

## HISTORICAL PERSPECTIVES

### Historical Article

# The impact of the 1938 fascist anti-Semitic legislation on the development of physiology in Italian universities following replacement of five full professors

 **Pompeo Volpe**,  **Carlo Reggiani**, and  **Aram Megighian**

*Dipartimento di Scienze biomediche, Università di Padova, Padua, Italy*

## Abstract

The effects of the 1938 fascist anti-Semitic laws on the development of physiology in Italy are discussed, focusing on the replacement of five full professors of human physiology expelled from the Universities of Bologna, Milan, Turin, Genoa, and Palermo. The academic community immediately took action to fill the vacant positions, in the spirit of “business as usual.” Replacements were made via either transfer of tenured professors or appointment of chair competition winners as tenure-track professors. The previous universities of the substitutes (Pavia, Siena, Messina, Parma) were also indirectly involved. Replacement proposals formulated by each university were approved by Giuseppe Bottai, minister of National Education. Overall, about half of the 17 physiology chairs present in Italy were involved with a significant and sudden generational change. Based upon biographical and scientific profiles of the expelled professors and their replacements, analysis is carried out on the ensuing qualitative effects on research activity. For the Italian physiology community, the impact was positive, or at least not negative in some cases, with the formation of important schools of research. In any case, the moral evaluation can only be negative on the tacit acceptance of expulsions for racial reasons, considered as ordinary administration or even as an opportunity for a more rapid career. Seen from this perspective, those distant events offer an occasion for reflection and a lesson still valid for all of us today.

**NEW & NOTEWORTHY** The effects of the 1938 fascist anti-Semitic laws on the development of physiology in Italy are discussed, focusing on the replacement of five full professors of human physiology expelled from the Universities of Bologna, Milan, Turin, Genoa, and Palermo. The changes in research topics and the formation of important schools stemming from the application of the anti-Semitic laws have been long-lasting and are still present.

*fascism; human physiology; Italian anti-Semitic laws; university*

## INTRODUCTION

On September 18, 1938, Benito Mussolini delivered a sadly notorious speech to an overcrowded and cheering Piazza Unità d’Italia in Trieste; it was his first and only public speech on anti-Semitic laws, whose initial provisions had been promulgated just 2 wk earlier:

With regard to internal policy, the current burning issue is the racial question. . . . Those who believe that we have obediently imitated anyone, or worse, acted on suggestions, are poor fools. . . . The racial problem did not suddenly burst out of nowhere. . . . It is in relation to imperial conquest; because history teaches us that Empires are conquered by arms but are held by prestige. And for prestige it is necessary to have a clear, severe racial consciousness, that establishes not only the differences, but also very clear superiorities.

The Jewish problem is thus only one aspect of this phenomenon. . . . World Jewry has been, for sixteen years, despite our policy, an irreconcilable enemy of fascism. . . . However, Jews of Italian citizenship who have unquestionable military or civil merit towards Italy and the Regime, will find understanding and justice. As for the others, a policy of separation is what awaits them (1).

Mussolini clarified the ideological path undertaken in the previous months, summarized in the so-called *Manifesto of Racist Scientists*, published on July 15, 1938, and linked the “policy of separation” to the foundation in 1936 of the Italian Empire in eastern Africa. At the same time, fascist propaganda was emphatically underscoring the mediator role played by Mussolini in the Sudetenland crisis; his initiative toward the governments of France and the United Kingdom led on September 30, 1938 to the Munich Agreement, that is,



Correspondence: P. Volpe (pompeo.volpe@unipd.it).

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the appeasement to all Hitler's territorial claims. With the fascist regime at the height of consensus,<sup>1</sup> anti-Semitic legislation did not provoke any public outcry in Italy.

Anti-Semitic royal decree laws (RDLs) sanctioned the exclusion of Jews from all sectors of public and private life: schools, universities, politics, finances, and professional activities. As for the universities, a total of 101 full professors of "Jewish race" were suspended from service on October 16, 1938, pursuant to RDL September 5, 1938, no. 1390, and 99 of them were dismissed on December 14, 1938.<sup>2</sup>

Between 1938 and 1945, the Italian academic community reacted in various ways to the dismissal of professors of "Jewish race." The participation in the anti-Semitic campaign was minimal but vocal; according to Sabato Visco, professor of general physiology in Rome, the Italian university would have been fully satisfied with the racial laws. He described the consequence of the racial laws to the Chamber of Faschi and Corporations on May 2, 1939 as a consequence of the

... application of the laws on the defense of the race, ... ~110 professors of Jewish race have had to abandon higher education. Naturally, the right-thinking made catastrophic predictions about the effect that this removal of 110 professors would have on the fate of the high national culture. I must declare that these predictions have proven to be absolutely unfounded. The Italian university has lost its professors of Jewish race with the most serene indifference. Furthermore, as a result of these measures, it has gained that spiritual unity that it previously lacked, it has acquired the firm awareness that it is possible to provide all the higher education that the country needs, drawing on professors who are 100% Italian.<sup>3</sup>

While indifference prevailed in the academic community, several private manifestations of empathy also emerged such as solidarity, understanding, concern extended to the family, hope for a personal solution to the dispensation, availability to take over the chair, offers of material and professional help, through informal assignments, publication of articles under a pseudonym, and bibliographical research. Furthermore, after the German occupation of Italy (September 8, 1943), there was also protection and decisive help to avoid deportation to extermination camps as well as help in promoting expatriation.

On the public level, however, no Italian academic protested<sup>4</sup>; as Angelo Ventura masterfully put it in 1995,

The racial laws threw the university community into bewilderment, and were certainly greeted with a widespread and tacit feeling of disapproval. But nothing suggests that they dug an irreducible moral furrow against fascism. Nowhere is there a protest of an offended conscience. Even those who had the authority and social rank to be able to express, without too much risk, even a cautious voice of dissent remained silent (Ref. 2; now in *Il fascismo e gli ebrei. Il razzismo antisemita nell'ideologia e nella politica del regime*. Donzelli, 2013, p. 117).

Replacement was the consequence of the dismissal of professors of "Jewish race." Suddenly, ~100 university chairs became vacant, sparking a broad, nationwide movement to fill them between 1938 and 1944. Vacant chairs opened up career opportunities: but did the colleague who attempted to occupy by transfer the chair of the expelled professor, the scholar who won the chair competition and could be appointed to the chair from which the holder had been removed know the racial cause of the chair vacancy or did they consider it irrelevant? It is clear that all the protagonists involved in the replacement procedures, candidates for replacement, deans and members of the Faculty Councils, rectors, academic and nonacademic patrons, were fully aware of the racial motivations behind the vacancies.<sup>5</sup> Nevertheless, they bowed to the fascist regime's directives.

