

PROJECT ADMINISTRATION DATA SHEET

☒

ORIGINAL

☐

REVISION NO. \_\_\_\_\_

Project No. G-41-D03

DATE: 6/18/81

Project Director: Dr. Roger M. Wartell

~~SCHOOL~~/Lab

Physics

Sponsor: DHEW/PHS/NIH - National Institute of Allergy and Infectious Diseases

Type Agreement: Grant No. 5 K04 AI00332-03 (year 03)

Award Period: From 7/1/81 To 6/30/82 (Performance) 9/30/82 (Reports)

Sponsor Amount: \$38,718

Contracted through:

Cost Sharing: \$ 2,863

GTRI/XXX

Title: Interaction of RNA Polymerase with DNA Sites

ADMINISTRATIVE DATA

OCA CONTACT

William F. Brown x4820

1) Sponsor Technical Contact: Program Official - Irving F. DeLappe, Ph.D; Chief, Molecular Microbiology and Parasitology Branch, NIAID; Bethesda, MD 20014

2) Sponsor Admin./Contractual Contact: Gary E. Thompson/Todi Ball, Grants Management Officer; Grants Management Branch; EAP-NIAID/Bethesda, MD 20014 - (301) 496-7075

Reports: See Deliverable Schedule Security Classification: None

Defense Priority Rating: N/A

RESTRICTIONS

See Attached NIH Supplemental Information Sheet for Additional Requirements

Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of \$500 or 125% of approved proposal budget category.

Equipment: Title vests with GIT; but none proposed.

COMMENTS:

COPIES TO:

Administrative Coordinator  
Research Property Management  
Accounting Office  
Procurement/EES Supply Services

Research Security Services  
Reports Coordinator (OCA)  
Legal Services (OCA)  
Library, Technical Reports

EES Research Public Relations  
Project File (OCA)  
Other: \_\_\_\_\_

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEETDate 2/16/84Project No. G-41-D03School/~~Lab~~ PhysicsIncludes Subproject No.(s) G-32-D03/Wartell/BiologyProject Director(s) Dr. R. M. Wartell~~XXX~~ / GITSponsor DHEW/PHS/NIH - National Institute of Allergy and Infectious DiseaseTitle Interaction of RNA Polymerase with DNA SitesEffective Completion Date: 6/30/82 (Performance) 6/30/82 (Reports)

## Grant/Contract Closeout Actions Remaining:

☒ None☐ Final Invoice or Final Fiscal Report☐ Closing Documents☐ Final Report of Inventions☐ Govt. Property Inventory & Related Certificate☐ Classified Material Certificate☐ Other \_\_\_\_\_Continues Project No. G-41-D02Continued by Project No. G-41-D04  
and Sub. G-32-D04

## COPIES TO:

Project Director  
Research Administrative Network  
Research Property Management  
Accounting  
Procurement/EES Supply Services  
Research Security Services  
Reports Coordinator (OCA)  
Legal Services

