

Curriculum Vitae

Ahmed T. Abdelal

Provost, Northeastern University

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Education

1967 Ph.D., Microbiology, University of California at Davis

Academic Appointments

2002-present Provost and Senior Vice President for Academic Affairs; Tenured Professor of Biology, Northeastern University

1992-2002 Dean, College of Arts and Sciences, Georgia State University

1997-2002 Founding Director, The Middle East Center for Peace, Culture, and Development, Georgia State University

1996-2002 Founding Director, Center for Biotechnology and Drug Design

1979-1992 Chairman, Biology Department, Georgia State University

1975-2002 Associate Professor and Professor, Biology Department, Georgia State University

1973-1974 Visiting Associate Professor, Bacteriology Department, University of California, Davis

1972-1973 Alexander von Humboldt Research Fellow, Institute for Microbiology, University of Göttingen, Germany

1968-1974 Assistant and Associate Professor, Faculty of Agriculture, Ain Shams University, Cairo, Egypt

Administrative Accomplishments as Provost at Northeastern.

- Collaborative approach. Strengthened the collaborative framework for work between the university administration and the faculty senate. Similarly, provided the academic leadership for securing strong collaborative and inter-disciplinary efforts across academic departments, colleges, and research centers.
- Developing and implementing strategic plans. Under President Freeland, provided leadership for development (2002) and implementation (03-08) of a five-year strategic plan that focused on strengthening experiential and inter-disciplinary learning, enhancing graduate professional programs, and enhancing national recognition in the inter-disciplinary sciences and engineering (biotechnology; nanotechnology; sensing and imaging) and in public and urban affairs. This plan, which included the addition of 100 faculty positions, received strong faculty and BOT support, and was instrumental in advancing national recognition of Northeastern University.

This plan was further strengthened, under President Aoun in 2006, by the addition of 30 full professors (06-08) with the specific goal of strengthening interdisciplinary education and research across all colleges. Exceptionally strong candidates were successfully recruited under this plan.

Also in 2006, led academic efforts in formulating a new strategic plan, which emphasized enhancing student learning outcomes through experiential learning, addressing global and societal challenges through interdisciplinary and translational research, enriching intellectual life and creative expression, strengthening urban engagement, and embracing global opportunities.

Considerable information on these and other initiatives can be found on the Northeastern websites; neu.edu and provost.neu.edu.

- Experiential learning. Provided strong leadership for further development of the nationally and internationally recognized model of cooperative education (Coop) that has been the hallmark of Northeastern. Specifically, successfully worked with the deans and the Coop faculty coordinators on enriching opportunities for high-quality learning experiences and with the deans and faculty leaders on effective integration of experiential learning with classroom learning.

Provided the leadership for expanding the framework for experiential learning for undergraduates through increased emphasis on opportunities for research and service learning. The research effort was very successful in increasing student participation in knowledge discovery as evidenced by the increasing breadth, quality and number of research presentations at the annual poster presentations organized by the Vice Provost for Research. Efforts are underway to coordinate and integrate service learning more fully with academic programs.

Enriched the experiential model through work with corporate partners and international education partners to increase opportunities for experiential learning in an international context. This model, which combines language proficiency, experiential learning, and learning about other cultures, has proved very attractive to corporate partners, international education partners, and to Northeastern students.

Supported successful efforts by deans to extend the experiential model to Masters programs, particularly in the professions and in the sciences.

Led the successful transformation of the Division of Cooperative Education from a centrally-administered unit into a distributed one that fully integrated the Coop faculty coordinators into the colleges while retaining a small central coordinating unit. This new organizational model provides for more effective integration of learning and for better adaptability of experiential to the various disciplines.

