

# the **new** **think**

**bulletin**

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**ASSOCIATION  
OF POLISH  
ENGINEERS  
IN CANADA**

**STOWARZYSZENIE  
TECHNIKÓW  
POLSKICH  
W KANADZIE**

**ASSOCIATION  
DES INGENIEURS  
POLONAIS  
AU CANADA**

206 BEVERLEY STREET  
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## ENVIRONMENTAL PROTECTION IN POLAND

by  
**Andrzej P. Sikorski**

Andrzej Sikorski manages a consulting firm, specialising in developing environmental business in Poland and other East European countries. His business association with Poland spans over 25 years. More recently, he was an adviser on East European affairs to Industry Canada and was involved with the development of the Canada-Poland agreement on environmental protection. He now works with the government committee that manages this agreement. He also consults on environmental issues to three federal Departments as well as to the private sector. He has organised several successful environmental industry missions into Eastern Europe, three of which targeted Poland. Andrzej Sikorski can be reached in Ottawa by phone (613) 828-4024 or fax (613) 828-3770.

**During the communist era, not only were the environmental standards in Poland among the most stringent in the world, but they were also consistently met and often exceeded by both industry and municipalities.**

Or so the Polish communist government wished the world to believe. Reality was very much different. In 1989, as the Polish "iron curtain" opened to the free flow of information, few were surprised to learn of the impending environmental disaster that Poland was facing. The results of 45 years of environmental and ecological mismanagement placed Poland among the most polluted areas of our globe, a dubious distinction shared by other countries from behind the "iron curtain".

The purpose of this article is to illustrate the environmental legacy left by the communist regime in Poland, to describe the approach adopted by the recent governments in addressing the environmental concerns and to point out some of the major achievements to date. Also included in this article is a review of the Canada-Poland cooperation in the environment. The topics raised are treated qualitatively. Numerical data is kept to the minimum and is given only to show comparative states or to illustrate trends. For those interested

in statistical data, there are numerous reports on the state of the environment in Poland published both by Polish authorities and international agencies.

Just how serious the environmental situation turned out to be in Poland at the time of the collapse of the communist regime can be illustrated by the following.

### **Air**

Poland's emission of harmful gases per unit of gross domestic product (GDP) were dramatically higher than those of the OECD countries.

- sulphur dioxide (SO<sub>2</sub>) - almost six times higher,
- carbon dioxide (CO<sub>2</sub>) - close to four times higher,
- nitrogen oxides (NO<sub>x</sub>) - over three times higher,
- dust emission was among the highest in the world

### **Water**

Consumption of water per GDP was three times higher than in OECD countries. This contributed to a serious shortage of drinking water in both rural and urban areas.

Water from only 2% of the river-lengths was fit

*dalszy ciąg na str. 2*

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## ENVIRONMENTAL PROTECTION IN POLAND

*dalszy ciąg ze str. 1*

for human consumption. Over one third was so heavily polluted both by chemicals and bacteria that it was unfit even for industrial use.

The discharge of salt into the Baltic by the rivers Vistula and Oder was estimated at 9000 tons per day.

Close to 45% of municipal and industrial waste water was discharged into rivers without any treatment. The remaining 55% was treated in old, ineffective and poorly managed plants, most in urgent need of thorough overhauls and repair. Treatment was largely restricted to physical and chemical pollutants. Few had any facilities for treating biological contamination.

Industrial liquid wastes, often containing heavy metals, oils and toxic chemicals, was unabatedly dumped into municipal sewage lines.

Annual discharge of sewage into rivers was estimated at 4 cubic kilometres.

#### Solid Waste

There are 1.8 billion tons of industrial solid waste accumulated in Poland, covering over 11,000 hectares of land. Each year an additional 80 million tons are added. This is close to 3 times the average in the OECD countries.

More than 400 million tons of hazardous waste are stored in Poland often in uncontrolled and unsecured sites. Well over 10% has been imported from neighbouring countries.

It is also estimated that over 10,000 unauthorized landfill sites exist in locations often not known to the authorities.

The above is by no means a complete

list of the environmentally offending conditions. Nevertheless, it does show the state of the environment inherited by the governments of the post-communist era.

The cost of prolonged exposure to such an over-polluted environment is mind boggling in its enormity. Losses caused to agriculture and forestry are staggering. Damage by corrosion in industry and to buildings and monuments is plainly visible for all to see. Tourism and the recreation industry suffered due to clients moving to less threatening environments. All these costs are, however, minor when compared to the human costs.

Fully one third of the population of Poland inhabits areas presently designated as environmental hazards. The average life expectancy in Poland is 5 years shorter and in Silesia, 8 years shorter than in Western Europe. Infant mortality is more than twice that of Sweden. In the city of Bytom (Upper Silesia) infant mortality has reached alarming rates of over 50 per 1000 births, ie. almost 7 times that recorded in Sweden. Instances of environmentally related diseases are very high and still rapidly increasing. The environment became a daily threat not only to human health but to human life itself. This is the price that the people of Poland paid for industrial development without regard for the environment and human well-being.

Confronted with this ecological disaster, the first post-war democratically elected government of Poland realised and accepted the urgency for effective environmental action. Encouragement and support for such action came from many quarters of the in-

### Oddział Kitchener

W dniu 11 marca '96 odbyło się spotkanie STP, Oddział Kitchener. Wygłoszono referaty: dr Maria Kuzio: - Braki w uzębieniu i ich negatywny wpływ na układ żucia; Mgr inż. Andrzej Kuzio: - Metoda ivocap i jej wpływ na jakość protez zębowych.

