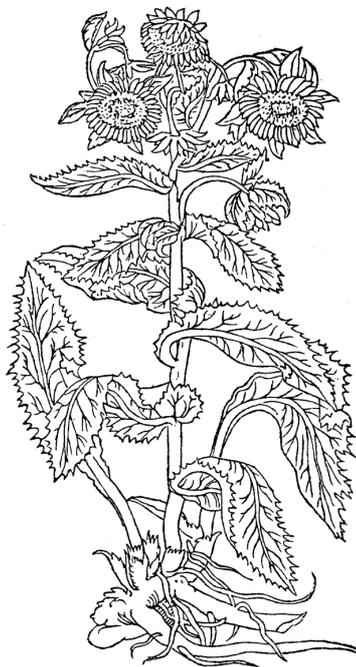


ACTA BIOLOGICA CRACOVIENSIS

SERIES BOTANICA

Vol. 52/1

2010



Polish Academy of Sciences – Cracow Branch
Jagiellonian University, Cracow

ACTA BIOLOGICA CRACOVIENSIA

Series Botanica

The Official Publication

of the Biological Commission of the Polish Academy of Sciences – Cracow Branch
and the Jagiellonian University, Cracow

DEVOTED TO PLANT ANATOMY, MORPHOLOGY, CYTOLOGY, GENETICS, KARYOLOGY,
EMBRYOLOGY, TISSUE CULTURE, PHYSIOLOGY AND BIOSYSTEMATICS

ESTABLISHED 1958

© Polish Academy of Sciences and the Jagiellonian University, Cracow 2010

The Ministry of Science and Higher Education, Polish Academy of Sciences and Jagiellonian University provided partial funding for the publication of this volume.

ACTA BIOLOGICA CRACOVIENSIA Series Botanica is published twice a year
by the Polish Academy of Sciences – Cracow Branch, św. Jana 28, 31-018 Cracow, Poland
and the Jagiellonian University, ul. Gołębia 24, 31-007 Cracow, Poland

Set and printed by KON Tekst Publishing House, Bobrzeckiej 9, 31-216 Cracow, Poland

Managing editor: Monika Tuleja

Technical editor: Wojciech Marcinek

Copy-edited by Michael Jacobs

ACTA BIOLOGICA CRACOVIENSIA Series Botanica on the Internet

The home page of *Acta Biologica Cracoviensia Series Botanica* can be found at
<http://www.ib.uj.edu.pl/abc/abc.htm>

Webmaster: Piotr Osyczka

The journal has an open access policy and is included in DOAJ (Directory of Open Access Journal
– <http://www.doaj.org>)

Indexed in *Science Citation Index*, *Current Contents (Agriculture, Biology & Environmental Sciences)*, *Biological Abstracts*, *BIOSIS Data*, *Index Copernicus*, *Polish Scientific Journals Contents* – AGRIC. & BIOL. SCI., AGRO-AGEN.

ACTA BIOLOGICA CRACOVIENSIA

Series Botanica

Editor

ELŻBIETA KUTA

*Department of Plant Cytology and Embryology, Jagiellonian University, ul. Grodzka 52
31-044 Cracow, Poland, Tel./Fax: +48-12-422 81 07, e-mail: e.kuta@iphils.uj.edu.pl*

Managing Editor

MONIKA TULEJA

*Department of Plant Cytology and Embryology, Jagiellonian University, ul. Grodzka 52
31-044 Cracow, Poland, Tel./Fax: +48-12-422 81 07,
e-mail: abc@iphils.uj.edu.pl*

Editorial Board

HARVEY E BALLARD, JR. *Department of Environmental and Plant Biology, Ohio University, Porter Hall, Athens, Ohio 45701, USA, e-mail: ballardh@ohio.edu*

Molecular approaches in plant systematics, ecology and evolution

TATYANA B. BATYGINA. *Komarov Botanical Institute, Department of Embryology and Reproductive Biology, Prof. Popov St. 2, 197376 St. Petersburg, Russia, e-mail: batygina@tb1390.spb.edu*
Plant embryology

