



Tullio Terni (1888–1946): The life of a neurocardioanatomist with a tragic epilogue

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ABSTRACT

Tullio Terni (1888–1946) was a pioneer of neuroanatomy at the University of Padua. He gave milestone contributions in the knowledge of cardiac innervation with the discovery of the “Terni column”, a preganglionic autonomous nervous center.

Due to “racial laws” introduced in Italy in 1938 by the Fascist government, he, being Jewish, was expelled from the University of Padua like many others from Italian universities. At the end of the 2nd World War, he was reinstated to his chair of Anatomy, however, having belonged to the Fascist party, he was dismissed from the Lincei Academy. It was a paradox that deteriorated his depression up to the suicide.

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1. Biography

Tullio Terni (Fig. 1) was born in Livorno on January 21, 1888. In 1910, he graduated in Medicine at the University of Florence at the School of Anatomy of Giulio Chiarugi (1859–1954), becoming pupil of Giuseppe Levi (1872–1965), whom he followed as assistant at the University of Sassari (1911–1915), Palermo (1915–1919) and Turin (1919–1924) [1]. He married Mary Sforni and had two children: Maurizio and Rachele (tenderly nicknamed “Lullina”). He took part of the 1st World War as Medical Captain and was rewarded with the Merit Crux. In 1919, when in Turin, he obtained the Private Professorship. At the early age of 36 years, he became Full Professor and was called to the University of Padua to hold the novel chair of Histology and Embryology, first instituted for him due to his outstanding scientific achievements. He created in Padua an internationally acknowledged center for biomedical research. He was voted Academician of the prestigious Lincei Academy in 1932. On 1933, he upgraded to the chair of Anatomy in Padua, becoming chief of the Institute when the former Director Dante Bertelli (1858–1936) retired.

With the advent of the “racial laws” on October 13, 1938, he was expelled from the University being Jewish. However, with the support of the Rector Carlo Anti (1889–1961), he was allowed to continue his ongoing research until 1940. Thereafter with the family he moved to Florence and lived hidden in the Tuscany village of Tutignano. He fell

into a state of depression and needed to be cured in a private Clinic in Merano (Bozen) for six months.

Soon after the end of the war, with the defeat of the Nazi-Fascist Regime, on May 13, 1945 Terni was reinstated to his chair at the University of Padua, but he was hesitant to be back due to his nervous breakdown. Meanwhile, the Committee, including his mentor Giuseppe Levi, of the newly established Lincei Academy, which was charged to select those to be readmitted, decided that Tullio Terni with other 35 previous members was not worth to be confirmed, having been compromised with the Fascism. Terni received the sad news on January 1946. On February of the same year, he signed the form of acceptance to having back the previous position at the University of Padua. On April 25, 1946 at 7 o'clock in the morning, he was found dead, following ingestion of a cyanuric phial, that he always kept with him to use with the family in case of Nazism arrest [2,3].

2. Terni, the scientist

Tullio Terni research ranged in several fields of neuroanatomy, descriptive or experimental cytology, embryology and teratology, human and comparative cytogenesis, cell culture, regenerative biology and transplantation techniques.

The most famous paper of Tullio Terni, relevant to cardiovascular medicine, was published in 1923 in the *Archivio Italiano di Anatomia e di Embriologia* (Italian Archive of Anatomy and Embriology), when he was still assistant, entitled *Ricerche anatomiche sul sistema nervoso autonomo degli Uccelli* (Anatomical researches on autonomous nervous system in birds) [4] (Fig. 2). Studying chick embryos, reptiles, birds and mammals by applying Cayal staining method, he discovered the

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Fig. 1. Portrait of Tullio Terni.

existence, in the thoracic-lumbar region of the spinal cord, of a preganglionic nervous center, located in the retro paracentral region in mammals and in intermediolateral site in humans (Fig. 3). This center, then called “Terni column”, constitutes a longitudinal column of nervous cells from the first thoracic to the second lumbar segment [5]. He demonstrated the existence of a spinal source of sympathetic innervation in the cardiac system, represented by preganglionic neurons located in the first five to six segments of the thoracic spinal cord at the lateral gray column, which synapse with neurons of the superior cervical, medium cervical and stellate ganglia and from the second to the fourth thoracic ganglia of the sympathetic trunk (Fig. 4). In the Gray’s Anatomy the reference to Terni in the autonomous nervous system is quoted in the last 5th edition [6].

