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In memory of Alfons Bukowski on the centenary of anti-doping research

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Alfons Bukowski (1858–1921) is commonly regarded as the pioneer of anti-doping research. In 1910, he developed a method to detect alkaloids in horse saliva. One hundred years later, this is a good moment to remember Bukowski, an outstanding Polish pharmacist, often mistakenly represented in world literature as a Russian chemist. It is also an occasion to mention that the real driving force in the history of doping were events related to horse rivalry. Copyright © 2010 John Wiley & Sons, Ltd.

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Introduction

An analysis of Greek mythology and works devoted to the Ancient Olympic Games allows for the assumption that doping first started with the Olympic Games. Oinomaos, a legendary king of Pisa, had a daughter, Hippodamia, who received numerous marriage proposals. Oinomaos came up with an idea to get rid of those suitors whom he regarded as unsuitable. Everyone willing to marry Hippodamia was required to take part in a chariot race against the King and the loser had to be prepared to sacrifice his life. Mythographers enumerate twelve (or thirteen) defeated men.^[1,2] At last, Oinomaos was faced with his own vanquisher, Pelops, the son of Tantalus. There are several versions of events which led to Pelops's victory. One argues that the winner fed his horse more stimulants than his rival did which allowed him win the race. Considering this event as an example of doping, it is also worth adding that Pelops is regarded by many as the founder of the Olympic Games, which were to be the celebration of his victory over Oinomaos.^[1,3] Another mythological story containing an example of practices that could be regarded as horse doping concerns Diomedes who fed his horses human flesh to render them unbeatable and savage.^[4,5] As early as the ancient Roman Empire the manipulation of racehorses before a race was punished and those found guilty were crucified.^[6]

The term 'doping' is almost always related to human athletes, even though originally the doping problem was a feature in mainly horse and greyhound racing.^[7] Several other examples could be provided to confirm this thesis and illustrate that the real driving force in the history of doping was events related to rivalry between horses. Although the etymology of the word 'doping' remains unclear, the fact is that the term was published for the first time in 1889 in English dictionaries defining it as 'a mixture of opium and narcotics used in horses'.^[8,9,10] In sport lexicons the definition of doping appeared for the first time in 1933.^[11] Beckmann's *Sport Lexicon* defined doping as 'the use of stimulating (performance enhancing) agents, which shall push the athlete beyond his/her normal limits of performance'.^[12]

The death of the cyclist Arthur Linton in the Paris–Bordeaux race may be the first recorded death of an athlete from a drug overdose. Depending on which account you read, the incident took place in 1879,^[13] or 1886,^[14,15,16] or ten years later.^[17,18,19] A closer examination of Linton's case – for example that by sports historian, Simon Craig – reveals that Linton died in 1896, but about two months after setting a record time in the then 'blue riband' Bordeaux–Paris cycle race.^[20] The first victims of doping in modern times appeared at the end of the eighteenth century when four jockeys were sentenced to death by hanging. The court in Cambridge gave such a severe punishment because the defendants had been doping their horses with arsenic.^[21]

In 1928, the International Amateur Athletics Federation became the first international sport federation to ban the use of stimulating substances in sport.^[10,22] The medication of racehorses was formally declared illegal by the English Jockey Club around 1903.^[23] The first national legislation to combat drug abuse in human sport was introduced by the French in 1963,^[6] while a regulation dated 1666 which banned the use of exciting substances in races was introduced in England.^[4,24] In 1967, the International Olympic Committee (IOC) appointed the Medical Commission to organize and supervise the fight against doping in human sport. The Association of Official Racing Chemists had already formed in 1947. However, neither organization would have been able to work effectively had they not had such basic tools as doping control and laboratory testing. The first human doping tests were carried out in the 1950s.^[25] In 1965, Arnold Beckett first applied sensitive gas chromatographic techniques to monitor drug abuse at an athletic event – the Tour of Britain cycle races.^[26] In 1968, the IOC initiated the first doping controls at the Olympic Games hosted by Grenoble (winter) and Mexico (summer). These consequently led to the systematic sports-drug testing programmes being introduced in 1967.^[27] As Hemmersbach^[28]

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Magister Farmacji
Alfons BUKOWSKI
r. 1917