JÓZEF BEDNARA. *Department of Plant Anatomy and Cytology, Maria Curie-Skłodowska University, ul. Akademicka 19, 20-033 Lublin, Poland, e-mail: ancyt@biotop.umcs.lublin.pl*
Plant embryology

BORUT BOHANEC. *Biotechnical Faculty, University of Ljubljana, Jamnikarjeva 101, 1000 Ljubljana, Slovenia, e-mail: borut.bohanec@bf.uni-lj.si*
Plant biotechnology

JARZY BOHDANOWICZ. *Department of Plant Cytology and Embryology, University of Gdańsk, ul. Kładki 24, 80-822 Gdańsk, Poland, e-mail: jurboh@biotech.univ.gda.pl*
Plant embryology; plant cell ultrastructure

MAURO CRESTI. *Dipartimento di Biologia Ambientale, Sezione Botanica, Università di Siena, Via P. A. Mattioli 4, I-53100 Siena, Italy, e-mail: cresti@unisi.it*
Sexual plant reproduction; pollen biology; pollen tube; pollen-stigma-style-ovule interaction; cytoskeleton

MARIA CHARZYŃSKA. *Department of Plant Anatomy and Cytology, Warsaw University, ul. Miecznikowa 1, 02-096 Warsaw, Poland, e-mail: marlig@biol.uw.edu.pl*
Cytoembryology of flowering plants; anther and pollen development (structural and molecular aspects)

MARTA DOLEŻAŁ. *Academy of Physical Education, Chair of Hygiene and Health Protection, Al. Jana Pawła II 78, 81-571 Cracow, Poland, Fax: +48-12-648 17 07*
General and medical mycology; health promotion; medical microbiology

FRANCISZEK DUBERT. *Department of Plant Physiology, Polish Academy of Sciences, ul. Podlužna 3, 31-239 Cracow, Poland, e-mail: dubert@jfr-pan.krakow.pl*
Physiology of plant growth and development

OL'GA ERDELSKÁ. *Institute of Botany, Slovak Academy of Sciences, Dúbravská 14, 84223 Bratislava, Slovak Republic*
Plant embryology; developmental biology

JOHANN GREILHUBER. *University of Vienna, Institute of Botany, Rennweg 14, 1030 Vienna, Austria, e-mail: johann-greilhuber@univie.ac.at*
Plant karyology

JOHN M. HERR, Jr. *University of South Carolina, Department of Biological Sciences, Columbia, South Carolina 29208, U.S.A., e-mail: herr@biol.sc.edu*
Plant morphology; anatomy; embryology

ANDRZEJ JOACHIMIĄK. *Department of Plant Cytology and Embryology, Jagiellonian University, ul. Grodzka 52, 31-044 Cracow, Poland, Tel./Fax: +48-12-422 81 07, e-mail: a.joachimiak@iphils.uj.edu.pl*

Plant genetics and cytogenetics; molecular phylogeny; sex determination; somaclonal variation

ANNA KOLTUNOW. *CSIRO Plant Industry, PO Box 350, Glen Osmond, SA 5064, Australia, e-mail: anna.koltunow@csiro.au*
Plant reproduction, developmental biology – particularly seed and fruit (cellular and molecular aspects)

JOLANTA MAŁUSZYŃSKA. *Department of Plant Anatomy and Cytology, Silesian University, ul. Jagiellońska 28, 40-032 Katowice, Poland, e-mail: maluszyn@us.edu.pl*
Plany cytology; cytogenetics

ELISABETH MATTHYS-ROCHON. *ENS Lyon, 46 Allée d'Italie, 69364 Lyon Cedex 07, France, e-mail: ematthysrochon@free.fr*
Plant gametes; pollination; cellular and molecular aspects of fertilization; in vitro development

MARIA OLSZEWSKA. *Department of Cytogenetics and Plant Molecular Biology, University of Łódź, ul. Banacha 12/16, 90-237 Łódź, Poland, e-mail: olszewsk@biol.uni.lodz.pl*
Plant cytochemistry and cytogenetics

