ANNALES
UNIVERSITATIS MARIAE CURIE – SKŁODOWSKA
LUBLIN – POLONIA

VOL. LVII, 1 SECTIO A 2003

Adam Bielecki (1910–2003)

Biography

Adam Bielecki was born on February 13, 1910, in Borysław, an eastern Galicia centre of oil mining. His father Marian Bielecki, from an impoverished gentry family, was an employee of the local oil company. Adam's mother Zofia Bielecka née Znamirowska belonged to a well known Galician family of teachers and intellectuals. In 1912 Adam's parents moved to Cracow and this ancient Polish city with its unique cultural atmosphere and "genius loci" shaped Adam's personality for a long time. An overwhelming influence in this direction must be attributed to his mother and her family. She aroused Adam's affection for music, painting and literature. In the high school Adam also showed talent for exact sciences. Since he simultaneously attended a music school, he could not decide until finishing the high school what his choice should be: music, or mathematics. Finally the logician Leon Chwistek and the analyst Stanisław Zaremba prevailed over Debussy, Szymanowski and Rachmaninov. However, the love for music remained and Adam showed to be a skilled piano player for the rest of his life. In his Cracow days he published two volumes of poetry. In conversation, Adam's interlocutors were often surprised by his broad knowledge of literature, arts and philosophy.

After finishing in 1928 the Hoene-Wroński High School in Cracow, Adam studied mathematics at the Jagiellonian University. He got his M.A. in 1931. In the same year Adam's first research paper [1] appeared and he also joined Polish Mathematical Society whose member he remained for ever. In the

early seventies an honorary membership of the Society was bestowed on him.

In 1935 Adam got his Ph.D. from the Jagiellonian University (UJ) upon presentation of the Ph.D. thesis [2] written under the supervision of professor Witold Wilkosz. From 1936 till 1939 Adam Bielecki held an instructorship (equivalent to assistant professorship) at the Chair of Theoretical Physics of UJ.

The Second World War and the Nazi occupation of Poland put a stop to Adam's teaching and research. On November 3, 1939, Bruno Müller, the Chief of Cracow Gestapo, summoned Professor Lehr-Spławiński, the rector of UJ, and ordered him to organize on November 6, at 12 noon a meeting of all academic teachers at the Collegium Novum of UJ. At the meeting Müller was supposed to present the attitude of the Third Reich towards the scientists and academic schools. At the proposed time Collegium Novum was surrounded by police troops, while Müller announced to those who came to the meeting that the University started the academic year without permit. Consequently, all who came would be arrested and sent to concentration camps. In this so-called "Sonderaktion Krakau" 184 academic teachers, among them Adam Bielecki, were arrested and transported first to Breslau and then on November 28 they were brought up to the Sachsenhausen-Oranienburg concentration camp. This action aroused many international protests, even from Germany's allies, which resulted in releasing the prisoners of age over 40. The younger ones were sent on March 4, 1940, to the infamous Dachau concentration camp. Further interventions of diplomats and even of German scientists resulted in setting free to the end of 1940 almost all the prisoners, Adam Bielecki among them.

Upon his return to Cracow, Adam was engaged as a part-time teacher in a primary vocational school but his main activity was an unofficial teaching of mathematics at the underground Jagiellonian University and participation in seminars illegally organized by mathematicians then living in Cracow.

For the first two years after the war Adam was teaching at the newly created Cracow Technical University. Then in 1947 he followed the invitation of Mieczysław Biernacki who was organizing the Mathematics Department of the Maria Curie-Skłodowska University (UMCS) in Lublin. Adam's association with UMCS continued beyond the time of his retirement in 1980. After this Adam was still teaching for a few years on a part-time basis.

The first position at the UMCS Adam held, was the Chair of Mathematical Logic and Foundations of Mathematics. His habilitation took place in 1949 and was based on the paper [7]. The appointments to associate and full professorship followed in 1950 and 1958, respectively.

Adam's activity during his stay in Lublin was not limited to teaching and research. He also held various administrative positions such as the dean of faculty, chairman of the Mathematics Department, the vice-rector of the

university, a member of numerous committees on the university and governmental level.

