Andreas Karachalios: *I chimici di fronte al fascismo. Il caso di Giovanni Battista Bonino (1899-1985)*, Istituto Gramsci Siciliano, Palermo, 2001, 220 pp.

The biographies of renowned scientists are prone to become hagiographies, especially when the scientist passed away shortly before and pupils are alive, active, and prepared to act in defense of their master. This is not the case with Karachalios' book, which offers an unbiased portrait of Giovanni Battista Bonino, the initiator of quantum chemistry in Italy. Bonino's biography is welcome also because it is the first full-length biography of an Italian contemporary chemist.

The volume is divided into two distinct parts of the same length, the first one being the biography and the second one a rich collection of documents. In the biographical part, Karachalios deals with the youth, the studies, and the beginning of the academic career of Bonino (ch. 2); the situation of the Italian chemical community in the first decade of the fascist regime and Bonino's personal commitment (ch. 3); Bonino's research in the new field of Raman spectroscopy and the formation of his own research school (chs. 4 and 5); the making of a new discipline, quantum chemistry, in Italy (ch. 6); and the years of political engagement, 1936-1941 and later (ch. 7). The documental part consists of 33 appendices, of which almost half are dedicated to documents about Bonino's difficult situation at the end of World War II and after the victory of the antifascist Resistance.

Many of the topics treated by Karachalios are interesting to readers of HYLE, and several deserve to be touched here. The first point of interest is the thought of the Italian physical chemist on the epistemological relationship between classical organic chemistry and the rising quantum chemistry. While Bonino's disciplinary contribution to quantum chemistry was modest, his opinion of its cognitive impact on chemistry was very near to (and independent from) that set out by the great Linus Pauling, *e.g.* in the foreword of *The Nature of the Chemical Bond* (Pauling 1939). In 1935 Bonino declared his admiration for "the wonderful strength, which gave organic chemistry many achievements", but in the same context he affirmed that it was important to reformulate the "axioms" of classical structural chemistry, because the same successful "classical development of benzene and aromatic nuclei chemistry" demonstrated the "contradictory character of Kekulé's axioms" (p. 94). A few years later, in 1938, he gave a lecture in Berlin, before the German Chemical Society. The title of the lecture was *Organische Chemie und Symmetrie*, in which he connected Werner's coordination theory, Mulliken's molecular orbitals, and group theory. Before that prestigious public, Bonino stated: "We must not be concerned about possible revolutions in the way of thinking of organic chemistry: on the contrary we have to express our admiration for the ingenuity of the classical organic chemists who guessed the fundamental importance of symmetry more than half a century ago, when it was far from any possibility to see a physical foundation of those concepts" (p. 95). Bonino worked at length on the symmetry and electronic structure of benzene, its heterocyclic analogs, and naphthalene, which Karachalios has analyzed in another fine essay (Karachalios 2001). In fact, the Italian physical chemist was very fond of group theory (p. 79), and in a sense he was affected by *die Gruppenpest* that swept among the spectroscopists after two young Budapest-born mathematical-physicists, Eugene Wigner and Johann von Neumann, published their articles (Cerruti 2003, pp. 199-204) and in particular after the publication of Wigner's *Gruppentheorie* (Wigner 1931).

The fondness of Bonino and his school for group theory was not shared by many other Italian physical chemists, which did not change more than thirty

years later, when, in 1968, the author of this review for the first time introduced group applications in a course of physical chemistry in Turin. However, Bonino's academic strategy before World War II caused a more serious fault than the *Gruppenpest*. In 1935 he began to speak about a new discipline, which he named *chimica fisica organica* (organic physical chemistry), as the meeting point between physical chemistry and organic chemistry (p. 76). With a rough and ready oversimplification, we can say that Bonino and his school moved from physical chemistry towards organic chemistry, in the same period when Ingold and his school pushed in the opposite disciplinary direction, from organic chemistry towards physical chemistry. From the epistemological point of view, it is fair to say that the direction followed by Ingold in the United Kingdom and by Hammett in the United States pointed to the understanding of the *reactivity* of organic molecules, while Bonino pointed to a better knowledge of the *structure* of the organic molecules. The first approach brought forth a new discipline, physical organic chemistry, and gave first rate and visible results, while the second one remained a kind of specialty inside the mainstream of physical chemistry.

The last topic of interest in Bonino's biography is his political behavior and that of the Italian chemical community during the (too) long fascist era, which in North Italy (where Bonino lived) lasted from 1922 to 1945. Although sixty years have gone by since the Savoia and the Duce committed the last betrayal against the Italian people, giving the German Nazis a free hand on great part of the Country (September 8, 1943), the international scientific community has not yet understood the fascist regime. Recently, *Chemistry & Engineering News*, an official journal of the American Chemical Society, published two letters whose authors attacked Giulio Natta because in 1938 he was appointed as the successor of Mario Giacomo Levi, when Levi, a Jew, was abruptly expelled from the Milan Polytechnic, and because Natta participated to the fascist efforts in preparation for war (Marans *et al.* 2003). The editor of *La Chimica e l'Industria*, the official journal of the Società Chimica Italiana, asked an historian to set out the principal aspects of the problem, and in due time the Italian journal published a letter which attempted to clarify the situation and dismissed the censure against Natta (Cerruti 2003b). Three points of this letter are relevant to understand Bonino's fascist faith and his important role in the Italian chemical community.

Between the end of 1920 and the beginning of 1921, Italian chemists shifted their political position from moderate liberalism to far right nationalism and fascism. This radical change of political attitude happened *before* the notorious *marcia su Roma* (October 1922), when the King Vittorio Emanuele III surrendered the State to a few thousands of ill-assorted and badly armed fascists (Cerruti 2000). The second relevant point is that in 1938 Natta was the best academic chemical engineer in Italy, and probably one of the best in the world. Since the Milan Polytechnic chair was the most important chair of industrial chemistry in Italy, the Natta's appointment was an obvious academic move, urged by the Polytechnic Director who was also strongly against Levi's expulsion (Signori 2000). In the present review this point is also important because Bonino became a member of the Accademia d'Italia, while neither Giacomo Fauser (of ammonia synthesis fame), nor Giulio Natta received the dubious but lucrative honor. Both Fauser and Natta ever maintained a very low political profile, whereas Bonino was a fascist activist, ready to transform the chemical professional association into "a great and special Militia under the orders of the Fascist Regime" (Appendix IX, p. 139). The last point is about the preparation for war. In the second decade of the fascist regime the 'modernization' of the country became vigorous and visible, especially in connection with the many

military undertakings (Ethiopia, Spain, Albania, and eventually World War II). For example, on November 12, 1937, a refinery, subsidiary of the American Vacuum Oil Co., was inaugurated in Naples. In the *Industrial and Engineering Chemistry*, the plant was described as "the second largest in Europe, but the most modern in the world" (Sansone 1938). In the same vein of the recent letters in *Chemistry & Engineering News*, one could also say that American Vacuum Oil was preparing the war on the side of the fascist regime. Bonino and the other fascist scientists and engineers are guilty before their country, not because they prepared the war (as many scientists everywhere in our times do) but because they knew with certainty that Italy was *not at all* prepared for a general war, and they did not oppose the untimely war, side by side with Hitler.

Anyway, as in any other part of the book, Karachalios's judgment on the political behavior of Bonino is dispassionate and well substantiated.

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