MARIA PAJĄK. *Department of Plant Cytology and Embryology, Jagiellonian University, ul. Grodzka 52, 31-044 Cracow, Poland, Tel./Fax: +48-12-422 81 07, e-mail: m.pajak@iphils.uj.edu.pl*
Plant embryology; apomixis

JAN J. RYBCZYŃSKI. *Botanical Garden – Center for Biological Diversity Conservation of the Polish Academy of Sciences, ul. Prawdziwka 2, 02-973 Warsaw, Poland, e-mail: jjryb@ob.neostrada.pl*
Plant tissue and organ culture; biotechnology; cryopreservation

BARBARA SKUCIŃSKA. *Department of Plant Breeding and Seed Science, The Agricultural University of Cracow, ul. Łobzowska 24, 31-140 Cracow, Poland*
Plant tissue and organ culture

MICHIEL T. M. WILLEMSE. *Laboratory of Plant Cell Biology, Wageningen Agricultural University, Arboretumlaan 4, 6703 BD Wageningen, The Netherlands, e-mail: mtm.willemse@xs4all.nl*
Sexual plant reproduction; biology of lower plants

HONG-YUAN YANG. *Key Laboratory of MOE for Plant Developmental Biology, Wuhan University, Wuhan 430072, China, e-mail: hyyang@whu.edu.cn*

Experimental manipulation of sexual plant cells; cell and developmental biology; fertilization and embryogenesis

MACIEJ ZENKTELER. *Laboratory of General Botany, Institute of Experimental Biology, Adam Mickiewicz University, ul. Umultowska 89, 61-614 Poznań, Poland, e-mail: maczen@amu.edu.pl*
Experimental embryology; plant tissue and organ culture

Review Board

Vol. 52/1, 2010

The Editor is deeply grateful to those listed below who have generously given their time to review manuscripts submitted to volume 52/1 of *Acta Biologica Cracoviensia Series Botanica*

