Academic Training for a Productive Workforce

*a not-so early phase company perspective*

Fifth Annual ACSESS Forum
Computational Science Curriculum Development
Monday March 3rd 2008
john.newsam@fqubed.com
fqubed: Corporate History

- Jan ’98: F. Schüth & team and Pharmacopeia-MSI (Accelrys) planning
- Mar ’99: hte Aktiengesellschaft founded
- Apr ’00: hte North America subsidiary
- May ’01: Planning for ‘FFF’ effort
- Jul ’02: fqubed founded
- Jul ’05: Completed year 3 operations
- Dec ’05: Acquired by Nuvo Research Inc.
April 5, 2005

John M. Newsam
4303 Corte Al Fresno
San Diego, CA. 92130

Dear Mr. John M. Newsam:

Your request for the purchase of the environmental license plate described above has been received in our office and reviewed.

Unfortunately, we are unable to approve the requested license plate configuration for the following reason(s):

1. California Vehicle Code, Section 5105(a), states, we must refuse any license plate configuration which carries connotations offensive to good taste and decency, or which may be misleading to some of our citizens.

A charge back in the amount of $41.00 will be applied to your credit card account. Please allow up to 60 days for the credit to show up on your statement.

Thank you for your interest in the California Environmental License Plate Program. If you have any questions, please call (916) 657-7654.

Sincerely,

K. Pulia, Manager
Special Processing Unit

TE:SB

Upon request, this document can be produced in Braille or large print. California Relay Telephone Service for the deaf or hearing impaired from TDD Phones: (916) 657-9717; from Voice Phones: (800) 777-0133. A Public Service Agency
Nuvo is becoming a global leader in the research & development of drug products for delivery to or through the skin.
State of the Art R&D Capabilities

- Disciplined new product planning process
- Unique skin permeabilization & permeation screening platforms
- Proven formulation development strengths

Headquarters

Manufacturing

fqubed (Research & Development)
INSIGHT™

Screening Permeabilization

- Original concept from UC Santa Barbara (S. Mitragotri)
- Impedance change as proxy of skin barrier permeabilization
- >3,000 measurements day⁻¹ [conventional ~30]

(INSIGHT™ = IN vitro Skin Impedance Guided High Throughput Screening)
NRI-1005 Formulations Screening

Number of Formulations

TEMPEST™ runs
Optimization FDC
Finite dose FDC
“Hits” [1.5x over Pennsaid®]

Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Week 13
Week 14

0
20
40
60
80
100
120
140
160
180
200

# Formulations

- Hits from finite dose (Flux 1.5x> Pennsaid)
- Preliminary FDC (based on previous screen)
- Finite dose FDC
- Optimization FDC
- TEMPEST screening
HTE screening platform development

Screening Skin Permeabilization

Screening Drug Permeation

Screening Sebum Permeabilization

Future

(SPATE™ = Screening Permeation)

(TEMPEST™ = Tempest Permeation)

(INSIGHT™ = Insight Permeabilization)

(INSIGHT™ = Insight Permeabilization)

(HAIL™ = High throughput Assaying of Irritation Levels)

(SQUALL™ = Spectroscopy-based Quantitative Assaying of irritation Levels)

2004  2005  2006  2007  2008

NUVO
Curriculum development: arms-length thoughts

Candidate ranking based on sense that she/he will:

- Fill an immediate & specific need
- Get the job done
  - Fluency with tools
  - Motivation & project completion drive
- Fit in
  - Inter-personal and manageability skills
- Bring a state-of-the-art viewpoint
  - Conversancy with own field
- Develop innovative solutions
  - Original research contributions
“Like to include in curriculum design”

- Pharmacokinetics study, cheminformatics study
- Proteomics, genomics research concepts and techniques
- Some courses useful for computational biologist/bioinformatics
  - Applied Statistics and Biostatistics
  - Bioinformatics-centric data structures and algorithms
  - Data mining and management in bioinformatics
  - Molecular modeling and drug discovery
  - Analytical and computational neuroscience
  - Microarray data exploration and analysis
  - Modeling and simulation in computational biology
  - Image processing and analysis
  - Pattern recognition and application
- Some level of industrial experience
Dimensions that resonate (personal)

- Meets minimum requirements
- Expertise of direct relevance
- Proven people skills
- Outstanding academic achievement
  - GPA; published / presented work(s); [award]
- Ability to innovate
- Industrial experience
- Introduction from acquaintance
- Extra-curricular achievement or interest
- Drive to project completion
Perspective: Early Phase Company

- D.Phil.
- Post doc, Japan (2 yrs)
- Exxon Research & Engineering Co. (8 yrs)
- Biosym Technologies, Inc./ MSI (10 yrs)
- hte, fqubed (NextGen Venture Fund)
Questions posed of a job seeker