The replacement process began in the fall of 1938 and was completed within a few academic years with existing and ad hoc legislative provisions; it took place in the spirit of academic continuity and "business as usual," in a framework of institutional relations unbalanced on the ministerial side. The removal of professors of "Jewish race" was not only racist and anti-Semitic but also a moral failure on the part of the universities.

The appointment to a vacant chair could be either on a temporary basis, through an annual teaching assignment, or on a permanent basis, through a tenured professorship (upon transfer, call of a chair competition winner, or request for a new chair competition). Regarding the chair competition, the Judging Commission, composed of tenured professors holding the fascist party membership card and appointed by the minister, could nominate up to three winners, referred to as

<sup>1</sup>Mussolini came to power on October 2022, yet the fascist regime began in 1925 with the so-called *leggi fascistissime* (very fascist laws).

<sup>2</sup>The first RDL was entitled *Provvedimenti per la difesa della razza nella scuola fascista*; subsequent RDLs were November 15, 1938, no. 1779, *Integrazione e coordinamento in unico testo delle norme già emanate per la difesa della razza nella Scuola italiana* and November 17, 1938, no. 1728, *Provvedimenti per la difesa della razza italiana*. Attilio Gentili and Cesare Sacerdoti (Pisa) were only suspended. Thus, the replacement procedures concerned only 96 chairs: Sacerdoti retired on October 28, 1938, Felice Supino (Milan) held a chair *ad personam* that disappeared with his dismissal; Gentili, declared "mixed non-Jewish," Walter Bigiavi (Parma), and Cesare Grassetti (Catania), having obtained the "declaration of non-belonging to the Jewish race," regained the chairs from which they had been removed.

<sup>3</sup>Discussion on the budget forecast of the Ministry of National Education (Visco S. XXX legislature, I of the Chamber of Faschi and Corporations, III plenary assembly, verbatim report, 1939, p. 50–52). In 1939, the Chamber of Faschi replaced the Chamber of Deputies.

<sup>4</sup>Interestingly, the reaction of the German academic community to dismissal of Jewish professors was rather similar in the period 1933–1937: "They remained passive towards the principle but were prepared to stand up for individuals who were threatened, particularly in the case of outstanding scholars and popular colleagues.... For the tenor of the times was not solidarity but rather a distinct lack of solidarity with the victims of Nazi policies" [Grüttner M. The Expulsion of Academic Teaching Staff from German Universities, 1933–45. *Journal of Contemporary History* 57(3): 2022, p. 526].

<sup>5</sup>The vast archive documentation is represented by letters and minutes of the Faculty Councils, which explicitly establish a relationship between the vacancy of a tenured position, due to the application of the racial laws, and the replacement procedures (Volpe P, Salustri S. *Posti liberi. Classificazione delle modalità di sostituzione dei professori di "razza ebraica" dispensati dalle Università italiane nel 1938*, unpublished).

University	Dismissed	Birth-death	Initial chair appointment	PNF*	ay 38-39	ay 39-40	ay 40-41	ay 41-42	ay 42-43	ay 43-44
Bologna	Alberto Mario Camis	1878-1946	1925	1921	Pupilli					
Milan	Carlo Foà	1880-1971	1914	1924	Margaria					
Turin	Amedeo Herlitzka	1872-1949	1913	1932	Mazza		Mazza	Mazza	Di Giorgio	
Genoa	Ugo Lombroso	1877-1952	1923	no	Tullio				Martino	
Palermo	Camillo Artom	1893-1970	1930	1932	Zummo		Zagami			

 transfer of tenured professor  
 annual teaching assignment  
 not effective transfer of tenured professor

 appointment of competition ternate  
 \* membership in Partito Nazionale Fascista  
 ay academic year

**Figure 1.** Professors of human physiology dismissed in 1938 and their primary substitutes.

ternates. Royal Decree (RD) August 31, 1933, integrated by RDL June 20, 1935, no. 1071, contained the provisions for the permanent appointment to a vacant chair: the Faculty Council was responsible for the proposal relative to the name of the chair, modalities of appointment, and names of nominees. In the case of transfer, the faculty identified, if possible, a triad (*terna*) of candidates. However, it was up to the fascist minister to approve or not any faculty's proposal; furthermore, he held the power of autonomous decision-making, being able to decree transfers and appoint ternates in the absence of any faculty proposal.

By and large, minister Giuseppe Bottai complied with university proposals in those years. Thus, the university recruitment procedures, through chair competitions and transfers of tenured professors, remained firmly in the hands of the academic community. This occurred in a constant and prevalent system of self-referentiality (3).

of the 17 physiology chairs present in all Italian medical faculties, held by professors of "Jewish race" (Fig. 1): Alberto Mario Camis in Bologna, Carlo Foà in Milan, Amedeo Herlitzka in Turin, Ugo Lombroso in Genoa, and Camillo Artom in Palermo (Ref. 4; this paper also contains brief curricula of the expelled physiologists).

This section provides the complete list of primary substitutes and of aspiring primary substitutes (Fig. 2A), thus filling a historiographical gap. In addition to primary replacements, there were secondary replacements, that is, replacements for chairs vacant because of the transfer of the holder to the chair previously held by a professor of "Jewish race." In this case too there were secondary substitutes and aspiring secondary substitutes, either tenured professors or ternates (Fig. 2B).

Four of the five expelled professors had become tenured professors before the establishment of the fascist regime in 1925 (Fig. 1), whereas all substitutes and aspiring substitutes became tenured professors afterward (Fig. 2). The average age of those replaced was 58 yr, that of substitutes by transfer 42.8 yr: the substitutes belonged to a younger generation and potentially still had >25 yr of university career, compared to those relieved who had just over 10 yr. As to the case of Palermo, there was no substantial difference (45 vs. 38 yr) between the dismissed professor and his substitute,

## REPLACEMENTS OF THE CHAIRS OF HUMAN PHYSIOLOGY

Of the 96 replacement procedures at national level, 5 involved the chairs of human physiology, almost one-third

University	Primary substitutes	Birth-death	Period	Initial chair appointment	PNF	From	New chair in	Secondary substitutes	Birth-death	Period	Initial chair appointment	PNF
Bologna	Giulio Cesare Pupilli	1893-1973	1938-1963	1933	1926	Siena		Anna Maria Di Giorgio	1897-1961	1940-1942	1940	1933
	Pietro Tullio					Parma						
	Gaetano Martino					Messina						
Milan	Rodolfo Margaria	1901-1983	1938-1971	1933	*	Pavia		Gaetano Martino				
								Luigi De Caro	1901-1965	1939-1965	1939	1923
Turin	Francesco Paolo Mazza	1905-1942	1940-1941	1936	1927	Turin						
	Anna Maria Di Giorgio	1897-1961	1942-1961	1940	1933	Siena						
Genoa	Pietro Tullio	1881-1941	1938-1941	1930	1932	Parma		Giulio Stella	1899-1978		1940	1933
								Michele A. Laporta	1903-1954	1941-1954	1941	1922
	Giulio Cesare Pupilli					Siena						
	Gaetano Martino					Messina						
	Antonino Clementi	1888-1968		1926	1925	Catania						
	Gaetano Martino	1900-1907		1934	1933	Messina						
Palermo	Vittorio Zagami	1902-1979	1940-1972	1940	1924							

 aspiring substitute  
 not effective transfer  
 competition ternate  
 \* membership in PNF; unknown date

**Figure 2.** A: substitutes and aspiring primary substitutes. B: substitutes and aspiring secondary substitutes. PNF, Partito Nazionale Fascista.

and therefore the prospect of a further career for both was between 25 and 30 yr.

