A tribute to Italian physiologists of Jewish descent evicted during the persecution ordered by the Fascist Regime in 1938

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Background

In the fall of 1938, the fascist government, headed by Benito Mussolini and allied with Nazi Germany, promulgated the Racial Laws, called at that time “Laws in Defense of the Race” with the aim to evict from the public, social, cultural, and academic communities all non-Aryans (Jews in particular) and others, such as homosexuals and gypsies, who were deemed racially or genetically unfit (57). Officially, the fascist regime wished to protect the nation against the “unnatural” influence of Jews and other, so-called “enemies” of the Italian people while safeguarding the purity of the race from degeneration caused by race mixing in Italy and within conquered African colonies. The Laws in Defense of the Race were preceded by vicious and aggressive anti-Semitism propaganda in the official media, newspapers, and magazines headed by fascist politicians with contributions from faculty members within medical schools (34, 35, 45, 48). The Manifesto on Racial Laws (1), a “Decalogue”, was published by anonymous on July 14, 1938 in the “Giornale d’Italia,” which was edited by Virgilio Gayda, brother of Tullio, late Professor of Physiology at the University of Pavia. Soon afterward, on August 5, 1938, it was republished (34) and signed by a group of 10 scientists ideologically aligned with the regime. Officially, the Manifesto had been written by a committee, and the most influential members (35, 48) were recognized scholars in Italian medical universities. Namely, the most influential members included the following scientists: Nicola Pende, a prominent endocrinologist and full Professor of Internal Medicine at the University of Rome; Arturo Donaggio, Chairman of Neurology at the University of Bologna; and Sabato Visco, Chairman of General Physiology in Rome. Minor members with national reputations from the University of Rome were Edoardo Zavattari (zoologist), Marcello Ricci (zoologist), Franco Savorgnan (demographist), Lino Businco (pathologist), and Guido Landra (anthropologist). Other members were Lidio Cipriani (anthropologist) from the University of Florence and Leone Franzoni (pediatrician) from Milan.

The scientific rationale for the Manifesto was poor, but that was not its intent. Mussolini had personally directed and added corrections to the original text to strengthen its anti-Semitic message. In accordance with Nazi racist ideology, Mussolini used the scientific committee to appraise and legitimize his antagonism policy against the Jews and their international economical and political influences. Thus, the Gran Consiglio of Fascism, the most powerful organ of the Fascist Regime (49), approved in rapid succession a series of edicts (17, 54, 55, 1231043-4046/07 $8.00 Copyright © 2007 The American Physiological Society
time and recalls that “From one day to the next, we became
ident of the Italian Jewish community, was a teenager at the
regime (35, 50). Tullia Zevi, until recently the longtime pres-
tively little warning and reversed the prior policy of the fascist
equal versus the law.” The Racial Laws had come with rela-
relation of the time, there was clearly stated that “all citizens are
that was also illegal because in the Italian Kingdom Constitu-
signed the laws and thus approved an unconscionable iniquity
racism was satisfied. King Vittorio Emanuele III cynically
on November 17, 1938 (17, 57). As a result , the needs of the
was to become law with the addition of few other regulations
56) and “The Paper of the Race” on October 6, 1938, which
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on November 17, 1938 (17, 57). As a result , the needs of the
alliance with Germany were safe (17, 18) and Mussolini’s
was determined according to the individ-
seek disapproval could be expressed be-
carcinoma’s political and ethical orientations. The opposition of
the fascist community to the Racial Laws was absolute and unre-
Since no public disapproval could be expressed be-
cardiovascular Sound, is
itor cardiac performance and on the mechanisms of heart sound
generation and cardiac contraction (40, 41).

Because of the Racial Laws, the faculties of medicine lost 18
full professors. Of the academic disciplines, physiology paid
the heaviest tribute as five were physiologists. At that time,
there were 17 Chairs of Human Physiology and 5 Chairs were
held by talented researchers who were full professors located in
the most prestigious medical schools but were of Jewish
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and Medical Schools

At the time, there were ~47,000 Jews in Italy, which were
located mainly in Rome, Milan, and Trieste. All were unex-
expectedly banished from public life and subjected to a wide
range of humiliating and degrading restrictions. Jews had been
completely integrated in Italian society; many had been active
participants in Italy’s independence movement during the 19th
century, most were proud of their Italian identity, many had
served in the Italian army during World War I, some had been
early supporters of Mussolini, significant numbers were mem-
ers of the fascist party [Partito Nazional Fascista (PNF)], and
only a few were known to be anti-fascists (11, 51).