- Undergraduate student recruitment and retention. Worked, in collaboration with the SVP for Enrollment Management and college deans, on developing and implementing an undergraduate recruitment plan that aligned recruitment goals with faculty strengths. Worked with the colleges on strengthening student learning outcomes and retention through expanded opportunities for Learning Communities, increased use of educational technology and supplemental instruction, and systematic responsiveness to student evaluations. Provided leadership for developing and implementing an “Early Warning System” that

faculty employ to provide timely mid-term notification to academic advisors regarding students who are not performing well in course work. The combined efforts have contributed significantly to increases in retention and graduation rates (the six-year graduation rate is projected to increase from 64% for the 2000 entering class to 75% for the 2004 entering class)

- Interdisciplinary graduate education and research. Provided the leadership for developing a strategy that developed interdisciplinary MA/MS degrees and encouraged the development of dual bachelor/Masters programs across the University. These efforts successfully expanded overall MA/MS enrollments across disciplines.

At the Ph.D. level, worked with deans to increase selectivity and to align degree programs more fully with research centers of excellence. Strengthened research efforts in the interdisciplinary sciences and engineering: (I) provided strong support for successful efforts that led to the award by NSF in 2004 of one of six national centers awarded that year for “Nano-Scale Science and Engineering” and 5-year renewal in 2003 of the then existing NSF Engineering Research Center in “Subsurface Sensing and Imaging”; (II) successfully recruited faculty leadership and associated scientists to establish a vibrant center for Drug Discovery; (III) established new interdisciplinary research centers (Energy, Drug Delivery, Antimicrobial Discovery, and Inflammation); (IV) provided the leadership for enhancing interdisciplinary linkages of centers in engineering, the natural sciences, and pharmaceutical sciences (Northeastern received one of four IGERT grants funded by NCI/NSF in 2005 in support graduate education in nano-medicine as well as a second IGERT in Civil Structure; (V) provided leadership for developing State-of-the Arts core facilities for support of these research efforts. These efforts were instrumental in increasing federal and total research expenditures at Northeastern.

Similarly, embraced and supported the development of the School of Social Sciences, Public Policy, and Urban Affairs. This School, approved by the Faculty Senate and the Board of Trustees in 2004, provides an interdisciplinary framework for the departments of African-American Studies, Economics, History, Political Science, and Sociology. It also houses three centers: Urban and Regional Policy; Labor Market Studies; Law, Policy, and Society. Establishment of this school enhanced considerably Northeastern’s efforts in addressing issues of importance to urban centers.

- Faculty workload. Provided leadership for the development of a university-wide policy on Faculty Workload. The primary goals of this policy, adopted unanimously in 2003 by the Faculty Senate, provides for differentiated workloads in teaching, research, and service, based on faculty interests and periodic peer review of effectiveness in these three areas. Importantly, the relative weights of teaching, research, and service in merit assessments are correspondingly adjusted. Implementation of this policy has been remarkably effective in increasing overall productivity of academic units.
- Advancement. Worked with President Aoun, the SVP for Advancement, and college deans on the development of a distributed model for advancement (development, alumni, and corporate relations) that is coordinated with central advancement. This model, initiated in 2006, has already proved to be more effective in fund-raising and securing gifts from corporation and foundations than the previously existing centralized model.

Provided strong support for deans and centers directors in fund-raising. A noteworthy achievement in this regard is the successful effort by engineering in securing a \$20M gift in 2005 for development of a program in engineering leadership at Northeastern.

- International Affairs and Partnerships. Provided leadership for developing and implementing an internationalization strategy that fosters collaboration *across disciplines* with partner institutions in countries that are of specific interest to the Northeastern faculty and to the Boston community. This model, which includes but does not focus as often is the case on area studies, has proved very attractive to international institutions in that it fosters connections between faculty and students in all disciplines and in that it addresses global and societal challenges including economic development and conflict resolution. This model has already increased collaboration in education and research across disciplines between faculty from Northeastern and partner institutions across the globe. Furthermore, it has led to several joint academic programs that offer dual degrees from Northeastern and partner institutions.