### Primary Replacements

The annual teaching assignments were limited (green in Fig. 1), and in four cases there were permanent substitutions because of the transfer of a tenured professor from another university (yellow in Fig. 1); in the only case of Palermo, the chair was filled in 1940 by appointment of a ternate (pink in Fig. 1).

#### University of Bologna.

The medical faculty met on November 15, 1938, the very day the relevant RDL was promulgated, to deliberate on the replacement of Mario Camis and of the pediatrician Maurizio Pincherle, both of "Jewish race." The minutes of the meeting clarify the procedures, the proactive role of the faculty, as well as the racial origin of the vacancy of chairs. Leonardo Martinotti, faculty dean, invited the participants to

... decide on the chairs of [human] physiology and Pediatric Clinic, made vacant by the provisions on the Jews ... [the dean] recalls that pursuant the law [the faculty] can provide temporarily with an assignment and definitively with proposals for [chair] competition or transfer; in the latter case, although proposals can be forwarded up to January 1st, also, at the invitation of the Rector it is necessary to provide promptly.

Based upon the preparatory work already carried out by Martinotti, with regard to the chair of human physiology:

... The faculty... unanimously proposes the following triad in alphabetical order: Margaria prof. Rodolfo, Martino prof. Gaetano, Pupilli prof. Giulio Cesare.<sup>6</sup>

The minister Bottai, after evaluating the shortlist of three candidates, appointed Pupilli by means of Decree of the Minister (DM) December 2 with effect December 16, 1938.<sup>7</sup>

#### University of Milan.

The medical faculty met on November 28, 1938 to replace Foà and chose to fill the vacant chair by transferring a tenured professor. Four full professors had applied, one of whom was Antonino Clementi, with a letter from Guido Mancini, national trustee of the Fascist Association of the

School, in his support.<sup>8</sup> The votes unequivocally indicated the faculty's preferences: 17 out of 17 for Margaria, 12 for Tullio, 11 for Clementi and 1 for Martino.<sup>9</sup> Bottai appointed Margaria in full compliance with the Milan resolution.

#### University of Turin.

Herlitzka's replacement in the medical faculty was complex (Fig. 1): first there was an annual teaching assignment (1938–1940) to his former colleague in biological chemistry Francesco Paolo Mazza, followed by a formal transfer to the chair (1940–1941) and by one last annual teaching assignment (1941–1942). Mazza's internal transfer from biological chemistry to physiology was an academic screen and not an effective replacement. It has been interpreted as a containment choice to avoid unwelcome external appointments, in a context characterized by excellent relationships between Herlitzka and Mazza: the former had been a commissioner in the chair competition for Mazza,<sup>10</sup> who, appointed tenure-track professor of biological chemistry on 16 December 1936 "despite not having his own laboratory and with limited resources, was able to benefit from the generous hospitality of... Herlitzka" (5).

Following Mazza's internal transfer to the sciences faculty on December 1, 1941, the medical faculty voted to fill the chair of human physiology with a tenured professor: on May 22, 1942; it unanimously proposed the appointment of the only candidate, Anna Maria Di Giorgio of the University of Siena.<sup>11</sup>

#### University of Genoa.

Lombroso's replacement was likewise complex: the medical faculty had begun by voting, on November 14, 1938, for a triad composed of Martino, Pupilli, and Tullio.<sup>12</sup> On December 9, 1938, rector Mattia Moresco communicated to minister Bottai his preference for Tullio, who was immediately appointed.

Upon Tullio's sudden death, the faculty attempted to fill his chair by transfer, unanimously accepting, on October 15, 1941, the application of Martino, full professor in Messina. Bottai appointed him with effect October 29, 1942 but then, urged by the academic authorities of Messina, postponed his transfer to October 29, 1943. The armistice of September 8, 1943, the Italian campaign, and the ensuing civil war prevented Martino from taking up his duties. Having been appointed rector of the University of Messina by the Allied military government, Martino renounced the

<sup>6</sup>Historical Archives of the University of Bologna (HAUBo), Faculty of Medicine and Surgery, Minutes from February 1, 1938 to February 21, 1939, p. 254.

<sup>7</sup>Bollettino Universitario (BU) was the official publication of the Ministry of National Education reporting any Decree of the Minister (DM) relating to chair competitions, appointments of tenure-track professors, and transfers of tenured professors. Because of space constraints, no further details are provided on the publication in the BU and on the dates of the appointment DMs.

<sup>8</sup>On October 17, 1938, the rector Alberto Pepere received a letter on letterhead of the Partito Nazionale Fascista, Direttorio Nazionale: "Prof. ANTONIO CLEMENTI... would like to obtain the chair of physiology that has become vacant at this University. I am therefore coming to strongly inform you of this on behalf of H. E. the Secretary of the P.N.F. [Partito Nazionale Fascista]. Clementi is an excellent old fascist from every point of view. I therefore ask you to consider his wish with all possible benevolence" [Historical Archive of the University of Milan (HAUMi), Razza, 9VI, b. 234].

<sup>9</sup>HAUMi, Royal University of Milan, Minutes of the meetings of the Faculty Council, Register no. 4, June 16, 1934–June 11, 1940, *Provisions for vacant Chairs*, p. 242–243.

<sup>10</sup>Mazza, a student of Gaetano Quagliariello in Naples (1928–1936), was a biochemist of great depth, large potential, and international importance for his studies on dehydrogenases of higher fatty acids, glycolysis in nervous tissue, synaptic transmission, and the structure of nucleic acids.

<sup>11</sup>Minutes extract of the Faculty Council in Central State Archive (Rome, Italy), Ministry of Public Education, Directorate-General for Higher Education, Division I, University Professors' Files, hereinafter CSA, b. 173, Di Giorgio Anna Maria.

<sup>12</sup>Minutes extract of the Faculty Council (CSA, b. 59, Tullio Pietro).

transfer, which was revoked retroactively on June 9, 1945 (6).

#### **University of Palermo.**

Since no tenured professors were available for transfer, the medical faculty entrusted a temporary teaching assignment to Cataldo Zummo, Artom's assistant, for two consecutive academic years (1938–1940). After the 1940 competition for the human physiology chair had concluded,<sup>13</sup> one of the ternates, Vittorio Zagami, expressed his aspiration to Nicola Leotta, university rector. On October 16, 1940, the faculty unanimously proposed Zagami<sup>14</sup> and minister Bottai appointed him tenure-track professor.