Some years later, after the armistice of Italy with the Allied
armed forces (September 8, 1943) and after the occupation of
Italy by the German army, Germany and the militia of Mus-
solini’s reconstituted fascist republic of Salò exacerbated the
Racial Laws, which culminated in the deportation of many
thousands of Jews to German concentration and death camps.
Approximately 5,700 Italian Jews perished (11, 47). However,
we will focus our attention on the persecution of Italian faculty
members located in medical schools.

At the beginning of the 1939 academic year, a few weeks
after the promulgation of the Racial Laws, 98 full professors,
~200 “liberi docenti” (professors without chairs or tenure),
and ~300 school teachers were banned from universities and
schools because of their Jewish heritage (43). Many renown
faculty members were evicted; among them were anatomist
Giuseppe Levi (Turin), a mentor of three future Nobel Laure-
ates (Rita Levi Montalcini, Renato Dulbecco, and Salvador
E. Luria); surgeon Mario Donati (Milan); histologist Tullio
Terni (Padua); medical clinician Guido Melli (Parma); pedi-
trician Maurizio Pincherle (Bologna); and medical clinician
Maurizio Mosè Ascoli (Palermo). Also included was Aldo A.
Luisada , a distinguished cardiologist from Ferrara who left
Italy in 1939 to become a faculty member at the medical school
of the University of Chicago. Luisada, founder and first pres-
ident of the Laennec Society for Cardiovascular Sound, is
remembered for his researches in phonocardiography to mon-
Fig. 1. Camillo Artom (1883–1970) of Palermo, Italy. [Reprinted with per-
mission from the University of Palermo.]

Jews in Italy and in Medical Schools

In this section, we commemorate the evicted physiologists
and provide a short biography listing their most important
scientific achievements before the promulgation of the Racial
Laws.

Camillo Artom. Dr. Camillo Artom (1883–1970) is shown in
Fig. 1; MD at Padua in 1917. During the years 1921–1923, he
was in Frankfurt as a pupil of Gustav Embden (1874–1933)
before moving to Amsterdam. Subsequently, he returned to
Italy and assumed positions in Palermo and Naples. Later, in
1930, he was appointed the Chair of Physiology in Cagliari;
in 1931, he then became the Chair of Physiology until 1938 at
the University of Palermo. Because of the Racial Laws, he left for
the United States the following year. As a result of his inter-
national reputation in lipid metabolism, Artom was offered the
position of Chairman of the Department of Biochemistry in the
Medical School at Wake Forest University in North Carolina.
In 1941, he became Chairman of the Department of Biochem-
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Racial Hygiene and the Brain Drain in Physiology

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istry at the Bowman Gray School of Medicine, also in North
Carolina, until his retirement in 1961. He became an Emeritus Professor of Biochemistry in 1963 and continued to perform research until his death in 1970. Artom published more than 200 scientific papers, with many devoted to the lipotropic role of choline in the hepatic oxidation of fat and lipid metabolism (5–8). He is remembered for his pioneering research with radioactive isotopes, which were published in 1937 within the prestigious journal Nature (3, 4). Artom used lipids labeled with radioactive isotopes of phosphorus that were prepared with the assistance of Emilio Segrè (1905–1989), a former colleague at Palermo who also left Italy because of the Racial Laws; Segrè remembers his colleague physiologist Artom in his autobiography and their scientific collaboration (52). Unfortunately, their fruitful collaboration was short lived. Consequently, the University of Palermo lost two of the most talented researchers, Italian physiology lost an eminent mind, and Italian physics lost a future Nobel Laureate.

It is noteworthy that Wake Forest University has the Dorothy Carpenter Medical Archive that houses the Camillo Artom Personal Collection. Additionally, in 1974, the university purchased a building in Venice named “Casa Artom” to accommodate one-semester students.

**Mario Camis.** Mario Camis (1878–1946) was a distinguished neurophysiologist who was born in Venice in 1878 (Fig. 2). In 1902, he obtained his medical degree from the University of Rome and in 1905 entered the Institute of Physiology in Pisa with Vittorio Aducco as his first mentor. Camis had other distinguished mentors, which included Pietro Albertoni, Luigi Luciani, Amedeo Herlitzka, Friedrich Kiesow (1858–1940), John N. Langley, and his beloved Sir Charles Scott Sherrington, a Nobel Laureate in 1932. Late in his career (1925), he became the Chair of Physiology at Bari. Subsequently, he assumed the chairmanship at Parma, where he was elected Chancellor, and in 1936 he moved to the Chair of Physiology at Bologna.