Provided leadership for expanding “Study Abroad”, resulting in increasing the annual percent participation rate from 12% in 2003 to 32% in 2007. Importantly, provided leadership for developing a distinctive model for Study Abroad that provides students with deeper international experiences through a “Dialogue of Civilizations” program. This program offers courses, which are led by teams of Northeastern faculty and faculty from international partner institutions, and involves students from Northeastern and host institutions (sites so far includes Egypt, Israel, Greece, Turkey, China, Thailand, Mexico, South Africa, and Niger; sites under development includes India, Japan, Argentina, Chile, and Ghana).

With the goal of also increasing presence of international students at Northeastern, strongly supported the development of the “Global Pathway Program” by the School of Professional and Continuing Education in partnership with Kaplan Inc. This program provides for recruitment of prospective international undergraduate and graduate students by Kaplan with Northeastern providing one year of academic preparation for enhancing preparation for admission and success in Northeastern undergraduate and graduate programs.

Established several regional global centers, including a Middle East Center for Peace, Culture, and Development; this center received Title VI funding in 2007. In accordance with the international strategy described above, this center includes area studies, but importantly, facilitates collaboration *across all disciplines*, including the sciences, business, and engineering. This center also works to advance public diplomacy and to foster dialogue and cooperation throughout the Middle East. An example of this work is participation by the Provost and the Center Director in an international conference hosted by Cairo University on “The Cultural Common Ground”, a novel approach for dialogue that focuses more on what is common, rather than what is different, across cultures and religions of the Middle East (Provost Abdelal served as co-chair for this conference and made a presentation in the plenary session; text is available on the website, provost.neu.edu).

- Professional and continuing education. Recruited new leadership for the School of professional and continued studies (SPCS) and provided strong support for developing and implementing a strategy that focused increasingly on professional graduate and online education and on serving as an incubator for new programs developed in close collaboration with all colleges at Northeastern. This strategy has been very successful in providing high-quality programs and in increasing enrollments and revenue. Northeastern now ranks among the top 10 institutions in this area in the United States.

- Diversity. Embraced and actively supported the historically strong emphasis at Northeastern on enriching diversity of the student body, the faculty, and the professional staff. A vice provost administers a fund for opportunity hires of under-represented faculty; an associate vice provost focuses on recruitment of under-represented students, and a second associate vice provost focuses on advancing careers of women faculty.

Supported strongly efforts to increase faculty involvement in K-12 education in Boston. Northeastern is recognized as a leader in STEM education (science, technology, engineering, and mathematics). The University is also a partner with two schools in the Roxbury community, including a charter school on Campus. These efforts aim to enhance preparation of under-represented students, and thus increase their success in college education.

As Dean of Arts and Sciences at Georgia State University

- Provided the leadership for development and adoption by the faculty of an integrated set of policies for assessing different aspects of faculty work and for aligning reward structures with assessment results. The developed policies were well received in national forums and were recognized in a case study by the Harvard Project on Faculty Appointments. This case study was published as a chapter (pages 25-45) in "Faculty employment policies, J. P. Honan and C.S. Rule (eds), Josse-Bass, 2002". This case study argues that, "a visionary dean has spent the past eight years tackling head-on some of the most contentious issues in faculty worklife: salary inequity, post-tenure review, and the explosion in part-time instructors to name but a few. And while no approach is flawless, Dean Abdelal and his colleagues offer a model of policymaking that not only works but works well". Significantly, having provided strong leadership for transformation of the College and for development and implementation of new policies that increased faculty productivity over nine-years of tenure, Abdelal received very high ratings in the formal faculty evaluation in 2001: 90% favorable rating, with 74% of the faculty rating the performance as excellent.
- Strengthened graduate and research programs through the establishment of 11 inter-disciplinary research centers. While the highest level of internal funding was reserved for areas where substantial faculty strength already existed, every effort was made to strengthen research and graduate programs in all areas of the College. The success of this strategy is evidenced by the increase in federal funding for research in the college from \$5M in 1991 to 20M in 2000. The College secured (jointly with Emory) in 2001 one of five NSF-funded national centers in neurobiology. A second center for biotechnology and drug design, directed by Abdelal, became the foundation for vigorous development of interdisciplinary effort in biological, chemical sciences and informatics. These efforts secured significant federal funding and received in excess of \$50M from the Georgia Research Alliance.
- Directed successful efforts in conversion from the quarter to the semester calendar, including the development of an innovative general education curriculum that emphasized inter-disciplinary learning, global economics and politics, and inter-cultural issues. At the same time, Abdelal directed vigorous student recruitment efforts that led to

increases in enrollment and student selectivity while maintaining the historically-rich diversity of the students.