#### **Secondary Replacements**

Expulsion of professors of “Jewish race” triggered concatenated transfers of tenured professors and, in some cases, appointment of tenure-track professors: three such fluxes were identified for human physiology chairs (Fig. 2B).

#### **Milan-Pavia flux.**

Margaria's chair in Pavia remained vacant (1938–1939), and teaching was temporarily entrusted to the lecturer Luigi De Caro.<sup>15</sup> At the end of 1939, the medical faculty proposed De Caro, winner of the 1939 competition for the Human physiology chair,<sup>16</sup> and minister Bottai appointed him tenure-track professor.

#### **Bologna-Siena flux.**

Pupilli's chair in Siena remained vacant (1938–1940); teaching was temporarily entrusted to Anna Maria Di Giorgio. On November 13, 1940, soon after the competition for the human physiology chair at the University of Ferrara had been concluded, the medical faculty of Siena proposed the nomination of one of the ternates, namely Di Giorgio,<sup>17</sup> who was swiftly appointed by minister Bottai.

#### **Genoa-Parma flux.**

Tullio's chair in Parma remained vacant (1938–1941). In 1939, the medical faculty unanimously proposed the appointment of Giulio Stella, terna in the 1939 chair competition; Stella's appointment was rejected by Bottai because of the lack of

the marriage requirement.<sup>18</sup> In 1940, new ternates being available from the 1940 chair competition, the faculty unanimously proposed Michele A. Laporta, whose appointment was also rejected on the same ground. Having married on September 25, 1941, Laporta was nominated tenure-track professor as of October 29, 1941.<sup>19</sup>

### **REINSTATEMENT AND ACADEMIC RELATIONSHIPS AFTER 1945**

Postfascist reparative legislation, approved by the governments of the National Liberation Committee (June 1944–June 1946), allowed the reinstatement<sup>20</sup> of professors dismissed in 1938. The reinstatement process, based on the combined provisions of two RDLs and two Lieutenant Legislative Decrees (DLLs) issued in 1944,<sup>21</sup> established the return of the tenured professor either to his original chair or, subordinately, to a different, doubled or supernumerary chair<sup>22</sup>; explicit consent and possession of Italian citizenship were, however, necessary requirements for reinstatement. With subsequent provisions, all reinstated professors were placed in supernumerary chairs (RDL May 27, 1946, no. 535) and allowed to remain in service until the age of 75 yr. Figure 3 summarizes the characteristics of each reinstatement.

Herlitzka, after his exile in Buenos Aires (1939–1946), was de facto reinstated at the University of Turin and codirected the Institute of Physiology with Di Giorgio (1946–1948).

Foà took refuge in Brazil and was appointed in April 1939 director of the experimental pathology section of the Faculdade de Medicina do Estado de São Paulo; readmitted de jure, he remained at the disposal of the Minister of Foreign Affairs until December 1948 while teaching biology at the Pontifícia Universidade Católica de São Paulo. Upon return to Italy, he resumed service on January 15, 1949 and remained at the University of Milan until his retirement in 1955.

Lombroso, socialist and antifascist, was one of the few Italian academics not to have the fascist membership card. After his expulsion, he carried out scientific activity as Maître de Recherche at the École de Medicine in Paris, until the German invasion (1940). Underground in Florence during the last war period (7), he resumed service on November

<sup>13</sup>The three ternates, Vittorio Zagami, Anna Maria Di Giorgio, and Michele A. Laporta, were recorded in the proceedings of the Judging Commission (DM October 9, 1940).

<sup>14</sup>Historical Archive of the University of Palermo, Medicine and Surgery, Registers of meetings (1939–1945), reg. 862, *Vacant Chairs, Prof. Zagami*, p. 37–38.

<sup>15</sup>Historical Archive of the University of Pavia, reg. 3662, Faculty of Medicine and Surgery—Minutes Register from October 21, 1929 to October 14, 1941, *Physiology Assignment*, p. 386.

<sup>16</sup>The three ternates, Luigi De Caro, Giulio Stella, and Michele Mitolo, were recorded in the proceedings of the Judging Commission (DM November 21, 1939).

<sup>17</sup>Historical Archive of the University of Siena, Minutes of the Council of the Faculty of Medicine and Surgery, February 24, 1939–June 7, 1949, *Provisions for the vacant chair of Physiology*, p. 117–118.

<sup>18</sup>RDL February 25, 1939, no. 335, prevented the appointment of celibates as university professors. The rule applied specifically to males and not to unmarried women (Valsecchi C, Volpe P. Maidens, celibates and the failure to be appointed university professor: a case of male discrimination between 1939 and 1943? *Historia et ius* 25/2024: 1–43, DOI 10.32064/25.2024.13, June 1, 2024).

<sup>19</sup>Minutes extract of the Faculty of Medicine and Surgery (CSA, b. 258, Laporta Michele).

<sup>20</sup>A professor is reinstated de facto, not simply de jure, in university roles even in a chair or location different from that of 1938.

<sup>21</sup>RDL January 6, 1944, no. 9, *Riammissione in servizio degli appartenenti alle amministrazioni dello Stato, degli enti locali e parastatali e controllati dallo Stato, aziende che gestiscono servizi pubblici o d'interesse nazionale, già licenziati per motivi politici*; RDL January 20, 1944, no. 25, *Disposizioni per la reintegrazione dei diritti civili e politici dei cittadini italiani e stranieri già dichiarati di razza ebraica e o considerati di razza ebraica*. Lieutenant Legislative Decree (DLL) September 7, 1944, no. 255, *Reintegrazione in servizio di professori universitari*; DLL September 7, 1944, no. 264, *Modificazioni al vigente ordinamento universitario*.

<sup>22</sup>Each university faculty had an organic endowment of chairs, that is, a fixed number of chairs. With the reinstatement of professors dismissed for both racial and political reasons, the endowment could be exceeded; in this case, any additional chair was labeled supernumerary.

University	Dismissed	Reinstatement DM	ay 44-45	ay 45-46	ay 46-47	ay 47-48	...	ay 54-55	In service until
Bologna	Alberto Mario Camis	Apr 8, 1945							
Parma*	Alberto Mario Camis								†Aug 26, 1946
Milan	Carlo Foà	Apr 2, 1946							Oct 31, 1955
Turin	Amedeo Herlitzka	Mar 25, 1946							Oct 31, 1948
Genoa	Ugo Lombroso	Nov 16, 1944							†Apr 10, 1952
Palermo	Camillo Artom	n.a.							

 *de jure*  
 *de facto*

\* restituted to University of Parma on Oct 31, 1945

ay academic year

**Figure 3.** Reinstatement of professors dismissed in 1938. DM, Decree of the Minister; n.a., not applicable. †death date.