Prelegentka zaczęła od pokazania modelu uzębienia człowieka i wyjaśnienia roli stawu skroniowo-żuchwowego w czynności żucia. Objaśniła rolę guzków i stoków na powierzchniach pracujących zębów trzonowych i oddziaływanie wszelkich nieprawidłowości zgryzu na sprawność wymienionego stawu. Usunięcie zębów w dolnej szczęce powoduje wysuwanie się przeciwstawnych zębów z ich zębodołów w górnej. Protetyka ma zapobiegać powstawaniu zjawiska „kołycki” i wyrodnieniu stawu skroniowo-żuchwowego. Innym sposobem zapobiegania skutkom ubytków jest szlifowanie powierzchni pracującej zębów. Zaciskanie szczęk i zgryzanie zębami przez sen są nieświadomymi odruchami obronnymi pacjenta, u którego w wyniku braków powstają wady zgryzu. Dr Maria Kuzio odpowiedziała wyczerpująco na kilka pytań słuchaczy. Czy usuwać tzw. „zęby mądrości”, ósemki? Tak, jeżeli zęby te są chore albo kiedy badanie rentgenowskie wskazuje wyraźnie na to, że ósemka nie wyróżnia się sama i nie stanie w łuku. Prelegentka zwróciła uwagę na ujemny proces ewolucyjny, a mianowicie skracanie się łuku zębowego. Zjawisko to występuje u współczesnej populacji i jest związane z „wygodą” odżywiania się, już od wieku niemowlęctwa. Jeżeli okazuje się, że ósemkę trzeba usunąć, aby chronić resztę uzębienia, to należy to robić w młodości. „Zęby mądrości” mogą się okazać niezbędne do zakładania mostków.

Guma do żucia - żuć, czy nie żuć? Jeżeli żuć, to gumę bez cukru, bo cukier w jamie ustnej stwarza warunki rozwoju próchnicy.

Dalej, mgr inż. Andrzej Kuzio mówił o protezach. Mosty, tzw. higieniczne, tzn. zawieszane nad dziąsłami z ubytkiem, są znacznie lepsze od „kosmetycznych”, zachodzących na dziąsła. Jednak wiele pacjentek i pacjentów upiera się przy tych mniej higienicznych. Jeżeli pacjentowi brakuje siódemki i ósemki, to można mu zrobić jedynie ruchomą protezę. Protezy wykonuje się z masy plastycznej utwardzanej w drodze polimeryzacji „na gorąco”, formuje się je metodą analogiczną do znanej od pradziejów metalurgii metody traconego wosku. Podczas twardnienia proteza ulega skurczeniu i w konsekwencji nie jest dopasowana idealnie do całości aparatu szczękowego. Dlatego ostatnio opracowano me-

todę polimeryzowania odlewu przy równoczesnym dopychaniu materiału do formy. Ten sposób wykonania jest wprawdzie bardziej kosztowny, ale otrzymuje się lepiej funkcjonujące protezy. Jeżeli pacjent ma jeszcze trochę swoich zębów, to robi się mu tzw. klamry okrężne. Wykonuje się także wszczepy (po ang. Implant), tj. sztuczne zęby osadzone na trzpieniach osadzonych w kościach czaszki. (Żuchwa jest częścią czaszki!). Trwałość wszczepów zależy zasadniczo od pacjenta, ponieważ posiadacz wszczepu musi dbać o idealną czystość jamy ustnej. Wszelkie zanieidbania kończą się wtargnięciem niszczących kość drobnoustrojów i w konsekwencji piękne a kosztowne wszczepy zostają odrzucone.

W części towarzyskiej spotkania prelegenci mówili też o swojej trudnej i najeżonej przeszłości drodze do uznania w nowym kraju ich wiedzy i umiejętności.

**Andrzej Szybiak**

### Oddział Toronto

Z cyklu sylwetki członków STP przedstawiamy zgodnie z wcześniejszą zapowiedzią sylwetkę zawodową kolegi dr Zdzisława Przygody. Dr Przygodę odwiedziliśmy tuż przed Świętami Bożego Narodzenia w Jego przytulnym domku w Don Mills. Było to bardzo miłe spotkanie, a rozmowa przeplatana wspomnieniami i dowcipami opowiadany przez kol. Przygodę świadczyła, że pomimo zmęczenia chorobą jest On dalej pełen duchowej werwy i zaangażowania w sprawę Stowarzyszenia i Polonii.

Nie tak dawno kol. Przygoda wydał swoją bardzo interesującą książkę pt. „Niezwykłe przygody w zwyczajnym życiu” - wydana w Polsce przez Wydawnictwo Ypsilon. Książka, którą czyta się jednym tchem, przedstawia rzeczywistość „Niezwykłe Przygody kol. Przygody”. Ukazała się też wersja angielska „The way to freedom”, którą kol. Przygoda podpisywał 25 listopada 1995 r. w Royal Military Institute.

W środowisku polonijnym dr. Przygodę znają wszyscy, a w profesjonalnym środowisku kanadyjskim Jego firma pracowała aktywnie przez 40 lat aż do roku 1994, 1995 był 60-tym rokiem Jego pracy zawodowej.

Poniżej przedstawiamy sylwetkę zawodową kol. Dr Zdzisława Przygody.

„DICK” Zdzisław Przygoda was born in Warsaw, Poland on 25 February 1913.