Library  
GTRI  
Research Communications (2)  
Project File  
Other \_\_\_\_\_

GRANT NUMBER <b>G-41-DO3/Wartell</b>	
5-K04-AI-00332-04	
PROGRESS REPORT	
NAME OF HEAD OF DEPARTMENT OR DEPARTMENTAL SUBDIVISION	
Professor Edward W. Thomas	
NAME OF Awardee	
Professor Roger M. Wartell	
INSTITUTION	
Georgia Institute of Technology	
TITLE OF RESEARCH PROPOSAL (REPEAT TITLE SHOWN ON PAGE 1)	
Interaction of RNA Polymerase with DNA Sites	
STATEMENT OF ACCOMPLISHMENT (IF SPACE IS INADEQUATE, USE CONTINUATION PAGE)	
RESEARCH	
<p>During the past year progress was made in developing methods of examining DNA conformation in solution. New results on junctions between different DNA conformations were obtained. Raman spectroscopy was employed to determine the vibrational spectra of short DNA molecules. Also, the temperature induced duplex to single strands transition of DNA promoter fragments was examined both experimentally and theoretically.</p> <p>One study examined the Raman spectra of the DNA polymer (dG-dC)<sub>n</sub>·(dG-dC)<sub>n</sub>, and two DNA restriction fragments, 95 basepairs (bp.) long and 157 bp. long (1). The 95 bp. DNA contains the RNA polymerase binding site of the E. coli lactose operon transcription start region. The 157 bp. DNA has 26 and 32 bps. of (dG-dC) sequences at each end of the 95 bp. DNA. The Raman spectra show that in 10mM NaCl, the two (dG-dC) regions of the 157 bp. DNA form a left-handed "Z" conformation which alters vibrations of the middle 95 bp. section. By itself the 95 bp. DNA has a B conformation in 4.5 M NaCl whereas (dG-dC)<sub>n</sub>·(dG-dC) is in a Z conformation. The results show that left handed helical segments of DNA can form junctions with, and distort DNA normally in a right handed helix. Raman data has been obtained which follows the intensities of 20 different vibrational bands of the 157 bp. DNA during the NaCl induced transition of the (dC-dG) regions from right to left handed helices. Computer methods were developed and are being applied to quantifying peak intensities and widths of overlapping Raman bands. These methods were successfully applied to examine the B to A transition of a heterogenous sample of calf thymus DNA (2).</p> <p>Theoretical analysis was carried out on the duplex of coils transition of three DNA fragments containing different promoter sequences. The influence of 20 known base pair mutations on the DNA melting curves were predicted. (3) Some of the predictions are currently being tested.</p>	
PUBLICATIONS	
<ol style="list-style-type: none"> <li>1. "The Junction Between 'Z' and 'B' Conformation in a DNA Restriction Fragment: Evaluation by RAMAN Spectroscopy" R. M. Wartell, J. Klysik, W. Hillen, and R. D. Wells, (1982) <u>Proc. Natl. Acad. Sci.</u>, (USA) in press.</li> <li>2. "Changes in Raman Vibrational Bands of Calf Thymus DNA During the B to A Transition" J. C. Martin and R. M. Wartell (1982) <u>Biopolymers</u> 21 499.</li> <li>3. "Fluctuational Base Pair Opening in DNA at Temperatures Below the Transition Region" by R. M. Wartell and A. S. Benight (1982) <u>Biopolymers</u>, in press.</li> <li>4. "Influence of Base Pair Changes and Cooperativity Parameters on the Melting Curves of Short DNAs", A. S. Benight and R. M. Wartell (in preparation).</li> </ol>	

Wartell, Roger M.

140-36-2902

Professor Wartell taught two courses in the School of Biology this winter quarter. One course was Biophysical Genetics, Biol. 4470. The second course, Biol 3308, was Genetic Engineering and was introduced into the curriculum for the first time by Professor Wartell and Professor Hall. Professor Wartell has also taught Biophysics II, Phys. 4252 and the undergraduate biophysics laboratory course Phys. 4254 in the spring quarter. Both of these courses are essential components of the option in biophysics. Two graduate students are working on their doctoral thesis research in Professor Wartell's laboratory.

Professor Wartell presented invited lectures at the University of Alabama - Birmingham (June 1981) and at Brookhaven National Laboratories (February 1982).

The biophysics courses and research have become a major feature of our programs under his strong leadership. They attract students at all levels and we see an increasing proportion of entering graduate students declaring this to be their area of proposed work. In recognition of these developments Professor Wartell serves on the committee to recruit and select graduate students. He is relied on as a source of well balanced judgements in all aspects of the school's activities. The faculty has elected him to serve on the school's advisory committee and the Director has appointed him to chair the committee to search for new faculty. In recognition of the contribution made by Prof. Wartell's research and instructional programs, we are searching for a further faculty person in the area of Biophysics.

In all respects Professor Wartell's contributions and career development are at a superior level.

UNIVERSITY OF ALABAMA - BIRMINGHAM