1, 1945, at the University of Genoa and formally reoccupied his chair, vacant after Tullio's death in 1941. Lombroso remained in service until his death, 6 mo before his retirement set for October 31, 1952.

Camis, after his missionary experience in the Philippines, came back to Italy and was ordained a Catholic priest on May 24, 1941, in Bologna. On October 13, 1945, the medical faculty of Bologna, in the presence of Pupilli, unanimously reserved a generic solidarity motion to Camis:

The faculty expresses to the distinguished Colleague Prof. Camis its deepest satisfaction for the revocation of the unjust racial provisions that had affected him and for which he returns to be part of it. At the same time, it takes note with deep regret of DM October 2, 1945 by virtue of which he is restituted... to the University of Parma from which he came.<sup>23</sup>

With the combined provisions of two pieces of postfascist reparative legislation, Camis was *de jure* reinstated in Bologna and then restituted to Parma, from which he had been *ex officio* transferred in 1935<sup>24</sup>; thus, he was *de facto* reinstated to the human physiology chair at the University of Parma. The chair was indeed vacant because Laporta, who had held the position since 1941 (Fig. 2B), had been suspended on July 1, 1945 by the University Purge Committee.<sup>25</sup> Camis's reinstatement, marked on January 4, 1946 by his expulsion from the Accademia Nazionale dei Lincei for being profascist (8), was brief: death came on August 28, 1946, and he did not resume any scientific activity.

Artom, who had been faculty at Wake Forest University in Winston Salem, NC, since 1939, declined the invitation to reinstatement in 1945. Having then acquired United States citizenship in 1946, he lost all rights to reinstatement.

Once the “parenthesis of fascism” had been overcome, the page of purge had been turned, and the policy of “necessary continuity” had been applied, normality was reestablished in academic relationships. This applied to supporters of fascism of all stripes, antifascists of all kinds, as well as replaced professors and their substitutes, primary, secondary, effective or aspiring. The normalization touched various spheres: direction of scientific journals, publications honoring professors, chair competition commissions, and the founding and direction of scientific societies.

In the case of physiologists, this applied to the founding of the Italian Physiological Society on October 10, 1947 (Refs. 9, 10; tenured professors also present at the founding meeting were Giuseppe Moruzzi, Quagliariello and Bergami, the last 2 students of Bottazzi, a leading physiologist during the fascist era) and to election of its first presidents, i.e., Herlitzka (1947–1949), Martino (1949–1952), Margaria (1952–1955), Sabato Visco (1955–1958), De Caro (1958–1961), and Zagami (1961–1964), that is, one dismissed, four substitutes, and Visco, one of the most anti-Semitic if not the most anti-Semitic university professor, who, after the transitory purge (1944–1949), resumed his role, functions and influence in the university. This also applied to participation in the Judging Commissions for chair competitions whose members were now elected.

The anti-Semitic persecution that developed between 1938 and 1945 was therefore not a sufficient reason to block, in postfascist and republican Italy, the resumption of good academic relationships between those expelled and their replacements; on the side of the persecuted ones there was often the will/need for oblivion, on the other side almost always the absence of substantial self-criticism (11).

<sup>23</sup>HAUBO, minutes of the Council of the Faculty of Medicine and Surgery 18-11-1939\_28-03-1949, II. Communication 2°, p. 246–247.

<sup>24</sup>Specific provisions in paragraph 2, article 17, DLL April 5, 1945, no. 238, annulled *ex officio* transfers ordered by Ministers of National Education since 1935, in the assumption that there had been political favoritism; moreover, it contained provisions for the annulment of revocation entrusted to the faculty deliberation. Paragraph 2, in fact, stated: “The transfers of tenured university professors ordered by the Minister... without the vote of the interested Faculties, pursuant to art. 6, paragraph 3, RDL June 20, 1935, no. 1071, will be revoked and the professors thus transferred will be returned to their place of origin with the beginning of the 1945–46 academic year, unless the faculties deem it appropriate to renew the transfer proposal...”

<sup>25</sup>As to purging committees, there was a first-level university purging committee and a second-level ministerial committee. Laporta, convicted by the Extraordinary Assise Court of Parma with sentence July 18, 1945, to 8 yr and 4 mo for collaborationism “with the Germans and with the so-called Italian Social Republic”, was acquitted by the Special Section of the Court of Cassation “because the fact... does not constitute a crime” and released from prison on April 9, 1946.

## QUANTITATIVE AND QUALITATIVE IMPACTS OF REPLACEMENTS

First of all, we must consider the objective situation that has arisen in human physiology, a discipline particularly affected by anti-Semitic persecution: out of 17 tenured professors in all medical faculties, 5 were relieved for racial reasons, 5 made themselves available for transfer, and 7 remained in their own university,<sup>26</sup> whereas five ternates were proposed for appointment as tenure-track professors on chairs vacated for racial reasons. This event was unique in its relevance to the history of Italian physiology. However, it was experienced merely as the consequence of a legislative intervention, without any consideration given to its political and moral significance.

The replacements opened up opportunities for mobility from marginal and/or insular universities to more important universities (Siena vs. Bologna; Messina vs. Genoa) or to universities undergoing rapid expansion supported by the fascist regime (Milan vs. Pavia), as well as allowing for the appointment of ternates stemming primarily (Zagami) or secondarily (De Caro, Di Giorgio, and Laporta) from dispensation of professors of “Jewish race.” Without racial dispensations and concatenated transfers, ternates would have had to look for other less prestigious universities. Alternatively, they risked not being appointed if the 2-year validity of the competition expired.

Around 1930 and beyond, there were no absolute value assessment indices, such as impact factor, number of citations, etc., that today allow for a meaningful yet not exhaustive comparison among researchers. Every comparison made, now for then, is mainly descriptive, evaluating empirical parameters developed ex post, e.g., scientific value and authority. “Scientific value” refers to the number and importance of international and national papers, their content, and the presence of seminal elements, that is, elements that represent a milestone in the development of the discipline. “Authority” refers to the importance over time of the scholar, the creation of a school, and the more or less fundamental role in the development of the discipline or of one of its branches.

From this point on, the qualitative impact of the replacement of each chair of physiology is described. Furthermore, an attempt is made to define the long-term impact of the replacements on the overall development of Italian physiology. In the case of Pupilli, Margaria, Di Giorgio, Zagami, and De Caro, the substitute held the new chair for over 20–30 yr (Fig. 2) and thus had the opportunity to shape the teaching and research of the discipline in a lasting and profound way.

### The Case of Bologna (and Siena)

Pupilli succeeded his *Maestro* Camis. This was apparently a linear continuity, but the two scholars had different curricula and profiles.