Dr Przygoda was educated at Danzig, Warsaw and Munich Universities obtaining his doctorate in Civil Engineering right after the World War II. During the war he

fought in the Polish underground and in the regular army. Caught by Gestapo, he was confined to concentration camps - the last one was Dachau.

He came to Canada in 1952 and opened his practice as a structural consulting engineer in 1954. He designed numerous schools, churches and commercial and industrial buildings. His most know projects are: McMichael Canadian Collection in Kleinburg, Ontario, Monastery for Cistercian Monks in Mono Mills, Ontario, John XXII school in Flamington Park, Father Henry Carr school in Rexdale.

Dick is well known in the Canadian community not only as an engineer but also for his voluntary work in various organizations.

He has many awards:

Fellow of Engineering Institute of Canada,

Fellow of the Institution of Structural Engineering's of Great Britain,  
Fellow of Royal Society of Health,  
Fellow of the Rotary International,  
to mention just a few.

His honours list includes:

Prize Winning Design in 1951 competition for the new downtown of harbour city of Halfa in Israel, Citizenship Award from the Association of Professional Engineers of Ontario,

Award Merit from the Toronto Historical Board,

Life Member of Ontario Consulting Engineers,

Life Member of Royal Canadian Military Institute,

Canada's Centennial Medal,  
Ontario Government Volunteer Service Awards twice each for 15 years,

Many Polish and Allied Forces Medals and Decorations.

Toronto owes him the commemorative plaques:

- to the author of „Ann of Green Gables” Lucy Maud Montgomery across the house she was living in Toronto, and

- to Elsie Gregory MacGill - first women professional engineer who was a famous aeronautical engineer.

He was also instrumental in erection of Sir Casimir Gzowski and Katyń Memorials in Toronto.

### Oddział Ottawa

#### Pożegnanie kol. T. Cieńskiego

Na specjalnym spotkaniu w Domu Polskim, które miało miejsce w dniu 3 marca br., dziękowaliśmy kol. Cieńskiemu za 5 lat pełnienia funkcji skarbnika naszego Oddziału STP oraz życzyliśmy mu powodzenia osobistego i dalszych osiągnięć w pracy zawodowej.

Kol. Cieński jest wybitnym metalurgiem.

*dokończenie na str. 4*

*dokończenie ze str. 3*

Ma na koncie 10 publikacji technicznych. Ostatnio pracował w Canada Center for Mineral nad Energy Technology jako Senior Metallurgical Engineer, Mineral Science Laboratories.

Wznosząc toast na Jego cześć w imieniu Oddziału, kol. L. Zielińska, przedstawiła wkład kol. Tadeusza w życie naszego Oddziału. Natomiast kol. A. Garlicki, jako prezes ottawskiego Okręgu KPK, przekazał mu medal 50-lecia KPK.

Zebrani, w wigilię 4 marca, wzniesli toast także z okazji imienin kol. K. Stysia życząc Mu wiele zdrowia.

Resztę wieczoru zebrani spędzili gwałtując przy napitkach i słodkościach.

**TBS**

### **Jak uzdrowić przemysł polski**

Pod tym tytułem odczyt inż. Leszka Chełmińskiego w środę 6 marca br. Zgromadził licznych słuchaczy w dużej sali Domu Polskiego w Ottawie. Zrazu ten tytuł wydał mi się zbyt śmiały, w czasie odczytu zmieniłem swe zdanie. Prelegent - były przewodniczący oddziału STP w Montrealu - po latach pracy w przemyśle lotniczym Kanady służył swą wiedzą i doświadczeniem w 14 krajach jako doradca w sprawach organizowania jakości produkcji, w tym dłuższy czas w Polsce.

Po wprowadzeniu przez prof. J. Łukasiewicza, inż. Chełmiński przypomniał szybki rozwój i wspaniałe osiągnięcia techniki polskiej w okresie dwudziestoletniej niepodległości. Poparł to licznymi przykładami z przemysłu lotniczego, w którym przodowaliśmy na świecie. Przeciwwstawił temu wyniki gospodarki sowieckiej, która zmuszała do produkcji ilościowej bez względu na jakość np. nagrodzono za wykonanie 100% zamierzonej ilości mimo 80% odrzutów. Nie uważa tej sytuacji za beznadziejną. Dał przykłady przedsiębiorstw amerykańskich, które po wprowadzeniu zasad jakości całościowej (total reliability) przeszły z progu bankructwa w produkcję dochodową. Wierzy, że w Polsce zrozumienie zasad działania współczesnego przemysłu, wymaga wysokiej jakości na rynku oraz przedstawienia podejścia do pracy zarówno przez zwierzchnictwo jak i też przez pracowników może dać b. dobre wyniki.

Liczne pytania po skończonym odczycie świadczyły o zainteresowaniu obecnych.

Na zakończenie była sposobność do rozmów towarzyskich przy kawie i ciasteczkach.

**B. Szpakowski**

### **Zarząd pracuje**

Na zebraniu Zarządu w dniu 19 marca 1996 r., które miało miejsce w Domu Pol-

skim zajmowano się następującymi sprawami.

1. Kol. L. Cyracki, nowy skarbnik naszego oddziału, powiadomił Zarząd, że przejął funkcję od kol. T. Cieńskiego

2. Lista osób pracujących społecznie do odznaczenia przez rząd Ontario.

3. Zarząd otrzymał list od ZG STP wyjaśniający postępowanie w stosunku do członków zalegających ze składkami. Zarząd Główny zastrzega sobie prawo usuwania członków ze Stowarzyszenia. Natomiast Oddziały mogą ograniczyć prawa delikwentów jako czynnych członków np. skreślając ich z listy dystrybucyjnej biuletynu.