TADEUSZ ADAMSKI (Polish Academy of Sciences, Poznań)
TADEUSZ ANISZEWSKI (University of Joensuu, Joensuu)
HARVEY BALLARD (Ohio University, Athens)
RAFAL BARAŃSKI (Agricultural University, Cracow)
BORUT BOHANEK (University of Ljubljana, Ljubljana)
JERZY BOHDANOWICZ (University of Gdańsk, Gdańsk)
SŁAWOMIR BOREK (Adam Mickiewicz University, Poznań)
EMILIA BRZOSKO (University of Białystok, Białystok)
MARIA CHARZYŃSKA (Warsaw University, Warsaw)
ABDUL JALEEL CHERUTH (Annamalai University, Annamalai Nagar)
ELŻBIETA CIEŚLAK (Polish Academy of Sciences, Cracow)
PETER VAN DIJK (Wageningen University, Wageningen)
TERESA DOROSZEWSKA (Institute of Soil Science and Plant Cultivation, Puławy)
ANA CRISTINA FIGUEIREDO (University of Lisbon, Lisbon)
JANINA GABRIELSKA (Wrocław University of Environmental and Life Sciences, Wrocław)
HALINA GABRYŚ (Jagiellonian University, Cracow)
EWA GAJEWSKA (University of Łódź, Łódź)
KATARZYNA GŁOWACKA (Polish Academy of Sciences, Poznań)
KAZIMIERZ GŁOWIAK (Medical University of Lublin, Lublin)
CRISTINA GONNELLI (University of Florence, Florence)
JOHANN GREILHUBER (University of Vienna, Vienna)
WANDA GUGNACKA-FIEDOR (Nicolaus Copernicus University, Toruń)
DANA HOLA (Charles University in Prague, Prague)
TIBOR JANDA (Hungarian Academy of Sciences, Martonvásár)
ANDRZEJ JOACHIMIAK (Jagiellonian University, Cracow)
EWA KALEMBA (Polish Academy of Sciences, Kórnik)
JANA KALINOVÁ (University of South Bohemia, Ceske Budejovice)
ANITHA KARUN (Central Plantation Crops Research Institute, Kerala)
JAN KĘPCZYŃSKI (University of Szczecin, Szczecin)
MARIA KLEIN (Agricultural University, Cracow)
TAKAO KOMATSUDA (National Institute of Agrobiological Sciences, Ibaraki)
ROBERT KONIECZNY (Jagiellonian University, Cracow)
KRZYSZTOF KOWALCZYK (University of Life Sciences in Lublin, Lublin)
FRANTISEK KRAHULEC (Academy of Sciences of the Czech Republic, Pruhonice)
EWA KURCZYŃSKA (Silesian University, Katowice)
MARTA LIBIK-KONIECZNY (Polish Academy of Sciences, Cracow)
YULE LIU (Tsinghua University, Beijing)
L. A. LUTOVA (St. Petersburg State University, St.-Petersburg)
IZABELA MARCIŃSKA (Polish Academy of Sciences, Cracow)
CLARIE V. MARTIN (The New York Botanical Garden, New York)
LENKA MARTONFIOVA (Botanical Garden, Safarik University, Kosice)
HARALD MEIMBERG (Ludwig-Maximilians-University Munich, Munich)
PAWEŁ NOWACZYK (University of Technology and Life Sciences, Bydgoszcz)
JUTTA PAPPENBROCK (University of Hannover, Hannover)
TOMASZ PAWŁOWSKI (Polish Academy of Sciences, Kórnik)
JAN PILARSKI (Polish Academy of Sciences, Cracow)
MARZENA POPIELARSKA-KONIECZNA (Jagiellonian University, Cracow)
MOSHE REUVENI (Agricultural Research Organization Volcani Center, Bet-Dagan)
ANDREAS RICHTER (University of Vienna, Vienna)
ADAM ROSTAŃSKI (Silesian University, Katowice)
PAULA RUDALL (Royal Botanic Gardens, Kew)
JAN J. RYBCZYŃSKI (Polish Academy of Science, Warsaw)
ANNA K. SAWILSKA (University of Technology and Life Sciences, Bydgoszcz)
ASHOK K. SHRAWAT (University of Alberta, Edmonton)
MAŁGORZATA STPICZYŃSKA (University of Life Sciences in Lublin, Lublin)
ADRIANO SOFO (Basilicata University, Potenza)
EWA SYMONIDES (Warsaw University, Warsaw)
MAGDALENA SZCZEPANIK (Polish Academy of Sciences, Cracow)
MAREK SZYNDEL (Warsaw University of Life Sciences – SGGW, Warsaw)
ELWIRA ŚLIWIŃSKA (University of Technology and Life Sciences, Bydgoszcz)
DAVID TWELL (University of Leicester, Leicester)
NARCIN PALAVAN UNSAL (Istanbul Kultur University Bakirköy, Istanbul)
KATARZYNA WOJCIECHOWICZ (Adam Mickiewicz University, Poznań)
ANDRZEJ WOJCIECHOWSKI (Poznań University of Life Sciences, Poznań)
COHEN YIGAL (Bar-Ilan University, Ramat-Gan)
MUSTAFA YILDIZ (Afyon Kocatepe University, Afyonkarahisar)
IBRAHIM MOHAMED ZEID (Science Helwan University, Cairo)
MACIEJ ZENKTELER (Adam Mickiewicz University, Poznań)
JANUSZ ZIMNY (Plant Breeding and Acclimatization Institute – IHAR, Radzików)