- What is difficult in thinking about job(s)/position(s) to apply for?
  *Direct relevance of curriculum*

- What most surprised you about interning in industry?
  *Collaboration need, communication, need to learn new technologies, working to deadline, sense of humor*

- What personal skills did you found useful (or lacking)?
  *Specific academic skills/knowledge*

- How do you see computational science strengths valued?
  *Today 3-4 out of 5; 5 years hence nearer 5*
Productive employee skills

- Good team player
- Communication skill or client-interface/design talent
- Interest to learn new technology
- Proactive
- Energetic, self motivator and ability to work independently
- Approachable and friendly
- Strong analytical and problem solving skills
- Experience in troubleshooting
fqubed hiring projections

March 6 2003 (launch + 8 months):
- fqubed is at fledgling phase
- Hiring predicated on funding, projects
- Predisposed toward existing ‘short list’ of candidates/contacts
- Current expectations:
  - VP Business Development, VP Science and Technology, then R&D (including computational)

March 2 2006 (launch + 44 months):
- Continue to engage contractors, interns
- Continue to recruit through contact network
- Immediate expectations:
  - PhD’s: Soft materials engineer, Skin biologist
  - MSc’s: Analytical chemist, Tissue biologist
fqubed hiring projections

March 6 2003 (launch + 8 months):
- fqubed is at fledgling phase
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March 2 2006 (launch + 44 months):
- Continue engage contractors, interns; recruit via contacts
- Immediate expectations PhD’s: Soft materials engineer, Skin biologist; MSc’s: Analytical chemist, Tissue biologist

March 2 2008 (launch + 68 months):
- Gearing for growth, predicated on Pennsaid® approval
- Informatics scientist; admin; experimentalists (PhD, MSc)
# Some MS & PhD Expectations

<table>
<thead>
<tr>
<th>Some Expectations</th>
<th>MS</th>
<th>PhD</th>
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</thead>
<tbody>
<tr>
<td>Proven technical skills</td>
<td>Frontline knowledge of own field</td>
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<tr>
<td>Ability to pursue given direction</td>
<td>Ability to research a science field</td>
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<tr>
<td>Motivation &amp; ability to develop new skills</td>
<td>Presentation skills, confidence, motivation, aspirations</td>
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<tr>
<td>Work ethic</td>
<td>Capacity for novel contributions</td>
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<td>Pursuit of problem to closure</td>
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<table>
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<tr>
<th>Some ??'s</th>
<th>Breadth in perspectives ??</th>
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<td></td>
<td>Degree of comfort with risk ??</td>
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Some preparation thoughts

- Outstanding achievement
- Industry experience
- Sense of direction(s) or step(s)
- Contacts, connections, networking
- Thinking/planning ahead (but.... )
Internships with us

Opportunities:
- No recurring formal program
- Occasionally 3 mos over summer
- ‘by hour’ on case by case
- Usually have potential projects, not always $
  - particularly marketing, business development

Usual expectation:
- Ability to work independently
<table>
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<tr>
<th>Large Company</th>
<th>Small Company</th>
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<tbody>
<tr>
<td>(Hire into program)</td>
<td>Hire into position</td>
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<tr>
<td>Often career management</td>
<td>Typically unstructured</td>
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<tr>
<td>Insulated from overall business</td>
<td>Sensitive to immediate company performance</td>
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<tr>
<td>Limited business exposure</td>
<td>Engaged in many business aspects</td>
</tr>
<tr>
<td>Certain stability, longevity plan</td>
<td>Higher-risk, maybe higher potential reward</td>
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Finding a position

- Post doc or not? (PhD or not?)
  - Directly relevant to position
  - Broader perspectives
  - Clarity on own preferred directions
  - Personally-desired experience (geography, culture, group, ..)

- Large company - small company

- Locating possibilities

- Plan a campaign

- Developing a predisposition towards consideration
My Own Career Path

- B.A. (Chemistry)
  - Post-graduate work or gainful employment
- D.Phil (Chemistry)
  - Inexplicable wish to live in Japan
- Fellowship in Japan (Physics)
  - Decision to come to US
  - Academia or Industry
- Staff Scientist at Exxon Corporate Research
  - Head-hunting approach
  - Working in the ‘comfort zone’
- Move to Biosym technologies (San Diego):
  - Change in external & internal circumstances
  - Motivation in ‘making technology useful’
- hte Aktiengesellschaft
  - Change in external & internal circumstances
  - Motivated for a ‘ground zero’ company launch
- fqubed, Inc. / Nuvo Research Inc.
Dimensions found important personally

- **Balance**

- **Key aspects of a job/position**
  - It pays the bills
  - It engenders passion
  - It has a strong scientific dimension
  - It leverages past investments
  - It stretches in new ways

- **Personal interactions**
  - Working with people you feel good about working with
  - Value of contact network

- **Opportunity to have impact**
Thank You . . . . .

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