In 1908, he was a young researcher in Cambridge, UK, with John Newport Langley (1852–1925) to study with Sir Joseph Barcroft (1872–1947) on the effect of electrolytes on the dissociation curve of oxyhemoglobin (9). They showed a shift of the curve to the right, which has become a classical result. He moved to Liverpool to be in the laboratory of Charles Scott Sherrington (1857–1952), where he discovered one of the features of spinal reflex excitation: the phenomenon of occlusion (12, 13, 44). The simultaneous stimulation of two dorsal roots induces two types of phenomena, called facilitation and occlusion. In the latter case, the amplitude of the response, recorded in the ventral roots, is inferior to the sum of the amplitudes of the responses obtained following the stimulation of the dorsal roots separately. The phenomenon of occlusion is due to the convergence on common motoneurons where a supraliminary depolarization is induced by the stimulation of each dorsal root; thus, the simultaneous stimulation of the two roots gives supraliminary depolarization of a common motoneuronal pool that is numerically inferior to the sum of the population excited by the separate stimulation of the two roots.

With Sherrington, Camis became a neurophysiologist and directed his researches on the vestibular system. He investigated the labyrinthine projections to the cerebellum by employing Marchi’s method (42) and demonstrated that the fastigial nuclei, nodulus, lingula, and uvula receive vestibular information (14). Later, in the 1930s, Olof Larsell (36) and Robert S. Dow (20) emphasized the role of the flocculonodular lobe in the coordination of movements of the eyes and body in relation to gravity and turning of the head in space. Information from the utricle, a gravity sensor, and the semicircular canals, which sense head turning, contribute to the control of this movement (21). Camis was the first to record the electrical activity from the cerebellar fastigial nucleus following labyrinthe stimulation (14); before him (1875), only Richard Caton (1842–1926) and a few other researchers had recorded electric currents from the brain. Camis described muscle hypertonia following decerebration and locomotion movements following the injection of nicotine in the cerebellar nuclei or cooling of the cerebellar anterior lobe; Frédéric Bremer confirmed these data (10). Camis published relevant researches on the relation between the vestibular system and vasomotor reflexes and, in 1928, published the treatise “The physiology of the vestibular apparatus,” translated by R. S. Creed (15), which became an authority on vestibular functions.

Camis became known as one of the most outstanding Italian physiologist of his time; moreover, he had a gifted pupil, Giuseppe Moruzzi, who was to become one of Italy’s most famous neurophysiologists (44). Soon after the Racial Laws, Camis became a Dominican monk and, in 1941, was ordained a priest and known as Father Albert. When he died in 1946, he was laid to rest in the mortuary chapel with two books placed next to him. One was the Bible and the other was Sherrington’s *The Integrative Action of the Nervous System*, books that Camis had never abandoned during the tragic years that followed the racial laws.

**Carlo Foà.** Carlo Foà (1880–1972) (Fig. 3) was son of the illustrious pathologist Pio, who was a Professor of Morbid Anatomy at the Turin Medical School. Foà was a pupil of both Angelo Mosso (1846–1910) and Giulio Bizzozero (1846–1901) and a graduate of medicine from the University of Turin. Although very young, he had the opportunity to work at the Sorbonne in Paris with Albert Dastre and Victor Henry before going to Lyp sia, Germany, to analyze physical-chemical phenomena with Wilhelm Ostwald (1853–1932), who received the Nobel Prize in 1909. When Foà was only 33 years old, he was appointed Professor and Chairman of Physiology at the University of Messina in Sicily. Later, he moved to Parma and then...
to Padua. In 1925, he became Chairman of Physiology in Milan, and, soon after, he was elected Dean of the Faculty. Because of the Racial Laws, he left for Brazil, where he remained until 1945. After the war, he returned to Italy, where he was reappointed to his former position and where he stayed until the age of 75.