- Established close collaboration with the College of Education through the formation of a joint “professional education faculty” responsible for teacher preparation. This model ensured the desirable balance between pedagogy and subject matter. In order to provide for active participation by the relevant departments in Arts and Sciences, a number of faculty members were recruited with an innovative definition of workload. This definition specified that a faculty member carries out his/her scholarly work in the relevant discipline as is normally the case but with the understanding that much of the teaching and service efforts is dedicated to teacher preparation. This collaborative model between Arts and Sciences and Education was effective in practice and an invited presentation was well received at a meeting organized by the Education Commission of the States and the American Association for Higher Education (Minneapolis, Minnesota, 2000). Collaborative efforts were also established with K-12 schools in Atlanta in a number of disciplines. One science education initiative designed and built an innovative mobile molecular biology laboratory, the “Bio-Bus”, for on-site work with teachers and students at various partner schools. This initiative successfully dealt with a key challenge in many urban schools; namely, the inadequacy of science facilities and the need for continuing professional training of science teachers in rapidly evolving fields. This effort attracted the attention of NSF, which subsequently provided funds to build one additional Bio-bus and provided operating funds for establishing longer-term relationships with K-12 schools.
- Increased Faculty Diversity. The quality of university life is enriched by the variety of vantage points and experiences that are available to students and faculty. Accordingly, the College has worked successfully to increase racial-ethnic and cultural diversity among its faculty and to increase women faculty in areas where they have been under-represented. The College has also successfully increased the number of minority students in graduate programs in areas of national need. The latter efforts were supported by funds from the College budget as well as through federally-funded programs for undergraduate and graduate majors in areas of national need.
- Enhanced Academic-Community Partnerships through the establishment of the Rosalyn and Jimmy Carter Partnership Award for Campus-Community Collaboration. This annual state-wide competition was strongly supported by the business community and by civic organizations in Atlanta.
- Strengthened international linkages through the development of strategic international initiatives anchored by substantive multidisciplinary linkages with partner educational and research institutions. The major considerations that guided the development of specific initiatives were the interests of the University faculty and the interests of the diverse Atlanta community. In each case, a critical mass of faculty from all colleges was recruited in support of the effort. The organizing framework for one of these strategic initiatives is the Middle East Center for Peace, Culture, and Development, which was founded and directed by Abdelal. This center established strong linkages with major universities in Egypt, Israel, and Jordan. Collaborative educational efforts covered a wide range of disciplines as exemplified by the offering of joint Masters Degrees in business administration and in biotechnology as well as annual workshops on urban issues. Regular exchanges in the arts and area studies were also initiated. While this Middle East Center differs from traditional Middle East centers that focus exclusively on

area studies, the innovative model developed at Georgia State received a significant Title Six grant in 2003. Importantly, the Georgia State Center worked collaboratively with the corresponding center at Ben-Gurion University in organizing workshops that brought together Israeli and Palestinian academic experts and public figures. These efforts culminated in a white paper that highlighted points of agreements on the framework for peaceful settlement of the Israeli-Palestinian conflict. A related effort to advance international understanding with journalists, journalism educators and students in the Middle East received in 2003 \$1.1M funding from the U.S. Department of State (Northeastern participated in this effort through a subcontract from Georgia State). Similar initiatives to foster linkages in Africa, Asia, and Latin America were developed and were anchored through partnerships with major universities in China, South Africa, and Mexico, respectively.