Camis, collaborator of Luigi Luciani and later of Herlitzka, under the guidance of Charles S. Sherrington (1908–1925) discovered the phenomena of occlusion and facilitation in the spinal cord and published fundamental papers on the vestibule-cerebellum relationship (Ref. 12; also *La Fisiologia dell'apparato Vestibolare*. Zanichelli, 1928). Back in Italy, he became full professor of physiology in Bari (1925), Parma (1925–1935), and Bologna (1935–1938). His illustrious students in Parma included the physiologists Giuseppe Moruzzi and Pupilli as well as the biochemist Giovanni Moruzzi; they exerted a decisive influence on the advancement of neurophysiology and biological chemistry in Italy (13).

Pupilli trained as a neurophysiologist under Camis in Parma. As was customary, Camis closely followed Pupilli's career: he served on the chair competition commission that declared Pupilli ternate in 1933 and on the committee for Pupilli's promotion to full professor in 1936.<sup>27</sup> After a stint in Sassari (1933–1935) and Siena (1935–1938), Pupilli was professor in Bologna from 1938 to 1968. In parallel with his scientific skills, he soon acquired important roles in the management of national research. In 1938 he was called by Visco to chair the Italian Society for Scientific Progress. After World War II, he held an influential position both within the university and on the National Research Council (14). Flanked by three valid collaborators, Ettore Fadiga, Pier Luigi Parmeggiani, and G. P. von Berger, Pupilli successfully carried forward the neurophysiological research program initiated by Camis, with particular reference to the cerebellum (15). Parmeggiani, in turn, developed his own neurophysiological research and was professor of human physiology in Bologna for 25 yr (1973–1998).

Thus, neurophysiological research showed continuity, despite the fact that Camis and Pupilli were very different personalities. Camis focused on a single theme and developed it in depth. His groundbreaking results at Sherrington's laboratory, coupled with further achievements after his return to Italy, earned him international recognition. Pupilli was the researcher who sustained quality work through capable collaborators, while also guiding national research programs with managerial and political acumen.

### The Case of Milan (and Pavia)

Both Foà and Margaria originated from the Turin school led by Angelo Mosso and Herlitzka, yet they pursued divergent paths. De Caro, who studied and collaborated with Filippo Bottazzi in Naples, had a background in biochemistry and pharmacology. The two concatenated replacements brought profound, lasting changes in the two Institutes of Physiology.

Foà, a student of Mosso and Giulio Bizzozero, was a versatile scientist whose research spanned diverse fields such as the cardiovascular system, melatonin, circadian rhythms, and reproductive processes. Tenure-track professor at the University of Messina from 1913, on December 1, 1924 he became the first professor of human physiology at the newly founded University of Milan. In addition to his scientific

<sup>26</sup>Virgilio Ducceschi (Padova), Gilberto Rossi (Florence), Silvestro Baglioni (Rome), Igino Spadolini (Pisa), Alberto Aggazzotti (Modena), Osvaldo Polimanti (Perugia), and Bergami (Naples).

<sup>27</sup>A note dated September 30, 1936 by Giuseppe Giustini, director general of Higher Education, states: “Try to include Prof. Camis Mario in the committee for the promotion to Full Professor of Prof. Pupilli Giulio Cesare, of Physiology at the Royal University of Siena” (CSA, b. 388, Pupilli Giulio Cesare). Camis, Quagliariello, and Visco were appointed to the committee.

research and teaching duties, he engaged in scholarly dissemination, as director of the magazine *Sapere*, while also taking on university administrative roles [Ref. 16; see also the letter of October 23, 1946 from Foà to the Ministry of Public Education (HAUMi, personal file Foà Carlo, no. 1336)].

Margaria graduated in 1924 and attended, between 1929 and 1934, prestigious laboratories, the most advanced in respiratory physiology and muscle energetics. First, he studied with Archibald V. Hill at University College in London and with Joseph Barcroft in Cambridge, later in the United States with Lawrence J. Henderson at Harvard and with Donald D. Van Slyke in New York, and finally with Otto Meyerhof in Heidelberg. Back to Italy, he was professor of human physiology in Ferrara (1934–1935), Parma (1935–1936), Pavia (1936–1938), and finally Milan, where he concluded his career in 1976 (17). At the University of Milan, he started a research laboratory on the physiology of exercise in all its muscular, cardiovascular, and respiratory components and shaped a great school. The qualified and tireless research activity of Margaria and his renowned school contributed significantly to the consolidated and accepted framework of the energetics of muscle contraction and human locomotion. Among his direct students,<sup>28</sup> many acquired international recognition and 11 reached full professorship (18).

The difference between Foà and Margaria is significant: Foà was an eclectic scientist and also an active popularizer, whereas Margaria systematically investigated a single theme for over 40 yr. Margaria created a school of international level, whereas Foà did not: even Enoch Peserico, his student and collaborator in Padua and Milan as well as lecturer in physiology, moved on to clinical activity and the management of the Padua University Hospital after World War II.

Within a few years, physiology at the University of Pavia underwent significant changes. During his brief tenure, Margaria carried out and published the first and pioneering study on the energetics of locomotion (19). De Caro, who had worked in the Carlo Erba pharmaceutical industry in Milan (1930–1938), brought a different expertise. Margaria's project was discontinued, and the research was turned toward metabolism, vitamins, and nutrition.

### The Case of Turin

Herlitzka graduated at the University of Rome in 1897, under the guidance of Luciani. In 1898 he moved to Turin, at the Institute of Physiology directed by Mosso, where he carried out his entire academic career, except for the Latin America exile. Herlitzka was an eclectic scientist, whose research activity ranged from enzymology to resuscitation methods, muscle contraction, and sport. In 1910 he stepped into Mosso's chair and became director of the laboratory of altitude physiology at Col d'Olen, renominated the Mosso laboratory. Herlitzka dealt with the physiology of high-altitude flight and, in doing so, developed friendly relations with Italo Balbo, Minister of the Air Force (1929–1934) and an important fascist hierarch.

Di Giorgio attended in Florence the Institute of Physiology directed by Gilberto Rossi and graduated in 1921 under the guidance of Igino Spadolini. After the 2-year period in Siena

(1940–1942), she moved to Turin, where she remained until her premature death. Her research activity continued along Rossi's neurophysiological path, with particular attention to the nonacoustic labyrinth, but also with contributions on the psychophysics of the visual system. Di Giorgio took charge of the Institute's core scientific endeavor and for about 20 yr, she directed the Mosso laboratory and participated in studies on high-altitude hypoxia, related to Italy's expedition to K2.

Although differing profoundly, Herlitzka maintained continuity with Mosso's scientific approach. His student Margaria was arguably the best to carry forward and expand on Mosso's cultural and scientific legacy in Milan. Conversely, Di Giorgio brought to Turin a neurophysiological research line that traced back to Luciani via Rossi. It was, however, Oreste Pinotti who shaped physiology at the University of Turin in its current form. A student of Giulio Stella's Padua school, he was appointed to the Turin chair in 1963 to succeed Di Giorgio.