ACTA BIOLOGICA CRACOVIENSIA

Series Botanica

CONTENTS

Volume 52/1, 2010

Original papers

- BOŻENA BIAŁECKA AND JAN KĘPCZYŃSKI
Germination, α -, β -Amylase and Total Dehydrogenase Activities of *Amaranthus caudatus* Seeds Under Water Stress in the Presence of Ethephon or Gibberelin A₃ 7
- AGNIESZKA K. KOWALKOWSKA, HANNA B. MARGOŃSKA, AND MAŁGORZATA KOZIERADZKA-KISZKURNO
Comparative Anatomy of the Lip Spur and Additional Lateral Sepal Spurs in a Three-Spurred Form (f. *fumeauxiana*) of *Anacamptis pyramidalis* 13
- ANNA ĆWIKLIŃSKA, ZBIGNIEW BRODA, JAN BOCIANOWSKI, AND AGNIESZKA DOBRZYCKA
The Usefulness of RAPD and AFLP Markers for Determining Genetic Similarity in Rye (*Secale L.*) Species and Subspecies 19
- LESŁAW B. LAHUTA, JOANNA GOSZCZYŃSKA, AND MARCIN HORBOWICZ
Seed α -D-galactosides of Selected *Vicia* Species and Enzymes Involved in Their Biosynthesis 27
- AYKUT SAGLAM, RABIYE TERZI, HATICE NAR, NESLIHAN SARUHAN, FAIK AHMET AYAZ, AND ASIM KADIOGLU
Inorganic and Organic Solutes in Apoplastic and Symplastic Spaces Contribute to Osmotic Adjustment During Leaf Rolling in *Ctenanthe setosa* 37
- TADEUSZ ANISZEWSKI
Canopy Behavior of Three Milkvetch (*Astragalus*) Species in Acclimatization to a New Habitat 45
- MONIR HOSSEINZADEH NAMIN, HASSAN EBRAHIMZADEH, BEHZAD GHAREYAZIE, TAYEBEH RADJABIAN, AND HOOMAN HOSSEINZADEH NAMIN
Initiation and Origin of Stigma-Like Structures (SLS) on Ovary and Style Explants of Saffron in Tissue Culture 55
- PAULINA FELCZAK, GRAŻYNA GARBACZEWSKA, AND KATARZYNA OTULAK
Necrosis in *Solanum tuberosum* Stems Infected with Potato Virus Y by Grafting 61
- ALINA TREJGELL, MAGDALENA MICHALSKA, AND ANDRZEJ TRETYN
Micropropagation of *Senecio macrophyllus* M. Bieb. 67
- EWA DUBAS, MARIA WĘDZONY, BEATA PETROVSKA, JAN SALAJ, AND IWONA ŻUR
Cell Structural Reorganization During Induction of Androgenesis in Isolated Microspore Cultures of Triticale (\times *Triticosecale* Wittm.) 73
- TERESA SZKUTNIK
Apomixis in the Sugar Beet Reproduction System 87

<p>KRZYSZTOF PAWLAK, WIESLAWA BYLKA, BEATA JAZUREK, IRENA MATLAWSKA, MARIA SIKORSKA, HENRYK MANIKOWSKI, AND GRAZYNA BIALEK-BYLKA Antioxidant Activity of Flavonoids of Different Polarity, Assayed by Modified ABTS Cation Radical Decolorization and EPR Technique</p>	97
<p>AGNIESZKA PŁAŻEK AND FRANCISZEK DUBERT Improvement of Medium for <i>Miscanthus</i> × <i>giganteus</i> Callus Induction and Plant Regeneration</p>	105
<p><i>Brief Communication</i></p>	
<p>DAGMAR SKÁLOVÁ, BOŽENA NAVRÁTILOVÁ, VLADAN ONDŘEJ, AND ALEŠ LEBEDA Optimizing Culture for In Vitro Pollination and Fertilization in <i>Cucumis sativus</i> and <i>C. melo</i></p>	111
<p>JOLANTA MARCINIUK, JOANNA RERAK, ALEKSANDRA GRABOWSKA-JOACHIMIAK, IWONA JASTRZĄB, KRYSZYNA MUSIAŁ, AND ANDRZEJ J. JOACHIMIAK Chromosome Numbers and Stomatal Cell Length in <i>Taraxacum</i> sect. <i>Palustria</i> from Poland</p>	117
<p>ANETA SŁOMKA, PIOTR KAWALEC, KRISTIN KELLNER, MONIKA JĘDRZEJCZYK-KORYCIŃSKA, ADAM ROSTAŃSKI, AND ELŻBIETA KUTA Was Reduced Pollen Viability in <i>Viola tricolor</i> L. the Result of Heavy Metal Pollution or Rather the Tests Applied?</p>	123