Administrative Presentations

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| 2001 | Panel member, "Implementing and Facilitating Experiential Learning across the Curriculum", Annual Meeting of the Council of Deans of Arts and Sciences. |
| 2001 | Panel Member, "The Trials and Tribulations of Part-time College Faculty", Seminar for Education Editors, organized by Columbia University's Hechinger Institute on Education and the Media. |
| 2001 | Presenter, "Comprehensive Program Review", Academic Administrators Workshop, University System of Georgia. |
| 2000 | Panel Member, "Evolution of Post-tenure Review", Annual Meeting of the Council of Deans of Arts and Sciences. |
| 2000 | Panel Member, "Insuring teachers' Subject Knowledge", Policy Forum on Teacher Education, Education Commission of the States and the American Association for Teacher Education. |
| 2000 | Presenter, "Integrating policies on salary equity, faculty workload, and post-tenure-review", Award Finalist at the Conference on "Academic excellence and cost management", American Council on Education and the USA Group Foundation. |
| 1998 | Presenter, "Seasons of the Academic Life and Post-tenure Review: How to build a Constructive Rather than a Punitive Approach". Forum on Faculty Roles and Rewards, American Association for Higher Education. |
| 1997 | Moderator, "Positive approaches to post-tenure evaluations". Annual Meeting of the Council of Deans of Arts and Sciences. |
| 1997 | Presenter, Implementation of post-tenure evaluations", Three workshops for Chairs of the University System of Georgia. |
| 1996 | Presenter, "The University Senate: A model for building a collaborative culture", Forum on Faculty Roles and Rewards, American Association for Higher Education. |
| 1995 | Moderator, "Faculty Workload: Accountability and Equity", Forum on Faculty roles and Rewards, American Association for Higher Education. |

Administrative Publications

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| 1996 | Blumenfeld, D.C., Crimmins, T.J., Dressel, P.L., and Abdelal, A.T., "Integrating Accountability Systems and Reward Structures: Workload Policy, Post-Tenure Evaluations, and Salary Compensation, Metropolitan Universities, volume 7 (4): 61-73. |
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Professional Memberships

American Society for Biological Chemists; American Society for Microbiology; American Academy for Microbiology.

Significant Disciplinary Service

- 2002-2003 Coordinator and Program Chair, "18th International Conference on Arginine and Pyrimidines", an international conference held every two years with participation by principal investigators and their students from key laboratories around the world, October 13-17, 2002, Cairo, Egypt. Report published in 2003 by Rubio, V. in *Int. Microbiol.* 6: 65-68.
- 1999-2003 Chair, Graduate Microbiology Teaching Award Committee, the American Academy for Microbiology
- 1999-2002 The Board of Visitors for the Centers for Disease Control.
- 1997-2001 The Scientific Advisory Group for the Georgia Research Alliance (a government-academic-business partnership for enhancing economic development through support of collaborative projects between research universities and industry).
- 1998-2001 Chair, Infectious Disease Cluster, The Georgia Research Alliance (State-wide coordinating body for scientists from research universities)
- 1986-1990 Meeting Development Committee, American Society for Microbiology
- 1985 Coordinator and Program Chair, "The Ninth International Workshop on Arginine, Atlanta, Georgia.
- 1982-1985 Chairman, Genetics Task Force, University Center Research Consortium.
- 1982 Local Arrangements Chair, The Annual Meeting of the American Society for Microbiology, Atlanta, Georgia.
- 1982-1983 President, Southeastern Branch of the American Society for Microbiology (Alabama, Georgia, and Northern Florida).
- 1980-1983 Member, Board of Education and Training, American Society for Microbiology.

Significant Service at Georgia State University

- 1997-2002 Member (one of two elected by the deans), University Senate Fiscal Advisory Committee (recommends budget allocations to the President)
- 2001 Co-Chair, Search Committee for Dean of Education
- 1998 Co-Chair, Search Committee for Dean of Health and Human Sciences
- 1997 Co-Chair, Search Committee for Dean of Business Administration
- 1995 Co-Chair, Search Committee for Dean of Law
- 1993 Provost Search Committee (representing the deans)

1990-92	Chair, University Senate Committee on Academic Programs
1990	Provost search Committee (representing Arts and Sciences)
1990	President Search Committee (representing Arts and Sciences)
1986-88	University Senate Executive Committee
1986-87	Chair, University Senate Committee on Research
1982-83	University Senate Executive Committee

Teaching Experience

Microbiology
Bacterial Physiology and Genetics
Food and Industrial Microbiology
Enzyme Technology

Scientific Research Interest

Regulation of arginine metabolism in bacteria; cloning and optimization of industrial enzymes.

