISCUSSION**

We have shown that Max Clara was an active and outspoken Nazi. His support of the Nazi system is clearly documented over many years, at least from 1935 to 1942 [9,10]. As we have

shown, his eventual acquittal by the post-war Denazification Tribunal was erroneous, as some relevant evidence was not considered. Clara's post-war claim to "active resistance" certainly belittles the efforts of true resistance activists.

His original description of the "Clara cell" in 1937 was based on tissue from executed prisoners. Using the bodies of executed prisoners for research purposes was neither illegal at the time – as long as the relatives did not request the body – nor a practice limited to the Nazi regime [50,51]. However, the growing terrorist aspect of jurisdiction was specific to the "Third Reich". It led to an enormous rise in executions, from 1-4 per year before 1933 to about 100 per year after 1933 and to more than 4000 executions in 1943 [52]. These numbers do not include military executions, murder by the *Gestapo* and deaths in concentration and extermination camps.

German and Austrian anatomists benefited from these changes through an unprecedented cadaver supply mainly used for teaching purposes, but also for research [51,53-55]. By making use of the cadavers, they – willingly or not – colluded with a political strategy that sought to eliminate not just dissidence, but also the very memory of the dissidence, in so far as the executed were denied proper burial [34]. This has been described as "moral complicity" with the system [56]. As we have shown, Clara not just passively benefited from the increasing "body supply" but actively stretched the legal limits of cadaver use – in cooperation with the legal authorities – by trying to conceal anatomical use of the bodies from the relatives of the executed. We must assume that Clara's collusion with the Nazi strategy to eliminate dissidence was willing.

It seems that Clara's use of the bodies of execution victims was not an issue for his contemporaries, neither during the denazification trial nor when the eponym "Clara cell" was established. If at all, post-war criticism of this practice was voiced against the anatomical use of the bodies of certain groups of *political* victims [51]. We suppose that many

contemporaries accepted the anatomical use of execution victims in principle (as they accepted capital punishment in principle), but objected to treating *certain* victims like 'common criminals'. In contrast to his Berlin colleague Hermann Stieve [51,57], Clara was never accused of using the bodies of political victims during his lifetime.

However, Clara crossed an additional ethical line by experimenting on at least one of the prisoners prior to execution [42]. While the experiment itself was the harmless administration of vitamin C, it demonstrates that Clara regarded this prisoner as little more than a guinea pig. To our knowledge, Clara and his co-workers were the only anatomists using scheduled executions for experiments that involved an intrusion into the life of the prisoner awaiting execution. Comparable experiments were performed by a zoologist in Halle/Saale in 1944, who had two prisoners drink a vitamin A emulsion six hours before their execution to study its effects on the retina [58]. While such experiments cannot be compared to the gruesome experiments on living inmates performed in some concentration camps, they can be seen as part of what Alexander Mitscherlich, in his report on the Nuremberg doctors' trial, has called "medicine without humanity".[59]

An ongoing debate exists in the literature on whether eponyms should be used at all [60], however, despite this, the use of eponyms does not seem to be declining. The awarding of an eponym like "Clara cell" is multifaceted. Firstly, putting aside the issue of scientific originality, an eponym is always a tribute to a person. Therefore, the scientific community should discuss whether it wants to honour an outspoken Nazi, as it currently does by using this eponym. Secondly, although the importance and histological expertise of Clara's original description are beyond doubt, the ethical context of this scientific discovery is at best questionable. To our knowledge, the Clara cell is the only 'Third Reich eponym', for which not only the person but the discovery itself is clearly linked to the Nazi system. In the cases of Reiter's disease and Hallervorden-Spatz disease, the eponymous discovery was made long

before the Nazi era [6,8] while Wegener's first description of "his" granulomatosis in 1939 had no connection to Nazi atrocities [7]. The challenge associated with these eponyms is based on the *personal* association of the scientists with the Nazi regime.

Renaming an eponym requires making a clear moral judgement, which, however, is not always straightforward [61]. Any appraisal of moral failure from today's perspective is difficult and must consider historical context. The purpose of this paper is not to simply offer such a judgement, but instead to initiate a historically reflective discussion of this eponym.

In our own opinion, a different term would be preferable. As the name assigned to this cell by the official anatomical terminology, "exocrine bronchiolar cell" [62], is a little unwieldy and does not clearly differentiate it from goblet cells, we suggest the descriptive term "club cell" – as used occasionally in German ("Keulenzellen") [48] and English [63] publications in the 1950's and 1960's.

## **Acknowledgments**

We thank Dilek Şahin and Nursel Yesilkus for translation from Turkish and James Ari Liebkowsky and Kathrin Heper for help with the English manuscript.

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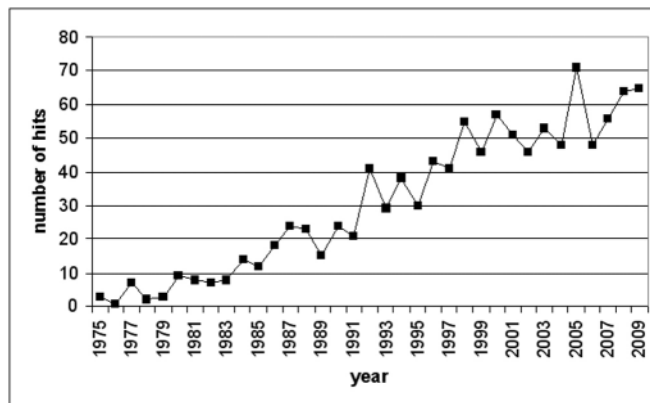
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## Figure legends

**Fig. 1**

Hits per year for the term "Clara cell" in the Medline database

[<http://www.ncbi.nlm.nih.gov/sites/entrez>; accessed on 22 Jan 2010], 1975 to 2009. Of the 1081 articles, only 3 were in German.



**Fig. 2**

Max Clara (1899–1966)



**Fig. 3**

Figure from Clara's original description of 1937 [1]. The original caption reads: "Epithelium from a terminal bronchiolus. Executed man. Fix[ation] Susa, paraffin, ferrous haematoxylin + naphthol green. The non-ciliated cells contain many granules, some of these granules reaching a considerable size."