Figure 1. The photograph of Alfons Bukowski published in Roeske works on Bukowski (W. Roeske, *Alfons Bukowski 1858–1921*, PZWL, Warszawa, 1968).

notes, even though doping analyses at the Olympic Games in Grenoble and Mexico may be regarded as a pilot project, systematic doping controls and analyses were performed in all sports at the Olympic Games in Munich in 1972. Still, from an historical point of view, drug testing in sport first started in horse racing.^[29] In 1999, at the Duke Conference on Doping in Sport, Wadler said, among other things, that remarkably, while testing horses for performance-enhancing drugs dates back to 1910, testing of humans for drug use in sports is a relatively new phenomenon, having started in the past quarter of a century.^[26] That is why Alfons Bukowski (Figure 1), who succeeded in detecting alkaloids in horse saliva, is commonly regarded as the pioneer of anti-doping research.^[4,22,30,31] This first application of chemical analysis to doping control was connected with a series of unexpected results in horse racing which occurred in Austria at the beginning of the twentieth century.^[12] However, Bukowski is often mistakenly represented in the world's literature as a Russian chemist. Most probably this is connected with Polish history. In 1795, the Third (and final) Partition of Poland took place. Poland lost its sovereignty until 1918. Warsaw, where Bukowski lived, was under Russian rule and Bukowski himself published several of his works in Russian.

Bukowski's Biography

The Lexicon of Pharmacology^[32] and the *Biographical Dictionary of Polish History*^[33] provide information that Alfons Bukowski was

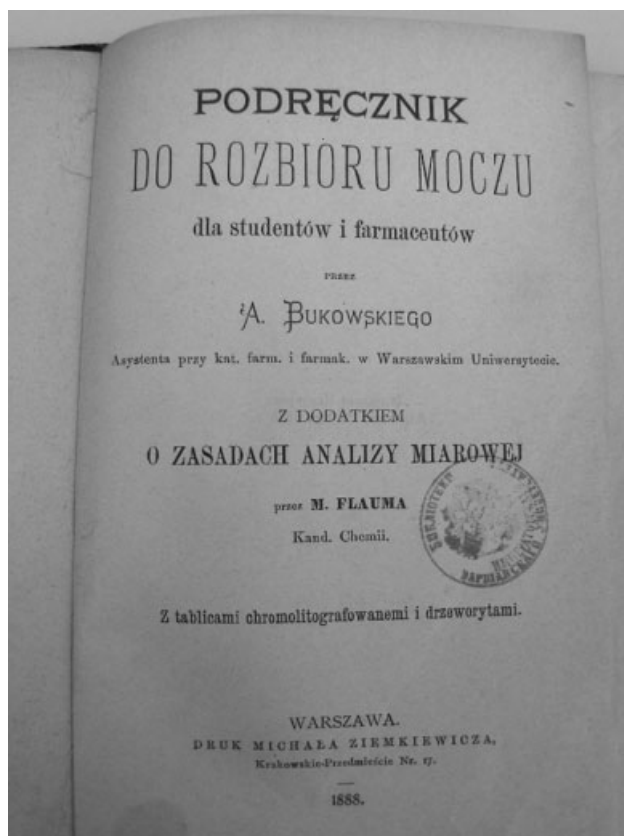


Figure 2. The title page of Bukowski's *Textbook of the Urine Analysis for Students and Pharmacists* (from the collection of The University of Warsaw Library).

born in Czerniowice on 23 October 1858, the second son of Julian Bukowski and Barbara Borowska. After his father's death in 1864, he moved with his family to Warsaw, which changed his life forever. Bukowski studied pharmacy at Warsaw University. In 1880, he obtained the title of the so-called Provisor of Pharmacy (a higher academic degree in pharmacy) and in 1889, he received his MSc, which at that time equalled the title of Doctor. In the years 1880–1884, Bukowski worked in the chemical-court laboratory of the Medical Office as well as in the laboratory of foodstuffs testing at the Holy Spirit hospital in Warsaw. He was also a junior lecturer in the Pharmacology and Pharmacognosy Department (1884–1897). In 1885, he founded his own School of Pharmacy for Assistant Pharmacists at which he lectured between 1885 and 1898. In 1897, he opened his own chemist's where he also organized an analytical laboratory and a chemical-pharmaceutical manufacturing company. Bukowski was the author of more than 100^[32] or even about 330^[33] scientific papers in pharmacognosy, toxicology, bromatology, and phytochemistry, including the first Polish textbooks in these scientific areas: *Textbook for Testing Food, Foodstuffs and Other Trade Goods* (1884) and *Textbook of the Urine Analysis for Students and Pharmacists* (1888) (Figure 2). He was a scientist member of the Warsaw Pharmaceutical Society and the editor of journal *Zdrowie* (trans. *Health*). Alfons Bukowski died in Warsaw on 29 June 1921.

