

German cancer journals, had already shown by 1930 that tars derived from tobacco smoke could induce cancer in experimental animals; in subsequent experiments he found that certain tobacco tar distillates could produce tumors in as many as 94 percent of all animals exposed.⁶⁶ Roffo was important in shifting the emphasis away from nicotine and onto tar as the active agent of tumorigenesis; Lickint by 1935 could state that nicotine was "probably innocent" of carcinogenic potency and that benzpyrene was more likely the guilty party.⁶⁷

Roffo's experiments were disputed by some—the English scientists Ernest Kennaway and R. D. Passey, for example, who claimed that he had burned his tobacco at temperatures too high to simulate actual smoking⁶⁸—but the striking results prompted others to explore the hazard. Neumann Wender, a Viennese professor, in 1933 showed that tobacco smoke contained not just tar and nicotine but methyl alcohol and other toxins (see fig. 6.9); he also showed that the tar content of cigarette smoke increased when the woody stems of tobacco plants were used in the manufacturing process.⁶⁹ Enrico Ferrari of Trieste that same year pointed out that since tar had "excellent cancer-causing properties," it was not hard to imagine that the increasing use of these woody parts might be responsible for the upsurge in lung cancer. Ferrari claimed to have been long convinced ("without a doubt") that cigarettes were a major cause of the disease; he endorsed Wender's proposal for a ban on the use of woody stems as an illegal adulteration.⁷⁰ He also suggested that it was not by accident that Trieste had both the highest lung cancer rate and the highest smoking rate of any region in Italy.⁷¹

Lickint had pointed to the preponderance of smokers among lung cancer patients in 1929, and his was the lead most often followed when physicians began to nail down the link. Rudolf Fleckseder of Vienna in 1936, for example, reported a very high proportion of smokers among his lung cancer patients (48 of the 51 males were smokers; 35 were heavy smokers), and others noted the disproportion.⁷² The stage was thereby set for the era's two most important statistical analyses: a 1939 paper by Franz Hermann Müller, a physician at Cologne's Bürgerhospital, and a 1943

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FIG. 6.9. This image is reproduced dozens of times in the back pages of *Reine Luft* in the late 1930s and early 1940s: it shows that tobacco smoke contains not just nicotine but carbon monoxide, ammonia, tar, and many other poisons. Most of these constituents had been identified in the nineteenth century. Top captions read: "A Widespread Misconception! Tobacco Smoke Contains Much More Than Nicotine!"