4. Sprawozdawcze Walne Zebranie oddziału będzie miało miejsce w piątek 10 maja 1996 r. o godz. 19.00 będzie odprawiona msza św. w intencji zmarłych członków oddziału. Patrz osobne zawiadomienie.

5. Sekretarz został zobowiązany do uaktualnienia listy adresowej członków oddziału.

6. Zarząd postanowił przekazać do decyzji Walnego Zebrania udział STP w komitecie budowy domu seniorów.

7. Zarząd postanowił wysłać list do wydawców Physics Esseys dziękujący za pomoc polskim uczelniom.

8. Opracowanie historii Oddziału dla Vademecum Polonii powierzono kol. L. Zielińskiej, przewodniczącej oddziału.

9. Kol. L. Zielińska reprezentowała STP na spotkaniu Engineering Institut of Cana-

da.

Następne zebranie zarządu planowane jest na 19 kwietnia.

### **Imprezy STP**

W dniach 28 lutego i 3 marca br. odbyły się różnego rodzaju imprezy towarzyskie zorganizowane przez nasze Stowarzyszenie.

W dniu 28 lutego kol. Maria Zielińska wygłosiła odczyt z przezroczami zatytułowany „Turcja, kraina rajów”. Zgodnie z tytułem kol. Zielińska opowiadała swoje wrażenia z pobytu w Turcji, którą odwiedziła w ub. roku. Odczyt ten był znakomicie zorganizowany przez panią Marię, oprócz bardzo ciekawych i dobrze opisanych przezroczek p. Maria podała wiele ciekawostek z historii tego pięknego kraju.

W dniu 3 marca zaś nasze Stowarzyszenie miało okazję pożegnać kol. Tadeusza Cieńskiego, naszego dotychczasowego skarbnika. Obszerniejsza relacja ze spotkania powyżej.

W dniu 6 marca miał miejsce z kolei odczyt kol. Leszka Chełmińskiego na temat "Jak uzdrowić polski przemysł". Patrz także relacja powyżej.

Zarząd STP serdecznie dziękuje kol. Marii Zielińskiej i kol. Leszkowi Chełmińskiemu za przygotowanie tych dwóch udanych wieczorów, a prof. Juliuszowi Łukasiewiczowi za wprowadzenie do odczytu kol. Chełmińskiego.

**Lidia Zielińska**

Przewodnicząca STP, Oddział Ottawa

## **WITAMY NOWYCH CZŁONKÓW**

*Uprzejmie informujemy, że w ostatnim okresie przyjęci zostali do STP następujący koledzy.*

### **Oddział Toronto:**

**Zych Jerzy Marek,**  
mgr inż. mechanik,  
AGH w Krakowie, 1975  
Member No 2198

**Gusta Jan Stanisław,**  
mgr inż. mechanik,  
Politechnika Łódzka, 1973  
Member No 2199

**Krzywkowski Bogdan Adam,**  
inż. mechanik,  
Politechnika Krakowska, 1981  
Member No 2200

**Romasz Marek,**  
mgr inżynierii środowiska,  
Politechnika Białostocka, 1994  
Member No 2201

**Samek Lech Romuald,**  
technik budowlany,

University of Waterloo, 1963 (2 years),  
Seneca College, 1991  
Technology Member No 2202

**Danowski Antoni,**  
mgr inż. elektronik,  
Politechnika Warszawska, 1973  
Member No 2204

**Siniarski Andrzej,**  
mgr inż. mechanik,  
Politechnika Krakowska, 1975  
Member No 2205

### **Oddział Ottawa:**

**Morawiecka Iza**  
B.Sc. in Pharmaceutical Chemistry,  
University of Toronto, 1969  
Member No 2203

### **New Link zaprasza...**

wszystkich, którzy dysponują ciekawym materiałem technicznym lub naukowym do nadsyłania artykułów, które mogłyby być opublikowane w kolejnych numerach. Prosimy dzwonić pod nr (416) 239-8874.

# Copernicus

Adam Pogorzelski

Through the ages people have observed the stars. The sky has always been fascinating, amazing, and mysterious. Since the time of ancient Greek philosophers and scientists, there have been false visions and theories about the universe. The Ptolemaic System (established by Ptolemy and based on Aristotelian theory) thought that the earth was the centre of the universe, and all heavenly bodies moved around it. That system survived over fifteen hundred years. The revolutionary changes occurred just after Copernicus, who 'stopped the sun and moved the earth', was born.

Encyclopedic comments say that he was an astronomer. It is not, however, the complete truth. Being a Renaissance man, Copernicus was also interested in many other fields. He was a doctor, an economist, an engineer, a politician, a poet, a painter, a geographer, a soldier, and, finally, a priest. As an exponent of this famous epoch, he was incredibly versatile and, at the same time, a man of genius in his field.

Mikołaj Kopernik was born in 1473, in the ancient Slavonic city-Torun. His father was an affluent merchant, and, additionally, his uncle was a Bishop-Polish Senator. That background allowed him to enter the oldest Polish university-Jagellonian in Cracow. It is also one of the oldest European universities, and it is older than Haiderberg in Germany or Vienna University in Austria. Copernicus's „Alma Mater” was, in those days, famous in Europe for its mathematical and astronomical sciences. The language of lectures was Latin, and almost half of student body was from western Europe. At Jagellonian University, Copernicus studied mathematics, astronomy, geometry, philosophy, and painting. The historic period of his stay in Cracow was important-during that time people were excited by eclipses of the sun and the moon; moreover, the information about the new land discovered by Columbus had just spread through Europe. All these events inspired Copernicus's imagination. Towards the end of his life, he said that everything that he achieved he owed to this particular university.