However, his most valuable services rendered to the UMCS and its Maths Department are connected with the critical period just after the untimely death of Mieczysław Biernacki in 1959. Then Adam was left as the only full professor of mathematics at the UMCS. This gap could be filled thanks to Adam's efforts as a tutor and a referee by helping both Biernacki's and his own students in their academic career (B. and J. Krzyż, Z. Lewandowski, K. Radziszewski) and by inviting to Lublin mathematicians from other centres (T. Leżański).

Adam was also responsible for establishing and organizing the computer department at UMCS. He had mastered by self-study the basic fundamentals of informatics and was able to train some young people (dr. Ś. Ząbek, mgr. Z. Skorzyński) so that they were able to teach students elements of this subject.

Adam's academic activity was not confined to the UMCS alone. For 14 years (1954–1968) he was also a professor at the Mathematical Institute of Polish Academy of Sciences and for 6 years (1972–1978) an employee at the Institute of Educational Studies. Moreover, he was active in establishing mathematical institutes at some newly founded schools such as the Silesian University in Katowice and the Lublin Engineering College, presently the Lublin Technical University.

For his achievements and excellence in teaching, research and administration Adam was awarded many medals, orders and special prizes by central and regional authorities. Adam's search for clarity, his deep mathematical culture and ability to find out analogies and essential generalizations were very helpful to those who had an opportunity to work with him and especially to many Ph.D. students whose theses were supervised, or referred by him.

Adam passed away on June 10, 2003, because of heart insufficiency. He left desolate his wife Jolanta and three daughters: Małgorzata, Zofia and Zuzanna, the first two of his late wife Sława.

Scientific activity of Adam Bielecki

The list of published papers and books whose author, or coauthor is Adam Bielecki, consists of 52 positions.

[1] *Sur une généralisation d'un théorème de Weierstrass*, Ann. de la Soc. Polon. de Math. **10** (1931), 33–41.

[2] *Global representation of m-dimensional surfaces in n-dimensional Euclidean space by means of implicit functions*, Ph. D. Thesis, Kraków, 1935, pp. 1–38. (Polish)

[3] (with S.K. Zaremba), *Sur les points singuliers des systèmes de deux équations différentielles ordinaires*, Ann. de la Soc. Polon. de Math. **15** (1936), 135–139.

[4] (with J.W. Weyssenhoff), *Quaternions, 4-dimensional rotations and Cayley's formula*, Bull. de'l. Acad. Polon. des Sci. et des Lettr., Sér. A (1936), 216–227.

[5] (with M. Mathisson and J.W. Weyssenhoff), *Sur un théorème concernant une transformation d'intégrales quadruples en intégrales curvilignes dans l'espace de Riemann*, Bull. de'l. Acad. Polon. des Sci. et des Lettr., Sér. A (1939), 134–144.

[6] (with St. Gołąb), *Sur un problème de la métrique angulaire dans les espaces de Finsler*, Ann. Soc. Polon. Math. **18** (1945), 134–144.

[7] *Sur certaines conditions nécessaires et suffisantes pour l'unicité des solutions des systèmes d'équations différentielles ordinaires et des équations au paratingent*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **2** (1947), 49–106 (1948).

[8] *Sur certaines inégalités dans les espaces abstraits de J. G.-Mikusiński*, Fund. Math. **36** (1949), 131–132.

[9] *Sur quelques conditions nécessaires et suffisantes pour que l'espace A_l de J. G.-Mikusiński soit topologique au sens de Kuratowski*, Fund. Math. **36** (1949), 133–136.

[10] *Sur une équation différentielle binome du II-me ordre*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **4** (1950), 13–17.

[11] *An elementary method of proving the Gauss–Ostrogradsky theorem*, Wiadom. Mat. (2) **1** (1955), 112–121. (Polish)

[12] (with K. Radziszewski), *Sur les parallélépipèdes inscrits dans les corps convexes*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **8** (1954), 97–100 (1956).

[13] *Quelques remarques sur la note précédente*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **8** (1954), 101–103 (1956).

[14] *Une remarque sur la méthode de Banach-Cacciopoli-Tikhonov dans la théorie des équations différentielles ordinaires*, Bull. Acad. Polon. Sci. Cl. III. **4** (1956), 261–264.