From the clinical viewpoint, the neurons of Terni’s column may play a role in several cardiac disease, including long QT and Catecholaminergic Polymorphic Ventricular Tachycardia, a still neglected possibility. In the human fetus, according to new concepts and animal model based theories, episodic respiratory activity, aimed at promoting lung development, is generated by the intermediolateral nucleus (ILN) in the upper spinal cord [7]. During fetal life, Terni’s column produces motor stimuli for the intercostal respiratory muscles to favor the compliance of the thoracic cavity [8]. This autonomic nucleus seems also to be involved in cardiovascular response to hypoxia, but its real function is not yet well understood [9].

Terni was a renowned international scientist, publishing both in Italian and German journals. He had several scientific relationships, including the Carnegie Institution of Washington in Baltimore and the Rockefeller Institute in New York, from which he received a significant grant that allowed him to purchase advanced equipment and to set up tanks of breeding of Axolot, a salamander known as “small monster”,

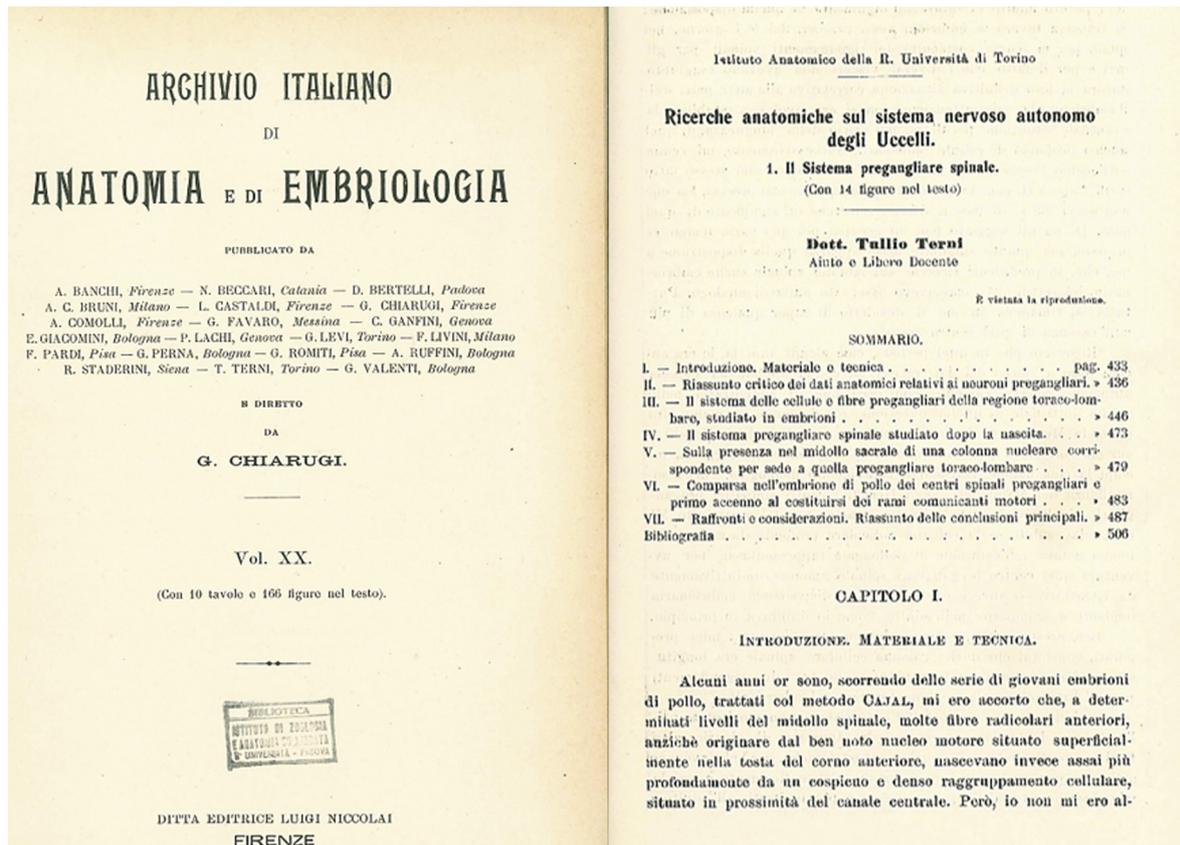


Fig. 2. Frontispiece of the Journal *Archivio Italiano di Anatomia e di Embriologia* (Italian Archive of Anatomy and Embriology), where Terni published in 1923 his famous paper *Ricerche anatomiche sul sistema nervoso autonomo degli Uccelli* (Anatomical researches on autonomous nervous system in birds).