After the young student's father died, his influential uncle became Copernicus's patron. The Bishop of a small church's duchy in the north of the country (The Ermland), a great politician, and a senator of Poland-of the time European power-sent his clever nephew for further education to Padua and Bologna, Italy. There, he completed medicine and law. Also, he improved his Greek language skills in order to read original works of the ancient Greek philosophers. Additionally, he translated Greek poetry into

Latin. In the meantime, his uncle arranged that Copernicus became a canonmember of the administrative council of The Farmland Duchy. It gave him financial independence and great opportunity to devote himself to sciences by the end of his life.

During his Italian training, he traveled to Rome in 1500, for the celebration of the middle millennium. He gave several informal lectures in mathematics for his great contemporaries. According to the legend, the Pope and Leonardo da Vinci were among them. He finished the long stay in Italy being granted the degree of doctor of canon law by University of Ferrara.

After returning to Poland in 1503, he served as an adviser to his uncle until the Bishop's death in 1512. He actively participated in creating of Polish politics toward the Order of the Teutonic Knights; in 1520, he prepared Ermeland for a defensive war against them. Copernicus acted as representative of the cathedral chapter. He traveled in Ermeland, where he was particularly known as a caring doctor, a foresighted steward, and, basically, a humble man. So many administrative responsibilities led him to interesting awareness in economy. In the book About Currency there was formulated the law of currency circulation. The same law was later described by English economist and named after him (the Gresham's law). According to the contemporary English economist, J. Taylor, many of Copernicus's economic opinions are still up-to-date.

His fame as an astronomer and mathematician increased quickly. In 1514, Copernicus was invited for Lateran Council to Rome to give his opinion on calendar reform proposal. However, he refused to express his point of view being already aware of serious defectiveness of obligatory geocentric system. He realized that at an early stage of his career. He knew that his new idea could cause suppressing him as an author or even provoke punishment. Nevertheless, he prepared a manuscript which summarized his concepts. „The Commentariolus”, as he named the manuscript, was circulated only among his friends.

At the same time, he continuously observed the sky. Wherever he stayed in Ermeland, he set up the astronomical observatories. For example, there still exists his chart of the equinox on the wall of the gallery in an Olsztyn castle, which is located in my home city.

Mathematical calculations of his observations eventually perfected his theory. He

developed his observations with diagrams. In 1533, Copernicus's „Commentariolus” was presented in Rome before the greatest, in those days, authority of the world, the Pope. Surprisingly, the work was approved. Then, increased pressure of requests to print officially new theory seemed to overwhelm him. However, he continued to hesitate. Finally the effort of Copernicus's friends led him to prepare the masterpiece of his life for publication. It gave him the surname of „father of astronomy”.

„The Revolutions of the Heavenly Spheres” was printed in Nurnberg, Germany when Copernicus was already on his deathbed. One believes that a copy was brought to him on the last day of his life. He died in 1543 in Frombork, Poland.

„The Revolutions...” was more than a brilliant contribution to world's science. It was, actually, the epoch's transition of human thought. Copernicus's theory was entirely revolutionary. Before it, people believed that the earth is a motionless centre of the universe. Also, the correct order of the planets was not known.

The founder of modern astronomy opposed the two-thousand-year old principle of Aristotle, whose explanation of falling bodies to the ground was that „they fall to their 'natural place' which is the centre of the universe.” Copernicus asserted that there was not single centre of gravity in the universe. All heavenly bodies have their own centres of gravity. Such a conclusion was essential for the development of physics. It was a scientifically reoriented base for Newton's concept of universal gravitation. Moreover, it was told that „without Copernicus, there would not be Einstein” (W. Billig). Surely, Copernicus was not a discoverer of the theory of relativity. However, he was its precursor. In the early sixteenth century he wrote, „Each observed movement is a result of the movement of an observer or an observed body or diverse movement of both of them.”

To complete the uncommonness of Copernicus's intellect, let us notice that he was the first man in science who tried to calculate the dimensions of planetary routes and approximate planetary distances.

In my home city, Olsztyn, I used to pass by a splendid Gothic castle many times. In that castle, Copernicus lived for six years. There, 500 years ago, he observed the sky and did mathematical calculations. He also wrote his work about currency there. Being near that place, I thought about Copernicus as a man, not as a scholar. I thought about his humble, hardworking, and lonely life among people who were not able to understand his ideas. Moreover, he alone was not even aware how essential his work would be for his descendants. My topic for this elaboration was an echo of those thoughts.

ternational community and took various forms. Poland's Western Europe neighbours, who were directly affected by the heavy trans-boundary migration of pollutants from Poland, were particularly vocal in their encouragement and support.

An early step was the restructuring of the Ministry of Environmental Protection and the establishment of national infrastructure to effectively address the environmental issues. The Ministry was elevated to the rank of a senior ministry with a mandate to develop, implement and effectively enforce a national environmental policy. By November 1990, the national policy was drafted and in early 1991 was ratified by Parliament. Its diligent enforcement began immediately and has continued to this day. Since then, Poland has had several governments, all of which supported and enforced the environmental policy. The original policy was neither rejected nor amended, in whole or in part. This attests to the wisdom of the policy and the widespread recognition for its need.