Federal Scientific Research Grants

1999-2002	Co-Principal Investigator, "Regulation of arginine catabolism in <i>Pseudomonas aeruginosa</i> , National Science Foundation, \$285,000.
2000-2002	Co-Principal Investigator, "Utilization of keratin containing materials by recombinant bacteria", Joint Project with Alexandria University, US-Egypt Science Cooperation Board, \$50,000.
1992-96	Principal Investigator, "Regulation of <i>carAB</i> in <i>P. aeruginosa</i> , National Institute of Health, \$949,000.
1991-94	Principal Investigator, "Effect of growth temperature on enzyme folding", Department of Energy, \$255,000.
1986-88	Principal Co-Investigator (joint effort with D. Boykin), "Research Equipment for the Laboratory for Microbial and Biochemical Sciences;" U.S. Department of Education, \$500,000.
1985-86	Principal Investigator, "Regulation of carbamylphosphate synthesis in microorganisms;" National Science Foundation, \$30,000.
1984-85	Sponsor (Dr. Rena Jones, Chair of Biology, Spelman College), MARC Faculty Fellowship; National Institutes of Health, \$60,000.
1984	Principal Co-Investigator, "Proposal for purchase of fermentation equipment;" National Science Foundation, \$75,000.
1982-83	Sponsor (Dr. Ronald Sheehy, Chair of Biology, Morehouse College), The Ford Foundation Minority Fellowship Program, \$50,000.
1981-83	Principal Investigator, "Regulation of carbamylphosphate synthesis in microorganisms", National Science Foundation, \$150,000.

- 1981-83 Principal Co-Investigator, "Biomedical Research Development Grant;" National Institutes of Health, \$264,000.
- 1981 Principal Co-Investigator, "Purchase of liquid scintillation spectrometer;" National Science Foundation, \$21,000.
- 1980 Principal Co-Investigator, "Proposal for purchase of ultracentrifuge;" National Science Foundation, \$17,500.
- 1978-81 Principal Investigator, "Regulation of carbamylphosphate synthesis in microorganisms;" National Science Foundation, \$150,000.
- 1978-80 Associate Investigator, "Purification and characterization of cervical cancer antigens;" National Cancer Institute, \$240,000.
- 1976-77 Co-Investigator, "Effect of pollutants on microbial activities in estuarine surface film;" Environmental Protection Agency, \$40,000.
- 1976-77 Co-Investigator, "Biodegradation of oil pollutants by yeast and yeast-like fungi;" Office of Naval Research, \$18,000.
- 1976-78 Principal Investigator, (GSU), "Regulation of carbamylphosphate biosynthesis in microorganisms;" National Science Foundation, \$61,800.

Funding from the Georgia Research Alliance

As Chair of biology at the time of establishing the Georgia Research Alliance and subsequently as Dean of Arts and Sciences, Ahmed Abdelal provided the leadership for development of initiatives in biotechnology at Georgia State University. In addition, Abdelal specifically served as Director or Coordinator of specific projects. These are indicated below.

- 2001-2002 Project Director, "Infectious Diseases Cluster", Georgia Research Alliance, Funding for faculty in Infectious Diseases", \$1,350,000.
- 1996-1997 Project Director, "Program in Gene Expression and Protein Engineering", Georgia Research Alliance, \$841,000.
- 1992-1993 Project Contact for GSU, "Microbial Biotechnology Consortium", in this capacity, Abdelal contributed significantly to the development of the conceptual foundation of the biotechnology initiative of the Georgia Research Alliance; GSU received \$1,900,000 in this first cycle of funding by the Alliance.