Bukowski's Work with Doping

Details regarding Bukowski's research to detect the use of doping in racehorses are known mainly thanks to retained

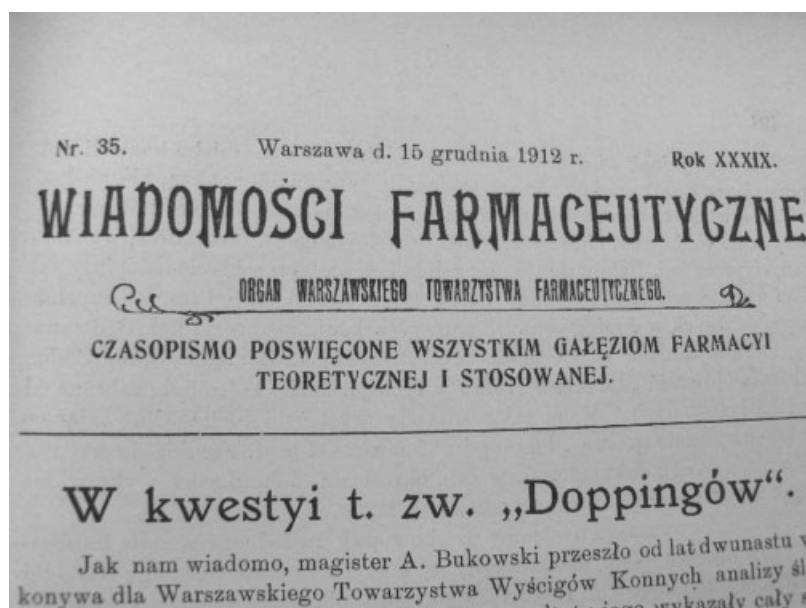


Figure 3. The front page of *Pharmaceutical News* of 15 December 1912 (from the collection of the University of Warsaw Library).

copies of *Wiadomości Farmaceutyczne* (trans. *Pharmaceutical News*) (Figure 3) as well as a monograph on Bukowski written by W. Roeske (Figure 4), who thoroughly discussed the Polish pharmacist's profile and achievements.

The problem of doping on racecourses in various European capital cities emerged in the first decade of the twentieth century and was connected with the appearance of American jockeys on the scene. At that time, doping meant administering stimulating substances such as heroin, cocaine, caffeine, and morphine to horses. Urine and faeces analyses were so complex and time-consuming that it made a quick payment of winnings impossible, and soon the Warsaw Jockey Club turned to Bukowski for help in solving the problem. Bukowski's racecourse observations drew his attention to profuse salivation of horses following a race and the thought of analyzing the saliva of those horses crossed his mind. He developed a set of procedures for sample collection as well as his own analytical method which proved to be so successful that in 1910, first the Budapest Jockey Club and then the Vienna Jockey Club asked the Polish pharmacist to present his method; a method which significantly reduced incidents of horse doping in Austria-Hungary. Bukowski's method was also effectively applied in St Petersburg and in Moscow.^[34] What is interesting is that, at first, the Board of the Vienna Jockey Club did not consider the results of Bukowski's analyses reliable. In order to verify their soundness, several horses were secretly given some doping agents and biological material along with samples from 'healthy horses' were handed over to Bukowski for analysis. The analyses, performed in the presence of the representatives of the Vienna Jockey Club, turned out to be positive only in the samples from those horses that had been administered doping agents.^[35] *Ipso facto*, Bukowski passed his first proficiency test in doping control. It should also be stressed that the sample collection procedure drawn up by Bukowski included more than a few elements which are still used in doping control today – for instance, in Bukowski's procedure, a sample sent to the analysis was coded to prevent the person conducting the analysis identifying the tested animal.