Many environmental issues required government urgent attention. It would be virtually impossible to address them all simultaneously. The national environmental policy recognised this and stipulated a clear set of priorities to be followed.

The designated near-term priorities, demanded immediate implementation with the attainment of results envisaged in three to four years. Within this group were environmental situations that posed severe threats to human health and life. These included:

- immediate stoppage of all imports of hazardous wastes for the purpose of storage in Poland,

- total closure or immediate change in manufacturing practices of the 80 industrial plants publicly designated as the biggest emitters of dangerous substances,

- implementation of a coal quality improvement program (Coal is the primary source for over 85% of energy used in Poland and is a major source of pollution.),

- reduction of dust and harmful gas emissions in Upper Silesia,

- reduction of the deficit in drinking water in both urban and rural areas,

- radical reduction in solid waste from both municipal and industrial sources.

The short term priorities also included environmental education with particular emphasis on promoting a sense of responsibilities for the state of the environment among law makers, industrial decision makers and the public at large. The environmental authorities recognised that the positive impact of education will become evident only after many years. Nevertheless, environmental education was considered a very worthwhile investment.

The medium term priority programs are

expected to be completed by the year 2000. They include programs that are more systematic and designed to move Poland closer to attainment of European environmental standards. The mid-term priorities include:

- reduction in emissions of CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, dust and volatile organic substances,

- elimination the drinking water deficit,

- reduction of industrial and municipal pollutants discharged to rivers, particularly the discharge of saline water to the rivers Vistula and Oder,

- implementation of an effective system for managing hazardous waste,

- implementation of programs to maximize the utilization of industrial wastes,

- introduction of low-waste technologies.

The long term priorities for implementation in the years 2000 and beyond include the following programs:

- instill and foster the sustainable philosophy and culture as the basis for all relevant public, business and private policies and decisions,

- encourage and support the use of environmentally sound technologies by industry,

- repair environmental damage and establish systems to prevent its reoccurrence.

In the first five years, efforts on behalf of the environment produced quite remarkable results. Some of the more notable achievements follow.

Imports of all hazardous materials for the purpose of dumping in Poland were stopped.

Twenty industrial enterprises were removed from the list of the eighty heaviest polluters in Poland, either due to improved performance or through government forced closures.

Emissions of acid gases and dust were dramatically reduced (SO<sub>2</sub> down by 15%, NO<sub>x</sub> down by 10%, dust down by 22%).

Close to 1000 wastewater treatment plants were either newly constructed or substantially upgraded.

Industrial solid waste production was reduced by 16%.

The burden of pollutants discharged into the Baltic decreased by almost 30%.

These achievements are but the beginning of the effort needed to resolve the Polish environmental problems. Continued and increased efforts will have to be sustained for many years before Poland can hope to establish and secure a sustainable and healthy environment.

It should not surprise anyone that the improvements to date have been achieved at very high costs. The actual spending levels surprise many. It is estimated that, over the last four years, environmental spending in

Poland has exceeded the equivalent of US \$ 1.1 billion, or 1.3% of the GDP. To achieve the final environmental objectives, such annual levels of spending are planned to continue well into the next millennium.

There are several sources of environmental funding. There is, of course, foreign aid as well as the local and national government budgets. Industry spends its own capital on environmental projects. Finally, there are the specially created national and regional (voivodship) environmental funds. Since Poland is known to be experiencing fiscal difficulties, most people expect that by far the largest portion of environmental spending in Poland must come from foreign aid. In reality, nothing can be further from the truth. Foreign aid accounts for only a small and decreasing fraction (3%, in 1994) of the total money spent on environment. The lion share of environmental spending (97% in 1994) comes from internal sources within Poland, as shown below.

National and Regional Funds for Environmental Protection	59 %
Industry	23 %
Local Budgets	10 %
State Budget	5 %
Foreign Aid	3 %

The very large share of environmental spending contributed by internal Polish sources surprises most people to the point of disbelief. A few words describing the national sources of environmental funds seem, therefore, in order.

In 1989, Parliament established the National Fund for Environmental Protection to encourage sound environmental practices through financial incentives (grants and loans) and disincentives (fees and fines). Their focus is on environmental issues of national priority. Each of the forty-nine regions in Poland has established its own regional environmental funds with essentially similar mandates focused on regional environmental issues. In addition many of the municipalities that have received the right to collect and manage their own taxes, have also established similar funds. Pollution fees and fines are imposed on polluters with the full force of law. The collected fees and fines are shared among the municipalities (10%) and Region Environmental Funds (60%). The National Fund receives 30% of all the moneys collected within each of the regions. The collected funds are legally bound to be spent exclusively on environmental projects. Some of this money is spent as grants in support of environmental programs. Most, however, is disbursed as soft loans at preferential rates (0.2 - 0.8 of the going commercial rate). In early 1994 (the last figure available to the author) the National Fund disbursed well over US \$ 300 millions for environmental projects. The en-

environmental spending by all the regions and municipalities combined is, of course, much higher.

In the past, the pollution fees and fines imposed on polluters were quite low and most industrial polluters considered them a mild irritant rather than a financial hardship. Moreover, it was relatively easy to negotiate non-payment with the government. In recent years, the fees, and particularly the fines, have risen dramatically and payments are extremely difficult to avoid. Industry, which now is profit driven, can no longer ignore the adverse effects of these fees and fines. Thus, industrial polluters are finding environmental capital investment an increasingly attractive alternative. The level of industrial investment in environmental projects is rapidly increasing.