Refereed Scientific Publications

1. Abdelal, A.T., and Phaff, H.J. (1968) Exo- β -glucanases in yeast. *Biochem. J.*, **109**: 347-360.
2. Abdelal, A.T., and Ingraham, J.L. (1969) Control of carbamylphosphate synthesis in *Salmonella typhimurium*. *J. Biol. Chem.*, **244**: 4033-4038.
3. Abdelal, A.T., and Ingraham, J.L. (1969) Cold sensitivity and other phenotypes resulting from mutation in *pyrA* gene. *J. Biol. Chem.*, **244**: 4039-4045.
4. Abdelal, A.T., Kessler, D.P., and Ingraham, J.L. (1969) Arginine auxotrophic phenotype resulting from a mutation in the *pyrA* gene of *Escherichia coli* B/r. *J. Bacteriol.*, **97**: 466-468.
5. Abdelal, A.T., and Phaff, H.J. (1969) Purification and properties of Endo- β -glucanases in the yeast *Hanseniaspora valbyensis*. *Canad. J. Microbiol.*, **15**:

- 697-703.
6. Foda, Y.H., El-Samkary, M., and Abdelal, A.T. (1970) Bacteriological studies on canned mango and orange juices. Ain Shams University, Res. Bull. **101**.
 7. Foda, Y., Abdelal, A.T., Hamed, M., and Samahy, S. (1971) A microbiological study on starter used in "Balady" bread. *ibid.*, **301**.
 8. Hamed, M., Foda, Y., Samahy, S., and Abdelal, A.T. (1971) Carbonyl compounds in starter, preferment, fermenting dough, and "Balady" bread. *ibid.*, **304**.
 9. Abdelal, A.T. (Editor) . (1973) Abstracts of microbiological research. Published by the National Research Council (Egypt) .
 10. El-Sadek, G., Khalafalla, S., Abdelal, A.T., and el-Nawawy, M. (1973) Screening tests of aerobic sporeformers for production of milk clotting enzymes. *Eg. J. Dairy Science*, **1**: 37-44.
 11. El-Sadek, G., Khalafalla, S., Abdelal, A.T., and El-Nawawy, M. (1973) Optimum conditions for production of milk clotting enzymes by aerobic sporeformers. *ibid.*, **2**: 37-44.
 12. El-Sadek, G., Khalafalla, S., Abdelal, A.T., and El-Nawawy, M. (1973) Purification and properties of milk clotting enzymes from *Bacillus megaterium*. *Eg. J. Dairy Science*.
 13. Gibriel, Y., and Abdelal, A.T. (1973) Measurement of heat resistance parameters for spores isolated from canned products. *J. Appl. Bact.*, **36**(2) : 321-327.
 14. Eid, S., Waly, Y., and Abdelal, A.T. (1974) The separation of two ornithine carbamyl transferases from pea seedlings. *Phytochemistry*, **13**: 99-102.
 15. Abdelal, A.T., and Schlegel, H.G. (1974) Separation of phosphoribulokinase from other enzymes of the Calvin cycle in *Hydrogenomonas eutropha* H16. *Archives fur Mikrobiologie*, **95**: 139-143.
 16. Abdelal, A.T., and Schlegel, H.G. (1974) Purification and regulatory properties of phosphoribulokinase from *Hydrogenomonas eutropha* H16. *Biochemical J.*, **139**: 481-489.
 17. Abdelal, A.T., and Schlegel, H.G. (1974) Purification and properties of fructose-1, 6-biphosphatase from *Hydrogenomonas eutropha* H16. *J. Bacteriol.*, **120**: 304-310.
 18. Abdelal, A.T., and Ingraham, J.L. (1975) Carbamylphosphate synthetase from *Salmonella typhimurium*: subunit composition, reversible dissociation of subunits and their contribution to catalytic and regulatory properties. *J. Biol. Chem.*, **250**: 4410-4417.
 19. Abdelal, A.T., and Ingraham, J.L. (1975) A sensitive radioactive method for determination of glutamine. *Anal. Biochem.*, **69**: 652-654.
 20. Abdelal, A.T., Griego, E., and Ingraham, J.L. (1976) Arginine-sensitive phenotype of mutations in *pyrA* of *Salmonella typhimurium*: the role of ornithine carbamyltransferase in the assembly of mutant carbamylphosphate synthetase. *J. Bacteriol.*, **128**: 105-113.
 21. Abdelal, A.T., Kennedy, E., and Nainan, O. (1977) Ornithine trans carbamylase from *Salmonella typhimurium*: Purification, subunit composition, kinetic analysis and immunological cross-reactivity. *J. Bacteriol.*, **129**: 1387-1396.
 22. Abdelal, A.T., Kennedy, E., and Ahearn, D.G. (1977) Purification and characterization of a neutral protease from *Saccharomycopsis lipolytica*. *J.*