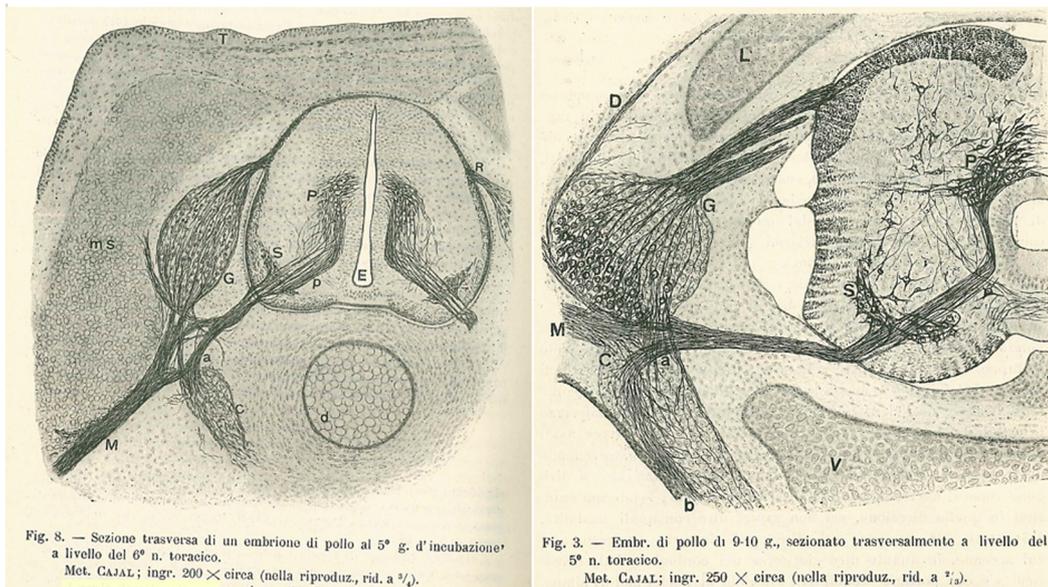


Fig. 3. Illustrations from Terni's *Ricerche anatomiche sul sistema nervoso autonomo degli Uccelli* (1933).

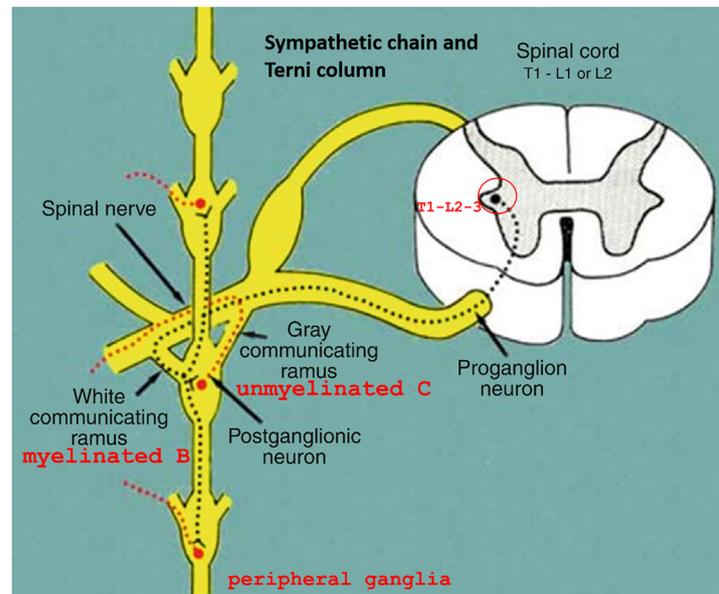


Fig. 4. Preganglionic nervous center in the thoracic-lumbar region of the spinal cord, located in intermediolateral site in humans and in the retro paracentral region in the other mammals.



Fig. 5. The Axolotl, salamander known as “small monster”.

to investigate the regeneration of dorsal pin [10] (Fig. 5). He anticipated the tanks of zebrafish for modern molecular genetic investigation.

The research activity of Terni and his subsequent discoveries deserve to be remembered as they were carried out in a relatively short period of time and in a dramatic social and political context [5].

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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