Poland's financial situation has been described as grave. It is, therefore, not surprising that, with the availability of environmental funding from the national and regional environmental funds, very little additional money is allocated for the environment from the state budget. There is, however, one specific instance where environmental funds come directly from the state coffers: the "debt-for-environment" swaps, often referred to as the "Ecofund". The Polish debt to foreign governments was US \$ 32 billions. In addition to the partial forgiveness of this debt, the creditor countries have also agreed that the original debt can be further reduced by up to 10% on condition that the money will be used by Poland on environmental projects of international significance. So far, four countries have agreed to this swap. United States, Switzerland and Finland agreed to a full 10% swap. France has initially agreed only to a 1% swap but is currently reported to be negotiating additional debt conversions. Two other OECD countries are said to be negotiating a swap-deal with Poland. Until now, Canada has not shown any interest in this type of swap agreement. The inducement to creditors is the commitment that any imports of environmental products, services or technologies paid for by the "swap" money will be purchased from the creditor country. The current value of the debt-to-environment swaps is US \$ 475 million over the next 18 years or, on average, US \$ 26.5 million per year.

Canadian environmental expertise is well recognised in Poland but, until very recently, was seldom seen there. This has now begun to change and a strong relationship is developing between Canada and Poland in the field of environmental protection. Canada is seen as a non-threatening partner with progressive management methods, responsible social and environmental attitudes and high business ethics. Poland is viewed by Canada as a fast developing mar-

ket for Canadian environmental goods, services and technologies where the Canadian environmental expertise can be shared with benefits accruing to both partners. This mutual recognition has led to the signing of a Memorandum of Understanding on Cooperation in the Environment, signed during the visit to Ottawa of President Lech Walesa (September 1994).

The Memorandum has a very strong commercial component which encouraged the development of business relationships between Polish and Canadian enterprises. So far, there have been three government sponsored Canadian industry missions to Poland related to environmental protection. Two were missions of the Canadian environmental industry. The third mission focused exclusively on the small hydro-power generation industry in Poland. To date, three of the mission participants have opened offices in Poland and two others have appointed local agents to represent them. Several companies are reporting satisfactory levels of sales. Other achievements include agreements on the construction and operation of several wastewater treatment plants, construction and operation of an incinerator facility and an industrial boiler-water pretreatment installation. There is one co-producer agreement involving the manufacture of energy saving devices and one joint venture under negotiation.

The prognosis for trade between Canada and Poland in areas related to environmental protection appears to be good. Several offers and bids submitted by Cana-

dian companies are under active consideration by Polish clients with decisions expected in the very near future. There is a realistic expectation that at least some of these will lead to commercial successes.

This article provides an overview of the state of the environment that resulted from the communist (mis)management of the Polish economy. It summarises the approach adopted by the post-communist governments in dealing with the urgent environmental issues and identifies the major results achieved. Sources of capital for environmental project are also discussed. Finally, a short overview of the developing relations between Canada and Poland in the area of environmental protection are presented. The article is not intended as an exhaustive report on the topics addressed. It is, as stated, an overview. For those seeking further and more detailed information there are numerous reports readily available. Two such publications are particularly recommend:

1. The National Environmental Policy Published by: Ministry of Environmental Protection, Natural Resources and Forestry Warsaw, Poland - November 1990.

2. Environmental Performance Review - Poland Published by: Centre for Cooperation with the Economies in Transition OECD Paris, France - 1995. the environmental objectives are to be achieved.

The former describes the beginning of the Polish environmental saga. The later reports on the current state of the environmental affairs in Poland.

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## Nowy program komputerowy do komponowania utworów muzycznych

Dr hab. Andrzej Szybiak

Każdy dźwięk daje się złożyć z pewnej ilości tonów, to znaczy prostych dźwięków, drgań sinusoidalnych, z których każdy daje się określić dwiema liczbami: częstotliwością i amplitudą. W kompozycjach muzycznych istotne są jeszcze dwa parametry: moment rozpoczęcia i zakończenia. A więc dźwięk można określić ściśle przy pomocy pewnego ciągu liczb. A dalej, każdą liczbę możemy zapisać przy pomocy ciągu cyfr w zadanym układzie. Procesory w komputerach wraz z odpowiednią aparaturą dźwiękową przekładają język liczb na sygnały dźwiękowe i na odwrót. Na tej zasadzie jest oparte urządzenie MIDI (Musical Instrument Digital Interface). Urządzenie z portem wyjściowym MIDI łączy się kablem z urządzeniem zaopatrzone w port wejściowy MIDI i muzyka może być

transmitowana pomiędzy tymi urządzeniami poprzez standaryzowany układ kodów cyfrowych.

Dwa dźwięki o tej samej wysokości, a wykonane na dwóch różnych instrumentach brzmią zawsze inaczej ponieważ różnią się między sobą tzw. barwą dźwięku. Dokładniej - tony o najniższych częstotliwościach wchodzące w skład tych dźwięków są identyczne (tzn. Mają te same częstotliwości), ale pozostałe tony wchodzące w skład tych dźwięków różnią się między sobą amplitudami. Jeżeli struna gitary lub słup powietrza w piszczałce drga z częstotliwością  $f$ , to jednocześnie drga z częstotliwościami  $2f$ ,  $4f$ ,  $8f$  itd. Amplitudy tych drgań nakładające się na podstawowy ton (tzn. ton o najniższej częstotliwości) są różne dla różnych instrumentów i te różnice stanowią o różnicy barw dźwięków. Fizyk

# New Careers for the nineties - or What colour is your portfolio?

From: *The Journal of the Association of the Chemical Profession of Ontario*

I recently attended a career planning workshop along with forty or so other middle managers and technical specialists. We learned how careers were being re-engineered, re-structured and removed. We have to do more, do it faster and do it with less. And do it with no guarantee of reward.