[15] *Une remarque sur l'application de la méthode de Banach-Cacciopoli-Tikhonov dans la théorie de l'équation* $s = f(x, y, z, p, q)$, Bull. Acad. Polon. Sci. Cl. III. **4** (1956), 265–268.

[16] *Réduction des axiomes de congruence de Hilbert*, Bull. Acad. Polon. Sci. Cl. III. **4** (1956), 321–324.

[17] *Remarques sur la méthode de T. Ważewski dans l'étude qualitative des équations différentielles ordinaires*, Bull. Acad. Polon. Sci. Cl. III. **4** (1956), 493–495.

[18] *Sur une méthode de régularisation des équations différentielles ordinaires dont les intégrales ne remplissent pas la condition d'unicité*, Bull. Acad. Polon. Sci. Cl. III. **4** (1956), 497–501.

[19] *Certaines propriétés topologiques des intégrales des équations différentielles ordinaires*, Bull. Acad. Polon. Sci. Cl. III. **4** (1956), 503–506.

[20] *Remarque à propos de la note "Certaines propriétés topologiques des solutions des équations au paratingent"*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **10** (1956), 95–97.

[21] *Extension de la méthode du rétracte de T. Ważewski aux équations au paratingent*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **9** (1955), 37–61 (1957).

[22] *Certaines propriétés topologiques des solutions des équations au paratingent*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **9** (1955), 63–79 (1957).

[23] *Sur l'indépendance des axiomes d'incidence, d'ordre et de congruence de Hilbert*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **9** (1955), 157–175 (1957).

[24] *Remarque méthodologique sur le second théorème de la moyenne*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **10** (1956), 77–80 (1958).

[25] (with J. Kisyński), *Une remarque à propos de deux notes de Z. Szmydt*, Bull. Acad. Polon. Sci. Sér. Sci. Math. Astr. Phys. **6** (1958), 15–17.

[26] (with J. Kisyński), *Sur un problème de Mlle Z. Szmydt relatif à l'équation* $\partial^2 z/\partial x \partial y = f(x, y, z, \partial z/\partial x, \partial z/\partial y)$, Bull. Acad. Polon. Sci. Sér. Sci. Math. Astr. Phys. **6** (1958), 321–325.

[27] (with J. Kisyński), *Sur le problème de E. Goursat relatif à l'équation* $\partial^2 z/\partial x \partial y = f(x, y)$, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **10** (1956), 99–126 (1958).

[28] *International Congress of Mathematicians in Edinburgh*, Wiadom. Mat. (2) **3** (1959), 151–161.

[29] (with K. Radziszewski), *Sur les cordes divisant l'aire d'un ovale dans un rapport donné*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **14** (1960), 47–54.

[30] (with C. Kluczny), *Sur une généralisation d'un théorème de H. Kneser*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **14** (1960), 111–116.

[31] (with C. Kluczny), *Sur un théorème concernant des systèmes d'équations différentielles ordinaires*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **14** (1960), 117–125.

[32] (with Z. Lewandowski), *Sur certaines familles de fonctions* α*-étoilées*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **15** (1961), 45–55.

[33] (with T. Dłotko), *Sur certaines équations fonctionnelles*, Ann. Univ. Mariae Curie-Skłodowska. Sect. A **15** (1961), 97–106.

[34] (with J. Krzyż), *The research papers on analytic functions and polynomials by M. Biernacki*, Folia Soc. Sci. Lublin **1** (1961), 71–77. (Polish)

[35] *Sur la méthode des approximations successives*, Folia Soc. Sci. Lublin **2** (1962), 59–61.

[36] *Certaines conditions suffisantes pour l'existence d'une solution de l'équation* $\phi'(t) = f(t, \phi(t), \phi(\nu(t)))$, Folia Soc. Sci. Lublin **2** (1962), 70–73.

[37] (with M. Maksym), *Sur une généralisation d'un théorème de A. D. Myshkis concernant un système d'équations oridinaires à l'argument retardè*, Folia Soc. Sci. Lublin **2** (1962), 74–78.

[38] (with Z. Lewandowski), *Sur un type de fonctions holomorphes subordonnés*, Folia Soc. Sci. Lublin **2** (1962), 92–94.