### The Case of Genoa (and Parma)

Upon Tullio's death in 1941, Martino's approved succession did not materialize. In 1945 Lombroso returned to his Genoa chair, which was entrusted after his death to his previous student Cataldo Zummo, as of November 1, 1953.

Lombroso graduated in 1903 at the University of Turin. In 1904 he moved to Rome, at the Institute of Physiology directed by Luciani; there, he discovered the pancreatic lipase in 1908 (20). Professor of human physiology in Messina (1923), Palermo (1923–1935), and Genoa (1935–1938), his research developed continuously in the field of digestive physiology, from digestion to food absorption and intermediate metabolism. Of particular importance are his studies on the intervention of the endocrine pancreatic function in the absorption of lipids, the metabolism of nitrogen, the genesis of proteins from ammonia, and the specific dynamic action of foods also in relation to the autonomic nervous system (21).

Tullio, graduated in 1905, was assistant in Bologna to Pietro Albertoni (1913–1918 and 1920–1924) and then Mariano Luigi Patrizi (1924–1930). Tullio unanimously won the competition for the chair of physiology in 1930; the Judging Commission included his mentor Patrizi.<sup>29</sup> Tenure-track professor at Messina (1930–1935), he was subsequently transferred to Bari (1935–1936), Parma (1936–1938), and Genoa (1938–1941). Tullio studied neuromuscular excitability, the physiopathology of the vestibular system and of the semicircular canals, describing the phenomenon that bears his name: vertigo and/or ocular movements induced by high-intensity sound stimuli in various animal species and in humans (22, 23).

If Lombroso had dedicated his research activity to lipid metabolism and its control of the endocrine pancreas, Tullio brought to Genoa different interests and skills on the non acoustic labyrinth and nystagmus. However important Tullio's work was considered by his contemporaries (24), the impact in Genoa was limited by his short stay. Lombroso's action was further prolonged after his return

<sup>28</sup>Emilio Agostoni, Joseph Milic Emili, Paolo Cerretelli, Franco Saibene, Giuseppe Sant'Ambrogio, Giovanni Cavagna, Piero Mognoni, Gabriele Cortili, Pietro Enrico di Prampero, Edgardo D'Angelo, and Arsenio Veicsteinas.

<sup>29</sup>Bottazzi, president, and Foà also served on the judging commission.

in 1945, characterized by a consistent resumption of research activity and consecrated by his election to the Accademia Nazionale dei Lincei in 1947 (25).

Martino was assistant to Giuseppe Amantea in Messina (1925–1930) and acting director of the Institute of Physiology at the Universidad Nacional de Asunción in Paraguay (1930–1934). Professor of biological chemistry (1934–1935) and then full professor of human physiology (1935–1957) in Messina, Martino finally succeeded Amantea in Rome (1957–1967). A member of the Italian Chamber of Deputies since 1948, he held important cabinet roles, as Minister of Foreign Affairs and of Public Education; at an international level, Martino became President of the European Parliament (1962–1964). The intense scientific activity of the 1930s, dedicated to the study of the hyperglycemic pancreatic hormone, later called glucagon, and of epilepsy, through experimental epilepsy models derived from Amantea (6), faded into the background when his political commitment had become prevalent after World War II.

The chair of Parma left by Tullio was filled by Laporta; assistant in Naples to Bottazzi (1928–1938) and then to Gino Bergami (1938–1940), Laporta was professor in Parma during the war period (1941–1945), in objectively difficult conditions. An ardent fascist since 1922 and a supporter of the Italian Social Republic after October 1943, he was dismissed from service with sentence September 24, 1946, issued by the Ministerial Purge Committee. Laporta was eventually reinstated to service on March 23, 1950 and had a brief period of modest research activity before his premature death in 1954.

### The Case of Palermo

Zagami and Artom had two different scientific personalities, but it was Zagami's decades-long directorship that shaped the Institute of Physiology in Palermo.

Artom, a medical student and pupil of Luciani in Rome,<sup>30</sup> graduated in medicine and surgery in 1917 at the University of Padua (26). Assistant to Lombroso in Messina (1920–1923) and Palermo (1923–1930), he was appointed tenure-track professor of human physiology at the University of Cagliari (1930–1935) and later transferred to Palermo (1935–1938). Artom's interests in lipid metabolism and the meeting with Emilio Segrè,<sup>31</sup> in the same period professor of experimental physics at the University of Palermo, paved the way to experiments with molecules marked with radioactive phosphorus isotopes (27). It was the second laboratory in the world to apply this methodology, proposed in 1934 by George de Hevesy (1885–1966), who won the Nobel Prize for Chemistry in 1943. In the United States since 1939, Artom became an international authority in the field of lipid metabolism (28). The diaspora of professors of "Jewish race" gave rise in some cases to permanent emigration to the United States, Latin America, and Palestine under British mandate, i.e., to the loss of scientific capital. Artom is undoubtedly a case in point, but it is impossible to say whether he would

have had the same brilliant career had he returned to Italy in 1945.

Zagami was Amantea's assistant in Messina (1926–1930) and then (1931–1940) in Rome (29). Zagami studied experimental reflex epilepsy and glucose metabolism (30) and won the competition for the chair of human physiology in 1940, whose Judging Commission included Martino,<sup>32</sup> and carried out all his academic career in Palermo (1940–1977). He created a school, and seven of his students became full professors of physiology, including Francesco Infantellina, his successor, and Giuseppe La Grutta, future rector of the University of Palermo (1972–1984).

The scientific and academic profiles of Artom and Zagami are markedly different. If Artom was an innovative and creative scientist whose contributions brought him international recognition, Zagami was the creator of the Palermo school of Physiology, the far-sighted and tenacious trainer of young researchers and builder of university facilities.

### CONCLUDING REMARKS

In the time frame considered, academic careers up to the chair were carried out according to law provisions and consolidated practices. Even the brief outlined curricular profiles demonstrate that the support of the sponsoring professors and the guided, stereotyped path of university degree–lecturer–teaching assignment(s)–chair competition(s) remained central to the typical academic career. This was the case before and after the advent of Mussolini in 1922, before and after the introduction of the oath of loyalty to the fascist regime in 1931, as well as before and after the promulgation of the racial laws in 1938.

There are no doubts that often if not always the appointment of a new professor is followed by changes in research and teaching. In 1938, however, leaving aside the moral and political evaluation of the racist anti-Semitic laws, in a few months professors of physiology were removed and replaced in five universities and the effects extended to an additional five universities (Fig. 2), putting into play approximately half of the 17 chairs of human physiology in Italy. It was a real "earthquake" for the Italian physiology community, which came out deeply remodeled. The impact of the changes can be recognized even today, at the beginning of the twenty-first century: even though the protagonists of the events of 1938 are no longer alive, their pupils and continuators are still active in Italian universities.