Foa was an eclectic researcher who analyzed the chemophysical parameters of blood, studied the effects of periodic breathing, and investigated cardiac automatism and the significance of blood pressure waves. He is remembered for his investigations in endocrinology physiology, which included the analysis of nonuterine development of fertilized eggs, the growth of the mammary gland, and, his seminal discovery, that the ablation of the pineal gland will induce precocious development of gonads in chickens (25, 26). Interest in the physiology of melatonin, the pineal gland hormone, has increased since his discovery, and it is known that the pineal melatonin rhythm serves as an internal daylength signal capable of regulating not only a variety of behavioral and endocrine rhythms but also the seasonal control of reproduction (2, 53).

Amedeo Herlitzka. Amedeo Herlitzka (1872–1949) (Fig. 4) was born in Trieste in 1872. He was a medical student at Pisa but was soon jailed (8 mo) in Trieste because of his activity against the Royal and Imperial Government of Vienna. He resumed his medical studies in Florence and then in Rome, where he graduated with a thesis from the Institute of Physiology, which was directed by Luigi Luciani (1840–1919). His thesis dealt with the ontogenesis of amphibian eggs, his most important investigation (28). At that time, the question was debated as to whether splitting a fertilized egg could produce two embryos. He obtained two embryos, although smaller, from the divided and fertilized eggs of Triton taeniatus, and, thus, the controversy was settled. This research brought him international fame and recognition that lasted for more than 50 years.

After graduation, Herlitzka worked for a year in the Psychiatric Hospital at Florence with Eugenio Tanzi (1856–1934). In 1898, he entered the Institute of Physiology of Turin to become the pupil of Angelo Mosso (19). He remained in Turin except for his exile period in Argentina because of the Racial Laws.

He became interested in biochemistry and investigated the ontogenesis of enzymes and the catalytic action of nucleoproteins of different organs, such as the liver and kidney, and in the activity of the glycolitic enzymes of Saccharomices cerevisiae (29). He also studied cardiopulmonary resuscitation in mammals after cardiac arrest due to asphyxia and developed a device for heart perfusion with epinephrine (31). Later, he became interested in muscle contraction and sport physiology and analyzed heat production during the cardiac cycle, conducted physiological evaluations of athletes, and established criteria of fitness for pilots (33). His selection methods for pilots were reported in the Handbuch der Biologischen Arbeitsmethoden by Emil Abderhalden (32). In addition, he made other meaningful contributions to the fields of aviation and muscle exercise physiology (30). Amedeo Herlitzka is remembered as an outstanding scientist who was a dominating influence in the history of Italian physiology.

Ugo Lombroso. Ugo Lombroso (1877–1952) (Fig. 5) had a father [Cesare Lombroso (1835–1909)] who was a famous Professor of Criminal Anthropology in Turin. As a student, he was influenced by the teachings of Gustav Embden, Oskar
Minkowski (1858–1931), and G. van Rijnberk. He was the Chair of Physiology in Messina (1919), Palermo (1923), and Genoa (1935). Because of the Racial Laws, Lombroso fled to France to become Maître de Recherche at the École de Médecine in Paris. After World War II, in 1945, he returned to Genoa to be reinstated as the Chair of Physiology. He was the first to publish in 1908 that a pancreatic lipolytic factor was responsible for the oxidation of lipids (38, 39). Fat liver infiltration in dogs after pancreatectomy was the proof for the fundamental role of the pancreas in fat metabolism. In later years, Lombroso’s observations were extended, and, since 1924, it has been known that the development of fatty livers in insulin-treated depancreatized dogs can be prevented by the administration of raw pancreas. When it was recognized that the activity of pancreas fractions upon the liver could not be accounted for by their choline and methionine content, an antifatty liver factor was postulated and called “lipocaic” by Dragstedt et al. (22, 23) and anti-fatty liver factor (AFL) by Chaikoff and Enteman (16). The presence of such a lipotropic pancreatic factor has been debated for more than 50 years.

Ugo Lombroso is remembered as anti-militarist, a socialist, and an anti-fascist. He was also one of the very few faculty members who never accepted the compulsory membership of the fascist dictatorship.

**Conclusion**

By the end of World War II, and after the fall of fascism, the Racial Laws were abrogated in Italy. Consequently, evicted professors of physiology were reinstated in their academic chairs. However, this was not the case for Camis, who died in the summer of 1946, or for Artom, who remained in the United States. Faculty members who endorsed the Racial Laws were punished, and some were jailed. However, they were soon released and resumed their previous academic positions.

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