[39] (with Z. Lewandowski), *A theorem concerning majorants of regular functions*, Folia Soc. Sci. Lublin **2** (1962), 95–96.

[40] (with J. Krzyż and Z. Lewandowski), *On typically-real functions with a preassigned second coefficient*, Bull. Acad. Polon. Sci. Sér. Sci. Math. Astr. Phys. **10** (1962), 205–208.

[41] *L'oeuvre de Mieczysław Biernacki à l'Université Marie Curie-Skłodowska à Lublin*, Colloq. Math. **9** (1962), 364–365.

[42] (with J. Krzyż), *Sur les travaux de Mieczysław Biernacki de la théorie des fonctions analytiques et de celle des polynômes*, Colloq. Math. **9** (1962), 365–372.

[43] *Sur les travaux de Mieczysław Biernacki de la théorie des équations differentielles*, Colloq. Math. **9** (1962), 372–375.

[44] (with Z. Lewandowski), *Sur une généralisation de quelques théorèmes de M. Biernacki sur les fonctions analytiques*, Ann. Polon. Math. **12** (1962), 65–70.

[45] (with Z. Lewandowski), *Sur un théorème concernant les fonctions univalentes linéairement accessibles de M. Biernacki*, Ann. Polon. Math. **12** (1962), 61–63.

[46] (with Z. Lewandowski), *Sur certaines majorantes des fonctions holomorphes dans le cercle unité*, Colloq. Math. **9** (1962), 299–303.

[47] *Quelques résultats récents sur les majorantes dans la théorie des fonctions holomorphes*, Colloq. Math. **11** (1963/1964), 141–145.

[48] (with T. Dłotko), *On the curl of singular completely continuous vector fields in Banach spaces*, Uniw. Śląski w Katowicach—Prace Mat. **3** (1973), 97–100.

[49] (with J. Błaż), *Über eine Verallgemeinerung der Nicoletti-Aufgabe für Funktional-Differentialgleichungen mit voreilendem Argument*, Monatsh. Math. **88** (1979), no. 4, 287–291.

[50] *Higher Geometry*, PWN, Warszawa–Lublin, 1953. (Polish)

[51] *Ordinary Differential Equations and Some Generalizations*, PAN, Warszawa, 1961. (Polish)

[52] *Logic and Elementary Set Theory (for students of the first year mathematics-teachers section)*, Instytut Kształcenia Nauczycieli i Badań Oświatowych, Lublin, 1974. (Polish)

Looking at the list we are able to identify Adam's scientific interests. However, it is impossible to distinguish the papers which contain deep and important ideas but remain unnoticed for different reasons. The Ph.D. thesis of Adam [2] published in Polish is a good example. The author discovered and applied the theorem on the partition of unity in the class C^∞ subordinated to a covering. This theorem was rediscovered some fifteen years later by Laurent Schwartz and became a basic tool in his theory of distributions.

Among Adam's papers dealing with ordinary differential equations and paratingent equations the voluminous habilitation paper [7] deserves special attention. Necessary and sufficient conditions for the existence and uniqueness of solutions of such equations are given there.

Papers [17], [19], [21], [22], [30] deal with topological properties of the set of solutions of systems of differential and paratingent equations. The retract method of T. Ważewski and Kneser's theorem on connectedness of emission region are useful tools in these papers.

In paper [14] the author introduced a method of extending the range of applicability of BCT (Banach–Cacciopoli–Tikhonov) fixed point theorem. A suitable choice of metric in a considered function space does not change the topology, while increasing the range of applicability of BCT-theorem. In papers [14] and [15] a new method of obtaining global existence results for ordinary and partial differential equations was introduced. The method consists in choosing a new norm in considered function space (called the Bielecki's norm) in such a way that the attached operator becomes a contraction. Then, besides existence and uniqueness of solution, the Bielecki's procedure in applying the BCT-fixed point theorem leads to a wider domain of definition and simultaneously to estimates for the solution in terms of the data.

The Bielecki's method has been applied, since its inception in [14] and [15], by many authors. It has become such a common tool in handling existence and uniqueness of solutions of differential (differential-difference, integral) equations that some authors do not feel compelled anymore to quote the originator. In the excellent article of C. Corduneanu [C] the author presents many papers in which the Bielecki's method has been illustrated on various classes of equations and under various assumptions.