The comparison of scientific profiles shows how in general there was a clear difference in the research topic (in Palermo: Zagami–Artom, in Milan: Margaria–Foà, in Pavia: De Caro–Margaria, in Turin: Di Giorgio–Herlitzka, in Genoa: Tullio–Lombroso), and only in Bologna was there a thematic continuity (Camis = Pupilli). Therefore, there was a change in scientific capital, possibly a loss in scientific capital in some cases. On the other hand, in some cases the impact on

<sup>30</sup>Appointed reserve medical officer (1917–1920), he was decorated with the Italian War Cross and the Romanian Cross for his contribution to the fight against a typhus epidemic in the Romanian Legion during World War I.

<sup>31</sup>Segrè (1905–1989), dismissed in the fall of 1938, moved to the University of California, Berkeley, CA and won the Nobel Prize for Physics in 1959.

<sup>32</sup>In Messina, Zagami had been a colleague of Martino, who was Amantea's assistant.

the Italian physiology community was positive, or at least not negative. In three universities (Milan, Bologna, Palermo) the substitutes (Margaria, Pupilli, Zagami) became school founders, bringing numerous and qualified collaborators to the chair.

In all cases, however, there is no doubt on the moral evaluation of the acceptance of the removal of professors based on “racial” reasons considered “business as usual” or even as an opportunity to speed up the academic career. Seen from this perspective, those distant events offer a paramount occasion for reflection and a lesson that is still valid for all of us today.

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P.V. prepared figures; P.V. drafted manuscript; P.V., C.R., and A.M. edited and revised manuscript; P.V., C.R., and A.M. approved final version of manuscript.

## REFERENCES

1. **Mussolini B.** *Discorsi (scelti da Giuliano Balbino)*. Zanichelli, 1939, p. 396.
2. **Ventura A.** *Le leggi razziali all'Università di Padova, in L'Università dalle leggi razziali alla Resistenza, Giornata dell'Università italiana nel 50° anniversario della Liberazione (Padova, 29 maggio 1995)*. Cleup, 1996.
3. **Montroni G.** *La continuità necessaria. Università e professori dal fascismo alla Repubblica*. Le Monnier, 2016, p. 4.
4. **Troiani D., Manni E.** A tribute to Italian physiologists of Jewish descent evicted during the persecution ordered by the Fascist Regime in 1938. *Adv Physiol Educ* 31: 123–128, 2007. doi:10.1152/advan.00059.2006.
5. **Cerruti L.** Mazza, Francesco Paolo. In: *Dizionario Biografico degli Italiani (DBI)*. Istituto dell'Encyclopædia Italiana, 2008, p. 72.
6. **Nicolosi PG, Farnetani I.** Martino, Gaetano. In: *DBI*. Istituto dell'Encyclopædia Italiana, 2008, p. 72.
7. **Lombroso S.** *Si può stampare. Pagine vissute. 1938–1945*. Casa Editrice “Dalmatia”, 1945, p. 149–183.
8. **Berlucchi G.** La memoria ritrovata. Ricordo di Mario Camis, un fisiologo nato. In: *La memoria ritrovata. Giornata in ricordo di Tullio Terni e Mario Camis (Roma, 12 marzo 2004)*. Accademia Nazionale dei Lincei, Atti dei convegni lincei 212: 103–120, 2005.
9. **Manni E., Troiani D.** (editors). *Introduction to the History of Italian Physiology*. Biblink Editori, 2008, p. 71–73.
10. **Fanò-Illic G.** Metti una sera a cena nel 1947. *pH* 2: 28–46, 2021.
11. **Volpe P., Simone G.** "Posti liberi". *Leggi razziali e sostituzione dei docenti ebrei all'Università di Padova*. Padova University Press, 2018, p. 125–136.
12. **Camis M.** Le correnti d'azione nel cervelletto per eccitamento del labirinto. *Arch Sci Biol* 1: 92–119, 1919.
13. **Berlucchi G.** La memoria ritrovata. *Atti dei convegni lincei* 212: 103, 2005.
14. **Cani V.** Pupilli, Giulio Cesare. In: *DBI*. Istituto dell'Encyclopædia Italiana, 2016, p. 85.
15. **Fadiga E., Pupilli GC.** Teleceptive components of the cerebellar function. *Physiol Rev* 44: 432–486, 1964. doi:10.1152/physrev.1964.44.3.432.
16. **Vicario S.** Foà, Carlo. In: *DBI*. Istituto dell'Encyclopædia Italiana, 1997, p. 48.
17. **Agostoni E.** Margaria, Rodolfo. In: *DBI*. Istituto dell'Encyclopædia Italiana, 2008, p. 70.
18. **Di Prampero PE, Ferretti G.** Margaria's revolution: a novel energetic view of muscular contraction. In: *Exercise, Respiratory and Environmental Physiology. A Tribute from the School of Milano*, edited by Ferretti G. American Physiological Society, 2023, p. 61.
19. **Margaria R.** Sulla fisiologia e specialmente sul consumo energetico della marcia e della corsa a varie velocità ed inclinazioni del terreno. *Lincei Rend Sci Fis Mat Nat* VII: 297–368, 1938.
20. **Lombroso U.** Sulla lipasi del secreto intestinale. *Lincei Rend Sci Fis Mat Nat* XVII: 136–140, 1908.
21. **Bock Berti G.** Lombroso, Ugo. In: *DBI*. Istituto dell'Encyclopædia Italiana, 2005, p. 65.
22. **Tullio P.** *Some Experiments and Considerations on Experimental Otology and Phonetics*. Cappelli, 1929.
23. **Addams-Williams J., Wu K., Ray J.** The experiments behind the Tullio phenomenon. *J Laryngol Otol* 128: 223–227, 2014. doi:10.1017/S0022215114000280.
24. **Remotti E.** Prof. Pietro Tullio. *Vita Universitaria* 5, 1941.
25. **Meneghetti E.** VIII, VI, Commemorazione del socio Ugo Lombroso. *Lincei Rend Sci Fis Mat Nat* XV: 473–482, 1953.
26. **Armocida G., Manzoni T.** Artom, Camillo. In: *DBI*. Istituto dell'Encyclopædia Italiana, 1988, p. 34.
27. **Artom C., Sarzana G., Perrier C., Santangelo M., Segrè E.** Rate of organification of phosphorus in animal tissue. *Nature* 139: 836–837, 1937. doi:10.1038/139836a0.
28. **Artom C.** Lipid metabolism. *Annu Rev Biochem* 22: 211–232, 1953. doi:10.1146/annurev.bi.22.070153.001235.
29. **Manzoni T., Amantea G.** Zagami, Vittorio. In: *DBI*. Istituto dell'Encyclopædia Italiana, 1988, p. 34.
30. **La Grutta V.** (editor). *Centenario dell'Istituto di Fisiologia Umana "Giuseppe Pagano"*, Palermo. Provincia Regionale di Palermo, 2006, p. 30–36.