What we can be assured of according to leading futurists and management experts is that by the year 2000, less than 50% of the workforce will be in conventional full time jobs. Most workers will be part-time, temporary or contract employees. Half the technical skills of today's graduates will become obsolete within three to seven years of graduation. Most industries are restructuring, transformed by new technology, new ways of working and global competition. It doesn't matter if you're a chemist in the pharmaceutical industry or working in the oil patch - the job you were hired for yesterday will likely disappear tomorrow.

In an unpredictable world, we learned that the most dependable asset is yourself. The more you invest in yourself, the

more you expand your opportunities. This means investing in keeping up with technological changes that are happening in your field as well as looking at other possibilities. Many pharmaceutical chemists that I know have developed multiple careers that include new jobs and new skills outside of the laboratory.

Successful survivors of the nineties will see themselves as the owners of a personal career portfolio - a unique set of talents, skills, competencies and experiences that can be used in a variety of different jobs.

What does this mean for new graduates? No company today can promise you a long term career and you should not expect your company to plan it for you. It's up to you to take responsibility for managing your own career. The only thing you can depend on is knowing that your skills are strong, current and marketable. You must also be strategic in looking at the possibilities that exist for your skills and career interests. Your company can help by providing support that will contribute to your future employability, but it is up to you to identify opportunities and prepare for them.

So how can you best keep up with continuous change? Plan for continuous learning...

To quote Alvin Toffler, „In the world of the future, the new illiterate will be the person who has not learned how to learn.”

As a final take away from my career planning workshop, I would like to share my thoughts on new rules for career success:

\*invest in your own growth and learning, make regular deposits and ensure you get good value for your investment

\*don't wait for your company to provide you with opportunities, they may never happen

\*keep up with what's going on in your field and business trends

\*learn how to learn and exercise your mind

\*ask for learning opportunities

\*develop transferable skills; what you have mastered in one job may be invaluable in another

\*be prepared to accept lateral moves or shift careers

\*if you haven't learned anything new in your job lately, find out why and change it

Faye van der Vooren, B.Sc., M.B.A.

Faye van der Vooren is currently Manager of Training and Development for a pharmaceutical company and a lifelong student.

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## Nowy program komputerowy do komponowania utworów muzycznych

*dokończenie ze str. 7*

powie, że dwa rozważane dźwięki mają te same wysokości a różne barwy, ponieważ szeregi Fouriera odpowiadające tym dźwiękom mają zgodne jedynie początkowe wyrazy.

Złożone oscylatory elektryczne, odpowiednio ustawione i połączone z aparaturą nagłaśniającą mogą wytwarzać dźwięki o zadanej barwie, a więc mogą naśladować instrumenty muzyczne. Impulsy elektryczne wytworzone w oscylatorach i przekazywane przez odpowiednie sprzęgi (interfases) i aparaturę nagłaśniającą naśladowują muzykę. Naśladowują lepiej lub słabiej, to już sprawa techniki, która stale idzie naprzód.

Jak donosi krakowsko-katowski biuletyn „Komputery i Biuro”, ostatnio opracowano nowy program komputerowy znakomicie ułatwiający pracę kompozytorów. Autorem programu jest Eric Heile, program nazywa się Note Worthy Composer. Pracuje

w systemach Windows i Windows 95.

Jak się tym cudem posługiwać? Po uruchomieniu systemu na ekranie ukazuje się pięciolinia. Kompozytor wpisuje najpierw tonację (klucz i znaczki chromatyczne) i tempo. Następnie za pomocą myszy i klawiszy wpisuje na pięciolinii nuty komponowanej partytury, utworu rozpisanego na orkiestrę. Program Note Worthy Composer dopuszcza wszystkie znaki pisma nutowego, a więc akcenty (synkopowanie), legato, staccato, trójki a także zmiany głośności, dynamiki, lub tempa utworu. Możliwe jest wstawianie nowych fragmentów do napisanej kompozycji. Wybrany ciąg nut można podwyższyć lub obniżyć o wybraną liczbę półtonów. Program kontroluje ewentualne błędy, takie, jak niezgodność nut wpisanych do jednego taktu z zadany

na początku metrum. Po napisaniu partytury wstawia się kartę dźwiękową i podłącza się komputer do sprzętu nagłaśniającego. Najlepiej użyć karty z zapisanymi na niej próbkami dźwięków instrumentów muzycznych, a więc z tzw. Wave Table. Teraz kompozytor może przesłuchać swoje dzieło. Kiedy partytura jest gotowa, to można ją wydrukować w drukarce a można też nagrać na dysk.

Program NOTE WORTHY COMPOSER jest dostępny w udziałowym archiwum SimTel.:

ftp: / /ftp.icm.edu.pl / pub/SimTel/win 3/ music/

Na podstawie artykułu Dariusza Ćwiklaka w biuletynie „Komputery i Biuro”, Nr 16 z 16 kwietnia 1996.

### New Link dziękuje...

Dr. hab. A. Szybiakowi za artykuły "Dziesięć lat i zawieszenie" i "Jak nastroić klawicymbał",

Dr. J. Bulikowi za Rozmyślenia na spacerach z Arim pt. "Co mi da należenie do S.T.P.?", które ukazały się w poprzednim numerze.