- Bacteriol., **130**: 1125-1129.
23. Ingraham, J.L., and Abdelal, A.T. (1978) Carbamylphosphate synthase (*Salmonella typhimurium*) .In Methods of Enzymology. (Jones, M.E., and P.A. Hoffee, eds.) , **Vol. LI**, pp. 29-35.Academic Press, New York
 24. Abdelal, A.T., Griego, E., and Ingraham, J.L. (1978) Arginine auxotrophic phenotype of mutations in *pyrA* of *Salmonella typhimurium*:Role of N-acetylornithine in the maturation of carbamylphosphate synthetase.J. Bacteriol., **134**: 528-536.
 25. Ogletree, F., Abdelal, A.T., and Ahearn, D.G. (1978) Germ-tube formation by atypical strains of *Candida albicans*.Antonie van Leeuwenhoek, **44**: 15-24.
 26. Price, C.W., Holwell, J., and Abdelal, A.T. (1978) Purification and properties of the arginine-specific carbamoylphosphate synthase from *Saccharomyces cerevisiae*.J. Gen. Microbiol., **106**: 145-151.
 27. Abdelal, A.T., and Nainan, O. (1979) Regulation of N-acetylglutamate synthesis in *Salmonella typhimurium*.J. Bacteriol.,**137**: 1040-1042.
 28. Abdelal, A. (1979) Arginine catabolism in microorganisms. Annual Review of Microbiology, **33**: 139-168.
 29. Ibrahim, A.N., Robinson, R.A., Marr, L., Abdelal, A.T., and Nahmias, A.J. (1979) Tumor-associated antigens in cervical cancer tissues and in sera of cervical and head and neck cancer patients.J. Nat. Cancer Inst., **63**: 319-323.
 30. Ibrahim, A.N., Rawlins, D., Abdelal, A., Azhar, A., Swaminathan, V., Mansour, K., and Nahmias, A. (1980) Tumor-associated antigens in lung cancer tissues and in sera of tumor-bearing patients. Cellular and Molecular Biology, **26**: 327-333.
 31. Crane, C., and Abdelal, A.T. (1980) Purification and regulatoryproperties of carbamylphosphate synthase from *Serratia marcescens*. J. Bacteriol., **143**: 588-593.
 32. Abdelal, A.T., W.F. Bibb, and O. Nainan. (1982) Carbamate kinase from *Pseudomonas aeruginosa*:Purification, characterization, physiological role, and regulation. J. Bacteriol., **151**: 1411-1419.
 33. Abdelal, A.T., L. Bussey, and L. Vickers. (1983) Carbamoylphosphate synthetase from *Pseudomonas aeruginosa*: Subunit composition, kinetic analysis and regulation. Eur. J. Biochem., **129**: 697-702.
 34. Ibrahim, A., R.A. Tucker, L. Marr, and A.T. Abdelal. (1985) In: Tumor-associated antigens in head and neck cancer tissues and in sera of tumor-bearing patients.Chretien, P.B., Johns, M., Shedd, D., Strong, E., and Ward, P., eds.) . **Vol. I**, pp. 568-573, Decker and Mosby.
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