The method of Bielecki's metric is still alive and is applied in areas far away from cases treated by Bielecki and his students, cf. e.g. [JK], [R], [K].

Bielecki was also dealing with quasilinear partial differential equations of hyperbolic type in [15] and in the papers [25], [26] and [27] written in common with J. Kisyński a continuation of this research is presented.

Adam frequently mentioned that he considers the papers [16] and [23] (where the axioms of Euclidean geometry, as proposed by Hilbert, are reduced) to be most important among his papers. In Hilbert's *Grundlagen der Geometrie* [H] the system of axioms is subdivided into three groups defined

by the following properties: incidence, order and congruence. In the seventh edition of 1930 the groups of axioms were essentially reduced, as compared with the first edition from 1899. In papers [16] and [23] Bielecki not only reduced axioms in all the three groups, but also showed that the new system is independent and equivalent to the Hilbert system of 1930.

In what follows we present the list of Ph.D. students and the English titles of their theses written in Polish. This is also a presentation of scientific interest of their supervisor. The Ph.D. thesis no. 2 was actually the subject proposed to Z. Lewandowski by late Professor Biernacki. However, Bielecki replaced Biernacki as supervisor, due to the passing away of the second one. The collaboration between Bielecki and Lewandowski aroused the interest of the new supervisor in analytic functions and resulted in a series of common papers: [38], [39], [44], [45], [46].

Ph.D. Students of Adam Bielecki

1. Konstanty Radziszewski, *On an extremal problem concerning bodies inscribed, or circumscribed on a convex solid*, 1954.

2. Zdzisław Lewandowski, *Identity of certain classes of univalent functions*, 1960.

3. Jan Kisyński, *Existence and uniqueness of solutions of classical problems for the equation* $s = F(x, y, z, p, q)$, 1960.

4. Barbara Krzyż, *Paratingent equations with delayed argument*, 1962.

5. Tadeusz Dłotko, *Investigation of properties of solutions of certain types of differential equations with deviated, or delayed argument*, 1962.

6. Jan Błaż, *Investigation of the existence of solutions of certain generalizations of differential equations*, 1962.

7. Kazimierz Goebel, *Lipschitzian maps and their generalizations*, 1967.

8. Stanisław Dobrzycki, *Warsaw Main School: Mathematics and Physics Faculty*, 1970.

9. Grażyna Hobot, *Some methods of solving ordinary differential equations*, 1971.

10. Wojciech Zygmunt, *Investigations on families of paratingent-functional equations*, 1974.

11. Piotr Borówko, *Applications of an approximation method in the theory of orientor fields and differential games*, 1982.

References

[C] Corduneanu, C., *Bielecki's method in the theory of integral equations*, Ann. Univ. Mariae Curie-Skodowska. Sect. A **38** (1984), 23–40.

[H] Hilbert, D., *Grundlagen der Geometrie*, Verl. und Druck von B. G. Teubner, Leipzig–Berlin, 1930.

[JK] Jackiewicz, Z., M. Kwapisz, *Convergence of waveform relaxation methods for differential algebraic systems*, SIAM J. Numerical Analysis **33** (6) (1996), 2303–2317.

[K] Kwapisz, M., *An extension of Bielecki's method of proving global existence and uniqueness results for functional equations*, Ann. Univ. Mariae Curie-Skodowska. Sect. A **38** (1984), 59–68.

[R] Rozkosz, Z., *Backward SDE's and Cauchy problems for semilinear equations in divergence form*, Probability Theory and Related Fields **125** (3) (2003), 393–407.

[Z] Zotkiewicz, E., *A word on Professor Adam Bielecki*, Wiadomoci Uniwersyteckie **7** (103) (September 2003), 16–17. (Polish)

JAN KISYŃSKI and JAN KRZYŻ

Politechnika Lubelska
Wydzia Elektryczny
ul. Nadbystrzycka 38
20-518 Lublin, Poland

Instytut Matematyki UMCS
pl. M. Curie-Skodowskiej 1
20-031 Lublin, Poland