Apart from Bukowski, two other researchers examined the problem of horse doping: Kaufman (who analyzed urine) and Frenkel (who analyzed faeces). During a meeting of the Pharmaceutical Society devoted to doping, participants discussed summaries of the papers which presented their work. Among others, an opinion of Professor Kaufman was presented and he assessed that working out a method to detect alkaloids in horse saliva was possible thanks to Bukowski's recommendations and to Frenkel's work. The method also proved effective because it was not possible to detect any trace in the saliva of alkaloids that had been administered prior to race day.^[35] Such information was important in those times because race rules prohibited administration of alkaloids to horses exclusively on race day. Nowadays, we face a similar problem in anti-doping research as certain substances are banned by the World Anti-Doping Agency (WADA) in competition only.

Bukowski carried out diverse research in the area of pharmacognosy, toxicology, bromatology, and phytochemistry, whose results he presented in numerous publications in both Polish and Russian. Part of his research focused on substances which are still considered doping today. Bukowski also worked on examining food and detecting the adulteration of foodstuffs, which resembles the present-day problem of contamination of dietary supplements with doping agents.

Below a list of several chosen works of Bukowski, as collected by Roeske^[34], is presented:

- *Strychnine or ptomaines* (1884)
- *Determination of theine in the commercial grades of tea* (1886)
- *Reaction of morphine* (1886)
- *Determination of cocaine* (1887)
- *On tobacco* (1887)
- *Tea adulteration in Warsaw* (1894)
- *About chemical and judicial investigation of cocaine* (1897)
- *Adulteration of foodstuffs* (1909)
- *On the so-called 'doping'* (1913)

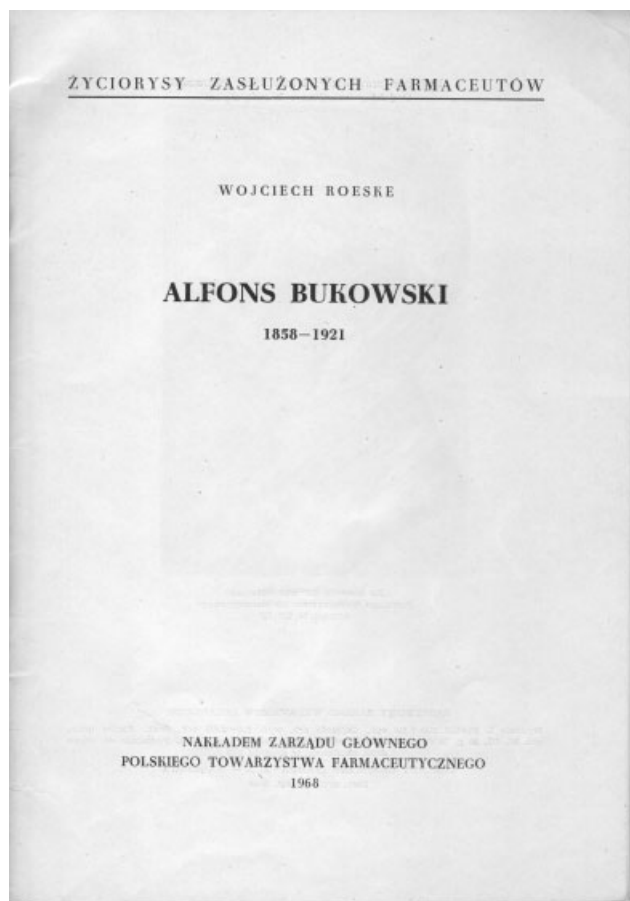


Figure 4. The cover of a monograph on Bukowski (W. Roeske, *Alfons Bukowski 1858–1921*, PZWL, Warszawa, 1968).

Summary

Alfons Bukowski was a great Polish pharmacist who is most commonly associated with anti-doping research in racehorses. According to his living descendants, his interest in horse doping began with his brother-in-law, who was the Director of Warsaw Stables.

Bukowski was a brave man. He performed his racecourse analyses when Poland was not an independent country and although these were described in Russian-, German- and French-language magazines where Bukowski was represented as a Russian chemist, he was not afraid to send corrections in which he called himself 'a humble Polish pharmacist'.^[34,35] Bukowski's work in the field of anti-doping is carried on by the staff of the Department of Anti-Doping Research of the Institute of Sport in Warsaw (a WADA-accredited anti-doping laboratory since 2004), who do their best to be deserving successors of their great forerunner.

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